



**DRAFT
ASSESSMENT
REPORT
SMALL PELAGIC
FISHERY**

**AFMA
July 2003**



AFMA's Legislative objectives

In the performance of its functions, the Australian Fisheries Management Authority (AFMA) must pursue the objectives of:

- a) implementing efficient and cost-effective fisheries management on behalf of the Commonwealth
- b) ensuring that the exploitation of fisheries resources and the carrying on of any related activities are conducted in a manner consistent with the principles of ecologically sustainable development and the exercise of the precautionary principle, in particular the need to have regard to the impact of fishing activities on non-target species and the long-term sustainability of the marine environment
- c) maximising economic efficiency in the exploitation of fisheries resources
- d) ensuring accountability to the fishing industry and to the Australian community in the Authority's management of fisheries resources
- e) achieving Government targets in relation to the recovery of the costs of the Authority.
- f) The *Fisheries Management Act 1991* also provides that the Minister, AFMA and Joint Authorities are to have regard to the objectives of:
 - g) ensuring, through proper conservation and management measures, that the living resources of the Australian fishing zone (AFZ) are not endangered by over-exploitation
 - h) achieving the optimum utilisation of the living resources of the AFZ
 - i) ensuring that conservation and management measures in the AFZ and the high seas implement Australia's obligations under international agreements that deal with stocks
 - j) ensure, as far as practicable, that measures adopted in pursuit of these objectives are not inconsistent with the preservation, conservation and protection of all species of whales.

In addition, AFMA, jointly with its counterparts in Queensland, coordinates and delivers fisheries management and surveillance/enforcement programs in the Torres Strait Protected Zone on behalf of the Torres Strait Protected Zone Joint Authority and in accordance with the provisions of the *Torres Strait Fisheries Act 1984*.

Small Pelagic Fishery – Draft Assessment Report

This draft assessment report for the Small Pelagic Fishery has been prepared by AFMA in accordance with the *Terms of Reference for the Strategic Assessment of the Small Pelagic Fishery* (Attachment 1). It provides for assessing the fishery under both the strategic assessment and export of native wildlife provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This Report comprises three parts:

Part I Overview	describing the assessment process and providing background information on AFMA
Part II Description of the Fishery	providing a detailed description of the Small Pelagic Fishery
Part III Environmental Assessment	detailing the assessment for the Small Pelagic Fishery

Consultation

Prior to being finalised, the *Terms of Reference for the Strategic Assessment of the Small Pelagic Fishery* were released as a draft for a public comment period of 28 days. Comments received on the draft were considered before finalising these *Terms of Reference*.

This draft assessment report will be available for public comment for a period of at least 28 days. AFMA and the Small Pelagic Fishery Working Group will review the report in light of any comments received. The AFMA Board Environment Committee will consider the finalised assessment report and provide it to the AFMA Board for approval. AFMA will then provide the report to the Minister for the Environment and Heritage for consideration under the EPBC Act.

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Executive summary

The assessment report for the Small Pelagic Fishery (SPF) has been developed in accordance with AFMA's obligations under the *Environment Protection and Biodiversity Conservation Act 1999* to prepare strategic assessment reports for all Commonwealth fisheries and assessment reports for those fisheries with an export component. The report considers impacts of the SPF on species caught in the fishery and the broader marine environment.

The assessment report for the SPF Fishery is divided into three parts. Part I provides an overview of AFMA. Part II provides a description of the SPF Fishery. Part III provides an assessment of the management arrangements for the SPF against the Commonwealth *Guidelines for assessing the ecologically sustainable management of fisheries*.

The Small Pelagic Fishery extends from the Queensland/New South Wales border around southern Australia to a line at 31° south (north of Perth) and is currently divided into four zones (refer to Figure 2). Commonwealth operators are entitled to take five species; jack mackerel, Peruvian jack mackerel, yellowtail scad, blue mackerel and redbait.

Substantial commercial operations have only occurred in Zone A principally off eastern Tasmania. There is, however, a long history of small scale commercial operations and recreational and charter fishers targeting small pelagic species in Zones A and D.

AFMA currently manages these fisheries as status quo fisheries with the state jurisdiction applying inside 3 nautical miles and Commonwealth jurisdiction in waters between 3 and 200 nautical miles. The jurisdictional arrangements for Zone A are in transition.

The Commonwealth and Tasmanian governments expect that a Joint Authority will be in place for Zone A by late 2003. Under this arrangement the fishery will be managed under Tasmanian state law (*Living Marine Resources Act 1995*) with AFMA's participation in management and assessment groups in place for this fishery.

This assessment covers the current management arrangements for Commonwealth waters:

- € the *Management Policy for the Commonwealth Small Pelagic Fishery* which applies to Zones B, C and D; and
- € the interim management arrangements AFMA (in cooperation with the Tasmanian Department of Primary Industries, Water and Environment (DPIWE) has in place under permits granted for the Commonwealth waters in Zone A.

This assessment where possible will reference changes to the Commonwealth's management role in the Zone A fishery as a result of the impending establishment of the Joint Authority. AFMA understands that DPIWE has advised Environment Australia that they intend to develop a plan of management for the Zone A Mackerel Fishery and to seek accreditation of the plan under the EPBC Act. AFMA has asked Environment Australia to consider the sections of this assessment which apply to Zone A in this context.

There is currently insufficient information available to develop quantitative stock assessments for small pelagic species. AFMA's policy for Zones B, C and D (which have been lightly fished to date) take this into account and implements a precautionary approach through the use of conservative output controls. Even though advice from the Small Pelagic Research and Assessment Team (SPRAT) suggests that these stocks are likely to be able to sustain higher harvest levels, AFMA recognises that the level of latent effort in the fishery is still a significant management issue. Stakeholder advice suggests that a large number of inactive permits in the fishery could be activated if there are small shifts in the demand for small pelagic species.

The management arrangements for Zone A reflect the transitional nature of the jurisdictional arrangements. The Tasmanian DPIWE, AFMA and industry are working to introduce a more contemporary management approach into an existing large scale industrial fishery (at one stage the largest in Australia by volume). To date this has not been a high priority for either jurisdiction, however, the establishment of the Joint Authority will provide the Tasmanian government with the legal basis for the implementation of a statutory management plan. The management plan will provide more secure access rights for operators, implement a more robust TAC setting process and set out cooperative mechanisms for dealing with the adjacent Commonwealth fisheries.

AFMA believes the current policy provides a responsible platform for the sustainable development of the fishery in Zones B, C and D with the option of going to a management plan should the fishery expand. The policy secures scientific and technical advice on the management of the resource through the establishment of stakeholder groups. These groups assist in the development of cooperative scientific and management arrangements between the sectors and jurisdictions which utilise and manage the small pelagic resources across southern Australia.

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PART I - OVERVIEW

1 Assessment to meet the Commonwealth's environmental legislation requirements

Commonwealth managed fisheries are subject to the strategic assessment provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Strategic assessment involves assessing all fishing activity under a Management Plan or policy rather than assessing each individual action or permit. The benefit of this approach is that it enables the cumulative impacts of a fishery to be considered and provides a level of certainty about what activities are permitted.

Once the assessment is complete, the Minister for Environment and Heritage may then “accredit” the Management Plan or policy. He must then make a declaration under the EPBC Act that actions under the accredited Plan/policy do not require further impact assessment approval. The Management Plan and a notice of intent to make the declaration will be tabled in Parliament for a disallowance period of 15 sitting days.

In deciding whether to accredit a Plan, the Minister must be satisfied that the assessment report adequately addresses the Terms of Reference, and any modifications the Minister has recommended to the policy, Plan or program have been made.

The primary focus of the assessments is an evaluation against the *Guidelines for the ecologically sustainable management of fisheries* (the Guidelines), which are contained within the Terms of Reference.

The EPBC Act also requires that all Australian fisheries with an export component be assessed against the Guidelines before export permits are granted.

Accordingly, this report provides for assessment and decision making under both the strategic assessment and export of native wildlife provisions of the EPBC Act.

1.1 The Assessment Timetable

Under the strategic assessment provisions of the EPBC Act, the Australian Fisheries Management Authority (AFMA) must commence two thirds of the assessments by July 2003 and have all assessments commenced by July 2005. The native wildlife export provisions require all Australian fisheries with an export component to be assessed against the *Guidelines for the Ecologically Sustainable Management of Fisheries* by 1 December 2003, to enable exports to continue.

2 About AFMA

The Australian Fisheries Management Authority (AFMA) was established in February 1992 under the *Fisheries Administration Act 1991*. The legislative basis for AFMA's management of fisheries is the *Fisheries Management Act 1991*. These two pieces of legislation create the statutory authority model for fisheries management under which AFMA is responsible for the day-to-day management of fisheries. Broader fisheries policy and international negotiations are administered by a smaller group within the Department of Agriculture, Fisheries and Forestry – Australia (AFFA).

As a statutory authority, AFMA has been established as a specialist Commonwealth fisheries management agency, external to, but working closely with AFFA and strategically with the Minister with portfolio responsibility for fisheries. Significant elements of the AFMA model include the organisation's day-to-day independence from the Minister; an expertise based Board; rights based management and a strong partnership approach with key stakeholders. Governing and guiding all of AFMA's activities are the legislative objectives contained under Section 6 of the *Fisheries Administration Act 1991* and Section 3 of the *Fisheries Management Act 1991* (see inside cover of this report). These objectives provide a clear direction and focus for the organisation and a framework within which AFMA must function.

2.1 Managing Commonwealth fisheries

The fisheries resources managed by AFMA are important community assets that support significant commercial fishing activity, recreational fishing and some subsistence and traditional fishing. These activities are of interest to a range of other stakeholders, including environmental groups, resource managers, researchers, and community groups.

AFMA maintains a firm commitment to managing Commonwealth fisheries resources for the benefit of the community as a whole. Co-operation with the community, industry, government and non-government agencies and others with an interest in the sustainable management of the Commonwealth's fisheries resources forms an integral part of AFMA's management.

AFMA has adopted policies of pursuing efficient harvesting regimes and providing positive market-based incentives for commercial fishers to enhance and conserve resources. A key mechanism is the provision of secure and transferable access rights (statutory fishing rights) within statutory management plans for major commercial fisheries. AFMA also manages fisheries in accordance with management policies that are implemented through binding conditions on Fishing Permits. Management policies provide a level of certainty combined with the flexibility needed in the dynamic environment of fisheries management.

AFMA has a continuing role to play in managing fish stocks on the high seas. This role has expanded substantially following the signing and ratification of the *United Nations Fish Stocks Agreement*, which came into force on 11 December 2001. AFMA also has regard to a range of international obligations and agreements such as the *United Nations Convention on the Law of the Sea*, the Food and Agricultural Organisation of the United Nation's *Code of Conduct for Responsible Fisheries* and a range of other environmental agreements such as the *Convention on the International Trade in Endangered Species of Wild Fauna and Flora*.

2.2 AFMA's structure

AFMA's structure incorporates:

- € an eight member Board of Directors responsible for overseeing AFMA's operations and making high level decisions on fisheries management matters. The Board is also responsible for setting the policy framework and ensuring that adequate resources and expertise are available to meet AFMA's legislative obligations. Board Directors are appointed on the basis of their skill and expertise in areas such as natural resource management, the fishing industry, finance, conservation and research. The Board is assisted by its Finance and Audit, Research and Environment Committees

- € a management team comprising an Executive, Senior Managers and Managers, committed to providing clear and effective leadership and direction to other staff in the organisation
- € a staff of approximately 105 (including management team) with responsibility for specific fisheries, operational and corporate functions within AFMA's Fisheries, Operations and Strategy and Planning Branches
- € Management Advisory Committees – expertise-based committees established for each major Commonwealth fishery with membership typically including an independent Chairperson, an AFMA member, a research member, industry members and an environment/conservation member. Management Advisory Committees (MACs) may also include a broader range of interest groups, such as recreational fishers, charter boat operators and traditional fishers. MACs provide a forum for discussion of matters relevant to the fishery, facilitate the flow of information between stakeholders, and advise and make recommendations to the AFMA Board on the management of the fishery.
- € Fishery Assessment Groups - established for each major fishery group or individual species, with membership drawn from fishery scientists, industry, fishery economists, management, conservation non-Government organisations, and recreational fishing and other interest groups. Fishery Assessment Groups (FAGs) synthesise biological, ecosystem and economic information on Commonwealth fisheries and coordinate, evaluate and regularly undertake fishery assessments in each fishery. FAGs report to the AFMA Board through the AFMA Board Research sub-Committee and MACs. Although the two groups work closely together, FAGs operate independently from MACs.

2.2.1 Relationship with other agencies

A significant component of AFMA's management approach is the close working relationship the Authority has established with both stakeholders and a number of other Commonwealth and state/territory Government and non-Government agencies, including other resource managers, research providers and key interest groups. A schematic representation of AFMA's relationship with stakeholders and other agencies is presented in Figure 1.

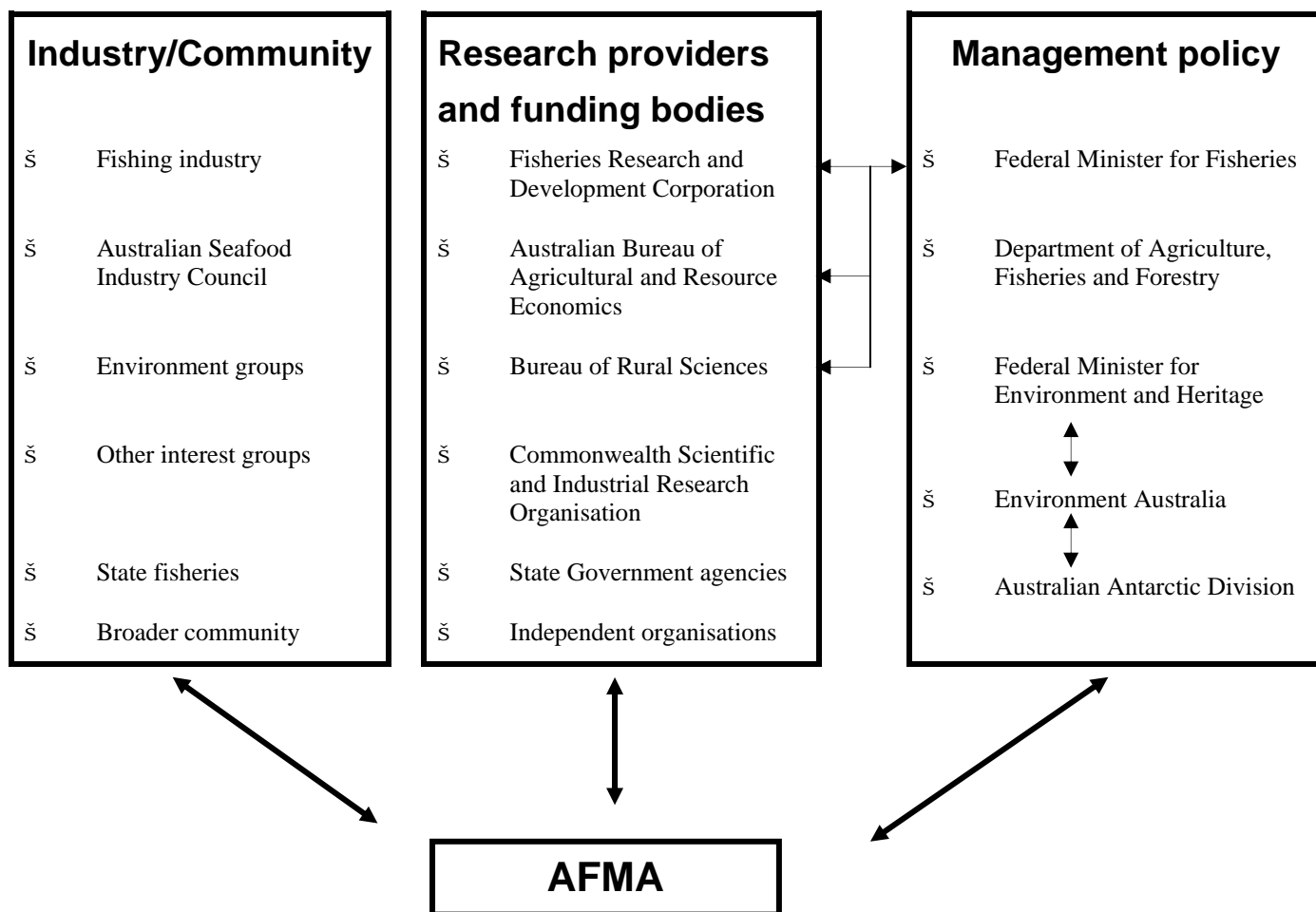


Figure 1: AFMA’s strategic relationship with stakeholders and other agencies

2.3 Accountability

AFMA’s governing legislation provides AFMA with clear accountability to the Commonwealth fisheries Minister and the Parliament and, through them, the wider community.

The legislation requires that the Commonwealth fisheries Minister approve the AFMA Corporate Plan and Annual Operational Plan. AFMA must also submit an Annual Report to the Minister and the Parliament and provide a copy of that report to the peak industry body - the Australian Seafood Industry Council (ASIC). The AFMA Chair and Managing Director are required to report on AFMA’s performance to the ASIC Executive and AFMA holds an annual public meeting to consult with industry, other stakeholders and the general public. The Minister must also formally accept each statutory management plan before it comes into effect. The Minister may also give directions to AFMA concerning the performance of its functions and the exercise of its powers and AFMA must comply with those directions.

Copies of AFMA’s key accountability documents are available at www.afma.gov.au.

In addition to specific legislative accountability provisions, AFMA has been subject to a number of external reviews and audits. AFMA’s management effectiveness has been reviewed by the Australian National Audit Office (twice), a Senate Standing Committee (1993 and 2000), a House of Representatives Standing Committee (1997). In response to these reviews,

and as part of good corporate governance, AFMA has strengthened its planning, performance assessment and reporting arrangements. The strategic assessment process under the *Environment Protection and Biodiversity Conservation Act 1999* is also a process of review and audit.

Independent reviewer ACIL Pty Ltd reviewed AFMA's management advisory committees (MACs) in late 2000. The ACIL report highlighted concerns over a number of MAC and AFMA processes and practices, although strongly supporting the MAC concept and the contribution of MACs to Commonwealth fisheries management. These concerns were dealt with in a series of 31 recommendations, the majority of which have been adopted by the AFMA Board. The Board noted that actions had already been initiated to address some of the issues covered in the report but that further action will be required to implement the remaining agreed recommendations. AFMA is currently implementing these recommendations. A copy of the report is available on the AFMA website.

2.4 Consulting with stakeholders

AFMA actively involves a wide range of key stakeholders in the process of developing and implementing fisheries management arrangements. This approach is supported by specific consultative processes that are embodied in the Authority's governing legislation and undertaken as part of good fisheries management practice.

AFMA's legislation specifies the consultative processes that AFMA must undertake with stakeholders when preparing plans of management. In particular, AFMA is required under Section 17 of the *Fisheries Management Act 1991* to maintain a register of interested persons who are to be notified of draft plans of management. The Act also requires AFMA to give public notice inviting persons and organisations to have their names and addresses entered on the register. Before formally accepting each statutory Management Plan, the Minister responsible for fisheries must be satisfied that adequate consultation has taken place and that AFMA has taken account of any representations received.

AFMA also consults broadly when developing fisheries management policy. The manner in which consultation is undertaken depends on the nature and scope of the issues being considered. AFMA advertises the availability of documents through newspaper advertisements, the AFMA website www.afma.gov.au, *AFMA Fishing Future* publications and/or mail outs to persons on various registers maintained by the Authority. In most cases, documents are available on the AFMA website or can be obtained directly from AFMA. AFMA also undertakes client surveys as a means of gathering information to assist the Authority measure its performance.

2.5 Research in Commonwealth fisheries

Dealing with scientific uncertainty is a key challenge in managing marine fisheries resources. Accordingly, AFMA puts a priority on fisheries research, stock assessments and in identifying strategies aimed at promoting the sustainable use of fisheries resources. AFMA's longer-term research directions and key research areas are set out in the Authority's Five Year Strategic Research Plan. Key fisheries also have their own Five Year Strategic Research Plans that outline priority research areas for the fishery.

AFMA's research function is overseen by the AFMA Research Committee (ARC), a six member committee drawn from AFMA's Board of Directors and executive management. The

AFMA Research Committee is responsible for advising the AFMA Board and other Commonwealth agencies on research priorities and advising the AFMA Board on research policy and issues.

The AFMA Research Committee also acts as the Commonwealth Fisheries Research Advisory Body, advising the Fisheries Research and Development Corporation on priorities and making recommendations about applications for research funding.

AFMA's approach to research involves close consultation with managers, fishers, researchers and others. This provides opportunities for stakeholders to have input into the research priority setting process through the Management Advisory Committees for each major AFMA managed fishery.

2.6 Fisheries and the environment

The community interest in environment issues and strengthened environment legislation has increased AFMA's focus on its ecologically sustainable development objective. AFMA has expanded the resources within its Environment Section, which has resulted in a number of achievements in recent years. AFMA has completed Bycatch Action Plans for all major Commonwealth Fisheries, meeting a commitment in the Commonwealth Policy on Fisheries Bycatch.

AFMA has worked with conservation groups and industry to implement measures such as the mandatory use of turtle excluder devices and bycatch reduction devices in the Northern Prawn Fisheries, and a strategy for managing incidental seal catch during winter fishing for blue grenadier in the Southern and Eastern Scalefish and Shark Fishery.

The AFMA Board is assisted by an Environment Committee, which provides advice on strategies to address environment and conservation issues, focusing on ecologically sustainable development, the precautionary principle and minimising the impact of fishing on non-target species. The Committee also provides advice on relevant environment related research and reviews key AFMA environment documents such as Bycatch Action Plans.

Membership of the Environment Committee includes representatives from AFMA, industry, science, a conservation NGO and the Commonwealth's environment agency - Environment Australia.

2.7 Funding arrangements

2.7.1 Fisheries management

The government established the current policy on fisheries management cost recovery in 1994 and AFMA has implemented this policy through levies on the commercial industry. The total cost of AFMA's operations is split between industry and Government (currently 40% and 60% respectively). The commercial fishing industry pays for costs directly attributed to fishing activity and the Government pays for activities that benefit the broader community as well as the industry.

In accordance with Government cost recovery policy, industry pays 100% of recoverable management costs. These include the running costs of Management Advisory Committees, licensing, AFMA's day-to-day fisheries management activities, developing and maintaining Management Plans and logbooks. Costs are recovered on a fishery by fishery basis with

Management Advisory Committees playing an integral part in the preparation of annual budgets for each fishery.

The resource base for the compliance component of fisheries management is 50% Commonwealth funded and 50% recovered from industry for the domestic fisheries. Foreign compliance funding is sourced 100% from the Commonwealth government.

2.7.2 Research

The following are the funding sources available to support fishery research:

- € **AFMA Research Fund (ARF)** - consists of annual Commonwealth Government funding and is primarily used to conduct management related research including fishery and stock assessments, research in economically non-viable fisheries and research that does not generally fall within the established guidelines for funding by the Fisheries Research and Development Corporation.
- € **MAC-Initiated Research Funds (MIRF)** - raised through levies on the holders of fishing concessions and are maintained by AFMA for use, on the advice of MACs, for specific research in particular fisheries. AFMA currently maintains MIRF for 11 of its managed fisheries.
- € **Fisheries Research and Development Corporation (FRDC)** - provides funding support for Commonwealth and state/territory fisheries research programs. FRDC's revenue base is based on:
 - ↓ the Commonwealth Government providing unmatched funds equivalent to 0.5% of the average gross value of fisheries production for the three preceding years (GVP)
 - ↓ state, territory and Commonwealth fishers and aquaculturists providing contributions of at least 0.25% of GVP (Commonwealth fisheries contribute to the FRDCs funding base through mandatory fishing industry research levies, collected by AFMA in addition to any MIRF levies)
 - ↓ the Commonwealth Government matching contributions by state, territory and Commonwealth fishers and aquaculturists up to a maximum of 0.25% of GVP.
- € **Fisheries Resource Research Fund (FRRF)** - AFFA administers funds for fisheries related research from the FRRF. The FRRF receives an annual Government appropriation and is an important source of research funding. Although the FRRF is managed by the Department of Agriculture, Fisheries and Forestry - Australia, AFMA is consulted on expenditure from the FRRF by participating in an advisory committee that evaluates applications for funding. FRRF programs are intended to provide an agreed program of independent assessment of Commonwealth fisheries management performance, and support the development of new and improved policies for the management of Australia's fisheries.
- € **Other government appropriation** - AFMA may also use its discretion to direct additional Government funding to research. In recent years, this type of discretionary funding has been used to partly fund the Integrated Scientific Monitoring Program for the Southern and Eastern Scalefish and Shark Fishery. This is a very limited avenue, used only for agreed priorities not funded by any other means.

Part II - DESCRIPTION OF THE SMALL PELAGICS FISHERY

1 Geographical context

The Small Pelagic Fishery extends from the Queensland/New South Wales border around southern Australia to a line at latitude 31° south (near Lancelin north of Perth). The fishery is currently divided into four zones (A to D) (refer to Figure 2). Commonwealth operators are entitled to take five species; jack mackerel, Peruvian jack mackerel, yellowtail scad, blue mackerel and redbait.

The range of the small pelagic species targeted in the fishery in the AFZ includes waters outside the area of the fishery. However, the main concentrations of the fish appear to occur in the inshore and near shelf waters in the southern parts of the fishery.

The states of New South Wales, Victoria, Tasmania and South Australia each control small pelagic resources within 3 nautical miles. Western Australia manages waters inside 3 nautical miles, east of 125° east, with the Commonwealth having jurisdiction to the high water mark west of this point. Victoria, South Australia and Western Australia do not allow state licensed commercial operators to target small pelagic species.

Substantial commercial operations have only occurred in Zone A, principally off eastern Tasmania. There is, however, a long history of small scale commercial operations and recreational and charter fishers targeting small pelagic species in Zones A and D.

AFMA currently manages these fisheries as status quo fisheries with the state jurisdiction applying inside 3 nautical miles and Commonwealth jurisdiction in waters between 3 and 200 nautical miles. The jurisdictional arrangements for Zone A are in transition.

The Commonwealth and Tasmanian governments expect that a Joint Authority will be in place for Zone A by late 2003. Under this arrangement the fishery will be managed under Tasmanian state law.

The Commonwealth and Tasmanian Governments recognise that elements of the current management arrangements require that allocation issues are best resolved under Tasmanian state law (provided that access rights of Commonwealth-only permit holders are accommodated).

The Tasmanian Department of Primary Industry, Water and the Environment (DPIWE) have established a draft process which will provide for the allocation of statutory fishing rights under a management plan once the Joint Authority is established. The clarification of jurisdictional responsibility for the fishery, the implementation of the proposed management plan and allocation of secure rights (ITQ SFRs) will provide the basis for the fishery to move to a more contemporary management framework.

The current Zone A arrangements have remained largely in place since 1993/94, and catches have not approached the Total Allowable Commercial Catch (TACC). AFMA and DPIWE recognise that the level of fishing directed at small pelagic species is strongly influenced by environmental factors and market factors (demand, exchange rates). The low levels of catch in Zone A in recent years reflect more the lack of fishing effort than any changes in local abundance of the stocks.

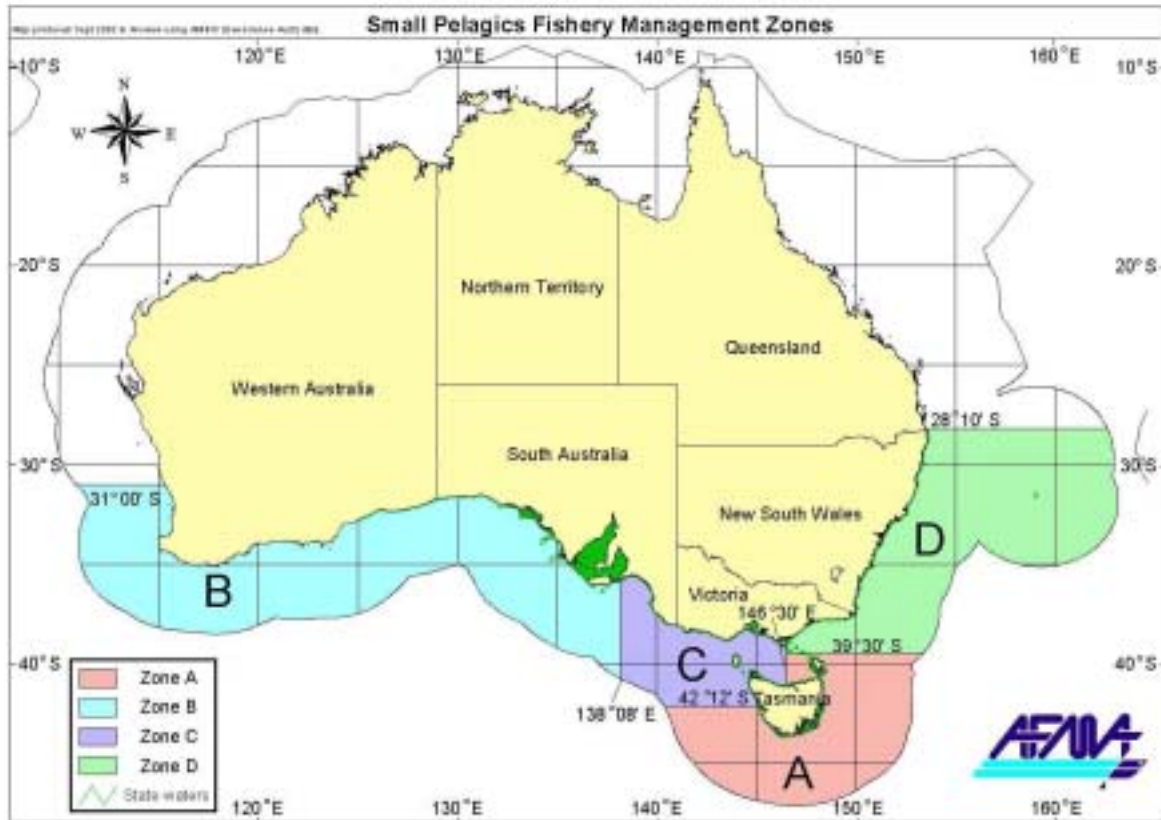


Figure 2: Area of waters of the Small Pelagic Fishery

Small pelagic species are associated with landmasses and rarely occur in deep oceanic waters. There is no conclusive evidence whether the stocks of the five small pelagic species exist as single or separate entities in Australian waters. There are medium sized commercial fisheries for blue mackerel and jack mackerel in New Zealand.

In the past, the low value nature of small pelagic fish has tended to make fishing a long way from port unprofitable due to the cost of fuel associated with the larger distances and the need for extended refrigeration of catches. Fishing has largely been restricted to waters relatively close to ports with suitable processing and freezing facilities for small pelagic species (radius fishing). The fishing companies currently fishing small pelagic resources in Zone A and Zone D are processing catch to suit a growing range of markets (fishmeal, aquaculture food, bait markets and human consumption).

2 History

- 1936 CSIRO conducts aerial surveys of pelagic fish resources off the East Coast, Tasmania and Western Australia. Large numbers of pilchard and mackerel schools were observed along the western edge of the Great Australian Bight.
- 1938 Government sponsors an investigation into pelagic fish resources off Victoria, Tasmania and New South Wales
- 1943 to 1950 Purse seine nets were used in pelagic fishing trials off NSW and eastern Tasmania. The first purse seine catch in Australia comprised about 4 tonnes of jack mackerel, taken near Hobart.

1960s and 1970s	Southern bluefin tuna pole and line fleet typically take about 700 to 1000 tonnes of live bait from east coast bait grounds (60 % yellowtail scad and blue mackerel).
mid 1970s	Purse seining was trialed near Lakes Entrance
1973	A fishery for jack mackerel was commenced by a company operating from Triabunna in Tasmania where it located a fish-meal processing plant
1979	The South Eastern Fisheries Committee set a TACC of 30,000 tonnes of mackerel for Australian waters with 10,000 tonnes reserved for waters off Tasmania
1984/85	First large catches of jack mackerel taken off Tasmania (purse seine method)
1986/87 & 1987/88	Catches of jack mackerel off Tasmania exceed 35,000 tonnes in both fishing seasons
1993/94	Existing management arrangements agreed between the Commonwealth and the states. Zone A created.
1996	OCS signed by the Tasmanian and Commonwealth ministers but not gazetted
1991 to 2000	Purse seine fishery in Zone A averaged around 12,000 tonnes per annum characterised by strong inter-annual and within season variability (linked to surface schooling behaviour).
2001/02	First significant catches of redbait taken by mid-water trawl method in Zone A
2001/02	Zone A TACC reduced proportionally between all sectors
2001/02	Commercial catches of redbait taken in Zone A using mid-water trawling
Feb 2002	First meeting of the Small Pelagic Research and Assessment Team (SPRAT)
March 2002	Management Policy for the Commonwealth Small Pelagic Fishery comes into effect (applies to zones B, C and D). Fishery formerly known as the Jack Mackerel Fishery.
Aug 2002	Zone A Small Pelagic Assessment Workshop – TACC setting and development of trigger points (included the Zone A Small Pelagic Fishery Assessment Group).
2003	The Southern and Eastern Scalefish and Shark Fishery Management Plan prohibits targeting of small pelagic species

2.1 Catches of small pelagic species in Zones A to D

Zone A (Tasmania)

The purse seine fishery off the east coast of Tasmania was the largest fishery in Australia (by weight) in the mid 1980s. The fishery was based out of Triabunna where a fishmeal processing plant was located. Catches in the fishery fluctuated (refer to Figure 3). The fishery, which continued up until 1999/2000, season was based on surface schools of jack mackerel. Climatic and oceanographic conditions strongly influence the abundance and behaviour of many small pelagic species and are believed to give rise to the strong inter-annual and inter season variability of jack mackerel off Tasmania.

The productivity of the shelf waters off eastern Tasmania is strongly linked to the relative strength of the East Australian current (EAC). The EAC is a surface current that brings warm nutrient poor water south. CSIRO oceanographers¹ have observed that in strong years (often La Niña) this water displaces the cooler water from the continental shelf off eastern Tasmania which reduces phytoplankton productivity.

Conversely, in El Niño years the EAC is often deflected to the east as a result of the high westerly wind stress and, as a result, there is a greater influx of cooler nutrient rich waters southern ocean. These richer waters promote phytoplankton blooms and krill swarms, which are an important food source for jack mackerel. These years are correlated with higher catches in the Zone A purse seine fishery.

The purse seine fishery relied on locating surface schools and as such its success in any one year was generally determined largely by the abundance of schools in south east Tasmanian shelf waters and their propensity to form large surface schools. The surface schooling behaviour of jack mackerel is strongly correlated with sea surface temperatures. Poor local weather (windy) conditions are an additional factor, which can make finding and catching surface schools more difficult. These factors mean it is difficult to use purse seine catches (purses seine catch/effort) as a stand alone index for jack mackerel abundance.

Pair trawling trials conducted in 2001/2002 demonstrated that mid-water trawling was a viable means of targeting small pelagic species. The first substantial catches of redbait were achieved using this method. Following the successful trial of mid-water trawl gear a multi purpose mid-water trawler/purse seiner was brought to Tasmania in late 2002 to target small pelagic species. Mid water trawling has been used to target redbait and jack mackerel, and operators expect that it will be successful with blue mackerel.

Redbait caught off Tasmania has been favourably received as feed by the southern bluefin tuna ranching industry in Port Lincoln. The Tasmanian Aquaculture and Fisheries Institute (TAFI) is currently directing a research effort at improving knowledge on the ecology and biology of redbait.

TAFI plans to submit a proposal for the identification of cost effective fishery independent indicators of abundance for redbait and jack mackerel to FRDC for consideration as part of the Corporation's 2004/05 funding cycle. In the interim TAFI will continue to investigate the utility of fishery dependent factors which would identify population stress (changes in age structure, growth, etc).

The current TACC for Zone A is 34,000 tonnes (all species), this is made up of:

Sector	TACC
Mackerel A	25,000 tonnes
Mackerel B (includes Commonwealth purse seine permits)	7,000 tonnes
Commonwealth trawl	2,000 tonnes
Total TACC	34,000 tonnes
	Trigger point
Tasmanian Diversified Sector (input controls) ²	3,800 tonnes

¹ Harris et al 1992

² The Tasmanian Diversified Inshore Sector (10 licenses) currently targets other species and a trigger limit of 3,800 tonnes has been set as an interim measure (recent catches of jack mackerel by this sector have averaged around 80 tonnes per annum)

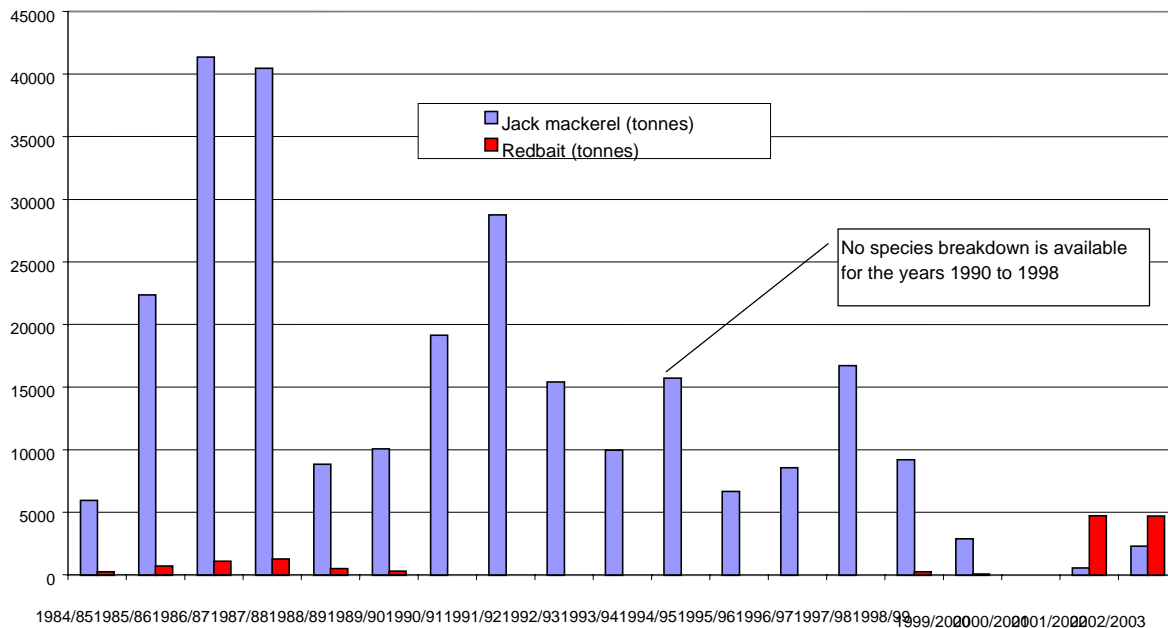


Figure 3: Catches of jack mackerel and redbait in Zone A

Zones B, C and D

Catches of small pelagic species outside Zone A have been low. The total reported catch from Commonwealth zones B and C for 1997 to 2002 was 124 tonnes of blue mackerel and 6 tonnes of jack mackerel.

Catches of blue mackerel and jack mackerel in the Commonwealth waters of Zone D have been more consistent averaging, 98 and 81 tonnes respectively between 1997 and 2002. Average annual catches of blue mackerel in the adjacent state waters (NSW) are 449 tonnes.

Catches of yellowtail scad in Commonwealth waters have been insignificant (an average of 3 tonnes per year between 1996/97 and 2002/03). The average annual commercial catch in NSW state waters is 474 tonnes (1997/98 to 2000/01).

The productivity of Australian waters is generally low and the stocks of small pelagic species are not comparable to those exploited in large scale industrial fisheries off South America, South Africa and in the northern Atlantic and northern Pacific Oceans.

There are small scale upwelling in parts of southern Australia and the GAB (eg Bonney upwelling) which contribute to local productivity. These upwelling events enhance phytoplankton and zooplankton and are thought to contribute to the higher abundance of pilchards in these areas (as determined by SARDI's fishery independent surveys). The SPRAT considered that the increased productivity would probably support a higher abundance of small pelagic species as well.

It is generally believed that productivity of small pelagic stocks off New South Wales is strongly linked to productivity from terrigenous sources (runoff, wind born dust). This suggests productivity and abundance of small pelagics, particularly along the east coast (Zone D), might be patchy.

The SPRAT attempts to incorporate any improved understanding of the relationships between local productivity and pelagic fish stocks when setting TCLs. Table 1 lists the trigger catch limits (TCLs) for the 2003/2004 fishing season.

Species	TCL (tonnes)		
	Zone B	Zone C	Zone D
Blue mackerel <i>Scomber australasicus</i>	5,000	3,500	3,500
Yellowtail scad <i>Trachurus novaezelandiae</i>	100	100	100
Jack mackerels <i>Trachurus declivis</i> , <i>T symmetricus</i>	4,000	2,500	2,500
Redbait <i>Emmelichthys nitidus</i>	1,000	1,000	1,000

Table 1: 2003/04 trigger catch limits for Zones B, C and D

2.2 Take of small pelagic species for bait in tuna fisheries

Operators in the three Commonwealth tuna fisheries are permitted under Offshore Constitutional Settlement (OCS) arrangements to take small pelagic species as bait for their own use in their fishing operations. Depending on the jurisdiction operators are permitted to use small scale purse seine, lampara and lift nets. Table 2 summarises the conditions, that apply to bait gathering operations. Most bait catching operations occur in near shore waters or embayments. Operators are entitled to take a range of bait species including pilchards, anchovies and the five small pelagic species. Of the five small pelagic species only yellowtail scad and blue mackerel are taken in significant quantities (refer to Section 2.1).

State	Method	Catch limits
Queensland	Any method	No limit
NSW	Lift nets in state waters (some ETBF operators hold state entitlements that permit purse seining in state waters) Purse seine outside 3nm	No limit
Victoria	Lampara net, lift net and/or small scale purse seine	Unlimited amounts for live bait 3 tonnes per trip for dead bait
Tasmania	Lampara net, lift net and/or small scale purse seine	Unlimited amounts for live bait 3 tonnes per trip for dead bait
South Australia	Any method	No limit
Western Australia	Any method	No limit

Table 2: Restrictions on bait fishing by Commonwealth tuna vessels by jurisdiction

AFMA is developing a bait logbook to ensure that complementary data gathering arrangements apply to Commonwealth tuna operators gathering bait and state managed commercial fishers that access bait species. AFMA is currently consulting with the tuna MACs on the utility of a specialised bait logbook.

The SPRAT takes these catches of small pelagic species into account when making its assessments.

Currently the Eastern Tuna and Billfish Fishery is the most significant taking an estimated 158 tonnes in 2002 mainly in inshore waters off New South Wales (Zone D). SBT operators only reported catches of pilchards for bait in 2002 (20 tonnes). The SBT fishery currently operates almost exclusively off South Australia.

Table 3: Reported self caught bait in Commonwealth tuna fisheries - 2002

Species	Catch (kilograms)		
	SBT	ETBF	SWTBF
Jack mackerel	0	115	0
Yellowtail scad	0	148,842	3,170
Mackerel	0	6,454	0
Blue mackerel	0	3,199	0
Total		158,610	3,170

2.3 Take of small pelagic species by state commercial fisheries

New South Wales, South Australia and Western Australia manage targeted fishing for inshore bait species, in particular the pilchard (*Sardinops sagax*). Under current OCS arrangements only Commonwealth, Tasmanian and New South Wales licensed operators are entitled to target small pelagic species. These species are under Commonwealth jurisdiction off Victoria, South Australia and Western Australia.

The access rights of Tasmanian Diversified Inshore Sector will be preserved under the proposed Management Plan for Zone A which the Tasmanian DPIWE intends to implement following the establishment of the Joint Authority. This does not include Mackerel A and Mackerel B licence holders (these are currently state licences).

The main fishery targeting small pelagic species in NSW is the Ocean Haul Fishery. Purse seine operators in the fishery took an average of 444 tonnes of blue mackerel and 402 tonnes of yellowtail scad each year between 1997 and 2000 (EIS – NSW Ocean Haul Fishery 2002). The Ocean Haul Fishery accounted for about 85% and 81% of the catches of these species respectively in NSW waters (commercial and recreational fisheries combined).

In June 2003 Environment Australia advised that the NSW Ocean Haul Fishery assessment was complete and that the fishery was exempt from export permit requirements until 2008.

2.4 Bycatch of small pelagic species in other commercial fisheries

Most small pelagic species are ubiquitous in their distribution above the continental shelf break and at stages occupy most parts of the water column. Consequently small quantities of these species are taken as bycatch in trawl fisheries and other inshore hauling type fisheries.

State managed fisheries

The bycatch of small pelagic species in the South Australian and Western Australian purse seine fisheries is relatively insignificant. Both fisheries are predominantly undertaken in inshore waters, adjacent to Zone B of the Small Pelagic Fishery.

Western Australia has two purse seine fisheries, the South Coast Purse Seine and the West Coast Purse Seine Western. Both target pilchards (*Sardinops sagax*) on the south and west coasts and scaly mackerel (*Sardinella lemuru*) (a more tropical species) on the west coast. The fisheries had an average annual combined catch of 51 tonnes for blue mackerel and 36 tonnes of yellowtail scad for the period 1998 to 2001.

The South Australian Pilchard Fishery has recorded annual blue mackerel catches of less than 5 tonnes between 1997 and 2001, although SARDI reports that blue mackerel are abundant in the same waters.

The Tasmanian Scalefish Fishery has a 100 kg trip limit for small pelagic species, and logbook records indicate that an average of 22 tonnes of small pelagic species (mainly jack mackerel) were landed in this fishery between 1996 and 2002.

An annual average catch of 23 tonnes of blue mackerel and 72 tonnes of yellowtail scad were recorded as bycatch in the remaining NSW commercial fisheries (excluding the Ocean Haul Fishery) between 1997 and 2001.

Commonwealth managed fisheries

The take of small pelagic species occurs at low levels in other Commonwealth fisheries operating in southern waters. Catches reported in logbooks for the period 1997 to 2002 are:

Species	Average annual catch 1997 to 2002 (kgs)		
	SEF Trawl	GAB Trawl	Gillnet hook and trap
Jack mackerel	38980	1053	255
Redbait	19576	515	
Blue mackerel	5558	1000	518

Demersal trawl operators in the SESS fishery are not permitted to use mesh sizes smaller than 90 millimetres. This is designed to reduce the catch of small fish in that fishery but also prevents effective targeting of small pelagic species using demersal trawl gear. Catches of small pelagic species in the gillnet hook and trap sectors in the SESS are negligible.

The Integrated Scientific Monitoring Program (ISMP) covers a representative sample of fishing effort in the Southern and Eastern Scalefish and Shark Fishery through at sea observers and port sampling programs. At sea observations indicate that bycatch of small pelagic species is largely confined to the trawl and danish seine gear sectors (Table 4). No bycatch was observed in the gillnet, dropline, demersal longline and trap sectors.

Table 4: Observed at sea catch in the SESS Fishery - 1/1/2000 to 31/12/2002 (ISMP)

SESS gear (sector)	Observed catch (kg)			Observed proportion of total effort in relevant sectors
	Jack mackerel	Blue mackerel	Yellowtail scad	
Trawl	38,517	1,382	1,063	2.56 %
Danish seine	113	0	4	0.03 %

2.5 Recreational and charter take of SPF species

The recreational game fishing and charter fishing sectors have traditionally relied on access to yellowtail scad and blue mackerel for use as bait. Game fishers use these species as live and dead baits when targeting marlin, tuna, yellowtail kingfish and other game fish species. Anglers fishing offshore features for demersal species also use these species for cut and live bait. Jack mackerel is occasionally targeted for use as bait by game fishers.

Game fishers use mass produced bait jigs (pre-rigged with around six small jigs) and/or small baited hooks on light tackle to catch bait species before heading to wider grounds to target gamefish. When used in conjunction with berley both methods are particularly effective for yellowtail scad and blue mackerel. They are not effective at catching pilchards or anchovies.

Yellowtail scad and blue mackerel are also encountered in bays and larger estuaries and are taken by anglers fishing from small boats, the shore and jetties. These anglers may retain some of their catch for consumption. Both species are favoured live baits for land based gamefishing along the east coast.

Tasmanian recreational fishers take jack mackerel using recreational gillnets and often save these for rock lobster bait.

The National Recreational and Indigenous Fishing Survey was published in August 2003 (refer to <http://www.fisheries.nsw.gov.au>). The survey used established techniques to estimate the proportion of the Australian population that participates in recreational fishing activities and to estimate their annual catch for a range of popular species. Surveys were conducted at the state and territory level and then combined to provide a national picture of recreational fishing activities.

The survey provides information on three small pelagic species blue mackerel, yellowtail scad and jack mackerel. The data for yellowtail scad and jack mackerel are provided as a combined group presumably because of the degree of difficulty in distinguishing these species. The estimated catch (in numbers) for blue mackerel, yellowtail scad and jack mackerel is provided in Table 6.

Baiting areas for recreational (and commercial) fishers generally coincide with topographical features, such as headlands, reefs eddies and navigational fixtures, in the 10 to 30 fathom range. Glaister and Diplock (1993) identified important bait grounds for both commercial and recreational sectors along the entire NSW coast including Tweed Heads, Iluka, Coffs Harbour, Port Stephens, Sydney Harbour, Jervis Bay, Bermagui and Twofold Bay. The characteristics of recreational effort and catch for small pelagic species from the National Recreational and Indigenous Survey 2003 is provided in Table 5.

	Where caught			Percentage caught by boat based anglers	Release rates
	Offshore	Coastal	Estuary		
Blue mackerel	8%	83%	9%	68%	21%
Yellowtail/jack mackerel	10%	65%	25%	58%	35%

Table 5. Characteristics of the recreational catch of blue mackerel & yellowtail/jack mackerel

Recreational representatives have indicated that management of these stocks also needs to take into account the importance of these species in the food chain particularly in regard to game fish species. Public concern was raised in late 2002 when the Commonwealth Government announced grants to Pelagic Fish Processors to assist with the development of a new commercial processing factory in Eden as part of the Federal Government's Eden Region Adjustment Package. Recreational bodies were concerned that large scale harvesting was being encouraged in the absence of sufficient information on available stocks and their role in the ecosystem.

Recreational peak bodies participate in the SPRAT and the Small Pelagic Fishery Working Group and are generally supportive of AFMA's precautionary approach to the management of small pelagic species in Zones B, C and D.

Estimated numbers caught	New South Wales	Victoria	South Australia	Western Australia	Tasmania
Blue mackerel	427,062	7,057	45,004	78,631	2,528
- <i>standard error</i>	<i>138,970</i>	<i>5,144</i>	<i>17,394</i>	<i>17,377</i>	<i>1,601</i>
Scads (yellowtail/jack mackerel)	218,237		2,679	125,746	33,571
- <i>standard error</i>	<i>51,551</i>		<i>1,270</i>	<i>27,478</i>	<i>18,487</i>

Table 6 Estimated annual recreational catch of blue mackerel and yellowtail/jack mackerel in waters adjacent to Small Pelagic Fishery (values indicated in bold italics represent relative standard errors of greater than 0.4)

2.6 Indigenous take of SPF species

The National Recreational and Indigenous Fishing Survey 2003 estimated that indigenous fishers in Western Australia take small quantities of blue mackerel (132 fish in the survey period).

3 Fishing methods

There are three methods permitted in the Small Pelagic Fishery.

3.1 Purse-seine

Purse seining is a method in which a large net is used to encircle surface schools of pelagic fish. When deployed a purse seine net extends like a curtain from its float line on the surface to a depth of about 80 metres the purse line (heavy wire warp) runs through the purse rings attached to the footrope of the net.

The net is deployed from the purse seine vessel using a drogue (sea anchor) to hold the net in position while the vessel steams around the school of fish releasing the rest of the net. The master then tries to finish shooting the net close to the other end so the gap can be quickly closed (pursing the net) thus capturing the school of fish. Small pelagic species can either be brailed (scooped) aboard or pumped directly into the fish-holding tanks.

The purse seine method has been the dominant method in the fishery until recently. However it is generally only effective when schools are on or close to the surface. Both jack mackerel and blue mackerel form large surface schools. Seasonality, ocean temperature and wind force are believed to be important factors in regard to this behaviour. Purse seine operations are largely restricted to daylight hours during periods of relatively good weather.

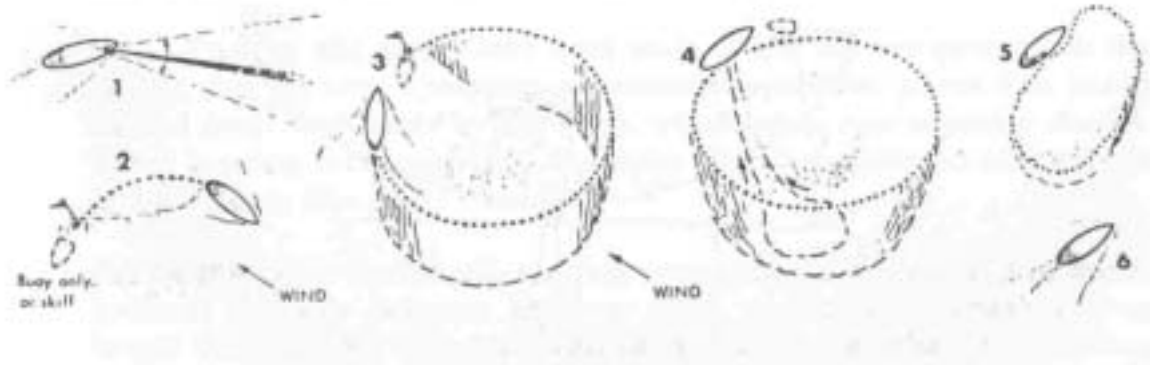


Figure 4 – Diagram of purse seining methods (Chapman and Wakeford, 1996)

3.2 Mid-water trawl

Mid-water trawls are used to target aggregations of small pelagic species when they are in the water column. These nets have large openings and can be towed either by a single boat or by two boats (pair trawling). A reasonably large and powerful trawler is needed for single vessel mid-water trawling. Industry advises that trawl speeds of over 4½ knots are required to consistently target blue mackerel and jack mackerel. Redbait can be successfully targeted at slightly lower speeds. An efficient mid-water trawl vessel entered the fishery in late 2002.

Although mid-water nets are usually ‘flown’ above the bottom the footropes and boards are robust enough to survive limited contact with the seabed. Figure 5 shows a mid-water trawl net and including the electronics required to accurately position the net in the water column.

Under current permit conditions the mesh size in the mid-water trawl nets must not be less than 40 millimetres although operators are allowed to use a 23 metre mesh liner, in which mesh size must not be less than 20 millimetres, positioned directly forward of the codend.

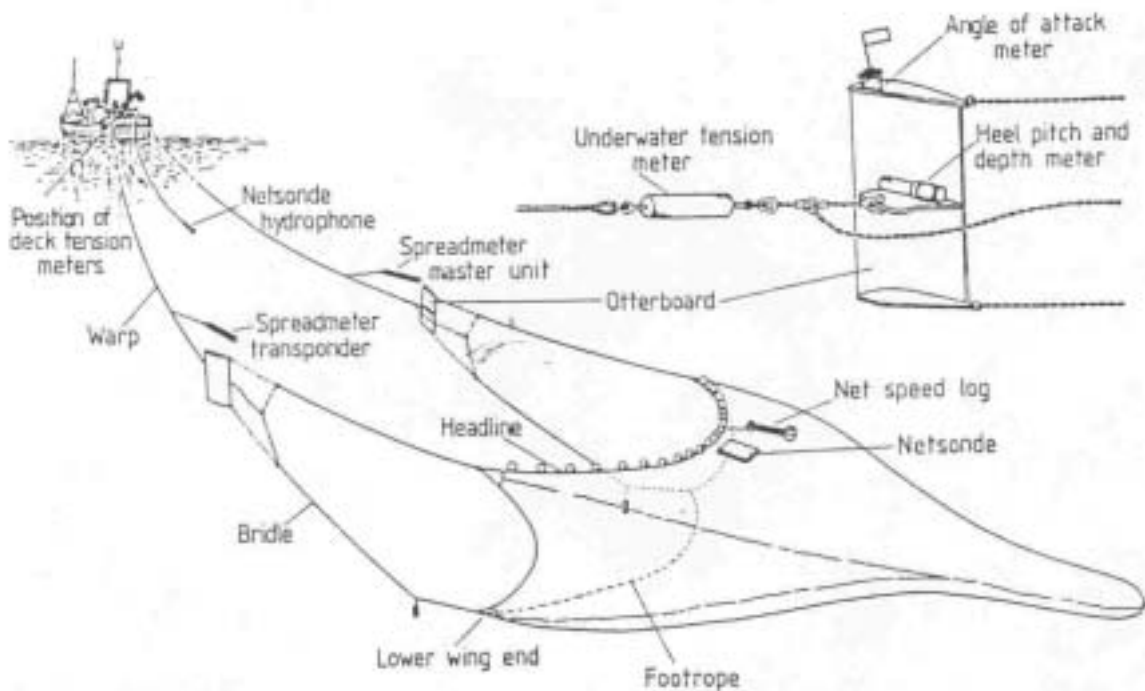


Figure 5 – Diagram of mid-water trawling (Chapman and Wakeford, 1996).

3.3 Mid-water pair-trawl

Pair trawling involves two vessels working together to tow a single mid-water trawl net. This approach is generally less efficient than a single vessel method. However, it allows operators to utilise existing demersal trawl or purse seine vessels to fish mid-water trawl gear of comparable dimensions to that used by large single mid-water trawlers.

The horizontal opening is controlled by the length of wire between the vessel and net and the distance between the vessels. The vertical opening of the net is achieved by using long bridles connected to a single warp off each vessel, with floats on the headline and a weight each side on the footrope bridle. The mesh size restrictions for single vessel mid-water trawls also apply to pair trawling operations. Pair trawling was first used successfully in Zone A in 2001 to target small pelagic species.

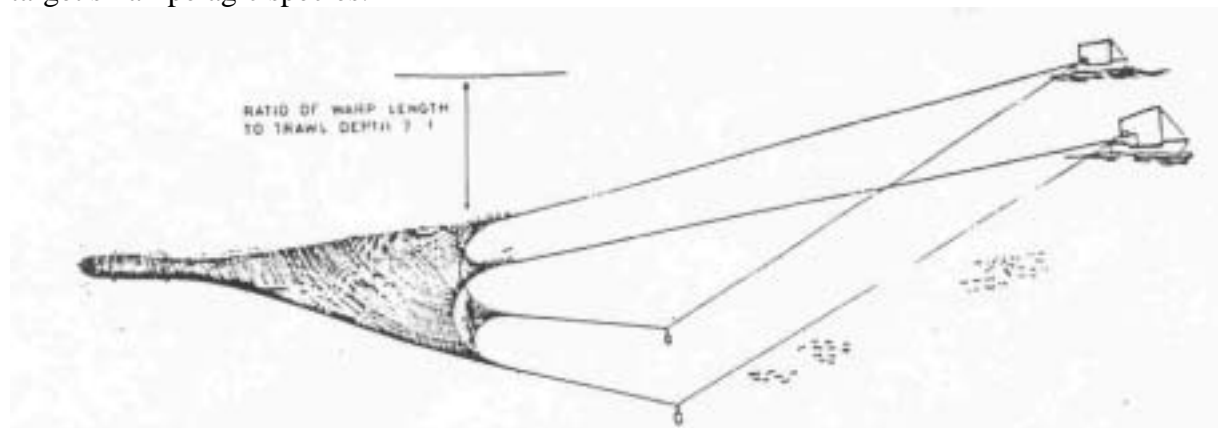


Figure 6 – Diagram of mid-water pair trawling (Chapman and Wakeford, 1996).

4 Species caught in the SPF

4.1 Target species

Under the Management Policy for the Commonwealth Small Pelagic Fishery (Zones B, C & D) and AFMA's Zone A permits for operators can only take five small pelagic species. Commonwealth operators normally only target jack mackerel, blue mackerel and redbait.

Peruvian jack mackerel are a minor catch component in jack mackerel catches off Tasmania. Their presence in the fishery was first recognised in 1989. Peruvian jack mackerel was first described in New Zealand waters in 1987 and now dominates catches in some areas. This species forms the basis of a large fishery off South America with annual catches of up to 4 million tonnes reported (FAO Fisheries Circular No. 920 FIRM/C920).

Operators in Commonwealth waters rarely target yellowtail scad although targeted fishing occurs in the New South Wales managed Ocean Haul Fishery.

Catch monitoring and observer data from Zone A suggests that the species being targeted normally comprises around 95 % of purse seine and mid-water trawl catches with other small pelagic species accounting for most of the bycatch.

Table 7 contains a description of each small pelagic species.

Table 7: Characteristics of the target species in the Small Pelagic Fishery

Characteristic	Jack mackerel	Peruvian jack mackerel	Yellowtail scad	Blue mackerel	Redbait
Distribution	Western Australia to southern Queensland and New Zealand	Abundant off South America, now established in New Zealand. Uncommon in Australia	Southern Queensland to Exmouth Western Australia	Shelf associated in Pacific, New Zealand and South-east Asia	Indo Pacific
Preferred habitat	Pelagic in coastal waters to at least 200m	Pelagic, 10 m to 300m	Pelagic forming large schools in inshore waters	Pelagic in coastal waters to at least 200m	Bathodemersal, depth range 100 to 500 m
Life history	Grow to 19 to 23 cm fork length at 2 years Lives for 15+ years Tasmania (23 years New Zealand) Are serial spawners and are believed to spawn deep in the water column near the continental shelf break	Poorly understood in Australian waters	Neritic species Mature at around 20 cm and 22 cm . Serial spawner	Lives from 8 to 24 years Thought to spawn in the southern Coral Sea and north eastern waters of the Indian Ocean	Maximum age estimated to be around 8+ years Length at 3 years old is about 245 mm.
Stock structure	There is some evidence that there are two stocks which overlap in Bass Strait	Evidence suggest that this species recently arrived from South America		Studies of mitochondrial DNA found no statistically significant difference between south eastern Australian and New Zealand samples. A parasite study (Rohde 1987) strongly suggested that Eastern Australia and New Zealand were separate.	
Schooling behaviour	Forms schools of similar sized fish. Surface schools are not generally found in water temperatures above 17°C. The abundance of surface schools shows strong inter-annual variability.			Forms size specific schools, known to school under larger pelagic fish kahawai and skipjack tuna	
Maximum size	47 cm fork length	70 cm total length	33 cm (FL)	65 cm (2.2 kg)	32 cm (TAFI)
Size at first maturity	50 % maturity in females at 31 cm	–		28 to 36 cm (3 to 5 years)	50 % of females mature at ~22 cm. Age of maturity estimated at 3 years

Characteristic (continued)	Jack mackerel	Peruvian jack mackerel	Yellowtail scad	Blue mackerel	Redbait
Known predators	Southern bluefin tuna, barracouta, shy albatross and Australian fur seals (Gales and Pemberton 1994), silver and mirror dories	-	Yellowfin tuna (Glaister and Diplock 1993) Yellowtail kingfish	Southern bluefin tuna (CSIRO) Shy albatross (Hedd and Gales 2001) gannets (Brothers et al 1993) and Australian fur seals (Gales and Pemberton 1994)	Australian fur seals (Gales & Pemberton) Southern bluefin tuna (CSIRO)
Catch history	Catches in Zone A exceeded 40,000 tonnes in mid 1980s.	Minor catch component in Zone A	Medium level catches in the NSW Ocean Haul Fishery	Medium level catches in the NSW Ocean Haul Fishery	Significant catches taken using the mid-water trawl method in late 2001
Recreational catch	Limited interest to recreational fishers. Recreational fishers target jack mackerel in inshore waters using recreational gillnets.	Negligible interest to recreational fishers	Highly valued as live bait and to a lesser extent for consumption	Highly valued as live bait and also sought after for human consumption.	Negligible interest to recreational fishers
Main commercial use	Fishmeal, bait, oil	Fishmeal, canned in South America	Fresh markets, longline bait, bait for recreational anglers	Fresh markets, export potential, important food fish in the northern hemisphere (canned, smoked and fresh)	Tuna farm feed
Concerns	Large catches taken in the 1980s have not been repeated. While it seems that the decline in catch is due primarily to oceanographic factors there is the possibility that fishing may have reduced jack mackerel populations.	Environmental concerns—this species now dominates New Zealand jack mackerel catches	Long lived species, catches off NSW comprise mainly 2 and 3 year olds but include smaller numbers of fish up to 15 years	Large northern hemisphere fisheries for chub and Atlantic mackerel (same genus) have shown a boom and bust cycles.	Limited information available on this species.

4.2 Bycatch species

Small pelagic species tend to aggregate in species and size specific schools. Purse seine and mid-water trawl methods rely on targeting aggregations of small pelagic species and as a consequence the bycatch of other species managed under other Commonwealth and state jurisdiction is relatively low. Observer data and onshore catch monitoring suggest that these species comprise less than 1 % of purse seine and mid-water trawl catches.

AFMA requires mid-water trawl operators to hold SETF concessions and to acquit any catches of SEF species against quota. Observer data from mid-water trawl operations indicates that small catches of SEF species like spotted warehou periodically occur in mid-water trawling operations.

Data from the Tasmanian Aquaculture and Fisheries Institute (TAFI) and AFMA indicate that catches in Zone A generally comprise 90 % by weight of the species targeted with almost all the remaining 10 % made up of other small pelagic species.

There is presently very little activity in the Commonwealth waters of the fishery north of Sydney (Zone D). Research undertaken in southern Queensland suggests that the composition of baitfish schools is more mixed in these waters. A limited developmental fishery for pilchards in southern Queensland was stopped in 1999 due to the capture of large numbers of dolphins. Anecdotal advice suggests the phenomenon of mixed schools and association with dolphins may also extend into northern New South Wales.

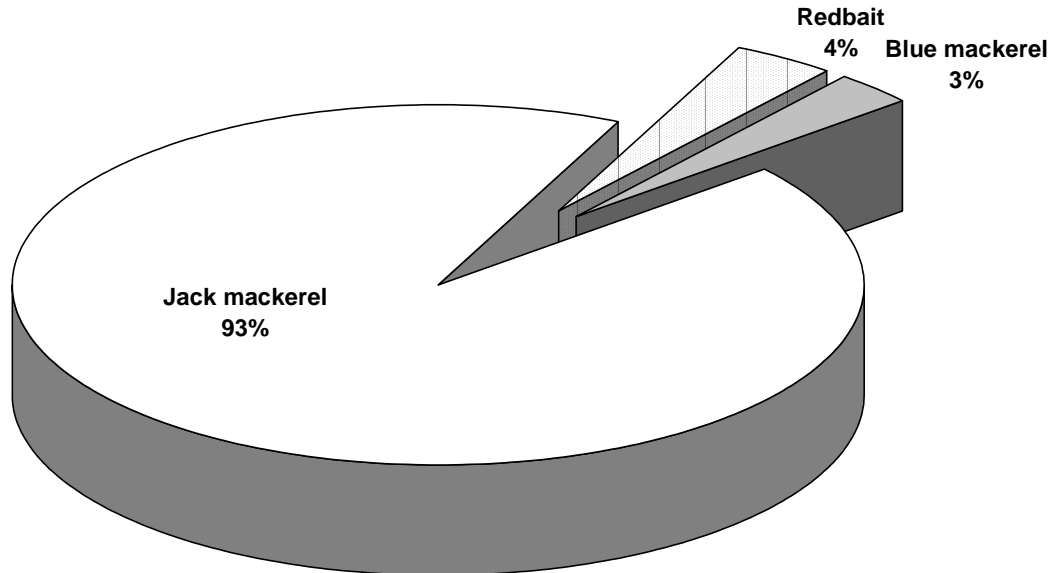


Figure 7: Purse seine catch composition – Zone A 1985 to 1989

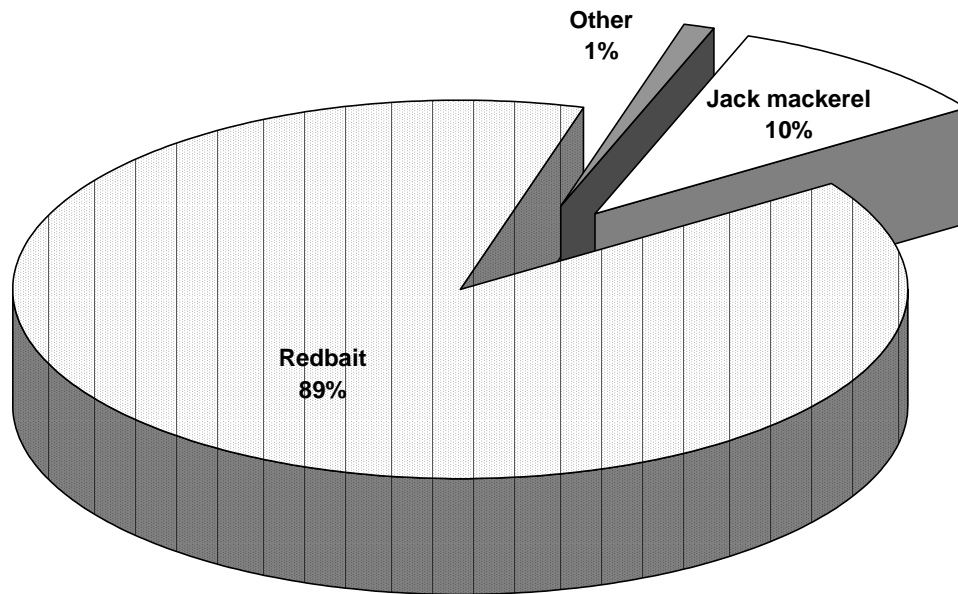


Figure 8: Mid-water trawl catch composition - Zone A 2001/02

There is limited logbook information on bycatch for Zones B, C and D as these have only been fished lightly to date.

5 Management arrangements

This strategic assessment report is being compiled as part of AFMA's responsibilities under the EPBC Act. As discussed in section 1, AFMA is required to demonstrate that the SPF is being managed in an ecologically sustainable manner for the purposes of accrediting the fishery and gaining export approval.

AFMA manages Zones, B, C and D in accordance with the AFMA Board approved Management Policy for the Commonwealth Small Pelagic Fishery March 2002. Access rights and the broad principles of this policy are primarily administered through a system of fishing permits, which are issued annually

Management measures, which are developed on the basis of periodic scientific and management review like the setting of TCLs, spatial management measures, specific gear controls and observer coverage levels are implemented as AFMA Board policy. AFMA communicates policy outcomes arising from Board consideration of advice from the consultative forums through mail-outs, AFMA's magazine *Fishing Future* and website.

AFMA does not have a formal MAC or FAG structure in place for the SPF given the lack of activity in Zones B, C and D. AFMA has, however, set up less formal consultative groups capable of providing expertise on all aspects of the fishery. These are:

Small Pelagic Research and Assessment Team (SPRAT)

The SPRAT provides advice to AFMA on the stocks of small pelagic species in Zones B, C and D and meets annually to determine risk weighted TCLs for the upcoming season for consideration by the AFMA Board.

The SPRAT is independently chaired. The SPRAT (and SPFWG) processes have been strongly supported by the states, industry, the recreational sector and conservation NGOs.

New South Wales, Tasmania and South Australia have supported the process through participation of scientists and managers from their respective state fishery agencies. Industry sectors based in those states have participated, as have representatives of the peak recreational fishing association (RecFish Australia).

Small Pelagic Fishery Working Group (SPFWG)

The Small Pelagics Working Group provides AFMA with advice on management and research needs of the SPF. The membership comprises commercial and recreational fishers, and representatives from environmental groups and State and Commonwealth fisheries management agencies.

A meeting of the SPRAT is convened within 30 days of a trigger point (TCL) being reached. The purpose of the meeting is to:

- € Review the available catch/effort data by time and area, as well as species composition of the catch;
- € Assess the risk to stocks, based on available information, and;
- € Recommend appropriate management response to the Small Pelagic Fishery Working Group (SPFWG) and the AFMA Board including consideration of:
 - whether a cap should be placed on either effort or catch;
 - alternative approaches that manage the impacts of ongoing catch on other users, or from an ecosystem perspective; and
 - any additional research or data collection that should be implemented.

The policy requires that the AFMA Board must decide on the most appropriate management response within 15 days of receiving the advice of the SPFWG/SPRAT.

Both groups work closely with the equivalent Zone A research and management advisory groups administered by DPIWE (described below).

Zone A Fishery

AFMA and DPIWE recognise that the current management approach is an interim arrangement pending the establishment of a Joint Authority and complimentary OCS agreement.

Tasmania will be responsible for the day to day management of the Zone A Fishery once the Joint Authority is gazetted. The proposed model for TACC setting would rely on expertise based advice from a formal scientific and management advisory committees (described below) and clearance through the AFMA Board before joint signoff by the Tasmanian and Commonwealth fisheries ministers.

In the interim both agencies have agreed to maintain existing access entitlements through complementary approaches. AFMA manages access to the Commonwealth waters of the fishery through the use of Zone A Fishing Permits, and DPIWE manages access to state waters through a system of licences. These are prepared with the following factors in mind:

- € continue to provide access to the resource for eligible persons in the lead-up to the establishment of the Joint Authority;
- € to preserve the relative access rights of various State and Commonwealth licence holdings until such time as an allocation of statutory fishing rights can be achieved under Tasmanian state law;
- € to respect, as much as is possible, the legislative objectives of Commonwealth and Tasmanian fisheries legislation.

DPIWE currently administers two expertise based advisory groups for the Zone A Fishery:

- € Zone A Small Pelagic Research and Assessment Group (ZASPRAG); and the
- € Zone A Small Pelagic Working Group (ZASPWG).

These are administered by DPIWE and both meet annually to review the TACC and other measures for the Zone A Fishery. The Working Group provides advice to DPIWE and the Tasmanian Minister for Primary Industries, Water and Environment.

DPIWE intend to formalise the assessment requirements in their draft management plan following the establishment of the Joint Authority. Under the proposed arrangements the Commonwealth will continue to have management and scientific input into the Zone A fishery through formal representation on both advisory groups and through the annual reporting process for the Joint Authority.

DPIWE propose that the setting of the Zone A TACC(s) be subject to:

- € advice received from TAFI, the Zone A SPRAG and Zone A SPWG;
- € review of the recommendations by DPIWE and the AFMA Board; and finally
- € joint approval of the Tasmanian Minister for Primary Industries, Water and the Environment and the Commonwealth Minister for Fisheries, Forestry and Conservation (or their delegates).

5.1 Decision rules in the Small Pelagic Fishery

Table 8: Decision rules

Sub-objective	Strategy	Decision rule	Implementation
Prevent overfishing in the SPF	<p>Zone A – TACC set for pooled species</p> <p>The TACC is further divided on the basis of method and access to state waters</p> <p>Additional trigger points based around changes in biological characteristics of the catch</p>	<p>Proposed by DPIWE</p> <p>If the catch of small pelagic species falls below 50% of the TACC for any one year a formal review process will be initiated. Subject to the review advice the following courses of action are available:</p> <ul style="list-style-type: none"> ∅ change in the TACC; ∅ introduction of species specific TACCs; ∅ spatial and temporal closures; ∅ prohibition or restriction on the take of specific fish species; or ∅ closure of the fishery. 	<p>The Zone A TACC is currently set out in a system of permits and licenses issued respectively by AFMA and DPIWE.</p> <p>The Commonwealth permits and state licences are complementary and set out the proportion of the TACC available to each permit 'class' (refer to Guideline 1.1.5).</p>
Prevent localised depletion	<p>Trigger catch limits (TCLs) set for each species³ in Zones B, C and D.</p> <p>Zone B – no more than 50% of the catch of blue mackerel and jack mackerel to be taken in any one 5° longitude band</p>	<p>1) SPRAT to convene within 30 days of a TCL being reached to review catch and make a recommendation to the AFMA Board:</p> <ul style="list-style-type: none"> ∅ whether a cap should be place on effort or catch; ∅ alternative approaches for managing impacts on other users, or ecosystem; ∅ any additional research or monitoring should be implemented; ∅ the AFMA Board required to respond within 15 days from receipt of advice; <p>2) should the catches/discards exceed the TCL by 25 % or greater the relevant zone will be closed to fishing until the review (1) is completed.</p> <p>That area of waters closed to targeted fishing for that species</p>	<p>Managed under the Management Policy for the Commonwealth Small Pelagic Fishery</p> <p>Fishery managed under permits</p> <p>TCLs and spatial management administered as AFMA Board Policy</p>
			AFMA Board Policy (2003)

³ Peruvian jack mackerel included with jack mackerel

5.2 Input controls

Zones B, C and D

The fishery is subject to limited entry. The only other significant element of the management policy administered by way of input control is the type of fishing gear allowed. Commonwealth permit holders are currently limited to the mid-water trawl and purse seine methods. Most Commonwealth permit holders can elect to use either of these methods depending on which best suits the conditions as most are entitled to use both methods.

There are no boat size restrictions in place on Commonwealth SPF permits.

Other than closing the fishery to new entrants AFMA has chosen not to pursue input controls as a means of managing the SPF. Profitable fishing for small pelagic species (both here and overseas) relies on targeting of aggregations. Information to date suggests that the fishery is highly specific to small pelagic species and operators are not permitted to target other species while fishing against SPF permits. On this basis AFMA believes the best way of limiting catches of small pelagic species to sustainable levels is to manage based on catch.

Given its current understanding of the fishery AFMA therefore cannot justify additional input controls on the basis of its legislative objectives. It is possible that specific input controls could be needed in the future for environmental reasons or as a result of the outcome of Commonwealth Government policy review on resource sharing and recreational sector allocation.

Zone A

There is an additional layer of input controls in Zone A which reflects the varying degree of access particular licence classes/gear sectors had to the then jack mackerel fishery in the 1980s and 1990s. Most of these restricted access arrangements were administered under Tasmanian jurisdiction, however, some restrictions are still supported by way of reciprocal arrangements in Commonwealth permits. DPIWE and AFMA both recognise the need to maintain the integrity of the system of access rights until the establishment of the Joint Authority and proposed allocation of statutory fishing rights by the Tasmanian Government can take place.

These input controls include:

- ∅ vessel size restrictions (Tasmanian Diversified Inshore Sector);
- ∅ restrictions on gear (purse seine only sector);
- ∅ restrictions on gear (Commonwealth trawl only sector); and
- ∅ closures (state waters for trawl method inside 3nm and closures for the purse seine method in some enclosed waters).

DPIWE has advised AFMA that, subject to consultation (and parliamentary support), some of these measures might be modified following the allocation of SFRs and the implementation of a statutory management plan.

5.3 Output controls

All sectors of the fishery are subject to output controls. These are set annually on the basis of scientific and management advice for each Zone.

Zones B, C and D

The AFMA Board sets Trigger Catch Limits for Zones B, C and D. AFMA's policy is that these are set on a precautionary basis and requires that the SPRAT prepares its advice in that context. The TCLs are:

- € species and zone specific
- € competitive
- € subject to review if triggered during the season.

The maximum amount a TCL can be exceeded is 25 % unless the review process provides recommendations that fishing can continue and this is supported by the AFMA Board.

Zone A

DPIWE sets a TACC for Zone A each year. The TACC is based on the advice of the Zone A Small Pelagic Research and Assessment Group (ZASPRAG). The TACC applies to all small pelagic species managed in the fishery and is further allocated across licence holdings as described in Guideline 1.1.6.

6 Economic assessment

Small pelagic species are low value fish. However, substantial fisheries can be sustained around ports adjacent to large concentrations of these species. The catching and processing of small pelagic species makes an important contribution to the regional economies around Eden in NSW and Triabunna in Tasmania.

The industry sectors currently targeting small pelagic species are:

- € industrial fishing in Zone A under moderate TACCs (based on large historic catches of jack mackerel). The sector has recently diversified with the introduction of mid-water trawling leading to commercial catches of redbait;
- € smaller scale targeting by Commonwealth and state operators for fresh markets and bait markets mainly off NSW and to smaller extents in Tasmania and the GAB;
- € bait catching by Commonwealth tuna operators.

There are small local markets for fresh chilled blue mackerel, yellowtail scad and jack mackerel, however, these are easily oversupplied with a resultant collapse in market price.

Jack mackerel caught in Zone A is used to produce fishmeal, tuna farm feed (dice up) and oil with a small amount being sold as rock lobster bait. Redbait fetches higher prices as feed for the Port Lincoln tuna farms. The proximity of suitable processing facilities including freezing and fishmeal processing plants is the key factor in determining whether large scale fishing for small pelagic species is profitable. AFMA expects that any short term expansion in fishery will probably take place in reasonable proximity to key fishing ports like Triabunna, Eden, Lakes Entrance, Port Lincoln and Albany.

The recreational and charter sectors in southern Australia place a high value on their right to access these species. Recreational and charter fishers rely on access to these species as bait to target sought after game fish species in most states. These sectors also make an important contribution to the regional economies, with large influxes of anglers occurring during the warmer months and during organised game fishing tournaments.

Game fishers and charter fishers use small pelagic species as bait (both live and dead). Game fishers consider reliable access to these species as a key to their success in targeting tuna, kingfish, striped marlin and other game fish species. Inshore and shore based fishers target yellowtail scad and blue mackerel for consumption and for use as live and dead bait.

Recreational peak bodies have also raised broader concerns about the role small pelagic species play in the ecosystem, particularly with regard to their importance as prey for gamefish species.

6.1 Permits

Given the distinct seasonality and historically variable nature of jack mackerel abundance in the fishery, the majority of Commonwealth SPF permit holders are not solely dependent upon the fishery for their livelihood. Most operators also hold fishing concessions that allow them access to other Commonwealth and state fisheries.

At the present time there are 70 fishing permits registered to 35 individuals, partnerships or companies at addresses in the following regions:

Home state (permit holder)	Number of permits (some holders hold multiple permits)
South Australia	11
New South Wales	8
Western Australia	7
Tasmania	6
Victoria	2
Queensland	1

7 Alternative management controls

AFMA considers that stocks of small pelagic species in Zones B, C and D (excluding Zone D yellowtail scad) are lightly fished⁴. However, AFMA recognises that there is limited information on stock structure, abundance and productivity. AFMA is aware that if domestic markets for small pelagic species were to improve there would be a strong incentive for the activation of latent permits and potential for overcapitalisation. AFMA has, on the basis of advice from the SPRAT, implemented output controls in the form of precautionary TCLs for these zones.

AFMA believes this approach (limited entry, and TCLs for each of the major species) will provide a sound basis for the development of small pelagic resources as more information on the stocks and environmental impacts becomes available and Commonwealth Government policy on resource sharing in regard to the recreational sector is finalised.

Catches in Zones B, C and D have never approached the trigger TCLs set by AFMA and, as a result, AFMA believes there is insufficient information on stock structure, stock abundance and productivity to proceed immediately to a management arrangement based on individual transferable quotas.

In this context AFMA believes the Management Policy for the Commonwealth Small Pelagic Fishery (March 2002) to be preferable to the alternative regimes based on current knowledge of the fishery.

Zone A of the fishery is currently managed using a multi-species TACC. Most of the catch has been historically taken inside Tasmanian state waters and, as a result, the nature of the access rights is more consistent with Tasmanian fisheries legislation and policy than the Commonwealth *Fisheries Management Act 1991*. AFMA (since its inception in 1992) and the Tasmanian Government have worked together to implement a more permanent management relationship for the Zone A Fishery however the slowdown of the fishery in the 1990s has meant that it has not been a high priority for either jurisdiction.

The Commonwealth and the Tasmanian governments are now proceeding with the establishment of a Joint Authority and AFMA understands this should be in place by early 2004. DPIWE has advised AFMA that, once the authority enters into force, their intention is to introduce long term management arrangements. At this stage DPIWE's preferred approach is a fishery management plan based on Individual Transferable Quota (ITQs).

AFMA expects that limited elements of the Tasmanian management regime (policy and proposed plan) will be inconsistent with the objectives of the Commonwealth legislation given that the *Living Marine Resources Management Act 1995* includes explicit socio-economic objectives. AFMA is, however, confident that the proposed management regime will be consistent with the Commonwealth's management approach in regard to measures in place to ensure sustainable management of the target species and the fishery's environmental impacts.

⁴ The 2000/2001 BRS Status Report rated the status of the jack mackerel stock as uncertain and considered that the stock in the western region of the AFZ is probably underfished.

8 Data collection monitoring and compliance

8.1 Fishery catch and effort data

All operators in the SPF are required to complete a catch and effort logbook. Purse seine operators complete the PS01, and mid-water trawling operators need to complete the SWT01. The information in the logbook is used for scientific purposes and allows researchers to better assess exploitation rates, fleet dynamics and total landed catch from the fishery. The volume of self caught bait from the ETBF and WTBF longline and minor line sectors is recorded in the AL05 and OT03 logbooks.

The PS01 and SWT01 logbooks provides for the recording of:

- ∄ Vessel details, including vessel dimensions, vessel name and distinguishing symbol, engine power, fuel capacity, cruise speed, technological equipment, and fish hold capacity.
- ∄ Owner's and master's details.
- ∄ Details of the fishing gear used.

Each page within the logbook provides for the daily recording of:

- ∄ If activity was carried out, and whether the activity was searching or fishing (PS01 only)
- ∄ The location of fishing activity (latitude and longitude).
- ∄ Fishing effort parameters (relevant to particular method)
- ∄ The estimated weight of each species caught.
- ∄ Bycatch details (species weight)
- ∄ Comments (PS01 only)

The concession holder or another authorised person is required to complete the logbook and certify that the information is a complete and accurate record. The likelihood of timely and accurate logbook completion is greatly increased by the requirement to make a landing report, and the possibility that the consistency of the report, the logbook records and the landed catch will be examined on the vessel's arrival in port (see 3.8.5). Industry have agreed to submit logsheets to AFMA within 7 days of returning to port to assist with monitoring of TCLs and the TACC in Zone A. The statutory period for the return of logsheets is 14 days from the end of the month during which the recorded fishing activity occurred.

The concession holder or another authorised person is also required to furnish 'nil returns' to account for periods when no fishing activity was undertaken. Failure to complete and submit log returns in accordance with these requirements may attract a caution or infringement notice. Persons giving false or misleading information may be liable for fines of up to \$27,500 or imprisonment for up to 12 months.

Logbook officers periodically visit fishing ports to talk to fishers about the logbook program and its importance to the management of the fishery. Feedback from these meetings helps AFMA improve logbook design and procedures.

AFMA contracts a company to enter logbook data onto AFMA's databases. This company is currently housed within AFMA's tenancy. The data entry consultants work closely with AFMA's staff to ensure the logbook data is entered in a timely and accurate fashion. Data entry consultants chase up outstanding returns from operators to ensure the integrity of AFMA's logbook databases is maintained. Logbook data returns for the 2002–03 SPF season were 100% complete as of August 2003.

There are restraints built into the current AFMA data entry systems, which warn the data entry consultants whenever questionable data is entered. These qualifiers greatly reduce the potential for keystroke errors. The data entry consultants contact operators when key fields have not been completed and when there is confusion in significant data fields.

AFMA has not yet implemented computerised routines to examine logbook data once it has been entered but has the capacity to do so. AFMA would rely largely on the expertise of the SPFWG and SPRAT to define the criteria for these checking routines and the decision rules for dealing with outliers.

Logbook data from the fishery are provided under Deeds of Confidentiality to scientists working on research projects and stock assessments that assist AFMA to meet its legislative objectives in regard to the fishery.

8.2 Observers

AFMA observers have undertaken cruises on pair trawl vessels in Zone A. Observer coverage of pair trawl operations was greater than 50% in 2001/02. AFMA has agreed that future observer deployments in Zone A will be managed by DPIWE and TAFI.

AFMA will base its decision to deploy observers in Zones B, C and D on the level of fishing activity and the advice of the SPRAT in regard to fishery data requirements and any potential for interactions with protected species. AFMA observers collect information for scientific and management purposes.

TAFI has an observer program operating in the mid-water trawl sector of the fishery. The observers collect scientific data on target species, bycatch and monitor operations for any interactions with protected species.

8.3 Landing reports and catch disposal records

Under DPIWE's proposed policy for the Zone A Small Pelagic Fishery (ZASPF) operators can only sell small pelagic species taken in Zone A to licensed fish receivers, further:

- € small pelagics can only be unloaded at Hobart, Triabunna or Devonport; or
- € at other Tasmanian or mainland ports provided prior 'intention to unload' reports are made to the Tasmanian Police or AFMA respectively.

Prior landing reports and catch disposal records are not required in Zones B, C and D at the present time. AFMA management currently monitor catches as reported in logbooks and will consider implementing prior reporting and catch disposal records if catches approach the trigger TCLs. Operators in Zone A are assisting by voluntarily completing Commonwealth Catch Disposal Records (SESS 2).

9 Research and assessment

9.1 Small pelagic species research

There has been a large amount of research done on small pelagics worldwide particularly where these species form the basis of large fisheries. Ward et al found that some research findings from northern hemisphere mackerel (*Scomber* species) fisheries were relevant to Australian fisheries for blue mackerel.

There has been limited research on small pelagic species in Australian waters. The focus of some of the research conducted in the 1980s and 1990s varied with some being driven by jurisdictional priorities and sectoral issues. Some useful earlier research looked into the oceanographic and environmental influences on jack mackerel abundance and their trophic role (Harris et al 1988 and 1992).

In recent years AFMA (through the SPRAT and SPFWG), FRDC, AFFA and state fishery agencies have sought to prioritise research into small pelagic species on the basis of its relevance to the management of commercial and recreational fisheries for those species. The Commonwealth, states, industry and recreational sectors recognise that a cooperative approach is needed to manage small pelagic species given the diversity of commercial, recreational and indigenous interests in these species and their trophic importance to other fisheries and temperate ecosystems.

An important outcome of this coordinated approach was the broad support for the FRDC Project 2002/061: Development and evaluation of egg-based stock assessment methods for blue mackerel.

SARDI and AFMA also contributed funds towards this three-year project and TAFI and NSW Fisheries have committed in kind support. A steering committee was formed to manage this project. It includes representatives from the Commonwealth, state fisheries agencies, universities and industry and recreational sectors.

The project will determine if an egg production model can be used as a basis for stock assessment for blue mackerel. This methodology has been successfully applied to the South Australian pilchard fishery (FRDC 94/029⁵).

TAFI is currently developing a research program on redbait in response to recent commercial catches of that species in Zone A. The research program is funded by industry contribution through fees for licences and quota fees. A list of completed research projects is provided against Guideline 1.1.1.

9.2 Research priorities

AFMA relies on the SPRAT and SPFWG to set research priorities for the fishery and to help advertise the research needs of the SPF. Participation on both groups is currently managed on a less formal basis than membership of AFMA's MACs and FAGs. One benefit of this approach is that input from all sectors and jurisdictions is accommodated while cooperative management arrangements and resource sharing issues are being developed and implemented.

⁵ A collaborative investigation of the usage and stock assessment of baitfish in southern and eastern Australian waters, with special reference to pilchards (*Sardinops sagax*)

This cooperative approach has helped secure funding commitments from Commonwealth and state agencies for recent investigations and research proposals relevant to the fishery.

Given the relatively low level of catches in the fishery, there is limited scope for raising substantial research funds through industry levies. In established fisheries these MAC Initiated Research Funds (MIRF) are used to fund fishery specific research. MIRF funds are partitioned by AFMA for use in those fisheries from which the funds were raised.

Currently the Small Pelagic Fishery must secure most of its research funds through the competitive process administered by AFMA (through the ARF) and the FRDC. Funding is also available from the FRRF (administered by AFFA), however, this is normally earmarked for independent assessment purposes⁶ and policy development. The SPRAT 2004/05 research priorities are provided as Attachment 7.

9.3 Fishery assessment

Two assessment groups currently provide advice on small pelagic species:

- € the Zone A Small Pelagic Research and Assessment Group (ZASPRAG) which provides advice on Zone A to DPIWE and AFMA; and
- € the Small Pelagic Research and Assessment Team (SPRAT) provides to provide advice to AFMA on TCLs for Zones B, C and D.

There is no formal stock assessment model in place for any of the small pelagic species. In the absence of reliable indices of abundance both assessment groups review historical catch and effort data, available information on the biology and life history of domestic small pelagic species and draw on information from other small pelagic fisheries to set Total Catch Limits (TCLs).

The FRDC Project 2002/061: Development and evaluation of egg-based stock assessment methods for blue mackerel is expected to provide the basis for a quantitative stock assessment for blue mackerel.

10 Regional activities

10.1 Other fisheries

The large area of waters of the SPF fishery overlap with many commercial and recreational fisheries. Other than in Zone A the low level of fishing undertaken to date in Commonwealth zones B, C and D means that the impact of the SPF on other fisheries either directly or through ecosystem effects is believed to be minimal.

Sections 4.1 to 4.5 describes those fisheries where overlap of catch/bycatch exist with the SPF. Table 9 summarises these 'direct' impacts and identifies potential indirect impacts the SPF might have with other fisheries prosecuted in its area of waters.

⁶ The BRS Review of biology and fisheries for mackerel was funded by the FRRF.

Fishery	Targets small pelagic species	Bycatch of SPF species occurs in the fishery	SPF has a bycatch of the fishery's target species	Target species known to prey on small pelagic species (not including larvae)	Target species occupies similar ecological niche to small pelagic species
Eastern Tuna and Billfish Fishery	Targets blue mackerel and yellowtail scad for bait	No	No	Yes yellowfin tuna and striped marlin known to feed on blue mackerel and yellowtail scad	Skipjack tuna and large blue mackerel may have some dietary overlap
Southern and Eastern Shark Fishery	No	Yes bycatch of most small pelagic species occurs in the demersal trawl sector	Limited – and these must be covered by quota	Yes – mirror dory, john dory tiger flathead and school shark are known to prey on jack mackerel	Jack mackerel appears to have an important trophic role in the demersal community
Southern Squid fishery	No	No	Small bycatch Gould's squid	Gould's squid and southern calamari are known to prey on yellowtail scad and jack mackerel	No
New South Wales Ocean Haul Fishery	Yes blue mackerel and yellowtail scad	NA	Yes	No	Fishery takes same species but in the coastal waters/beaches
Southern bluefin tuna Fishery	No	Very limited bycatch in bait operations for pilchards	No	SBT prey on redbait and jack mackerel off Tasmania and in the GAB	No
South Australian Pilchard Fishery	No	Limited bycatch of blue mackerel	Potentially	No	Pilchards are an important part of the inshore pelagic fish assemblage off SA
Western Australian salmon and herring fisheries	No		Potentially for herring	Salmon possibly prey on yellowtail scad and small blue mackerel	Herring occupy similar habitat to pilchards, yellowtail scad and young blue mackerel
Western Australian Purse Seine fisheries	No	Limited bycatch of blue mackerel and yellowtail scad	Potentially	No	Pilchards are an important part of the inshore pelagic fish assemblage
Western Australian - South Coast Trawl	No	Possible bycatch of blue mackerel and jack mackerel	Potentially	Uncertain	
Western Tuna and Billfish Fishery	Entitled to target small pelagic species for bait	No	No	Yellowfin tuna and striped marlin likely to feed on blue mackerel and yellowtail scad	Skipjack tuna and large blue mackerel may have some dietary overlap
Recreational fisheries	Recreational fishers target yellowtail scad and blue mackerel for bait and food	Not relevant	Limited	Yes as for commercial tuna fisheries.	Not relevant

Table 9: Other fisheries in the area of waters of the Small Pelagic Fishery

10.2 Other activities

Transport

This fishery incorporates Australia's southern coastline and southern parts of the east and west coasts. Ocean transport is crucial to the Australian economy and many vessels move through the area of the SESSF. Most of the large vessels use the major ports within the area of this fishery, including:

Brisbane	Coffs Harbour	Newcastle	Sydney
Port Kembla	Lake Entrance	Melbourne	Hobart
Launceston	Devonport	Portland	Port Adelaide
Port Lincoln	Esperance	Albany	Fremantle

There are many other smaller ports within the area of this fishery that are also commonly used by transport vessels. Map 69 in Larcombe et al. (2002) shows shipping routes and traffic in 1999-2000 for south-eastern Australia (from about Wollongong, NSW to western Kangaroo Island, South Australia). It is clear from this map that the majority of shipping stays relatively close to the Australian mainland. The majority of the ships travelling through the Bass Strait region tend to stay close to the Victorian coast, although some traffic transits Bass Strait.

Map 70 in Larcombe et al. (2002) breaks the shipping traffic in south-eastern Australia into four main categories:

- ∅ Routes to and from south eastern Australia
- ∅ Transit routes
- ∅ Ferry routes
- ∅ Routes within south eastern Australia

The majority of shipping in south eastern Australia falls into the first category, with substantial shipping within the region and transiting through south eastern Australia to and from ports in New Zealand and northern Australia. The only major ferry routes in Bass Strait are from Melbourne to Devonport and George Town and from Flinders Island to Bridport and Port Welshpool. A ferry service also operates from Cape Jervis to Kangaroo Island in South Australia.

Tourism

Tourism is the most important industry to many of the coastal communities situated adjacent to this fishery. The marine and coastal environments are extremely important to this tourist industry. A list of major tourist activities that occur within the area of the SPF or adjacent to it includes:

Recreational fishing	Game and charter fishing	Whale watching
Surfing and swimming	Scuba diving and snorkelling	Yachting and yacht racing

Most of these tourist activities are centred very close to the coast and fishing from the SPF has the potential to interact with some activities in particular recreational fishing which is extremely popular throughout most of the area of this fishery. Game fishing is popular along the eastern coast of NSW and Tasmania and off the west coast of Western Australia. Game fishing is less popular off Victoria and South Australia. Game fishing can occur out of any port but the Gold Coast, Port Stephens, Sydney, and Batemans Bay, Narooma, Bermagui, St Helens, Eaglehawk Neck, Port MacDonnell, Port Lincoln and Fremantle are some of the most popular ports. This fishing is usually based on large tuna and marlin species that are under Commonwealth jurisdiction. Some charter operators also target other species such as kingfish and flathead. Map 85 in Larcombe et al. (2002) shows the number of charter operators in each port in South eastern Australia. This includes all charter vessels mainly used for fishing, diving and whale watching.

Yachting is another recreational activity that occurs further from the coast where the majority of the fishing in the SPF occurs. Yachting can vary from a single or small number of vessels out for a days sailing to organised, highly competitive races such as the Sydney to Hobart. Map 86 in Larcombe et al. (2002) shows the major yacht races that occur in south eastern Australia each year.

Petroleum, underwater pipelines and cables

The offshore petroleum industry is a major industry in Bass Strait and impacts on the environment of the SESS Fishery. Map 74 in Larcombe et al. (2002) shows the areas covered by offshore petroleum titles. These areas are mainly in continental shelf waters of less than 200 m depth and are largely situated in north eastern Bass Strait, western Bass Strait and south eastern Tasmania and south eastern South Australia. The actual position of oil and gas wells is shown on map 77 in Larcombe et al. (2002). There is a large concentration of wells in north eastern Bass Strait. Wells have also been drilled in central Bass Strait, off Western Tasmania and of south western Victoria but have mainly been found to be dry. Associated with the wells in north eastern Bass Strait are a number pipelines and other infrastructure connecting the platforms to each other and the mainland. Map 78 of Larcombe et al. (2002) shows oil and gas pipelines and a proposed gas pipeline that will connect Tasmania to mainland Australia.

Seismic Surveys

Part of the oil exploration process is seismic surveys. Offshore seismic surveys, involving the use of high intensity sound signals to probe the geological structure of the seabed, were first carried out in Australia in the Otway Basin off Victoria's western shoreline in 1959. In the following forty years, almost 300,000 kilometres of trackline were surveyed by seismic vessels deploying first explosives and then arrays of compressed air guns. Intermittent firing of the air guns sends high-energy sound waves down through the water column and into the underlying rock. This technology has allowed the petroleum industry to search for and locate oil-bearing deposits below the seabed (Larcombe et al. 2002).

Two types of seismic survey have been used: two-dimensional (2D) and three-dimensional (3D). The latter involve a closely spaced grid of survey transect lines and are more intense and localised than a linear 2D survey. Since 1963, roughly 180 000 kilometres of 2D seismic lines have been acquired in the south eastern Australia from over 190 surveys. The vast majority of these have been concentrated in three dense patches in Bass Strait: the Gippsland Basin (73 000 km), the Otway Basin (53 000 km) and the Sorrell Basin (38 000 km). The most recent survey in 2001 was carried out in the Otway and Sorrell Basins. There were no 2D seismic surveys in the region between 1996 and 1998 nor in 2000 (Larcombe et al. 2002). Maps 75 and 76 of Larcombe et al. (2002) show where 2D and 3D seismic surveys have occurred.

The effect of seismic surveys on marine life is not well understood. It is known that seismic surveys kill and damage fish eggs and larvae. This damage only occurs in close proximity to the air guns involved in seismic survey and is not thought to significantly harm fisheries, especially if surveys are well planned and are conducted outside breeding seasons.

The more serious effect that seismic surveys have on fisheries is the effect on fish behaviour. Several cage studies on various fish, turtle and cetacean species have been conducted (eg Pearson et al. 1992; McCauley et al. 2000). Sounds from the air guns used in seismic survey affect fish behaviour at levels of 154 DB, about 100 DB lower than the sound emitted by a typical seismic survey air gun. Air gun sounds lose 100 DB over distances of at least 10km (Kenchington 1999). It is thought that some of these behavioural changes either affect the catchability of the fish or cause them to migrate out of fishing grounds, reducing commercial fish catch rates.

The only experiment on the effects of seismic surveys on fisheries occurred in the Barents Sea using randomly located trawl (185 tows) and demersal longlines (131 sets) five days prior, during and five days after a 3-D seismic survey (Engas et al. 1996). This was conducted on fishing grounds for Atlantic cod and haddock in conjunction with an acoustic survey. Catch rates of the Atlantic cod and haddock dropped by 45% and 67% inside the survey area and 25% and 50% adjacent to the survey area during the survey (Engas et al. 1996). Catches rates did not return to normal during the five days after the survey.

Basslink

Basslink Pty Ltd has been given environmental approval from the Victorian, Tasmanian and Commonwealth government to connect the Tasmanian electricity grid to the mainland grid. Basslink is a high voltage electricity cable that will connect the Tasmanian and Victorian electricity grids and will run through Bass Strait. The cable will be laid within the area of Small Pelagic Fishery although that part of Bass Strait is currently not lightly fished for small pelagic species.

The cable will be monopole with metallic return. This configuration has a metallic wire several metres from the main cable to complete the circuit. This option prevents the expected corrosion of the monopole option, but will still create a relatively large electric field.

The potential effects of the Basslink cable have been reviewed by Walker (2001) and it is uncertain how the cable will affect the marine fauna. As shark and ray species are sensitive to electrical fields these animals are the most likely to be affected by Basslink. It is unclear what impacts such an operation might have on small pelagic species.

The conditions of approval for the Basslink project require a monitoring program for marine biota to be developed. The monitoring program will be reviewed by the Bass Strait Environment Review Committee, which is yet to be established. Basslink Pty Ltd held a meeting in early May and another in late June 2003, to discuss the scope of the marine monitoring program and the terms of reference and membership of the Environment Review Committee.

11 Marine protected areas

There are many Marine Protected Areas (MPAs) in the area covered by the SPF, including both Commonwealth and State declared MPAs. Some MPAs are multi-zoned, with fishing allowed in some parts but not others. The following is a description of some of the major MPAs that are relevant to the SPF.

11.1 Jervis Bay Marine Park

Jervis Bay Marine Park is approximately 180km south of Sydney and 20km south east of Nowra, in the Batemans marine bioregion. The marine park covers an area of approximately 22,000 hectares and spans over 100km of coastline and adjacent ocean, extending from Kinghorn Point in the north to Sussex Inlet in the south and including most of Jervis Bay (see Key Map).

The marine park is a multiple-use park that aims to conserve marine biological diversity and marine habitats, while catering for a broad range of recreational and commercial activities.

The park is in New South Wales State waters and does not have a direct impact on Commonwealth SPF permit holders. Restrictions on access do, however, affect tuna longline operators seeking bait and state licensed purse seine operators in the Ocean Haul Fishery. The longline fleet has traditionally relied on Jervis Bay as a source of bait (particularly in bad weather).

The Royal Australian Navy (RAN) has been associated with Jervis Bay for almost 90 years and uses Jervis Bay for a variety of training activities. Defence services are exempt from any restrictions imposed by the NSW marine parks legislation. However, cooperative management strategies are in place through an agreement between the NSW Marine Parks Authority and the Commonwealth Department of Defence.

More information on the park can be accessed at <http://www.mpa.nsw.gov.au/>

11.2 Great Australian Bight Marine Park

The Great Australian Bight Marine Park includes waters within State (South Australia) and Commonwealth jurisdictions. The South Australian component of the Park was declared in 1996 as the “Great Australian Bight Marine National Park”, primarily to protect calving grounds of the southern right whale and important populations of the Australian sea lion . The Commonwealth component of the Park was declared in 1998 as the “Great Australian Bight Marine Park (Commonwealth Waters)” to complement the South Australian component in protecting southern right whales and Australian sea lions, and to protect the seafloor environment as part of the National Representative System of Marine Protected Areas, a key element of *Australia’s Oceans Policy*.

The Commonwealth component is made up of two overlapping Zones, as detailed in the *Great Australian Bight Marine Park (Commonwealth Waters) Plan of Management* (Commonwealth of Australia, 2000):

- 4 The Marine Mammal Protection Zone is broadly parallel to the coast and complements the South Australian component of the Park, primarily to protect the southern right whale and Australian sea lion. This Zone extends from three to approximately 12 nautical miles offshore and is approximately 139 nautical miles wide.
- 4 The Benthic Protection Zone is broadly perpendicular to the coast and protects the unique and diverse flora and fauna in that area associated with the seafloor, as well as the underlying sediments. This Zone extends from three to 200 nautical miles offshore and is approximately 20 nautical miles wide.

Fishing in the area now included in the Park has a long history and remains part of the economic and social culture of the coastal areas in western South Australia. A number of Commonwealth- and State-administered commercial fisheries operate in the Park.

The management plan for the Commonwealth component (Commonwealth of Australia, 2000) includes a number of provisions relevant to commercial fishing. Generally, commercial fishing is allowed if it occurred at the time the Park was declared. However demersal trawling is banned and the Marine Mammal Protection Zone is closed to all vessels from 1 May to 31 October each year. If an existing fishery expands or extends its range, or a new fishery is proposed that overlaps the Park, additional access to the Park will only be granted if a full assessment of the potential impacts shows that there will be no significant negative impacts on the values of the Park. Any fisher operating within the Park must hold and comply with a valid Commonwealth or State statutory fishing concession. In addition, they must hold and comply with the conditions of a permit from the Commonwealth Director of National Parks. He or she must report any interaction or incident between a fishing vessel or fishing equipment and a marine mammal, or one that significantly damages the seafloor sediments, flora or fauna within the Benthic Protection Zone. The Commonwealth Director of National Parks has wide powers to impose additional controls on fishing within the Park.

The management plan for the State component (Government of South Australia, 1998) requires fishers to hold relevant statutory fishing concessions and also to observe the permanent closure of the component’s Sanctuary Zone and the annual closure of its Conservation Zone from 1 May to 31 October.

11.3 Wilson's Promontory Marine Park and Marine Reserve (Victorian Government)

Wilson's Promontory Marine Reserve adjoins the Wilson's Promontory National Park along the southern coastline and includes its nearby islands. The Reserve includes a 300 metre wide protection zone around the rocky reefs between Norman Bay and Refuge Cove. No draft Management Plan or Management Plan exists for the Reserve and Park. The Wilson's Promontory Marine Reserve and Park are comprised of Victorian State waters.

The Reserve is characterised by steep granite outcrops, and sandy seafloors which are close inshore and can reach a depth of fifty metres. A diverse range of marine flora and fauna inhabit these underwater cliffs, providing an ideal diving environment.

Oberon Bay includes seagrass meadows (*Heterozostera tasmanica*) which support rich communities of marine flora and fauna and provide nursery and feeding habitats for many fish species. Kanowna Island and Andersons Islets are breeding grounds for Australian fur-seals and, many oceanic birds including penguins, short-tailed shearwaters, fairy prions, silver gulls and Pacific gulls.

Wilson's Promontory Marine Park encompasses the eastern and western coastlines of Wilson's Promontory, north of the fully protected Marine Reserve. The Marine Park is characterised by soft sediment areas among offshore reefs with diverse biotic assemblage and four species of significant seagrass meadows.

Pillar Point near Tidal River and Refuge Cove on the east coast are popular locations for diving and snorkelling. Line fishing is the only type of fishing permitted in this area. Line fishing and commercial fishing is permitted in the remainder of the Park, and spearfishing and diving for abalone and rock lobster are permitted subject to some restrictions.

11.4 National Representative System of Marine Protected Areas

The MPAs listed above are part of the National Representative System of Marine Protected Areas (NRSMPA). The NRSMPA aims to establish and manage a comprehensive, adequate and representative system of MPAs and to contribute to the long-term ecological viability of marine systems, to maintain ecological processes, and to protect Australia's biological diversity at all levels (ANZECC 1999). The NRSMPA also aims to provide for the species requirements of threatened species, migratory species and species vulnerable to disturbance. Within the NRSMPA, MPAs have been established for the conservation of biological diversity and to have a secure status. The Commonwealth Government has highlighted its commitment to the NRSMPA by introducing the *Australian Oceans Policy*.

12 Indigenous interests

On October 11 2001 the High Court of Australia affirmed two earlier Federal Court decisions that native title claims could exist over the sea. This decision ruled that while native title could exist, Indigenous Australian's do not have a right of exclusive possession. The Federal Court ruled that native title could co-exist with other rights and that native title is still regulated by fisheries laws.

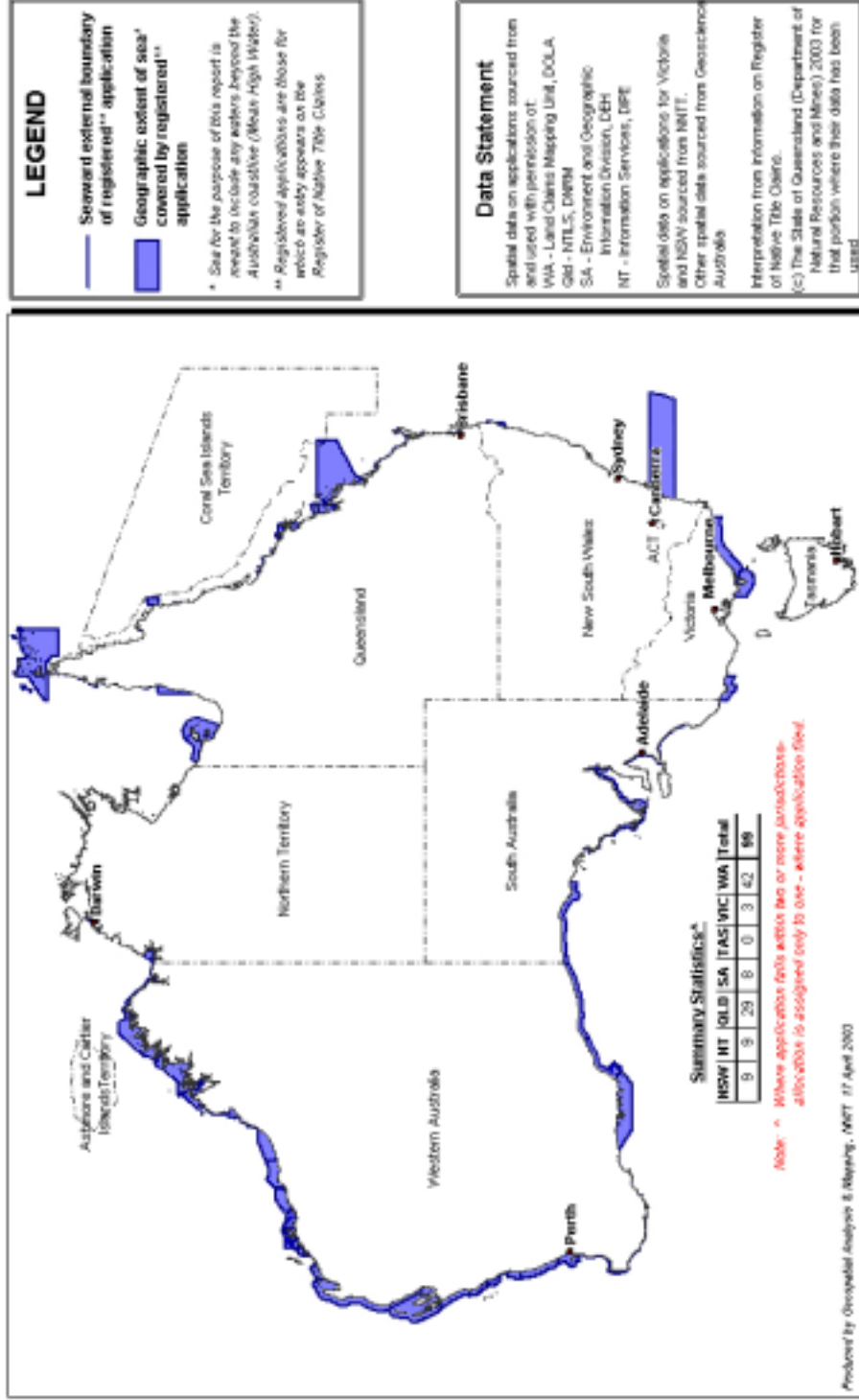
At the time of the decision about 120 native title claims involving areas of sea existed. Many of these claims do not affect this fishery, as some are in northern Australia outside the area of the fishery.

There is substantial Indigenous interest in the marine environment of this fishery as many traditional coastal communities throughout southern Australia have traditionally used the sea as a source of food. Figure 9 shows all native title sea claims as of March 2003. Map 81 of Larcombe *et al.* (2002) also shows Indigenous sea claims and the landward extent of those claims as well as areas of Indigenous land title agreements that affect the sea in south eastern Australia.

It is unclear what effect these claims will have on the SPF should they be successful.

Figure 9: Native title claims that include areas of sea (National Native Title Tribunal www.nntt.gov.au)

Areas of sea* subject to claim as per Native Title Claimant Applications on the Register of Native Title Claims as at 31 March 2003



13 Marine pollution

Pollution of the marine environment by ships of all types, including fishing vessels, is strictly controlled by the International Convention for the Prevention of Pollution from Ships, commonly known as MARPOL 73/78. In Australian waters discharges from all ships including fishing vessels are regulated by the Protection of the Sea (Prevention of Pollution from Ships) Act 1983. This Act implements the Australian MARPOL regulations, which apply to Australian fishing vessels wherever they are operating and can also be applied against foreign fishing vessels operating anywhere within Australia's EEZ. Penalties for not complying with the law are up to \$200, 000 for individuals and \$1 million for companies. The Australian Maritime Safety Authority (AMSA) administers MARPOL through Commonwealth and State/NT legislation. AMSA has issued marine notices advising mariners of the legislation and its requirements.

The disposal of garbage from ships and boats of all sizes is now strictly regulated. The regulations are:

- ∅ The disposal of plastics into the sea is totally prohibited. Plastic material includes synthetic materials such as trawl and fishing nets, synthetic rope, plastic sheeting, fibreglass, strapping bands, paints, electrical/electronic, floats and many other products;
- ∅ Food wastes, paper, glass, metal and crockery cannot be disposed of within 12 nautical miles of land. If processed through a grinder with a 25 millimetre screen, the garbage may be discharged if the vessel is more than 3 nautical miles from land;
- ∅ Garbage that floats cannot be discharged within 25 nautical miles of land.

MARPOL73/78 requires vessels over 400 tonnes to develop a waste Plan of Management and maintain a garbage disposal record book. All vessels over 12m in length are required to display placards setting out the disposal requirements of MARPOL 73/78. Many of the vessels involved in all sectors of this fishery are longer than 12m and must comply with this requirement.

AFMA observers reported full compliance with MARPOL during deployments in Zone A.

PART III - ENVIRONMENTAL ASSESSMENT

14 Assessment of ecological sustainability – *Guidelines for the ecologically sustainable management of fisheries*

Environment Australia, in conjunction with AFMA, has developed the *Guidelines for Assessing the Ecological Sustainability of Commercial Fisheries* (the Guidelines). The Guidelines form part of the generic *Terms of Reference – Environmental Assessment of Commonwealth Fisheries*. The Guidelines consist of two overarching principles and a series of objectives. They require that data collection, assessment and management responses in place for target species, byproduct, bycatch and the broader environment are adequate to demonstrate that a commercial fishery is managed in an ecologically sustainable manner. The Guidelines are a central component of the *Terms of Reference for the Small Pelagic Fishery* (Attachment 1).

The guidelines are addressed below in relation to the Small Pelagic Fishery.

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.

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

Guideline 1.1.1: There is a reliable information collection system in place appropriate to the scale of the fishery. The level of data collection should be based upon an appropriate mix of fishery independent and dependent research and monitoring.

Catches of small pelagic species are currently only significant in Zone A. Catches are very low in the Commonwealth waters of Areas B, C and D (refer to Section 2.1). AFMA recognises that the current information collection system is inadequate for the potential scale of the fishery - given the amount of latent effort and the potential for its activation if marketing opportunities for one or more small pelagic species improves.

AFMA formed the SPRAT in 2001 to improve the quality of advice on stocks, better inform TACC and TCL setting and identify and implement research and monitoring strategies. On the basis of advice from the SPRAT and the findings of the BRS Blue Mackerel Review AFMA believes that development of a sound biological basis for estimating stock productivity and determining appropriate TCLs or TACs will rely primarily on the implementation of fishery independent research and monitoring programs. Fishery independent monitoring is expensive and there are limited means of paying for such programs either directly by levies on industry (given the low value nature of the fishery and the current low levels of production) or through application to Commonwealth research funding bodies.

In the interim AFMA is committed to manage any further development in the SPF in a precautionary manner. AFMA has, on the basis of the SPRAT's advice, set precautionary TCLs for areas B, C and D for 2003/04. In this context AFMA is working with stakeholders to develop a more appropriate mix of fishery dependent and fishery independent information systems to better inform stock assessment in the fishery.

The Commonwealth and Tasmanian governments are proceeding with the implementation of a Joint Authority for the Zone A Fishery. DPIWE and AFMA expect that the Zone A Fishery will then be managed under Tasmanian state law. Both agencies intend that this arrangement will be complementary to approaches for Zones B, C and D, however, it is expected that it will be based around a higher TACC given the reasonable understanding of catches in this fishery over time.

Balance of fishery dependent and fishery independent research and monitoring

The commercial fishery relies on targeting aggregations of small pelagic species. Reviews of biology and stock assessment models for small pelagic species conclude that reliance on fishery dependent data are inappropriate for new and developing fisheries (Ward, P. et al 2002, Caton, A. 2002). Experience in northern hemisphere mackerel and South American anchovetta fisheries has shown that fishing vessels can continue to maintain reasonable catch rates despite significant declines in abundance. Ward, P. et al 2002 concludes that CPUE is a poor proxy for abundance in small pelagic fisheries.

Ward, P. et al 2002 notes that fishery independent methods are the preferred method for estimating abundance of small pelagic species. SARDI is leading a FRDC research program to develop an egg production survey for blue mackerel in Areas A, B, C and D in the fishery. This project follows the successful application of this survey method to the South Australian pilchard fishery (Ward T. et al 2002). These surveys allow scientists to back calculate spawning biomass from information on egg density and distribution. This methodology requires a reasonable understanding of the spawning characteristics of the species. The proportion of the stock that can be harvested is derived from these estimates (elaborated in Guideline 1.1.5).

The application of the egg production survey technique to blue mackerel is expected to allow scientists to assess whether a similar approach could be successfully applied to jack mackerel and redbait stocks. AFMA and DPIWE note that PIRSA has been contracting SARDI to assess status of the South Australian pilchard using this approach since 1998.

AFMA and DPIWE expect that milestone reporting during the project will help them assess the costs and benefits of this approach in regard to:

- € continuing regular application of the egg production survey and associated stock assessment process for blue mackerel; and
- € possible extension to jack mackerel and redbait stocks.

This survey technique is expected to provide scientific support for higher TACCs (TCLs). However AFMA is unsure if the prospects of access to higher catches offered by a more robust stock assessment approach will be sufficient to attract ongoing funding from industry for the necessary fishery independent surveys given the low value nature of small pelagic species. Subject to the successful completion of FRDC project 2002/061 AFMA would look to resolve this issue through consultation with industry, the recreational sector, Commonwealth research funding bodies, AFFA and the state fisheries agencies.

Tasmanian Aquaculture and Fisheries (TAFI) is seeking to identify fishery dependent information, which could be used to develop indicators of population stress (changes in age structure, size at first maturity, etc). If these indicators are sufficiently sensitive they can then provide a biological basis for decision rules. Managers can then develop management responses, which enable them to react to changes in the abundance/productivity of the stocks in the absence of a quantitative stock assessment model. The stock assessment approach for jack mackerel and redbait in Zone A is currently based mainly on fishery dependent data.

Catch per Unit Effort (CPUE) data obtained from logbooks is unlikely to form the basis of future stock assessment models. However, logbook data in combination with other fishery dependent data will provide important secondary inputs to any future stock assessment models based on fishery independent surveys. All species in the fishery are relatively long lived. Therefore, TAC setting processes can be better informed if reliable information is available on the size and sex structure of the catch. This information can be used to refine the outputs of the egg production surveys. Fishery independent surveys generally provide estimates for one or two cohorts in the fishery (spawners in the case of egg surveys). If surveys are conducted regularly a better picture of the relative abundance of year classes can be obtained. Once reasonable estimates of abundance are obtained, these, along with estimates of natural and fishery mortality, can be incorporated in stock assessment models. Fishery dependent data naturally provides the best data on the level, species composition and age structure of catches (fishing mortality) and can also assist in the understanding of natural mortality.

The fishery dependent and independent data collection programs for the four zones are described below.

Fishery dependent research and monitoring information

AFMA and Tasmania maintain shot by shot logbooks in their target fisheries. New South Wales is the only other jurisdiction where targeting of small pelagic species currently occurs (Ocean Haul Fishery - mainly yellowtail scad and blue mackerel). NSW operators are required to record catches in monthly logbook returns. Logbooks are described in Table 10.

AFMA, TAFI and DPIWE have placed observers on vessels operating in Zone A. AFMA placed observers on mid-water trawling trials in 2001/02 to monitor the impacts this method may have had on protected species and SEF quota species. Following the successful completion of these trials the company involved secured a vessel capable of mid-water trawling and purse seining. The three agencies have agreed that DPIWE and TAFI will now jointly administer the Zone A observer and port sampling programs in recognition that day to day management of Zone A will reside with Tasmania following establishment of the Joint Authority. TAFI observers have since undertaken regular trips and conducted port sampling work since the introduction of single vessel mid-water trawling operations into the fishery.

TAFI is currently working closely with industry and processors to regularly collect and analyse information from jack mackerel and redbait catches in Zone A (TAFI Technical Report – *The Tasmanian Redbait Fishery*). Since early 2003 SeaFish Tasmania has had a designated crew member collect biological samples from every trawl shot and freeze these for later analysis by TAFI biologists.

Tuna vessels in the ETBF, SWTBF and SBT fisheries are required to record daily information on bait catching operations including bait species and quantity caught. AFMA TAP observers verify this information and collect additional biological information on bait species when on board tuna longline vessels. AFMA is currently seeking comment on a draft specialised bait collection logbook from its Tuna MACs.

Small pelagic species are caught as bycatch (frequently discarded) in the Commonwealth Southern and Eastern Scalefish and Shark (SESS) Fishery. Operators in the trawl sector are only required to record estimates of quantities of these species when retained⁷. The gillnet, demersal longline and trap sectors are required to record discards. This data is supported by observer data gathered through the Integrated Scientific Monitoring Program (ISMP).

Logbooks provide useful information on the spatial structure of catches. This information is complemented by information on catch composition and biological characteristics collected by observers and through onshore sampling programs. Collaborative sampling arrangements have been fostered through the SPRAT and the blue mackerel project. Logbooks also provide information for other management purposes.

The National Recreational and Indigenous Fishing Survey was released in August 2003 and provides estimates of the take of a range of species by the recreational and Indigenous sectors. The survey was able to derive an estimate of the take of blue mackerel by these sectors and a combined estimate for yellowtail scad and jack mackerel (refer to Guideline 1.1.4). The survey was a joint initiative of the Commonwealth and State/Territory Governments to obtain fisheries statistics to support the management of non-commercial fishing in Australia. The recreational sector is also supporting FRDC Blue Mackerel Project 2002/061 through the provision of samples. The recreational sector provides researchers with an important source of biological information from areas outside the main commercial fishing grounds.

Management arrangements under the SPF Management Policy March 2002 for Zones B, C and D include a commitment to develop and implement improved data collection for the fishery. The SPRAT will detail the data to be collected and methods of collection and provide information about data analysis and management. Data will be collected on catch and effort in the fishery, biological and ecological aspects of the fishery and technical and economic aspects of the fishery.

Compilation of fishery dependent information is facilitated through the SPRAT and the Zone A SPRAG and is largely undertaken by the scientists working on small pelagic species in the various jurisdictions.

⁷ The ISMP is designed to collect data on discards in the trawl sector, AFMA considers logbooks to be an unsuitable for this purpose given the diversity of bycatch in that sector.

There has been limited research into SPF species in Australia in recent years. Fishery managers and scientists have relied mainly on fishery dependent data in the form of catch and effort logbook data from state logbooks in Tasmania (Zone A) and Commonwealth purse-seine and trawl logbooks in Zones A, B, C and D to monitor the fishery. Research conducted by fisheries scientists investigating abundance has highlighted the need for increased fishery independent research due to evidence that suggests that oceanographic conditions and prey abundance determines surface schooling and the availability of certain species to purse-seining methods (Caton, A. 2002, Ward, P. et al).

AFMA is currently developing a data acquisition and management plan. AFMA expects that this will provide a more strategic approach to data collection and management. Within this framework the SPRAT will take a lead role in development of research and monitoring strategies for the fishery.

Table 10 provides a summary of fishery dependent information collection systems in the SPF.

Fishery independent research and monitoring

The recently funded FRDC Project 2002/061 Development and evaluation of egg-based stock assessment methods for blue mackerel in south Australia is under way to provide quantitative information required to establish appropriate TACs for this species. The project is a 3 year study and will develop methods for sampling adults and identifying and staging eggs, which are required to apply an egg-based stock assessment model to blue mackerel. The results from the model will then be used to calculate conservative estimates of minimum spawning biomass of blue mackerel off south eastern Australia. The objectives of the project include:

- ∄ to synthesise information available on the fisheries for blue mackerel in southern Australia (including review of information on biology);
- ∄ to describe the spatial and temporal patterns of age and growth, and compare the age structure of commercial and recreational catches and fishery-independent samples of blue mackerel taken through out southern Australia;
- ∄ to estimate the critical adult reproductive parameters for blue mackerel, especially spawning fractions and batch fecundities, in south-eastern Australia;
- ∄ to establish methods and criteria for identifying and staging the eggs and larvae of blue mackerel;
- ∄ to estimate the size of the spawning areas and levels of egg production of blue mackerel off south-eastern Australia (northern NSW to the central Great Australian Bight);
- ∄ to develop and evaluate methods for estimating the spawning biomass of blue mackerel in southern Australia;
- ∄ to evaluate potential harvest strategies for blue mackerel in southern Australia and provide preliminary estimates of the potential yields for each zone of the Commonwealth fishery;
- ∄ to estimate the number, size frequency and total weight of blue mackerel taken by recreational (charter, gamefish and trailer-boat) fishers off the NSW coast.

Progress updates on the blue mackerel project are provided to the SPRAT and SPFWG on a regular basis. The final results will be incorporated into the formal stock assessment process for blue mackerel and any relevant aspects will be considered in further stock assessments for other SPF species.

The Tasmanian industry has provided aerial spotting data to TAFI, however, the utility of this information for stock assessment purposes is limited because the flights were undertaken on a commercial basis rather than in accordance with a specific sampling protocol. Interpretation of aerial survey data is further complicated because the relationship between the abundance of surface schools and the actual abundance of jack mackerel in a particular region is not fully understood. The New Zealand Ministry of Fisheries is investigating the possibility of using aerial survey data in its domestic blue mackerel fisheries to develop relative indices but has concerns about the patchiness of data in time and space.

The use of acoustic survey methods is not currently under active consideration for SPF.

Completed research specific to the SPF (formerly the Jack Mackerel fishery)

- € FRDC 95/034 - Age and growth of jack mackerel and the age structure of the jack mackerel purse seine catch
- € FRDC 95/151 – Ageing yellowtail (*Trachurus novaezelandia*) and blue mackerel (*Scomber australasicus*) in New South Wales
- € FRDC project – A collaborative investigation on the usage and stock assessment of bait fishes in southern and eastern Australian waters, with special reference to pilchards (*Sardinops sagax*); extension into Queensland and New South Wales.
- € A review of biology and fisheries for mackerel (BRS 2001) FRRF
- € Jordan, A.R., Pullen, G. and Williams, H. (1995). Age, growth and back calculated birthdate distributions of larval jack mackerel, *Trachurus declivis* (Pisces: Carangidae) in eastern Tasmanian waters. *Marine and Freshwater Research* **46**, 831-842
- € Jordan, A.R., Pullen, G. and Williams, H. (1995). Jack mackerel resource assessment in south eastern Australia: Tasmanian Department of Primary Industry, Fisheries and Energy. Sea Fisheries Research Laboratories. Final Report to the Fishing Industry and Development Council, Project DFT2Z
- € Glaister, J.P. and Diplock, J.H. (1993) Baitfish and the East Coast Tuna and Billfish Fishery – Species, Status and Situation. AFMA.
- € Welsford, D.C. and Lyle, J.M. (2003) Redbait TAFI Technical Report No. 20 The Tasmanian redbait (*Emmelichthys nitidus*) fishery: a synopsis of biological data.

Current research

- € The AFMA/CSIRO Ecological Risk Assessment for Commonwealth Fisheries project (discussed in more detail under Guideline 1.1.2).
- € FRDC 2002/061 Development and evaluation of egg-based stock assessment methods for blue mackerel in south Australia.

Table 10: Summary of fishery dependent data and monitoring in the SPF

Zone/sector	Zone A (Tasmania)	Zones B, C and D	Tuna fisheries (take of bait)	Bycatch in Commonwealth fisheries	NSW Fishery	Ocean Haul	Haul
Logbooks (operator supplied data)	<p>PS01 – purse seine sector</p> <p>SWT01 mid-water trawl</p> <ul style="list-style-type: none"> - fishing effort - catch quantity by species - gear and vessel information - protected species interactions <p>Tasmanian General Fishing Returns</p> <ul style="list-style-type: none"> - daily catch records 	<p>PS01 – purse seine sector</p> <p>SWT01 mid-water trawl</p> <ul style="list-style-type: none"> - fishing effort - catch quantity by species - gear and vessel information - protected species interactions 	<p>AL05 – longline sector</p> <p>PS01 in June 2002 - purse seine and pole & line sector</p> <p>OT03 - minor line sector</p> <p>AFMA is currently drafting a new bait catch logbook.</p> <p>Currently operator supplied data on SPF species caught and used as bait is recorded in fields in the target species logbook pages.</p>	<p>Logbooks for the fisheries managed under the SESS Management Plan have provision for recording of bycatch of small pelagic species</p>	<p>Ocean Hauling Monthly Catch Return Code Sheet</p> <p>Monthly returns –catch by species fishing effort days per zone</p>		
At sea monitoring (independently verified data)	<p>AFMA observer coverage of pair trawling operations</p> <p>Joint DPIWE/TAFI observer program – single vessel mid-water trawling and purse seine sectors (representative sample of fishing effort)</p> <p>Verification of logbook data, catch composition, additional biological sampling and protected species interactions</p>	<p>Requirements for 25 % coverage by AFMA observers for pair trawling trials</p>	<p>AFMA observers record bait catching operations in tuna longline fisheries. Observers record catch by species and quantity.</p>	<p>Integrated Scientific Monitoring Program (ISMP)</p> <p>Representative sample of fleet effort.</p> <p>Verified data on:</p> <ul style="list-style-type: none"> 4 fishing effort 4 quantified catch and bycatch composition 	<p>The FMS requires the implementation of a Scientific Observer Program</p>		
Port sampling (scientific)	<p>A port/catch sampling program is a component of TAFI's research program</p>	<p>Cooperative arrangements through the Blue mackerel steering committee – undertaken by state agencies</p>	<p>Not applicable - catch not landed</p>	<p>Representative sample of fleet effort (ISMP)</p>	<p>As above</p>		
Landing verification	<p>Catches monitored through logbooks. Operators are voluntarily completing catch disposal records (SESS 2)</p> <p>Under the proposed ZASPF catches will have to be unloaded to persons holding a fish processing license and complete landing dockets for DPIWE and AFMA</p>	<p>Catches monitored by AFMA through logbook returns</p> <p>AFMA has the ability to implement additional requirements as permit conditions</p>	<p>Not applicable</p>	<p>SESS operators are required to sell fish through persons holding AFMA Licensed Fish Receiver Permits.</p>	<p>Fish must be sold to Registered Fish Receivers – this information is cross referenced on Ocean Hauling Monthly Catch Return</p>		

Assessment

Guideline 1.1.2: There is a robust assessment of the dynamics and status of the species/fishery and periodic review of the process and the data collected. Assessment should include a process to identify any reduction in biological diversity and /or reproductive capacity. Review should take place at regular intervals but at least every three years.⁸

To date no quantitative stock assessments have been undertaken for small pelagic species in the fishery. In the absence of reliable indices of abundance both the SPRAT and the Tasmanian Small Pelagic Working Group (TSPWG) meet annually to review catch data, new biological information, research outcomes and advice from the industry and recreational sector. This information is assessed in the context of local oceanographic conditions and the scientific understanding and management experience available from other fisheries for similar species in Australia (South Australian Pilchard Fishery) and elsewhere in the world.

AFMA has adopted a conservative approach through the setting of precautionary Trigger Catch Levels (TCLs) for Zones B, C and D. AFMA considers that the SPRAT's annual stock status assessments are sufficiently robust in this context.

AFMA is required under its current policy to seek advice from the SPRAT within 30 days of a TCL being reached. The SPRAT is required to review the risk to stocks based on available information and recommend appropriate management strategies to the SPFWG and AFMA Board. The AFMA Board must respond within 15 days of receiving advice from the SPFWG/SPRAT (refer to Guideline 1.1.7).

The current management arrangements for Zone A provide for a substantially higher TACC in comparison to the TCLs set for Commonwealth zones B, C and D (refer to Guideline 1.1.5). The Zone A TACC currently refers to the total catch of small pelagic species and is allocated across various license holding and gear sectors (the basis of these allocations has been supported by various ministerial statements and investment warnings).

Currently the Tasmanian Small Pelagic Research and Assessment Group meet annually to review the TACC and other measures. DPIWE intend to formalise assessment requirements in a draft management plan. DPIWE anticipates that under the Joint Authority the TACC approval process will involve the AFMA Board prior to joint sign off by the Tasmanian and Commonwealth Fisheries Ministers (or appropriate delegated authorities). The reporting requirements and recommendations will include:

- ∅ Recommendation of an appropriate TACC for each fishing year (Zone A Small Pelagic Research and Assessment Group (ZASPRAG));
- ∅ The setting of species specific TACCs if required;
- ∅ Setting of appropriate performance indicators (trigger points) that can be monitored and evaluated at predetermined intervals (ZASPRAG);
- ∅ Preparation of annual fishery assessment reports that report against each of the performance indicators;

⁸ Review should be undertaken by the relevant management authority in a transparent way

In addition to annual assessments the draft management plan requires that the designated authority initiate an assessment of the status of the fishery if a trigger point is reached. ZASPRAG and the Zone A Small Pelagic Fishery Advisory Committee (ZASPFAC) will conduct the initial assessment and develop appropriate management options. The designated authority must then consult with industry, the community and other appropriate persons in regard to assessment and any alternative management strategies. The designated authority must then present the outcomes of the review and proposed management options to industry within three months of the initial notification.

In addition to the assessments undertaken by the formal expertise based groups two additional approaches are underway which are expected to improve the robustness of assessments for small pelagic species:

1. The development of population stress indicators for jack mackerel and redbait stocks in the Zone A fishery (with concurrent investigation into identifying a cost effective fishery independent survey technique) - TAFI; and
2. The investigation of an egg production survey technique for blue mackerel stock assessment across Zones A, B, C and D (FRDC Project 2002/061).

AFMA anticipates that the blue mackerel project will provide the basis (on completion in 2005) for a stock assessment model for blue mackerel. In the interim AFMA will continue to set precautionary TCLs for blue mackerel based on the most current assessments by the SPRAT.

Ecological risk assessment

AFMA, in conjunction with CSIRO and BRS, is undertaking a project entitled *Ecological risk assessment for Commonwealth fisheries*. The objectives of this project include:

- ≠ consolidating/developing ecological risk assessment methods that will meet the requirements of strategic assessment for Commonwealth fisheries
- ≠ determining the relative sustainability risks in Commonwealth managed fisheries, considering target, byproduct, bycatch and broader ecological impacts where possible.

The following approach will be adopted for the project:

1. qualitative risk assessment to identify broad categories of risk. This will involve:
 - ≠ collecting available background information in the fishery such as fishery dependent and fishery independent information, species list, fishery assessment reports, research undertaken in the fishery, protected species and habitats in the area, expert knowledge etc
 - ≠ providing a basic description of potential ecological system impacts (species, habitats, area etc)
2. a full quantitative risk assessment including formal treatment of risk and uncertainty and development of models to evaluate risk management strategies.

The small pelagic component of the project is expected to be complete in late 2003. A final report on all Commonwealth fisheries is expected to be complete by the end of 2003. AFMA acknowledges that this project will provide a preliminary assessment of the status of species taken in the fishery, and will not be a definitive assessment of species.

Table 11. Current understanding of small pelagic stocks.

	Zone A	Commonwealth Zones B, C and D	External review
Blue mackerel	Tends to move into Zone A in summer. Probably a shared stock with Zones C and D	SPRAT preliminary assessments note that approximate biomass estimates range from 20,000 tonnes to greater than 100,000 tonnes and has recommended that Trigger Catch Levels should represent precautionary harvest strategies of 20% of the biomass.	The BRS Fishery Status Report 2000/01 (Caton, 2002) documents that the status of blue mackerel in the SPF is uncertain
Jack mackerel	Catch and age structure suggest some fishery impacts but environmental factors not fully understood Environmental factors have a profound impact on the behaviour of jack mackerel and their availability to the purse seine method.	The SPRAT 2003 assessments noted that jack mackerel are more vulnerable than blue mackerel due to different biology and life history. The SPRAT increased the low and medium risk TCLs for Zone B in light of new information on higher levels of productivity due to upwelling in the GAB.	The BRS Fishery Status Report 2000/01 (Caton, 2002) documents that the status of jack mackerel in the SPF is uncertain
Redbait	The SPRAT acknowledges that information from industry, observers and scientists during recent pair trawling operations in Zone A (2001/02) suggests that extensive resources of red bait may exist in that zone. Preliminary assessment by TAFI suggests redbait grow fast and live to a maximum age of 7 to 8 years (ageing techniques not validated). Suggest growth and turnover are likely to be high.	The SPRAT considers that there is not enough information on life history or stock status to make a conclusive stock assessment of red bait.	No independent assessments available.
Yellowtail scad	Not considered a target species in Zone A	SPRAT 2003 noted that yellowtail are significantly exploited by a range of user groups across their size range. Vulnerability thought to be similar to jack mackerels. The SPRAT recommended that yellowtail scad be managed largely as a bycatch of fishing operations for blue and jack mackerel. Recommended highly precautionary TCLs.	NSW data indicate some change in age structure in the State catch.

Guideline 1.1.3: The distribution and spatial structure of the stock(s) has been established and factored into management responses.

Five species can be targeted under current management arrangements in the Commonwealth and Zone A. AFMA and the Tasmanian Government anticipate that future Joint Authority arrangements will apply to the same 5 species. AFMA and the Tasmanian Government believe that with respect to management purposes that the stocks of these species are restricted to Australia's EEZ. It is however possible that for some species limited exchange of larval and/or adult fish occurs with New Zealand stocks.

The geographic distribution and spatial structure of the SPF species is not completely known for all species. As information on distribution and spatial structure of stocks becomes available, the data will be factored into the assessment processes and management responses. Anecdotal evidence suggests that the apparent local abundance of small pelagic species in Zones A, D and B is not closely correlated.

The SPRAT 2003 noted that information on stock structure is needed in order to effectively manage effort and issues of localised depletion. The current management zones are not based on relevant biological or oceanographic characteristics. Any new information on local stock structure may require:

- € a review of the current fishery boundaries and/or
- € TCLs, TACCs and other management actions to be given effect in a more specific manner.

No comprehensive studies on the stock structure of small pelagic species have been undertaken in Australian or New Zealand waters. In overseas small pelagic fisheries identification of separate stocks (from a management perspective) has been achieved using information from genetic, parasitology and tagging studies. In the absence of this information the SPRAT and the Tasmanian SPRAG undertake their assessments with reference to the prevailing oceanographic conditions in the various zones and integrate this with fishery dependent and anecdotal information on stocks from industry and the recreational sector.

The current knowledge of distribution and spatial structure of each stock and current research is described below.

Distribution and spatial structure of jack mackerel

Jack mackerel are found in Australian and New Zealand waters. Jack mackerel are known to spawn off Tasmania and in the GAB. Studies of mitochondrial DNA suggest that Australian stocks are separate from New Zealand stocks and that there may be distinct sub-populations in Australia (GAB and south east region overlapping in Bass Strait).

The SPRAT currently recommends TCLs for jack mackerel in Zones B, C and D on the assumption that there are separate stocks for management purposes in Zone A.

Distribution and spatial structure of blue mackerel

According to the BRS review on mackerels (Ward, P et. al 2001) blue mackerel are widely distributed in the south-western Pacific Ocean and inhabit South-east Asia, Australasia, the northern Indian Ocean and Red Sea, however their stock structure is uncertain.

The review describes blue mackerel distribution around Australia as from off north-western Australia through to the Great Australian Bight to south-eastern Australia and Queensland. Distribution through Bass Strait is uncertain, however, blue mackerel are distributed around southern and western Tasmania.

The BRS review hypothesises that there might be separate stocks in the western Indian Ocean and the south-eastern Pacific. The review also states that there is likely to be limited mixing between blue mackerel in Australia and New Zealand and, therefore, the fisheries should be managed as separate stocks. A parasitological study (Rohde 1987) suggested that eastern Australia and New Zealand blue mackerel populations are separate stocks. Further stock structure studies and tagging programs are required to verify stock structure for this species.

One of the objectives of FRDC Project 2002/061– Development and evaluation of egg-based stock assessment methods for blue mackerel *Scomber australasicus*, in southern Australia as described in Guideline 1.1.1, includes:

To describe the spatial and temporal patterns of age and growth and compare the age structure of commercial and recreational catches and fishery-independent samples of blue mackerel taken from throughout southern Australia.

Distribution and spatial structure of redbait

The redbait species (*Emmelichthys nitidus*) taken in Zone A is a geographically widespread species reported from the continental shelf break of Africa, Australia, New Zealand and South America. They are also found in association with seamounts, islands and mid oceanic ridges in the south west Atlantic, Indian and south Pacific oceans (TAFI Technical Report, Fishbase).

Distribution and spatial structure of Peruvian jack mackerel

The presence of Peruvian jack mackerel was first reported in 1989 (Australian Fisheries 48-6) and this represented the western most record for the species. It is currently a minor component of Zone A jack mackerel catch. Peruvian jack mackerel form the basis of a large fishery of Peru and Chile. The FAO note that the abundance and range of this species appears to have increased since the 1970s. Peruvian jack mackerel were first reported in New Zealand waters in 1987 and have become established throughout much of the New Zealand EEZ (New Zealand Environmental Performance Indicators Programme).

Distribution and spatial structure of yellowtail scad

Yellowtail scad occur from southern Queensland around the southern half of the continent to Exmouth Gulf in Western Australia. Yellowtail scad are also found in New Zealand where they form a substantial component of the jack mackerel catch in the more northern zones. In Australia they appear to be most abundant in New South Wales. Yellowtail scad are neritic and are uncommon in waters cooler than 13°C. Anecdotal information suggests that the abundance of yellowtail along the east coast is patchy and there is currently little understanding about the rate and extent of mixing between the areas of higher apparent abundance.

Guideline 1.1.4: There are reliable estimates of all removals, including commercial (landings and discards), recreational and Indigenous, from the fished stock. These estimates have been factored into stock assessments and target species catch levels.

The SPRAT and the Tasmanian SPWG incorporate, where possible, estimates of all sources of mortalities from within the AFZ in their annual TAC and/or TCL setting workshops. The working groups rely on inter-agency cooperation to pull together relevant extracts from logbook, catch disposal databases and recreational surveys.

The National Blue Mackerel Steering Committee has established a cooperative framework for the compilation of information on removals (including age structure) for blue mackerel from all relevant jurisdictions and sectors.

All the working groups/committees have an overlap of membership and there is a commitment from all parties to ensure the exchange of information between the groups is maintained. The primary systems for collecting information on removals from the various sectors taking small pelagic species are summarised in Table 12.

Sector	Logbooks	Observers	Port sampling	Catch disposal records
Zone A	Yes	Yes	Yes	Voluntary completion of SESS 2 forms
Zones B, C and D	Yes	(for pair trawling)	No	No (can be implemented under permits if required)
NSW Ocean Haul Fishery	Monthly Catch Returns	Scientific observers	-	Restricted Registered Fish Receivers
Commonwealth Tuna Fisheries (bait)	Basic catch by species information recorded in Tuna logbooks A bait catch logbook is currently being drafted	Observers collect data on bait catching operations	Not relevant as catch is not landed	Bait cannot be sold or transferred to other operators
SA Pilchard Fishery	Research logbook	No formal program	Biological sampling is a component of the egg production survey	Catch disposal records (ITQs)
WA Purse Seine Fisheries	Research logbook in the southern fishery	No formal program	Biological sampling at the processing plants	Catch disposal records in the South Coast Fishery (ITQs)
SESS Fishery	Yes	ISMP	ISMP has a port sampling component but it does not currently extend to small pelagic species	Yes
Recreational sector	No Logbook program in place for charter boats in NSW	No	NSW Fisheries has monitoring programs for gamefishing and charter sectors	NA

Table 12. Systems for recording removals of small pelagic species

Commercial landings

Estimates of commercial removals of the key target species, jack mackerel, blue mackerel and redbait, from the SPF are considered reliable. Catch records for yellowtail scad and blue mackerel in the NSW Ocean Haul Fishery are considered to be good.

Yellowtail scad and Peruvian jack mackerel are only a small component of Zone A removals and are not recorded separately in logs or landing data (*Trachurus* species are quite similar in appearance and there is no commercial incentive to sort catches). TAFI's observer and onshore sampling programs provides information on the catch composition of commercial catches, and this data is used to estimate total landings of each small pelagic species.

Catches of small pelagic species in Commonwealth Zones B, C and D are derived from logbooks and AFMA believes this information is satisfactory given the current low level of effort in these zones. AFMA logbooks have been reviewed and re-designed to facilitate appropriate data collection needed for assessments of commercial removal in the SPF and in all Commonwealth fisheries that have SPF species in the catch. AFMA recognises, however, that without independent verification there will continue to be a level of uncertainty. This uncertainty is factored into the precautionary trigger catch limits provided by the SPRAT.

The Management Policy states that the collection of accurate catch/effort data in relation to the harvest of SPF species across all catching sectors is fundamental to the maintenance of effective management strategies for the SPF. The SPRAT is committed to annually review the data collection strategy to identify any further improvements required for the collection of commercial landing data in the SPF.

Commercial discards

There have been no reported or observed instances of high grading of target species in this fishery, based on earlier Tasmanian observer work and AFMA observer data collected for the pair trawling operations. The fishery is mainly quantity oriented with the end product being sold mostly for fishmeal and bait. There is some catch for value added processing for human consumption.

Recreational and Indigenous removals

Estimates of recreational removals and Indigenous take from the stocks in the SPF are not as reliable as commercial estimates although there are programs in place to collect regular data from the recreational sector in NSW (Charter Boat Monitoring Program and the Gamefish Tournament Monitoring Program).

There are several processes in place to improve these estimates:

€ recreational sector representation on SPFWG and SPRAT.

- € The recently completed National Recreational and Indigenous fishing survey –this project a joint initiative of the Commonwealth and State/Territory Governments to obtain fisheries statistics to support the management of non-commercial fishing in Australia. Data was gathered in three aspects of this survey including the Recreational Fishing Survey (includes on-site surveys), the Indigenous Fishing Survey, and the Visiting International Fisher Survey. The survey provides estimates of the catch of small pelagic species which are targeted/caught incidentally by recreational fishers, where they are mainly caught and what proportion is discarded on a state by state basis (refer to Section 2.5 and Guideline 1.1.4).
- € The National Blue Mackerel Steering Committee – will form the basis for cooperative data sharing and research arrangements during FRDC Blue Mackerel Project 2002/061. An important aspect of the project is to provide information on the number, size frequency and total weight of blue mackerel taken by recreational anglers off NSW.

Information is factored into stock assessments

The recent commercial and recreational landing data/estimates are currently one of the main sources of information the Tasmanian SPWG and the SPRAT refer to when setting TACCs/TCLs.

SPRAT 2003 recognised that to some extent the lack of recent fishing effort (and catches) in Commonwealth waters in Zones B and C has made the assessment of small pelagic stocks in those areas more difficult. In this regard the low level of removals contributed to the setting of precautionary TCLs.

In regard to Zone D (off NSW) SPRAT 2003 noted that recreational and commercial removals of yellowtail scad from state waters were somewhat uncertain and, given that this species is significantly exploited across its size range, recommended that low risk TCLs be adopted. The AFMA Board supported the SPRAT's recommendations that TCLs for Zones B, C and D be set at 100 tonnes for 2003/04.

Guideline 1.1.5: There is a sound estimate of the potential productivity of the fished stock/s and the proportion that could be harvested.

There are currently no quantitative methods for deriving estimates of the potential productivity for small pelagic species in Zones A, B, C and D. Based on findings of the BRS Review, AFMA believes that sound estimates of the productivity of the various small pelagic stocks will depend on the implementation of fishery independent monitoring surveys and an improved understanding of the biology and life history of small pelagic species in Australian waters.

The completion of FRDC Blue Mackerel Project 2002/061 is expected to deliver the first stock assessment model for a small pelagic species managed in this fishery. The egg production method, which is used in the South Australian Pilchard Fishery, is accepted internationally and has been subject to extensive peer review. The SPRAT and the Tasmanian Working Group have drawn limited inference on the productivity of small pelagic stocks from the quantitative stock assessment undertaken for the pilchard fishery (TAC for 2003/04 is 36,000 tonnes).

In the interim AFMA has set TCLs for Zones B, C and D at levels considered well below internationally accepted sustainable harvest levels for such species – given the widespread distribution of small pelagic species in southern Australia and their apparent abundance in the various zones.

Oceanographic investigations have shown that this productivity off eastern Tasmania (Zone A) largely arises from the influx of cooler nutrient rich water from the Southern Ocean. The previous existence of a large purse seine fishery for jack mackerel is an indication of this productivity and this is further evidenced by the abundance of redbait in these waters. The Zone A TACCs reflect the high productivity of the waters off eastern Tasmania waters and are based primarily on historic catch levels of jack mackerel in that fishery. These have been reduced in recent years and now apply to the aggregate catches of small pelagic species rather than just to jack mackerel.

TAFI is also seeking to identify indicators of population stress (changes in age structure, size at first maturity, etc) to better inform stock assessment and TACC setting. TAFI is also investigating possible cost-effective fishery independent survey techniques.

Guideline 1.1.6: There are reference points (target and/or limit), that trigger management actions including a biological bottom line and/or a catch or effort upper limit beyond which the stock should not be taken⁹.

Zones, B, C and D

The current Management Policy for Zones B, C and D the fishery includes precautionary reference points for target species in the form of precautionary TCLs. The reference points for SPF species are provided below. These current management arrangements require that the reference points are reviewed annually (TCLs are reviewed if they are triggered during the fishing season).

Species	Trigger catch limits (TCLs)		
	Zone B	Zone C	Zone D
Blue mackerel	5,000	3,500	3,500
Yellowtail scad	100	100	100
Jack mackerels	4,000	2,500	2,500
Redbait	1,000	1,000	1,000

If the total of reported catches/discards in Zones B, C and D exceed the TCL by 25 % or greater before any management response is decided the relevant zone/s shall be closed to fishing. The review process (as described under Guideline 1.1.2) with subsequent recommendations to continue or cease fishing will then be completed.

AFMA has implemented a precautionary approach in regard to local depletion in Zone B. A spatial management regime limits the catches of these species within any 5 degree longitude band to no more than 50% of the TCL for each species.

⁹ Reference points can allow for seasonal fluctuations in stock recruitment and other areas of uncertainty.

Zone A

The TACC for Zone A of the fishery applies to all species. The TACC is allocated across various gear sectors and licence holdings:

Sector	No. of licences	TACC
Mackerel A - allocated sector Mid-water trawling and purse seine methods	4	25,000 tonnes
Mackerel B - competitive sector purse seine only	14	7,000 tonnes
Tasmanian Diversified Inshore Sector Small purse seine operations	10	3,800 tonnes
Commonwealth Trawl Sector	8	2,000 tonnes
Total		37,800 tonnes

DPIWE proposes to incorporate additional trigger points for a range of biological and spatial characteristics of the catch in a draft plan of management. These include:

TACC

- ∄ The catch of small pelagics falls below 50% of the TACC set for any one year.

Biological characteristics

- ∄ A significant change in size structure in commercial catches of small pelagics.
- ∄ When mean catch size for any species declines below size at 50% maturity.

Catch composition

- ∄ If blue mackerel commercial catches reach 10% of the overall total TACC; and/or
- ∄ If redbait commercial catches exceed 50% of the overall total TACC; and/or
- ∄ If bycatch catches of all other scalefish species exceeds 10% of the catch; and/or
- ∄ If Jack Mackerel commercial catches exceed 30% of the overall total TACC; and/or
- ∄ If yellowtail or Peruvian mackerel catch exceeds 10% of the total TACC.

Area

- ∄ If 50% of TACC is taken in those waters between Freycinet Peninsula and Tasman Is.

The trigger points may be reached either by themselves or in combination. The review process is described under Guideline 1.1.2.

DPIWE intends to incorporate these trigger points in the draft management plan for the Zone A Fishery. DPIWE also proposes that requests for inclusion of triggers based on other factors relating to the environment, market, etc will also be considered during the public consultation process for the draft management plan.

Efforts to improve the utility of reference points in management arrangements

AFMA, CSIRO and EA have recently commissioned a project entitled *Best practice reference points for fisheries*. In summary, the objectives of this project are:

1. to review and summarise recent development of reference points in Australian and international fisheries, including reference points relating to target species, bycatch species, endangered and protected species, habitats, food chain dependencies, reversibility of change, and biodiversity at genetic, species and ecosystem levels.
2. to identify current world's best practice reference points for each of these, and provide guidance on their applicability in different circumstances.

This project is due for completion by the end of 2003. The results of this project and the *Ecological Risk Assessment for Commonwealth Fisheries* project will be incorporated into future review of the SPF fishery reference points.

Guideline 1.1.7: There are management strategies in place capable of controlling the level of take.

The SPF is currently managed under a limited entry framework implemented on a zone by zone basis.

There is, however, a large amount of latent effort in the fishery. In light of the limited information on stocks and the potential for activation of latent effort should changes in the market for small pelagic species occur, AFMA has implemented output controls for Zones B, C and D.

Output controls are the key management strategy in the Commonwealth SPF Management Policy March 2002 and provide for the determination and application of precautionary Total Allowable Catches (TACs) and/or Trigger Catch Levels (TCLs). Output controls have formed the basis of management arrangements for Zone A since 1993/94.

The management measures to control the level of take are administered through conditions on Fishing Permits issued by the AFMA and licences by DPIWE.

Total Allowable Commercial Catch (TAC) and Trigger Catch Level (TCL)

The Commonwealth SPF Management Policy states that the TAC and/or TCL assessment and setting processes will identify the sustainable level of removals or total allowable catch and/or trigger catch level by commercial fishers from each zone of the fishery for each SPF species, and will include estimates of recreational and charter fishing, small pelagic species taken as bait and bycatch in other State and Commonwealth fisheries and Indigenous removals.

The policy defines the TAC and/or TCL for a SPF species as:

the total commercial catch, including landed and/or discarded catch from the purse-seine and mid-water trawl sector.

A precautionary TAC and/or TCL for each SPF species will be reviewed and determined by AFMA for each fishing season. The TAC and/or TCL for each year for each Zone that is needed to manage the fishery will be set based on:

- € a species specific basis for blue mackerel, yellowtail scad and redbait
- € a combined species TAC/TCL for the two jack mackerel species (*Trachurus spp*)
- € information given by the advisory committee and other interested bodies

- ≠ the total estimated catch by commercial, recreational, charter, indigenous and any other users of the fishery
- ≠ information about the sustainability of marine species in the area of the fishery
- ≠ the reference points set for the stocks of any quota species
- ≠ any decision rule used for the setting of the TAC and/or TCL
- ≠ the precautionary principle

Each year the Small Pelagic Fishery Research Assessment Team will consider relevant information and provide advice on the TACC and/or TCL ranges for each SPF species.

Level of take by other sectors

Small pelagic species cross jurisdictional boundaries. In recognition of this, and the need for a centralised management approach, the Commonwealth has developed, or is in the process of developing, Offshore Constitutional Settlements (OCS) with most states.

Under some of these OCS arrangements, management of small pelagic species from the 3 nautical miles to the 200 nautical mile AFZ boundary is the responsibility of the Commonwealth through AFMA for Zones B-D. Management arrangements for Zone A are currently under review as described in Part II with the proposed formation of a Joint Authority between Tasmania and the Commonwealth.

Under OCS arrangements state operators in Victoria, South Australia and Western Australia cannot target small pelagic species. The relevant state fisheries agencies are responsible for enforcing this requirement.

The targeted catch of small pelagic species in New South Wales state waters is managed under the Ocean Haul Fishery. This fishery relies on limited entry and a zonal system of management for NSW inshore waters. In June 2003 EA advised that the fishery's assessment was complete and that it was now exempt from export permit requirements until 2008.

Catches of small pelagic species for bait by tuna longline operators is managed under limited entry and through gear restrictions agreed under OCS arrangements (refer to Table 2). Catches in this sector cannot be sold or transferred and AFMA expects that the demand for bait will be kept at reasonable levels following the implementation of TAEs in the ETBF and ITQs in the WTBF. If required AFMA can impose additional restrictions on bait collecting through Directions or conditions on SFRs under both tuna management plans.

The targeting of small pelagic species is not permitted in the Southern and Eastern Scalefish and Shark Fishery. Mesh size restrictions in force for the trawl sector (minimum mesh size of 90 mm) prevent effective targeting of small pelagic species.

Monitoring of catches

AFMA requires small pelagic operators to return logbook pages (SWT01 and PS01) within 7 days of completion to assist with monitoring of catches against TCLs. AFMA's Data Entry Section maintain a running tally of catches of small pelagic species in Zones B, C and D and advise the fishery managers if catches become significant (approach TCLs).

Catches for Zones B, C and D are monitored against TCLs set on a financial year basis.

Logbook requirements for small pelagic species in Zone A are in transition:

- € Purse seine operators in state waters are required to return the Purse Seine Daily Fishing logbooks to DPIWE;
- € Purse seine operators in Commonwealth waters return PS01 logs to AFMA within 7 days of completion; and
- € Mid-water trawl operations must be reported in SWT01 logs to AFMA within 7 days of completion

AFMA and DPIWE are jointly monitoring catches in Zone A through logbooks and landing records. Mackerel A operators (the main catching sector) are voluntarily completing Commonwealth Catch Disposal Records (SESS 2) for catches in Zone A and are providing copies of SWT01 logs to DPIWE to assist with quota monitoring.

Catch disposal records provide certified weights of the catches of small pelagic species which can be used to verify estimates made in logbooks.

The management of catches against TACCs will be simplified when the Joint Authority comes into effect. DPIWE proposes to implement a catch monitoring system under a plan of management. Key elements are:

- € small pelagic species taken in Zone A must be sold to licensed fish receivers, further;
- € small pelagic species can only be unloaded at Hobart, Triabunna or Devonport; or
- € at other Tasmanian or mainland ports provided prior ‘intention to unload’ reports are made to the Tasmanian Police or AFMA respectively.

The fishing season for Zone A is from 1 September to 31 August the following year.

Spatial and temporal closures

Under the TACC and/or TCL management system, zones are closed once the respective TACC is reached or considered for closure if the respective Trigger Catch Level is reached as described in the SPF Management Policy (Attachment 3). The SPRAT will then review the circumstances under which the TACC or TCL has been reached and provide a recommendation to the AFMA Board in accordance with the process outlined in the Management Policy.

Closures can be implemented to ensure that fishing does not have a negative impact on particular species while allowing fishing to continue in other zones for other species.

Guideline 1.1.8: Fishing is conducted in a manner that does not threaten stocks of by product species. (Guidelines 1.1.1 to 1.1.7 should be applied to by-product to an appropriate level).

Small pelagic species are targeted in schools and as a result the target species comprises more than 90 % by weight in most individual operations. The remaining component of the catch (less than 10%) is usually dominated mainly by other small pelagic species (refer to Section 4.2).

Catches of species targeted by other fisheries are very low in purse seine operations but slightly higher in mid-water trawling. AFMA requires that catches of species managed by quota under the SESS Fishery Management Plan be covered by quota. AFMA is consulting with the states to determine suitable bycatch limits for state managed species that are occasionally taken when fishing for small pelagic species. The current trigger limit in Zone A is that catches of byproduct species (species other than the scheduled small pelagic species) must not exceed 10% of the total catch.

On the basis of available information AFMA believes both fishing methods are highly selective and that based on logbooks, port sampling and observer coverage the small quantities of bycatch of Commonwealth and state species taken are reported reliably and decremented against quota where appropriate.

Guideline 1.1.9: The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

AFMA is confident that the application of output controls provides a strong basis for sustainable management of small pelagic species across southern Australia. AFMA recognises that there is a degree of uncertainty associated with the setting of TACCs and TCLs given the lack of stock assessment models for these species. However AFMA believes that the TACCs/TCLs are set at appropriate levels based on our best understanding of the productivity of the fishing grounds and its relationship to abundance of small pelagic species in the various zones.

AFMA realises that the various management zones are not based on the ranges of small pelagic species or possible sub stocks. In this context the precautionary management strategy outlined in the SPF Management Policy March 2002 for Zones B, C and D provides an additional safeguard to those stocks fished at higher levels in Zone A. 4

In the absence of stock assessment models AFMA believes that the depth of scientific and sectoral participation in the SPRAT and SPFWG provides a robust basis for the setting and review of TCLs (and other management measures). AFMA is confident that the advice from both groups has been consistent with AFMA's policy commitment to manage the fishery in a precautionary manner.

AFMA and DPIWE are working to simplify the jurisdictional arrangements for the Zone A fishery. The current arrangements represent a compromise between the legislative objectives of both jurisdictions.

AFMA and DPIWE believe the proposed Joint Authority and future management of the fishery under Tasmanian legislation will provide greater security of access for operators currently accessing the fishery under a combination of Commonwealth permits and Tasmanian licences. It is both agencies' view that clearer jurisdictional arrangements and stronger access rights will provide a stronger basis for the implementation of more contemporary management arrangements (refer to Attachment 4 - Draft Zone A Small Pelagic Fishery Policy).

DPIWE has indicated that it intends to adopt an ecosystem based focus on the resource and surrounding environment. The management approach (based on ITQs) will apply measures to minimise impacts on the structure, productivity, function and biological diversity of the marine ecosystem. The proposed arrangement provides for the setting of reference points, based on biological characteristics of the fishery, and associated management actions triggered if monitoring indicates these reference points have been reached (or in some cases not reached).

AFMA is confident that Commonwealth participation in Zone A scientific and management groups will help ensure that assessment and management responses for small pelagic species are complementary across management zones.

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

Management responses

Guideline 1.2.1: A precautionary recovery strategy is in place specifying management actions, or staged management responses, which are linked to reference points. The recovery strategy should apply until the stock recovers, and should aim for recovery within a specific time period appropriate to the biology of the stock.¹⁰

AFMA has accepted advice from the SPRAT in regard to precautionary TCLs for Zones B, C and D. AFMA will ensure catches are maintained in accordance with these TCLs and associated review processes. AFMA's view is that this approach is compliant with Guideline 1.2.1. AFMA believes that given the current knowledge of stocks and its commitment to manage the fishery through precautionary output controls that it is unnecessary to articulate a specific recovery strategy.

AFMA proposes that the review of TCLs and other management measures will continue on an annual basis unless catches approach TCLs in which case additional reviews (which must be completed within specified time frames) are triggered. To date, catches of small pelagic species in Areas B, C and D have fallen well short of the TCLs.

The FRDC Blue Mackerel Project 2002/061 will provide the basis for the first quantitative stock assessment for a small pelagic species in the fishery. AFMA anticipates that this project will assist in the identification of appropriate reference points for this species. AFMA believes that, once the reference points are agreed, it may then be appropriate to consider developing a recovery strategy for blue mackerel.

There is currently no specific recovery strategy for stocks in Zone A. DPIWE has indicated that its approach (following establishment of the Joint Authority) will rely on:

- € the setting of appropriate trigger points for each performance criteria and reporting against those trigger points in the annual fishery assessment report;
- € reviewing strategies against the objectives if any of the trigger points are reached; and
- € developing a recovery plan in line with an approved stock rebuilding program.

Guideline 1.2.2: If the stock is estimated as being at or below the biological and/or effort bottom line, management responses such as a zero targeted catch, temporary fishery closure or a 'whole of fishery' effort or quota reduction are implemented.

None of the SPF species is estimated at or below the biological and/or effort bottom line.

AFMA and DPIWE are currently able to reduce catches of a particular species in Zone A by several mechanisms and these could involve action by one or both jurisdictions.

¹⁰ Strategies require that recovery should take place within specified times with certain degrees of probability

AFMA can vary the conditions listed on a permit applying to fish and fishing methods (Schedule 4). This allows AFMA to restrict targeting of certain species and vary the gear used to target fish. Operators can, however, appeal changes to permits.

AFMA cannot implement spatial and temporal closures unless these needs were anticipated and included as a condition when the permits are issued. AFMA's recent management plans have stronger provisions for Directions and Temporary Orders which can be implemented as spatial and temporal closures.

DPIWE can close the area of the waters of the Zone A fishery for purse seine methods but would rely on complementary action by AFMA to stop mid-water trawling for the species of concern.

The tools available to AFMA and DPIWE are listed below including DPIWE's proposed measures for the Zone A fishery.

Commonwealth permits Zones A, B, C and D	Tasmanian Interim Management Controls	Zone A (DPIWE proposed)
Prohibition of targeted fishing for a species	Close the waters of the purse seine fishery	Change in the TACC
The introduction of size limits for specific fish species		Introduction of species specific TACCs
Closure of 5 degree longitude strips in Zone B (AFMA Board policy)		Restrictions on the amount and types of gear which may be used
Amend the TCLs (currently determined under AFMA Board policy)		A prohibition or restriction on the taking of specific fish species
		Spatial and temporal closures
		The introduction of size limits for specific fish species
		Closure of the fishery

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

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

Information requirements

Guideline 2.1.1: Reliable information, appropriate to the scale of the fishery, is collected on the composition and abundance of bycatch.

AFMA and TAFI have collected a reasonable amount of verified information on the composition and abundance of bycatch species taken in the Zone A fishery (refer to Section 4.2). An ongoing catch monitoring and observer program is currently being administered by TAFI (refer to Guideline 1.1.1).

There is only one company fishing intensively in Zone A, and TAFI report that it has been very cooperative in regard to observer placements and catch sampling requirements. TAFI is confident that the 'at sea' and port sampling coverage levels are robust. The scientific sampling program is quite intensive at present in response to the development of the redbait resources.

The level of verified data for Zones, B, C and D of the fishery is limited. There has been very little fishing effort in these zones in recent years. AFMA currently relies on logbook for information on bycatch in these zones.

AFMA's SPF permits include a condition whereby observers can be placed on vessels. This allows AFMA to respond to any significant increase in effort in Zones B, C and D. The observer requirements for pair trawling are more specific. AFMA currently requires 25% observer coverage on pair trawling operations in the fishery (pair trawling has only being trialed in Zone A).

AFMA is seeking to implement a specific logbook for bait catching in the tuna fisheries to improve information on the removals by this sector. This is now a matter of consultation with industry and state agencies.

AFMA has not yet developed a Bycatch Action Plan for the Small Pelagic Fishery. Operators using mid-water trawl methods are also required to hold SESS endorsements and are working under the auspices of the current South East Trawl Fishery Bycatch Action Plan and South East Trawl Fishing Industry Association (SETFIA) code of conduct when using the trawl method.

AFMA has not yet decided whether to develop a BAP for the fishery or to integrate bycatch management measures more fully into the management policy (see Guideline 2.1.6). AFMA anticipates that the BAP/or the next iteration of the management policy will set out data collection protocols for bycatch species.

AFMA expects that the *Ecological Risk Assessment for Commonwealth fisheries* project will address the Small Pelagic Fishery in late 2003 This process will identify areas of data deficiency in the fishery and will help the SPRAT determine data collection priorities for the fishery. AFMA expects that the results will also feed into the BAP or equivalent sections of the next management policy for the fishery.

AFMA believes the current data collection system is adequate for bycatch given the low levels of activity in most of the fishery. AFMA and DPIWE are confident that the data collection program administered by TAFI is collecting high quality information on bycatch in Zone A and is adequately sampling fishing effort in Zone A.

AFMA recognises that increased effort in Zones B, C and D may require information above that provided in logbooks but believes that the ERA project will assist with the identification of bycatch issues that may require more intensive monitoring.

AFMA has the ability to place observers in the fishery if 'at sea' monitoring is needed. AFMA is also confident that cost effective port sampling programs could be implemented if required. Options available could include cooperative approaches with state agencies established through the SPRAT and Blue Mackerel Project or through contractual arrangements with third party providers similar to those administered in the SESS, ETBF and

SWTBF.

Assessments

Guideline 2.1.2: There is a risk analysis of the bycatch with respect to its vulnerability to fishing.

There has been no formal risk analysis of bycatch and its vulnerability to fishing for the Small Pelagic Fishery. In order to initiate the assessment of bycatch species the following processes are being implemented in the SPF:

- € The *Ecological Risk Assessment for Commonwealth Fisheries* is expected to be completed for the SPF in late 2003. The aims of the project include identifying those species most at risk of interaction with the fishing gear, of capture and of subsequent discarding. Results will be incorporated into the broader assessment of all Commonwealth fisheries through this project.

The results from this project will form the basis of the assessment of bycatch vulnerability to fishing. The SPRAT and SPFWG will undertake further risk assessment as required in developing the Bycatch Action Plan for the SPF.

The SPF is committed to undertaking such assessments as required in the Management Policy. The Management Policy states that the guidelines for the Ecologically Sustainable Management of Fisheries must be met and requires that the management regime:

- € be capable of 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
- € requires compliance with relevant threat abatement plans, recovery plans, the National Policy on Fisheries Bycatch, and bycatch action strategies developed under that policy.

Management responses

Guideline 2.1.3: Measures are in place to avoid capture and mortality of bycatch species unless it is determined that the level of catch is sustainable (except in relation to endangered, threatened or protected species). Steps must be taken to develop suitable technology if none is available.

There are currently area closures inside Tasmanian state waters which are administered differentially according to gear type. In general enclosed waters are closed to both purse seine and mid-water trawl, waters out to 3nm (state limits) are limited to purse seine only and outside 3nm both methods can be used.

Areas closed under the Tasmanian Scalefish Management Plan apply to the Zone A Fishery. DPIWE intend that the new management arrangements include the power to implement closures if and when required.

The only bycatch species assessed as common in Zone A catches by TAFI are barracouta and spotted warehou.

- € **Barracouta** are a state managed species and are not considered to be a management or research priority in Tasmania. TAFI identify this species as the most common bycatch species mainly because schools of barracouta are sometimes caught in a few mid-water trawl shots. They are also taken in modest numbers by commercial and recreational fishers.
- € **Spotted warehou** are managed under ITQs in the SESS Fishery. TAFI reports that spotted warehou comprise up to 5% of the catch on a small proportion of mid-water trawl shots. Operators must cover catches of these species with quota. BRS classified the spotted warehou's stock status as uncertain in 2001/02.

AFMA and DPIWE's assessment of logbook and observer data collected to date is that no immediate need to implement measures to manage impacts on general bycatch in the Zone A Fishery.

There is insufficient information on bycatch in Zones B, C and D to make an assessment, however, the low level of fishing activity in these zones suggests any impacts are currently insignificant.

Bycatch Action Plan

The National Bycatch Policy indicates that all Commonwealth fisheries require formal Bycatch Action Plans. The subsequent Commonwealth Policy on Fisheries Bycatch sets out a more flexible approach for smaller fisheries, whereby bycatch arrangements will be incorporated in the management arrangements. Under current policy AFMA is committed to developing a bycatch action plan for the fishery but intends to consult with stakeholders in regard to option of incorporating bycatch management principles in a revised management policy.

The BAP or relevant section in the management policy will require that:

- € information is gathered about bycatch species;
- € bycatch is kept below a level that will allow stocks of bycatch species to be maintained at an ecologically sustainable level;
- € AFMA must review the bycatch action plan at least once every second year after the commencement of the management arrangements to ensure that it is appropriate for ensuring that bycatch is reduced to, or kept at, a minimum; and
- € if information gathered under the bycatch action plan shows that it is necessary to do so, AFMA will amend the management arrangements.

Management measures will be developed, in conjunction with the SPRAT and SPFWG, to avoid and/or reduce the capture and mortality of bycatch species from the fishery.

Guideline 2.1.4: An indicator group of bycatch species is monitored.

This Guideline is addressed in conjunction with Guideline 2.1.5 below.

Guideline 2.1.5: There are decision rules that trigger further additional management measures when there are significant perturbations in the indicator species numbers.

An indicator group of bycatch species has not been identified for the fishery, nor have ecosystem indicators been identified.

The *Ecological Risk Assessment for Commonwealth Fisheries* project will assess bycatch at a species level. Should this project, or future reviews of this project, raise concern about a particular species, AFMA in conjunction with industry, SPRAT and SPFWG, will develop appropriate management responses.

Guideline 2.1.6: The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

There are no specific management responses based on finfish bycatch at present in any of the management zones. The limited information on bycatch in the fishery suggests the fishery is relatively selective. The fishery is also presently confined to a relatively small area and this may add a large element of protection to stocks of species taken incidentally in its operations. None of the species recorded by AFMA and TAFI (Attachment 5) as being taken in the fishery (some as trace amounts) were identified as at risk in the report commissioned by the Marine Species Section (EA).

Conservation Overview and Action Plan for Australian Threatened and Potentially Threatened Marine and Estuarine Fishes - J. J. Pogonoski, D. A. Pollard and J. R. Paxton February 2002

AFMA anticipate that the *Ecological Risk Assessment for Commonwealth Fisheries* will provide the basis for identifying any bycatch issues and will provide AFMA with a better understanding of the status of bycatch stocks and an indication of those bycatch stocks that may be at high risk. If necessary, AFMA and DPIWE will develop bycatch management responses to ensure that the fishery is conducted in a manner that does not threaten bycatch species. Both agencies are confident that if management responses are needed for bycatch species suitable ones could be developed on a cooperative basis with industry. Alternatively, AFMA and DPIWE have the head of power to implement measures under existing policy or by variation to permit or licence conditions.

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

Guideline 2.2.1: Reliable information is collected on the interaction with endangered, threatened or protected species and threatened ecological communities.

AFMA currently collects information on interactions with protected species in the Small Pelagic Fishery in three ways:

- ∄ AFMA logbooks provide a facility for the masters to records the details of any direct interactions with protected species; and
- ∄ AFMA permits require that any capture, injury to, or death of a seabird or marine mammal be reported to AFMA within 24 hours of the incident.

- € AFMA observers collect information on the abundance and behaviour of wildlife during pair trawling operations including any direct interactions with protected species.
- € TAFI observers record the presence of seals and seabirds and note any captures that occur.

Verified observer data on wildlife interactions were collected through the observer program for the mid-water pair trawling operations in 2001/02. The pair trawl vessels were using Seal Excluder Devices (SEDs) during this period, which may have been a positive factor in reducing interactions with fur seals. Only one report of a fur seal interaction was reported by industry during the period pair trawling was employed in the Zone A fishery. In this instance a fur seal entered the net through the SED escape hatch during a fish pumping operation. The seal was released alive.

AFMA observers monitored setting and hauling events during the pair trawl trials. Observers reported that the short tailed shearwaters, shy albatross and Buller's albatross were the most abundant species. Observers reported that albatross and petrel species exhibited greatest interest during hauling and fish pumping operations. Short tailed shearwaters, although abundant, were generally disinterested in fishing operations, with one observer noting that large flocks move through the observation zones. No seabird contacts with the vessel or fishing gear occurred during observed fishing operations.

Observers reported that Australian and New Zealand fur seals (an average of five per shot) were attracted to the vessel during hauling and fish pumping operations. Observers also inspected the net for any signs of entanglement - no contacts with the fishing gear or vessel were observed. Observers noted that seals took advantage of small quantities of fish that spilt during problems experienced with fish pumping operations on a few occasions.

The company that undertook the pair trawling trials introduced a single vessel mid-water trawler in December 2002. This vessel has used a SED continuously since then. As of June 2003 the company has advised that no seals have been caught (alive or dead). TAFI observers have also reported no observed interactions on their regular trips.

There is limited verified data available on the fishery's interactions protected species in Zones B, C, and D due the relatively small size of the fishery and with its short history.

AFMA anticipates that the outcomes of the *Ecological Risk Assessment of Commonwealth Fisheries* project will form the basis on which to define the priority areas and species associated with the SPF.

Assessments

Guideline 2.2.2: There is an assessment of the impact of the fishery on endangered, threatened or protected species.

There has been no assessment of the impact of the fishery on endangered, threatened or protected species.

The BRS report entitled *Non-target Species in Australia's Commonwealth Fisheries – a Critical Review* (Harris and Ward 1999) examined the information available on non-target species in Commonwealth fisheries including the amount and composition of catch, fishery specific issues, previous assessments of fishing effect and future assessment requirements. The primary focus of the report was on sources of mortality on non-target species that could be observed from the catch and ecological effects as a result of competition/predation interactions. The results of this research indicate possible ecological effects on seabirds and marine mammals in the SPF.

The *Ecological Risk Assessment for Commonwealth Fisheries* includes protected species. The SPF component of this project is expected to be completed in late 2003. The outcomes of this project will be provided to the SPRAT and SPFWG for consideration in the development of appropriate responses. Future ecological risk assessments will incorporate data from the data collection program. Should the *Ecological Risk Assessment for Commonwealth Fisheries* identify data needs, these will be addressed through a data collection program as appropriate.

Seabirds

The level of seabird interaction has not been assessed in the SPF. Based on data collected by observers the level of direct interactions appears to be minimal, however, further verified data would be required to accurately assess the impacts. Observer coverage on the pair trawling operations indicates some level of provisioning but no contact with the gear.

In October 2001, the Minister for the Environment and Heritage approved the *Recovery Plan for Albatrosses and Giant-Petrels* (EA, 2001). The impetus for this recovery plan began in December 1997 when several albatross species were listed as threatened, highlighting the need to develop a coordinated conservation strategy for albatrosses and giant-petrels. The overall objective of this Plan is to minimise (or eliminate) threats due to human activity to albatrosses and giant-petrels to ensure their recovery in the wild. The *Recovery Plan for Albatrosses and Giant-Petrels* is available at www.ea.gov.au. Should impacts of the SPF be identified in the recovery plan or review of the plan, appropriate managements arrangements will be put in place.

Grey nurse and great white sharks

These two shark species are currently protected in Commonwealth waters under the EPBC Act. The distribution of these species includes the area of waters of the SPF. Data collected from the logbook and observer programs indicates no interaction with these species.

Cetaceans

Data collected from observers in Zone A suggest only low levels of interactions with cetaceans (bow-riding). Anecdotal information from industry suggests that small cetaceans are not habituated to fishing operations for small pelagic species in southern waters.

AFMA believes that the situation with cetaceans may be different for waters in northern NSW (Zone D). A limited developmental purse seine fishery for pilchards in southern Queensland was stopped in 1999 due to the capture of large numbers of dolphins. Research on baitfish in southern Queensland suggests that mixed schools are a feature of the region and that dolphins and carcharhinid sharks are frequently associated with the aggregations. There is currently very little fishing activity for small pelagic species north of Sydney in Zone D.

AFMA, the SPRAT and industry are aware of the problem with dolphins in south east Queensland and the possibility that this association might extend into the northern part of Zone D.

Seals

Management and industry have focused more attention on the potential for seal bycatch in the fishery. The reported interaction with a fur seal during a fish pumping operation (released alive) and the bycatch of fur seals in the trawling operations targeting blue grenadier off western Tasmania suggest that the bycatch of seals could increase if seals become habituated to mid-water trawling operations.

Anecdotal information suggests occasional interactions with seals in purse-seine operations of the fishery. However these rarely result in entanglements and sometimes involve seals clambering on board vessels. Harris and Ward 1999 reported a low incidence of seals being encircled during purse-seining and that, invariably, the seals escape over the nets unharmed.

Marine mammal interactions in mid-water trawl fisheries both nationally and internationally can be high due to the predator/prey relationship between these species. Mid-water trawling operations have been known to have high interactions with seals such as in the New Zealand squid trawl fishery where parts of the fishery have been closed due to sea lion catches. The Australian blue grenadier fishery is another fishery known to have significant seal interactions. The level of interactions may depend on depth, speed of the trawl and the time of day.

The *Ecological Risk Assessment for Commonwealth Fisheries* project, described under Guideline 1.1.2 will provide further information on the level of risk to protected species from the fishery so that appropriate management measures can be taken if required.

Guideline 2.2.3: There is an assessment of the impact of the fishery on threatened ecological communities.

No threatened ecological communities have been identified in the area of the fishery.

Management Responses

Guideline 2.2.4 There are measures in place to avoid capture and/or mortality of endangered, threatened or protected species.

The *Ecological Risk Assessment for Commonwealth Fisheries* will provide initial information and assessment of the fishery's interactions with endangered, threatened or protected species. Management measures will be reviewed as necessary to ensure that the capture and mortality of these species are minimised.

Bycatch Action Plan/measures in policy and fishing permits

The Commonwealth Bycatch Policy requires that AFMA must implement measures to minimise the taking of protected species. AFMA intends that in the case of the Small Pelagic Fishery to incorporate these measures in the management policy for Zones B, C and D rather than in a stand alone BAP.

DPIWE intends to incorporate objectives in the Zone A Small Pelagic Fishery Management Policy which set out requirements to report interactions, establish baseline information using catch monitoring and observers and if required encourage industry to adopt mitigation strategies. The draft policy provides for an annual review of impacts on protected species and has provision for the implementation of spatial and/or temporal closures to safeguard protected species or threatened ecological communities.

The company responsible for most of the fishing effort in Zone A has used Seal Exclusion Devices (SEDs) since they introduced the mid-water trawl method into the fishery. SEDs provide seals with an escape passage from the net. The mid-water trawler uses a SED on all trawl shots in the fishery and works in accordance with the SETFIA code of conduct which sets out additional techniques for reducing the opportunities for seals to access trawl nets.

Guideline 2.2.5: There are measures in place to avoid impact on threatened ecological communities.

No threatened ecological communities have been identified in the area of the fishery.

AFMA Management keeps abreast of new nominations of species and ecological communities for listing under the EPBC Act and also consults regularly with the Marine Species Section. AFMA has mechanisms in place to ensure new listings are brought to the attention of the appropriate fishery managers and the relevant management and scientific forums for each fishery (Environment updates, permanent EA observers on MACs).

AFMA is confident current consultative mechanisms can adequately assess the requirements of new listings under the EPBC Act and develop suitable management responses if required.

Guideline 2.2.6: The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

The management measures described above indicate that the fishery is being conducted in a manner that is consistent with this objective. In addition, the following will ensure the fishery is conducted in a manner that avoids the mortality and injury of endangered, threatened and protected species:

- € initiation of the *Ecological Risk Assessment for Commonwealth Fisheries* project, described under Guideline 1.1.2; and
- € analysis of the results of each of these, and the development of management responses by AFMA in conjunction with SPFWG and industry.

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

Information requirements

Guideline 2.3.1: Information appropriate for the analysis in 2.3.2 is collated and/or collected covering the fisheries impact on the ecosystem and environment generally.

There is limited information available for analysis in the Ecological Risk Assessment described under 2.3.2. Information available includes:

The **fishery** (area, catch history, bycatch information, fishing practices).

The **ecosystem**:

- € **habitat** (eg. habitat types – range and distribution, physical and biotic aspects of habitat, oceanographic influences); and
- € **trophic aspects** (eg. predator prey relationships, trophic level of key species, trophic webs, patterns of primary production).

Most of the significant information on the fishery is confined to Area A and to a lesser extent Area D. The level of fishing in Zones C and B has been insignificant to date. Fishery information is described under Guideline 1.1.1.

The launch of Oceans Policy in 1998 signalled the Commonwealth Government's commitment to put in place a management regime at the large ecosystem level. The subsequent development of the South East Marine Regional Plan led to a greater priority been given to ecosystem relationships for various sections of south-east marine region. Since then there have been several ecosystem related research projects undertaken for the Southern and Eastern Scalefish and Shark Fishery (SESS Fishery). AFMA expects elements of this work to be relevant to the ERA for the Small Pelagic Fishery particularly in regard to Zones A and D. One general finding of this work is that pelagic production underpins a significant proportion of the productivity of the demersal fishery. Relevant research includes:

- € Diets and trophic guilds of SE shelf demersal fishes – Bulman, Althaus, He, Bax and Williams 2001
- € Ecosystem of the South East Fishery (Australia) and fisher lore - Prince 2001

There is also reasonable body of research available into the prey needs for SBT, some seabird and seals species in the south east region. This work was reviewed by Ward et al in regard to the possible 'bottom up' control blue mackerel may exert on game fish, sharks and marine mammals. This body of research will be considered by the ERA in regard to possible broader trophic impacts arising from catches of all small pelagic species. Relevant research includes:

- € Young, Lamb, Le, Bradford and Whitelaw – 1997 feeding ecology and interannual variations in diet of SBT in relation to coastal and oceanic waters off eastern Tasmania.
- € Brothers, Gales and Pemberton 1993 - Prey harvest of the Australasian gannet (*Sula serrator*) in Tasmania
- € Gales and Pemberton 1994 – Diet of the Australian fur seal in Tasmania
- € Hedd and Gales 2001 – The diet of shy albatrosses (*Thalassarche cauta*) at Albatross Island, Tasmania

AFMA also expects that the ERA will review the Small Pelagic Fishery in the context of the large international fisheries for small pelagic species which are known for experiencing large changes in abundance and in, some cases, the species composition of catches eg. Peruvian anchovetta, South African pilchard. These events are strongly linked to oceanographic changes and reductions in some species are often accompanied by increases in other small pelagic species. Ward, P. et al 2001 suggest that the extent of the impact on dependent species arising from changes in the abundance of a particular species would to some extent depend on the mobility of the predator and its ability to switch prey (opportunistic feeder).

Assessment

Guideline 2.3.2: Information is collected and a risk analysis, appropriate to the scale of the fishery and its potential impacts, is conducted into the susceptibility of each of the following ecosystem components to the fishery.

- 1. Impacts on ecological communities**
 - Benthic communities
 - Ecologically related, associated or dependent species
 - Water column communities
- 2. Impacts on food chains**
 - Structures
 - Productivity/flows
- 3. Impacts on the physical environment**
 - Physical habitat
 - Water quality

As stated in 2.3.1 there has been no specific investigation of ecosystem impacts associated with the Small Pelagic Fishery. AFMA has commissioned CSIRO, MAFRI and BRS to conduct a formal ecological risk assessment project for the SPF. The project, described in Attachment 6, will report on the relative risks of the fishery in regard to the above ecosystem components. AFMA expects that the assessment will be completed by late 2003.

Until the ERA is completed AFMA can only provide a limited assessment of fishery impacts on the listed ecosystem components.

Impacts on ecological communities

Based on current understanding of the gear types in the fishery, advice from industry and observer coverage AFMA considers the direct impacts of fishing gear on benthic environments to be minimal.

Purse seine gear is used to target surface schools of fish and, while the footrope of the purse seine can rest on the seafloor during some inshore operations, there is only limited force exerted on the bottom and benthic structures. The purse seine vessel is essentially stationary when pursuing takes place so there is very limited dragging of the gear on those occasions when it comes in contact with the seafloor.

Mid-water trawl gear is used to target schools or aggregations of fish in the water column. Mid-water trawl gear takes very small quantities of demersal fish and can sustain limited contact with the bottom. AFMA observers did not report any benthic material in observed trawl shots off Tasmania.

Small catches of ‘demersal’ fish in mid-water trawls are possibly explained by their moving up into the water column to feed (particularly at night). The propensity of some species, considered to be mainly demersal in habit, to feed in mid-water has been evidenced by gut analysis (Bulman et al 2001) and by their presence in pelagic longline bycatch (AFMA observer data).

Ecologically related, associated species or dependent species

Studies on higher order predators in south-eastern Australia have indicated that small pelagic species comprise a significant component of these animals’ diet at times. These include fur seals, shy albatross, Australasian gannet, southern bluefin tuna and some SESS quota species (mirror dorys and john dorys).

The recreational sector has also raised concerns about the impact of the fishery on game fish (marlin and tuna) abundance. Ward et al (2001) suggest that the impact of fishery removals on gamefish might be less significant than for less mobile predators (seals). They also noted that studies on marlin and tuna species generally suggest that they were opportunistic feeders and switched feeding behaviour readily to suit conditions.

AFMA is not yet in a position to assess the importance of small pelagic species to higher order predators and /or the possible implications to small pelagic stocks as a result of longstanding fishing for some of the species that prey on small pelagic species. AFMA will rely on the ERA to review the available information and report on the relative risks for various ecologically related, associated and dependent species arising from the small pelagic fishery.

AFMA expects that the key issues for consideration by the ERA will include:

- ∄ The natural interannual variability in the abundance of small pelagic species and the responses of predators to these changes;
- ∄ The extent of reliance on adjacent small pelagic resources by nesting seabirds and lactating seals;
- ∄ The possible relationship between local upwelling events, small pelagic abundance and cetaceans (blue whales and the Bonney upwelling)
- ∄ Information on species that enter and leave the region annually during breeding and feeding migrations seals, humpback whales, yellowfin tuna, southern bluefin tuna, school sharks (summarised in Glimpses of the South-East Marine Region – http://www.oceans.gov.au/pdf/summarypaper_se_marine.pdf)

Impacts on water column communities, food chains and productivity flows

AFMA understands that small pelagic species are an important part of the food chain in the south-east marine region. There is a reasonable amount of information about the importance of zooplankton (particularly krill) to small pelagic species and their importance to larger pelagic (and some demersal) predators off Tasmania, Victoria and New South Wales.

On this basis AFMA considers it likely that small pelagic species occupy an important role in the structure and productivity flows in areas of the fishery (Eastern Tasmania and the GAB upwelling areas). Some of this information has been consolidated during the development of the South-east Regional Marine Plan. The National Oceans Office has published key conceptual models of benthic and demersal continental shelf ecosystems for the South-east marine region (Figure 10). These models provide a schematic representation of the role of small pelagic species in that region.

Key ecosystem features and functions

Food energy from pelagic to benthic via detritus and vertical movement of demersal species

Local nutrient cycling through falling detritus, renewal by renewal by detritivores, and physical mixing back to the surface

Assemblages of species depend on latitude, depth substrate type and water currents

Shelf communities may depend on food energy from further inshore (seagrass detritus) and further offshore (movement of species onshore from the shelf-break)

Figure 10: Draft conceptual model of benthic and demersal continental shelf ecosystems (adapted from 'A Summary Paper – glimpses of the South-east Marine Region' - NOO 2002).

There is less information available for other areas of the fishery. AFMA has received anecdotal advice from industry and scientists that the abundance of small pelagic species is patchy along the NSW mid coast which suggest productivity may be more closely linked to terrigenous inputs. Additional information on the productivity and structure of the ecosystem is expected from two current FRDC projects:

- € FRDC Blue Mackerel Project 2002/061 (a better understanding of the productivity for most of the waters of the fishery); and
- € The FRDC project 01/1154 - Trophic interactions in eastern Australian pelagic food webs - the ecological effects of longline fishing in the Eastern Tuna and Billfish Fishery. One aspect of this study directly relevant to the Small Pelagic Fishery (Zones A and D) is the investigation of the components and linkages within the pelagic ecosystem from apex predator through to food sources in the eastern Australian longline fishery.

AFMA expects that the ERA will review available information in regard to potential impacts of the fishery on food chains and productivity flows and identify areas where more information and research is desirable.

Impacts on the physical environment - physical habitat and water quality

The purse-seine and pair-trawling sector of the SPF are not considered to have a significant impact on physical habitat and water quality for the following reasons:

- € fishing methods are pelagic and have no significant interaction with the benthos
- € vessels generally retain fish in whole form and other than small losses during fish pumping operations discharge no offal
- € operators are required to adhere to MARPOL regulations which prohibit the disposal of garbage from ships and boats. AFMA observers have reported full compliance with these requirements to date.
- € These regulations require fishing vessels to make every effort to retrieve all lost or damaged fishing gear. Gear damage in purse seining operations is usually limited to splits in the net and these rarely result in loss of fishing gear. The mid-water trawl sector may have potential to impact on physical habitat in some areas, depending on the bottom topography and this could occasionally result in the loss of portions of net. If fishing gear is lost, the operator must report the approximate positions and reasons for the loss to the nearest port authority or the Australian Search and Rescue Centre in Canberra. This allows other vessels to look out for and retrieve the gear.

Management responses

Guideline 2.3.3: Management actions are in place to ensure significant damage to ecosystems does not arise from the impacts described in 2.3.1

Despite the limited information currently available on ecosystem impacts associated with the Small Pelagic Fishery AFMA believes that the following management objectives and measures contribute to ensuring that significant ecosystem impacts do not occur:

- € precautionary species specific trigger catch limits (TCLs) for Zones B, C and D;
- € spatial management regime for Area B (to address concerns of local depletion);

- ∄ total allowable catch (TACC) for SPF species in Zone A;
- ∄ proposed trigger points for Zone A based on catch composition (address possible changes that cannot be explained by other factors such as environmental variability);
- ∄ proposed trigger points for Zone A based to address local depletion concerns;
- ∄ prohibition of trawl fishing from inshore waters such as designated Shark Nursery Areas;
- ∄ the *Ecological Risk Assessment for Commonwealth Fisheries* project to identify areas of concern. AFMA, SPRAT and SPF WG will consider the results of the project in the development of appropriate management responses;
- ∄ ongoing review of the results of the *Ecological Risk Assessment for Commonwealth Fisheries* project by SPRAT;
- ∄ provisions for spatial management, which allows area closures to be implemented to ensure that fishing does not have a high impact on an area of particular sensitivity;
- ∄ several marine protected areas within the area of the fishery (described in Part II).

Guideline 2.3.4: There are decision rules that trigger further management responses when monitoring detects impacts on selected ecosystem indicators beyond a predetermined level, or where action is indicated by application of the precautionary approach.

No ecosystem indicators have been identified for the fishery. The stock assessment processes for SPF species and the *Ecological Risk Assessment for Commonwealth Fisheries* project will identify areas and/or species of concern. Appropriate management action will be taken if required.

Areas of concern include impacts of fishing on non-target species (including threatened and protected species), benthic habitats and marine food chains (ecologically related species). CSIRO is currently undertaking a project entitled *Ecological indicators for fishery management: non-target species, habitats and food chains*. The project commenced on 1 June 2000 and is due for completion by late 2003. The objectives of the project are to:

- ∄ review the current use of ecological indicators in fisheries management
- ∄ identify robust ecological indicators and reference points for fisheries management.

The results of this project will be included within the management regime for the SPF, and will be considered in any future review of the management arrangements.

Guideline 2.3.5: The management response, considering uncertainties in the assessment and the precautionary management actions, has a high chance of achieving the objective.

The management responses described above in Guideline 2.3.3 ensure that the fishery is conducted in a manner that minimises the impact of fishing operations on the ecosystem generally. AFMA, SPRAT and SPFWG also recognise that more information is needed to identify the extent of the structure, productivity, function and biological diversity of the ecosystem.

17 Compliance

AFMA currently monitors catches in the fishery through logbooks. AFMA's Data Entry Section monitor catches against TCLs. AFMA and DPIWE jointly monitor catches against the TACC in Zone A. The industry in Zone A is assisting by voluntarily completing catch disposal records (fish receivers provide verified weights for landed catches).

AFMA bases the fishery's compliance budget on the expected level of activity in the fishery (which is currently relatively low). AFMA relies on its contractual arrangements with state fisheries agencies to deliver field compliance.

AFMA observers also report on the level of compliance with at sea arrangements.

18 Review mechanism for the management arrangements

Management arrangements currently remain in effect until AFMA revokes or amends them. There have been proposals for some years for a legislative instruments bill under which legislative instruments would cease after 5 years with the exception of statutory management plan cessation after 15 years.

DPIWE has indicated that a review of management arrangements will continue the establishment of the Joint Authority. DPIWE expects that following further public consultation the Zone A Small Pelagic Fishery policy will be settled and that this will remain in force until the establishment of a statutory management plan.

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List of Attachments

1. Terms of Reference for the – Environmental Assessment of the Small Pelagic Fishery
2. Terms of Reference for AFMA Management Advisory Committees
3. Management Policy for the Commonwealth Small Pelagic Fishery March 2002
4. Zone A Small Pelagic Fishery – Draft Policy Document August 2003 (DPIWE)
5. Species recorded in the Small Pelagic Fishery – Zone A
6. Outline of the Ecological Risk Assessment (ERA) process
7. Small Pelagic Fishery research priorities for 2004/05

Glossary of terms

Access right	A right to carry out specified fishing activities.
Australian fishing zone	Waters adjacent to Australia and its external territories (excluding Torres Strait and the Antarctic Territories) which extend from defined baselines to 200 nm seawards, but not including coastal and excepted waters. Agreed boundaries apply where these zones intersect the 200 nm zones of other nations. Within the Australian fishing zone, Australia exercises jurisdiction over all fishing by Australian and foreign boats.
Bycatch	In its broadest sense, bycatch includes all living and non-living material (except for the target species) which is caught while fishing, including by-product, discards and that part of the catch which does not reach the deck but is affected by interactions with the fishing gear. For the purposes of the Commonwealth Bycatch Policy, bycatch is defined more narrowly as discards and that part of the catch that does not reach the deck but is affected by interactions with the fishing gear.
Byproduct	Any part of the catch which is kept or sold by the fisher but which is not the target species.
Discards	Any part of the catch which is returned to the sea, whether dead or alive.
Fishing concession	A statutory fishing right, or a fishing permit or a foreign fishing boat licence granted under the provisions of the <i>Fisheries Management Act 1991</i>
Fish stock	The living resources in the community or population from which catches are taken in a fishery. Use of the term fish stock usually implies that the particular population is more or less isolated from other stocks of the same species and hence self-sustaining. In a particular fishery, the fish stock may be one or several species of fish but here is also intended to include commercial invertebrates and plants (www.fao.org)
Individual transferable quotas	Individual transferable quotas refer to individual portions of a total allowable catch - units of quota - which allow the holder to catch that portion of the total allowable catch each season. The weight value of the individual transferable quotas change proportionately to changes in the total allowable catch set for a species each season. Individual transferable quotas are fully tradeable and can be sold or leased to other persons.
Input controls	Restrictions placed on the amount of effort input into a fishery eg by restricting types and size of fishing gear and boats and the amount of fishing time.
Limited entry	Management arrangements whereby only a fixed number of operators are allowed to fish in a particular fishery. New operators may only gain access to the fishery by purchasing an existing right.

Longline fishing	A method of fishing that can be either surface set (pelagic) or bottom set (demersal) line fishing. Both methods comprise a main line to which are attached branch lines, each fitted with one or more baited hooks or artificial lures.
Non-target species	Any part of the catch, except the target species, and including bycatch and byproduct.
Offshore Constitutional Settlement	An agreement between the state(s) and the Commonwealth whereby the state or the Commonwealth (or in some cases a Joint Authority) is given jurisdiction for a particular fishery occurring in both coastal waters and the Australian fishing zone. When no Offshore Constitutional Settlement agreement has been reached the fishery remains under the jurisdiction of the state out to 3 nm, and the Commonwealth from 3 to 200 nm.
Output controls	Restrictions imposed on the quantity of fish that can be taken from a fishery within a specified period of time. This can be by either a competitive total allowable catch or a total allowable catch allocated to participants as individual transferable quotas.
Pelagic fish	Fish that are normally caught at or near the sea surface or in the water column.
Pelagic longlining	A fishing method that targets pelagic fish species. A pelagic longline comprises a mainline to which are attached branch lines, each fitted with one or more baited hooks or artificial lures. A pelagic longline is set so that the mainline, branch lines and hooks are suspended above the seabed by floats at the sea surface.
Quota management	A method of management based on output controls whereby the total allowable catch is allocated among eligible operators and allocated as shares in the annual total allowable catch.
Reference point	A reference point indicates a particular state of a fishery indicator corresponding to a situation considered as desirable (Target reference point, TRP) or undesirable and requiring immediate action (Limit reference point, LRP, and Threshold reference point, ThRP) (www.fao.org).
Statutory fishing rights	Statutory fishing rights are rights granted under Section 21 of the <i>Fisheries Management Act 1991</i> . The nature of statutory fishing rights in a fishery is detailed in the plan of management which creates those rights. A statutory fishing right may be a right to use a boat, a unit of fishing gear, or a quantity of catch, or other rights as identified in the management plan.
Straddling stock	Stock which occurs both within the EEZ and in an area beyond and adjacent to EEZ (www.fao.org)
Target species	The most highly sought component of the catch taken by fishers.

Total allowable catch

A total allowable catch represents the amount of fish of a particular species that can be taken from a fishery in a prescribed period. Total allowable catches are set for fish species managed through individual transferable quotas.

List of acronyms

ABARE	Australian Bureau of Agricultural and Resource Economics
AFFA	Agriculture, Fisheries and Forestry Australia
AFMA	Australian Fisheries Management Authority
AFZ	Australian Fishing Zone
ANAO	Australian National Audit Office
ASIC	Australian Seafood Industry Council
BRS	Bureau of Rural Sciences
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DPIWE	Department of Primary Industries, Water and the Environment
EA	Environment Australia
EPBC	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ETBF	Eastern Tuna and Billfish Fishery
FAO	Food and Agriculture Organisation of the United Nations
FRDC	Fisheries Research Development Council
ISMP	Integrated Scientific Monitoring Program
MARPOL	International Convention for the Prevention of Pollution from Ships
nm	Nautical mile
SARDI	South Australian Research and Development Institute
SBT	Southern bluefin tuna
SESS	Southern and Eastern Scalefish and Shark Fishery
SPF	Small Pelagic Fishery
SPRAT	Small Pelagic Research and Assessment Team
SPFWG	Small Pelagic Fishery Working Group
SWTBF	Southern and Western Tuna and Billfish Fishery
TAFI	Tasmanian Aquaculture and Fisheries Institute
TSPWG	Tasmanian Small Pelagic Working Group

TACC	Total allowable commercial catch
TAP	Threat Abatement Plan
UNFSA	United Nations Fish Stock Agreement