



Australian Government
Australian Fisheries Management Authority

Ecological Risk Management

STRATEGY FOR THE SOUTHERN AND EASTERN SCALEFISH AND SHARK
FISHERY

2015

Version History

Version	Date	Author	Changes
1.0		Dan Corrie	-

Executive Summary

This Ecological Risk Management (ERM) Strategy is for the Southern and Eastern Scalefish and Shark Fishery (SESSF). The ERM Strategy sets out the management actions necessary to support the objectives of the *Fisheries Management Act 1991* and *Commonwealth Policy on Fisheries Bycatch 2000*, in particular:

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 (which include 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.

To pursue this, the objectives of this ERM Strategy are to:

- implement management arrangements to minimise fishing impact on non-target species and habitats, with a particular focus on high risk species and habitats assessed through AFMA’s Ecological Risk Assessment process
- minimise interactions with species listed¹ under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) excluding conservation dependent species¹

Key to this ERM Strategy is addressing the high risk species as assessed through the Australian Fisheries Management Authority (AFMA) ERA process. The ERA provides a hierarchical framework for a comprehensive assessment of the ecological risks arising from fishing activities, and was conducted for four of the main fishing methods across the SESSF. They are:

- otter board trawl in the Great Australian Bight Trawl and Commonwealth Trawl Sector
- Danish seine in the Commonwealth Trawl Sector
- scalefish automatic longline in the Gillnet, Hook and Trap Sector
- shark gillnet in the Gillnet, Hook and Trap Sector.

The ERA process assesses the risk of AFMA not meeting its objectives when managing the impacts of commercial fishing on all aspects of the marine environment. Species identified as high risk through this process are treated as priority species for management actions to minimise the risk.

¹ Some key commercial species are listed under the EPBC Act in the category of conservation dependent. However, these species are managed in accordance with the Commonwealth Fisheries Harvest Strategy Policy under species-specific rebuilding strategies and therefore do not fall under the ERM framework with the exception of school shark which is currently assessed as high risk under the ERA.

Twenty-six species including three species groups have been assessed as at risk from the impacts of fishing across the SESSF including: 16 species of sharks, rays or skates (chondrichthyans); three species of bony fish (teleosts); two invertebrate species groups; one seabird group and four marine mammals (Table 1). Of the 26 species at risk, six are listed under the EPBC Act as threatened, endangered or protected (TEP) species. In Table 1, ‘albatross – unidentified’ refers to nine albatross species of the genera *Diomedae* and *Phoebetria* which have not been identified to species level.

A review of logbook information, observer reports and available literature identified 219 TEP species found within the area of the SESSF. The TEPs have either been caught or interacted with in the fishery, or their distribution overlaps with the fishery. They include three species of sharks, 74 species of seabirds, 51 species of marine mammals, 10 species of marine reptiles and 81 species of bony fish. The measures under this ERM strategy require those engaged in fishing in the SESSF to take all reasonable steps to minimise interactions with TEP species which are thought to occur in the area of the fishery.

Habitats, discarding, and more general bycatch issues are also addressed as part of this ERM Strategy.

Table 1 Priority species to be addressed in the SESSF ERM. ALL – Automatic Longline, DAN – Danish Seine, GABT – Great Australian Bight Otter Board Trawl, GILL – Shark Gillnet, OT – Otter Board Trawl (CTS)

Species Name	Common Name	Method
<i>Sepiidae</i> – undifferentiated	Cuttlefish	GABT
<i>Order Octopoda</i> – undifferentiated	Octopuses	GABT
<i>Arctocephalus forsteri</i>	New Zealand Fur Seal	GILL
<i>Delphinus delphis</i>	Common Dolphin	GILL
<i>Neophoca cinerea</i>	Australian Sea Lion	GILL
<i>Diomedeidae</i> –undifferentiated	Albatrosses –undifferentiated	OTTER
<i>Arctocephalus p. doriferus</i>	Australian Fur Seal, Eared Seals, Seals	OT / DAN / GILL
<i>Figaro boardmani</i>	Sawtail Catshark	ALL
<i>Polyprion oxygeneios</i>	Hapuku	ALL
<i>Centrophorus harrissoni</i>	Harrisson's Dogfish	ALL / OT
<i>Centrophorus zeahaani</i>	Southern Dogfish	ALL / OT
<i>Hydrolagus lemurs</i>	Bight Ghost Shark	ALL / OT
<i>Dipturus canutus</i>	Grey Skate	ALL / OT
<i>Squalus mitsukurii</i>	Green-Eyed Dogfish	ALL / OT
<i>Carcharhinus brachyurus</i>	Bronze Whaler	GILL
<i>Carcharodon carcharias</i>	White Shark	GILL
<i>Furgaleus macki</i>	Whiskery Shark	GILL

<i>Galeorhinus galeus</i>	School Shark	GILL
<i>Notorynchus cepedianus</i>	Broadnose Shark	GILL
<i>Sphyrna zygaena</i>	Smooth Hammerhead	GILL
<i>Azygopus pinnifasciatus</i>	Righteye Flounder	OT
<i>Centrophorus squamosus</i>	Nilson's Deepsea Dogfish	OT
<i>Dipturus australis</i>	Common Skate	OT
<i>Trygonorrhina fasciata</i>	Eastern Fiddler Ray	OT
<i>Urolophus sufflavus</i>	Yellow-backed Stingaree	OT
<i>Ventrifossa nigrodorsalis</i>	Rattail	OT

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1. Overview

Fishery description

The Southern and Eastern Scalefish and Shark Fishery (SESSF) is a multi-sector, multi-species fishery that covers almost half of the Australian fishing zone (AFZ). The area of the fishery stretches south from Fraser Island in southern Queensland, around Tasmania, to Cape Leeuwin in southern Western Australia (Fig. 1). The fishery operates in both Commonwealth and State waters under different Offshore Constitutional Settlement (OCS) arrangements with State governments. The fishery is comprised of the following sectors:

- Commonwealth Trawl Sector (CTS)
- East Coast Deepwater Trawl Sector (ECDWTS)
- Scalefish Hook Sector
- Shark Hook Sector
- Shark Gillnet Sector
- Trap Sector
- Great Australian Bight Trawl Sector (GABT).

The Scalefish Hook, Shark Hook, Shark Gillnet and Trap Sectors are collectively referred to as the Gillnet, Hook and Trap Sector (GHAT). There are also smaller sectors in the SESSF which include the South Australian, Tasmanian and Victorian coastal waters sectors.

The South East Management Advisory Committee (SEMAC) provides advice to AFMA on management measures for the SESSF. The Great Australian Bight Trawl Sector Management Advisory Committee (GABMAC) remains separate. The Southern and Eastern Scalefish and Shark Fishery Resource Assessment Group (SESSFRAG) is the key scientific advisory group. SESSFRAG initiates, reviews and critiques research proposals and research results where relevant to the SESSF. A number of smaller Resource Assessment Groups (RAGs) provide advice on species specific matters to SESSFRAG, which is then considered by SEMAC, GABMAC and the AFMA Commission. SESSFRAG also considers data from the Integrated Scientific Monitoring Program (ISMP, described in Section 3).

Area of the Southern and Eastern Scalefish and Shark Fishery

JN: 63,200

Indicative map only

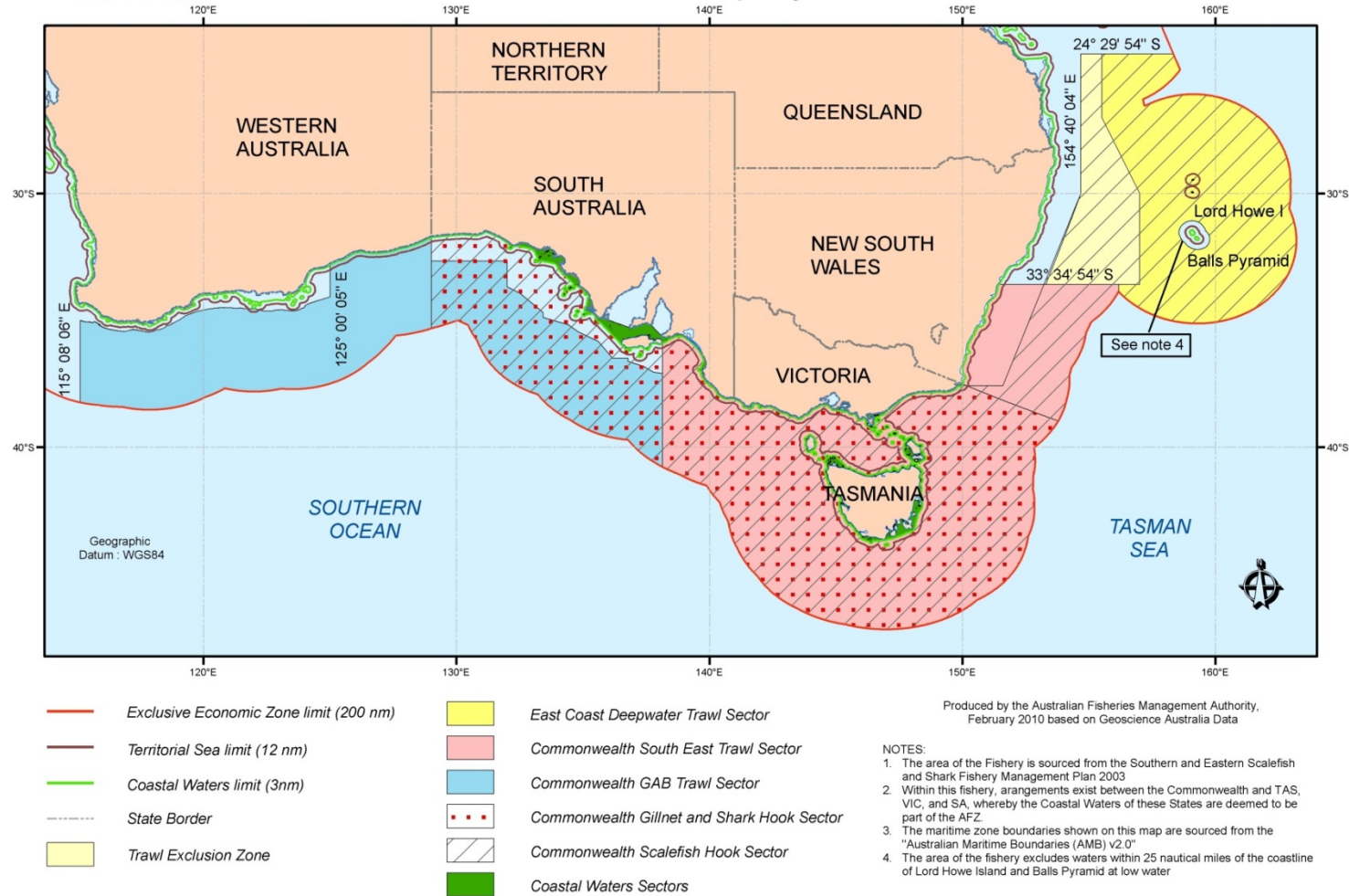


Figure 1 Map of the Southern and Eastern Scalefish and Shark Fishery

Ecosystem based fisheries management

One of AFMA's key objectives as described in the *Fisheries Management Act 1991* is to ensure that the exploitation of the resources of the fishery and the carrying on of any related activities are conducted in a manner consistent with the principles of ecologically sustainable development with regard to the impact of fishing activities on non-target species and the long-term sustainability of the marine environment.

AFMA aims to minimise the impacts of Commonwealth managed fisheries on all aspects of the marine environment. AFMA's adoption of Ecosystem Based Fisheries Management (EBFM) is a departure from traditional fisheries management with the focus shifted from the direct management of target species to considering the impacts of fishing on five components of the marine environment (Fig. 2):

- target species
- byproduct species
- bycatch/discard species
- threatened, endangered and protected (TEP) species
- habitats and communities.

Target species, and some byproduct species, are managed in accordance with the *Commonwealth Fisheries Harvest Strategy Policy and Guidelines 2007* (HSP) (DAFF, 2007). The objective of the HSP is the ongoing sustainable and profitable utilisation of Commonwealth fisheries through the implementation of harvest strategies. Fishery specific harvest strategies set out the management actions necessary to achieve defined biological and economic objectives and contain processes for monitoring and conducting assessments of the biological and economic objectives in a given fishery.

AFMA is guided by the *Commonwealth Policy on Fisheries Bycatch 2000* (DAFF, 2000) to ensure that bycatch species and populations are maintained.

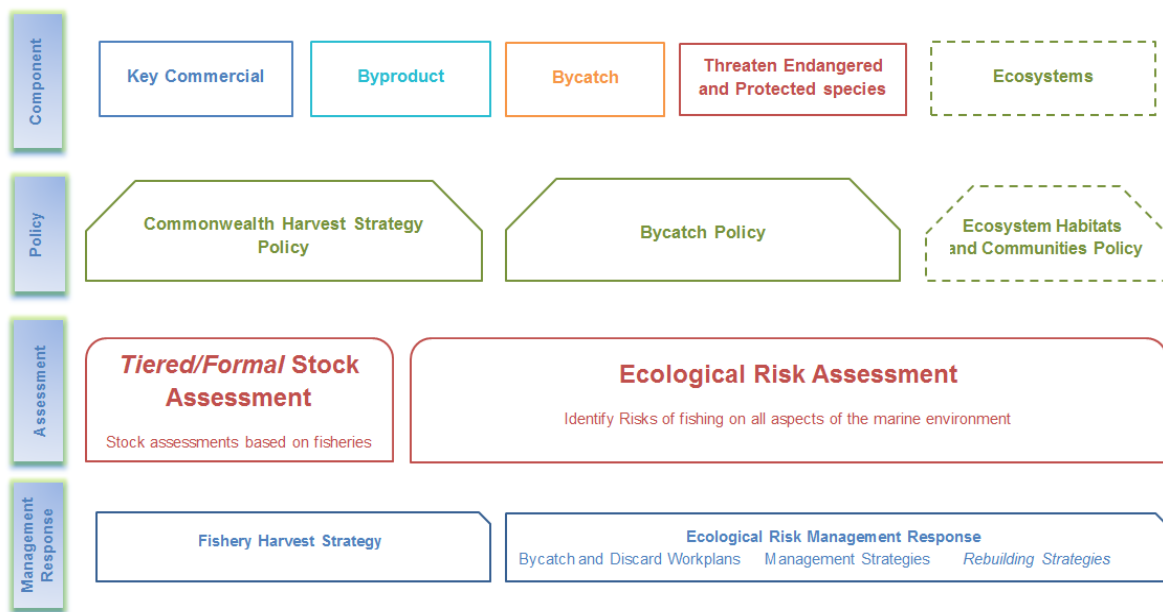


Figure 2 AFMA's Ecosystem Based Fisheries Management Framework

Ecological Risk Assessment & Ecological Risk Management

To mitigate the impact of Commonwealth managed fisheries on the marine environment AFMA has developed and implemented an Ecological Risk Assessment (ERA) and Ecological Risk Management (ERM) process. The ERA/ERM details a robust and transparent process to assess and mitigate the impact of Commonwealth managed fisheries on the marine environment.

The purpose of this ERM Strategy is to respond to the outcomes of the ERA but also to address more general bycatch and discarding issues in the SESSF. Through data collection and management arrangements, AFMA aims to minimise the number of species at risk by mitigating the impact of fishing. Data collection might include species-specific biological information and interaction rates or fishery-specific effort and gear selectivity information.

The objectives of this ERM Strategy are to:

- minimise fishing impact on non-target species and habitats, with a particular focus on high risk species and habitats assessed through AFMA's Ecological Risk Assessment process

- minimise interactions with species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) excluding conservation dependent species².

The ERA involves a hierarchy of risk assessment methodologies progressing from a comprehensive but largely qualitative analysis at Level 1, to a quantitative analysis at Level 3 (Fig. 3). This approach is a means of screening out low risk activities and focusing more intensive and quantitative analyses on those activities assessed as having a greater environmental impact on AFMA managed fisheries. For the detailed ERA methodology refer to *Ecological Risk Assessment for the Effects of Fishing: Methodology* (Hobday *et al.*, 2007). Detailed ERA assessments for AFMA managed fisheries can be found on AFMA’s website.

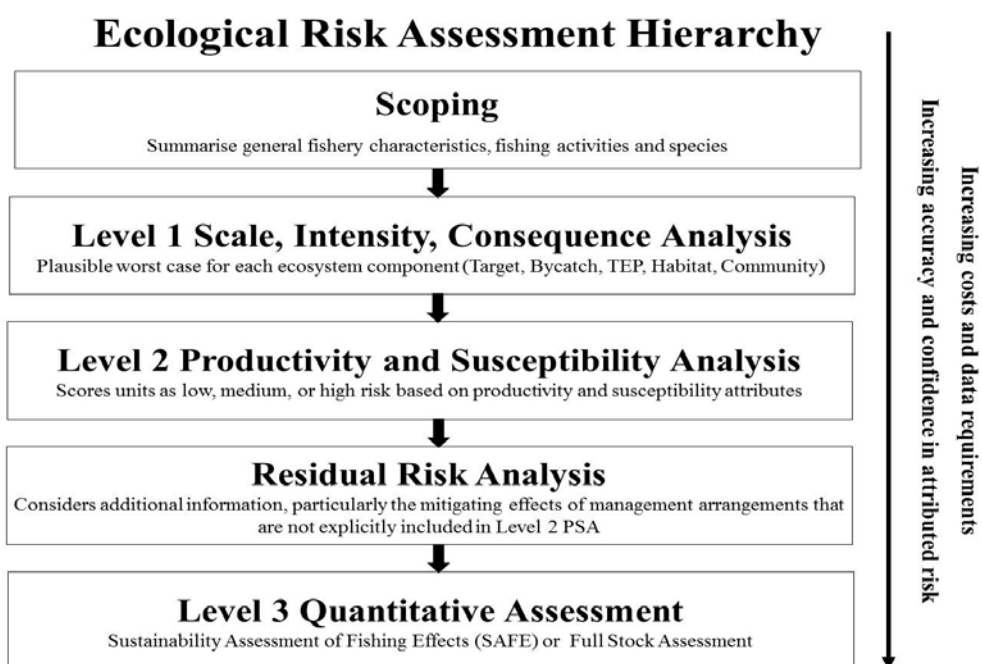


Figure 3 Ecological Risk Assessment Hierarchy

The output from the ERA process is a list of priority species which have been assessed as at risk from a (number of) fishing method. The priority species are the focus of the development and implementation of the ERM strategy. This ERM Strategy is for the SESSF and applies to the following fishing methods:

- otter board trawl in the GABT
- Danish seine in the CTS
- otter board trawl in the CTS

² Conservation dependent species are managed under species-specific rebuilding strategies.

- scalefish automatic longline in the GHAT
- shark gillnet in the GHAT.

As part of the ERM annual review the outcomes of this ERM Strategy will be reported against its objectives. Section four of this document details the gear-specific ERM strategies and the actions to achieve the objectives of this ERM Strategy. Review and reporting mechanisms are detailed in section five of this document.

2. Ecological Risk Assessment results

The impact of each fishing method across the SESSF has been assessed through the application of a progression of risk assessment methodologies including the following assessments:

- | | |
|------|--|
| 2008 | ERA for effects of fishing completed to Level 2 Productivity Susceptibility Analysis (PSA) for non-teleost and non-chondrichthyans, habitats and communities, and to Level 3 Sustainability Assessment of Fishing Effects (SAFE) for all teleost and chondrichthyan species. |
| 2010 | Application of residual risk guidelines to Level 2 PSA results for all non-teleost and non-chondrichthyan species. |
| 2012 | Re-assessment by application of residual risk guidelines to Level 2 PSA results for non-teleost and non-chondrichthyan species.

Re-assessment of Level 3 SAFE for all teleost and chondrichthyan species. |
| 2014 | Application of residual risk guidelines to Level 3 SAFE results for all teleost and chondrichthyan species. |

The final list of priority species (or species groups) for the SESSF, including highest level of assessment and fishing method is shown in Table 2. There are 26 species, including three species group, that have been assessed as at risk from the impacts of fishing across the SESSF including; 16 species of sharks, rays or skates (chondrichthyans), three species of bony fish (teleosts), two invertebrate species groups, one seabird group and four marine mammals (Table 2). Six of the 26 species at risk are listed under the EPBC Act as TEP species. In Table 2, ‘albatross – unidentified’ refers to nine albatross species of the genera *Diomedae* and *Phoebetria* which have not been identified to species level.

A review of logbook information, observer reports and available literature, identified 219 TEPs as theoretically found within the area of the SESSF. The TEP species have either been caught or interacted with in the fishery, or their distribution overlaps with the fishery. These include three species of sharks, 74 species of seabirds, 51 species of marine mammals, 10 species of marine reptiles and 81 species of bony fish. Consistent with effective fisheries management and the specific requirements of the EPBC Act, all reasonable steps will be taken to ensure that interactions with TEP species are minimised.

Habitats, discarding, and more general bycatch issues are also addressed as part of this ERM Strategy.

Table 2 Priority species to be addressed in the SESSF. Highest level of assessment and fishing method are also shown. ALL – Automatic Longline, DAN – Danish Seine, GABT – Great Australian Bight Otter Board Trawl, GILL –Shark Gillnet, OT – Otter Board Trawl

Species Name	Common Name	Highest Level of Assessment	Method
<i>Sepiidae - undifferentiated</i>	Cuttle Fish	Level 2 Residual Risk	GABT
Order <i>Octopoda</i> - <i>Undifferentiated</i>	Octopuses	Level 2 Residual Risk	GABT
<i>Arctocephalus forsteri</i>	New Zealand Fur Seal	Level 2 Residual Risk	GILL
<i>Delphinus delphis</i>	Common Dolphin	Level 2 Residual Risk	GILL
<i>Neophoca cinerea</i>	Australian Sea Lion	Level 2 Residual Risk	GILL
<i>Diomedeidae -undifferentiated</i>	Albatrosses –unidentified	Level 2 Residual Risk	OTTER
<i>Arctocephalus p. doriferus</i>	Australian Fur Seal, Eared Seals, Seals	Level 2 Residual Risk	OT / DAN / GILL
<i>Figaro boardmani</i>	Sawtail Catshark	Level 3 SAFE	ALL
<i>Polyprion oxygeneios</i>	Hapuku	Level 3 SAFE	ALL
<i>Centrophorus harrissoni</i>	Harrison's Dogfish	Level 3 SAFE	ALL / OT
<i>Centrophorus zeehaani</i>	Southern Dogfish	Level 3 SAFE	ALL / OT
<i>Hydrolagus lemurs</i>	Bight Ghost Shark	Level 3 SAFE	ALL / OT
<i>Dipturus canutus</i>	Grey Skate	Level 3 SAFE	ALL / OT
<i>Squalus mitsukurii</i>	Green-Eyed Dogfish	Level 3 SAFE	ALL / OT
<i>Carcharhinus brachyurus</i>	Bronze Whaler	Level 3 SAFE	GILL
<i>Carcharodon carcharias</i>	White Shark	Level 3 SAFE	GILL
<i>Furgaleus macki</i>	Whiskery Shark	Level 3 SAFE	GILL
<i>Galeorhinus galeus</i>	School Shark	Level 3 SAFE	GILL
<i>Notorynchus cepedianus</i>	Broadnose Shark	Level 3 SAFE	GILL
<i>Sphyrna zygaena</i>	Smooth Hammerhead	Level 3 SAFE	GILL
<i>Azygopus pinnifasciatus</i>	Righteye Flounder	Level 3 SAFE	OT
<i>Centrophorus squamosus</i>	Nilson's Deepsea Dogfish	Level 3 SAFE	OT
<i>Dipturus australis</i>	Common Skate	Level 3 SAFE	OT
<i>Trygonorrhina fasciata</i>	Eastern Fiddler Ray	Level 3 SAFE	OT
<i>Urolophus sufflavus</i>	Yellow-backed Stingaree	Level 3 SAFE	OT
<i>Ventrifossa nigrodorsalis</i>	Rattail	Level 3 SAFE	OT

An ERM Strategy for each fishing method, including priority species and their associated risk scores, is presented Section four.

3. Developing an Ecological Risk Management strategy

This section describes the management arrangements and approaches AFMA uses to mitigate the impact of fishing in the SESSF and to achieve the overall objectives in this ERM Strategy.

Management tools

AFMA employs a number of management tools which broadly fall into two categories: input controls and output controls. Input controls limit the amount of effort in a fishery, indirectly controlling interactions with target, byproduct, bycatch and TEP species. Output controls directly limit the number of species which can be taken from the water or interacted with.

Catch restrictions

For most target species and some byproduct and bycatch species, fishers are restricted to a total allowable catch (TAC). Based on a sustainable recommended biological catch (RBC) the TAC is set in conjunction with harvest control rules and limits how many fish (by weight) can be landed in a fishery during a fishing season. Fishers may catch a share of the TAC that is proportionate to the share of Statutory Fishing Rights (SFRs) that they hold. For species subject to rebuilding strategies, targeting is not permitted and AFMA may set a bycatch TAC. Bycatch TACs are recommended by the RAGs and are set at a level estimated to cover unavoidable bycatch while still allowing rebuilding to occur.

The landing of some species is prohibited. This applies to all TEP species (except those listed as conservation dependent) and to some bycatch species which are thought to be depleted or in need of recovery efforts. Fishers must report all interactions with TEP species, species under rebuilding strategies (see below) or species with specific management strategies in place.

Catch triggers

In some cases AFMA implements catch triggers that are designed to be precautionary and alert AFMA that a review of risks and management for a particular species might be needed. For example, there are several shark bycatch species in the GHAT which are monitored against catch triggers.

Trip limits

Species are either targeted or taken as incidental catch when targeting other species. Trip limits are designed to reduce the targeting of some species and to encourage active avoidance.

Spatial closures

AFMA has implemented spatial closures aimed at reducing the impact of fishing on byproduct, bycatch and TEP species. Some of these closures are also designed to protect vulnerable habitats from the impact of fishing. Closure Directions (described in Appendix A, Table 2) can be short term, such as the Coorong closure for shark gillnet method in the GHAT to protect dolphins while a longer term management strategy was developed. Other closures are longer term, such as closures to all fishing methods to protect deepwater dogfish species.

Closures implemented to protect specific species may also have a flow-on effect and afford some protection to other species which have similar geographical distribution or behavioral traits.

Gear restrictions

Fishing concession conditions specify minimum gear requirements to reduce interactions with non-target, bycatch and TEP species. Gear restrictions can include mandatory use of bycatch exclusion devices such as ‘pinkies’ designed to deter seabirds during trawl operations. Gear restrictions are designed to select for certain size classes of target species or exclude other sizes thereby reducing bycatch. In the GHAT for example, gillnet mesh size is restricted to between 150 and 165 mm to select for sub-adult gummy sharks, and to avoid juveniles and large breeding adults.

Size limits

The most commonly employed size (or length) limit is minimum length. This prevents fishers from harvesting fish under a prescribed length. This aims to increase the abundance of small fish and allow juveniles to grow to reproductive age, and contribute to stock recruitment. Another approach is maximum size limits, or a combination of the two, which in addition to protecting juveniles, protects large breeding adults. This is particularly useful for species with few sexually mature adults and large numbers of juveniles.

Observer and monitoring arrangements

AFMA employs a number of monitoring tools to collect information on fishing activity in the SESSF. They include:

Logbooks

It is mandatory for all SESSF operators to complete logbooks. Catch and effort data is recorded and used to monitor the level of harvest and the status of stocks. Logbooks also provide information on gear design, including bycatch reduction devices (BRDs). There is a requirement to record all interactions with TEP species in the logbooks. Information collected is used for stock assessments and development of management arrangements for the fishery.

Catch disposal records

On landing, a fisher is required to complete a form detailing the species caught and their accurate weight. AFMA integrates the catch information with records of quota entitlements and provides periodic updates to management and industry on the remaining quota available for a fishing year.

Vessel Monitoring System

The Vessel Monitoring System (VMS) consists of a tracking unit on the fishing vessel which transmits data about vessel positions to AFMA through a satellite communications network and an internet connection.

Observer Program

The Observer Program places AFMA trained observers on domestic and if required, foreign boats fishing within the AFZ and some adjacent high seas areas under international arrangements. A key component of the observer program is the Integrated Scientific Monitoring Program (ISMP). The purpose of the ISMP is to provide reliable, verified and accurate information on the fishing catch, effort and practice of a wide range of vessels operating inside the SESSF.

Each year the requirements and priorities for the Observer Program are determined by AFMA after consultation with the relevant MACs and RAGs.

Electronic monitoring

Electronic monitoring (e-monitoring) is a system of sensors and video cameras capable of monitoring and recording fishing activities which can be reviewed later to verify logbook data. Similar to the objectives of the Observer Program, e-monitoring systems are used to ensure that AFMA has reliable, verified and accurate information on catch, discards, fishing effort and interactions with TEP species. E-monitoring systems are recording at all times while the boat is fishing and video footage is reviewed to verify if the fisher has accurately completed their logbooks. E-monitoring systems can also be used to collect biological information such as fish length frequencies in some instances.

In the SESSF, e-monitoring systems are required on all full time gillnet and demersal longline boats. Lower effort boats will continue to be monitored using other methods based on their risks.

Species specific strategies

Upper-Slope Dogfish Management Strategy

The Upper-Slope Dogfish Management Strategy (the Strategy) was revised in 2012 to promote the recovery of two species of dogfish, Harrison’s dogfish (*Centrophorus harrissoni*) and southern dogfish (*C. xeehaani*). The Strategy relies primarily on a network of spatial closures (Appendix B, Fig. 5) complemented by a range of non-spatial operational measures. The network builds on existing closures by implementing new closures, extending existing closures and revising existing closures (Table 3). The Strategy also provides some protection to endeavour dogfish (*C. moluccensis*) and greeneye spurdog (*Squalus chloroculus*).

The types of management arrangements which apply under the Strategy include:

- a prohibition on the take of Harrison’s dogfish and southern dogfish
- area closures
- monitoring obligations through observers or electronic monitoring
- a limit for bycatch of Harrison’s and southern dogfish when undertaking permitted types of line fishing in specific areas
- handling practices to improve post capture survival for released sharks.

Table 3 Closures under the Upper Slope Dogfish Management Strategy.

Spatial Closures	Details	Complementary management arrangements where fishing is permitted inside closures
Extended Closures		
Extended Endeavour Dogfish Closure off Sydney	Extended closure to all methods of fishing across the core depth range	Fishing is not permitted so complementary measures are not applicable.
Extended closure in the Flinders Research Zone (FRZ)	Extended closure to range from 200m to 1000m for all methods. The extended FRZ incorporates the existing Babel Island and Cape Barren Closures and one area of the existing 700m line closure	
Extended Port MacDonnell Closure	Extended closure to all methods of fishing across the core depth range	Fishing is not permitted, so complementary measures are not applicable.
New Closures		
Murray Dogfish closure	Closed to trawling Open to hook methods	Line fishing subject to regulated handling practices, interaction limit per boat and 100% monitoring* Vessel interaction limit of three ¹ gulper sharks which if reached the closure will be closed to that boat for 12 months. Trigger limit removed for power handline method.
Derwent Hunter Seamount	Closed to all fishing methods	Fishing is not permitted, so complementary measures are not applicable.

Queensland and Britannia Guyots	Closed to demersal longline (including trotline and auto-longline) Open to hydraulic hand reel droplining ¹³ only	Line fishing subject to regulated handling practices, interaction limit per boat and 100% monitoring* Vessel interaction limit of three gulper sharks which if reached the closure will be closed to that boat for 12 months. Trigger limit removed for power handline method.
Revised Closures		
Barcoo Seamount and Taupo Seamount	Will remain closed to all trawl methods Will be open to line fishing	Line fishing subject to regulated handling practices and 100% monitoring* Vessel interaction limit of three gulper sharks and if reached the closure area will be closed to that boat for 12 months. Trigger limit removed for power handline method.
Harrison's Dogfish Closure	Will remain closed to all fishing methods in an amended depth range (200 m to 1000 m) which reflect the depth range of Harrison's Dogfish and Southern Dogfish.	Fishing is not permitted, so complementary measures are not applicable.

¹ An interaction limit has been developed as a conservative number by AFMA reviewing the possible boats to fish in the closure as the maximum gulper sharks that AFMA consider should be taken from an area.

*100% monitoring by an approved AFMA method

Threat Abatement Plan (2014) for the Incidental Catch (or bycatch) of Seabirds

First developed in 1998, then reviewed and updated in 2006 and 2014, the objectives of the Threat Abatement Plan (TAP) are to reduce the bycatch of seabirds in oceanic longline operations in the AFZ. In the SESSF the criteria to meet this objective is a bycatch level of less than 0.01 birds per 1000 hooks.

Five key areas are described to meet the objectives of the TAP. Those relevant to AFMA are:

Mitigation – AFMA will continue to require domestic and foreign longline vessels in all demersal fisheries operating within Australian jurisdiction to adopt proven mitigation measures that ensure the performance criteria for each fishery are achieved in all areas and seasons. AFMA will implement an appropriate management response (described in the TAP) if data analysis indicates that the criteria have not been met in any area, season and fishery, or that observer coverage has dropped below acceptable levels.

Education – AFMA will communicate the results from data analysis throughout the community, stakeholder groups and international forums, and programs will be established that provide information and education to longline operators. AFMA will also implement a risk based compliance strategy to ensure that requirements relevant to the mitigation of seabird bycatch are complied with.

International Initiatives – AFMA alongside the Department of Agriculture will communicate the results of implementing the TAP and promote seabird bycatch mitigation to foreign fishers through international fisheries forums.

Research and Development - AFMA, the Department of Agriculture, and the Department of the Environment will promote and support research and development of new mitigation measures by facilitating access to and awareness of fisheries research funding programs.

Innovation - AFMA will support innovation in 'bird friendly' fishing measures and devices and will also support the trialing of new mitigation measures and devices under operational conditions by granting individual scientific permits to operators.

Seabird Management Plans

Seabird Management Plans (SMPs) are compulsory for operators in the CTS and GABT. SMPs set out a variety of proven mitigation measures that are tailored to each vessel and identify physical mitigation measures to stop seabirds from interacting with the warp wires and other fishing gear. They also include measures dealing with the discharge of biological waste from vessels to reduce seabird attraction and interaction.

For each fishing trip the fisher must:

- carry a copy of the AFMA approved SMP on the nominated boat
- comply with the measures and requirements contained in the SMP
- ensure each member of the crew on board the nominated boat is briefed on the content of the SMP before each fishing trip
- ensure each member of the crew on board the nominated boat complies with the measures and requirements of the SMP.

Further 'common-sense' measures are employed by fishers to help reduce the risk of interactions, including reducing the time the nets are on the surface of the water and cleaning the net of fish when re-setting. This reduces the likelihood of seabirds using the nets as a food source and consequently getting entangled.

AFMA monitors the adherence to and effectiveness of the management arrangements and implements additional controls if necessary.

Shark and Ray Handling Practices – A Guide for Commercial Fishers in Australia

The shark handling guide was developed by AFMA to improve the handling of non-target shark species and to provide background material on fisheries related injuries and research on survivability. Improving handling practices can have a significant impact on the survivorship of sharks and rays that have been captured and is a proactive measure that industry can follow. One of the key inputs to the Level 2 PSA and Level 3 SAFE is the post capture survivability of species. If handling practices are improved and post capture survivability increases, it may result in a lower risk score for some species. The guide outlines techniques for handling sharks and rays of various sizes, and describes reporting requirements for species listed under the EPBC Act.

Dolphin Strategy

The Dolphin Strategy aims to reduce and monitor interactions between dolphins and gillnets used by Commonwealth shark fishers in the GHAT. The common dolphin, *Delphinus delphis*, was assessed as high risk in the most recent ERA due to 52 reported interactions between September 2010 and September 2011. On 22 September 2011, AFMA closed an area of the GHAT off South Australia to gillnetting, established a zone adjacent to the closed area with mandatory monitoring while fishing with gillnets, and allowed the use of hooks by affected gillnet concession holders in both the closed area and monitoring zone. The closure was revoked on the implementation of AFMA's Dolphin Strategy on 8 September 2014.

The Dolphin Strategy aims to reduce bycatch of dolphins in Commonwealth managed gillnet fisheries through the implementation of an individual responsibility framework. This framework holds operators to be individually responsible for interactions with TEP species, and enables AFMA to respond at an individual boat level. This reduces the need for imposing large scale spatial closures on responsible operators who do not interact with TEP species. If performance measures detailed in the Dolphin Strategy are not met, AFMA can exclude individual operators from the fishery.

National Plan of Action for the Conservation and Management of Sharks 2012

Australia published its first *National Plan of Action for the Conservation and Management of Sharks* in 2004 (DAFF, 2004). In 2010, a review of this plan focused on the strengths and weaknesses and made recommendations for the development of the 2012 plan. The new plan, based on the objectives and aims of the *International Plan of Action for the Conservation and Management of Sharks* (IPOA-Sharks), prioritised issues and identified actions to address them. Some of these actions include:

- improved identification of shark species by all resource users
- coordination of shark research
- reliable assessments for shark bycatch/byproduct
- reduce cryptic fishing mortality of shark species
- assessment of shark handling practices for the conservation and management of sharks
- develop strategies for the recovery of shark species and populations
- reduce or, where necessary, eliminate shark bycatch.

Australian Sea Lion Management Strategy

The Australian sea lion (ASL; *neophoca cinerea*) was listed as threatened (vulnerable) under the EPBC Act in 2005. The ASL Strategy was developed to reduce and monitor interactions between ASLs and gillnets used by Commonwealth shark fishers in the SESSF, namely the

shark gillnet fishery in the GHAT. The key objectives of the ASL Strategy are to significantly reduce the ecological risk that fishing in the SESSF poses to ASLs and enable their recovery. To do this, the following management measures have been implemented.

Gillnet spatial closures

The spatial closures are designed to significantly reduce the impact of fishing activities on ASLs and enable the recovery of species, including all sub-populations. The total area of the fishery closed to gillnet fishing is approximately 421,000 km² (Appendix B, Fig. 12). In addition to all other closures, fishers are restricted to approximately 28.8 per cent of the area that could be fished prior to the management of shark fishing by the Commonwealth government.

Gear restrictions

Over time, gear restrictions, including mesh size and depth have changed. In waters adjacent to South Australia, the maximum permitted headrope length is 4 200 m. In all other Commonwealth waters the maximum permitted headrope length is 6 000 m. Net specifications include a maximum depth of 20 meshes and a mesh size of 15-16.5 cm. Some Commonwealth fishers targeting gummy shark in Tasmanian and South Australian Coastal waters are further restricted to 1 200 m and 1 800 m of net respectively.

Adaptive management

Under the adaptive management system, South Australian waters are divided into seven management zones (Appendix B, Fig. 12). If pre-determined trigger limits for ASL mortalities are reached, these zones will be closed for 18 months from the date of the most recent interaction. Observer coverage has increased to 100 per cent since the implementation of this strategy.

Recovery Plan for the Australian Sea Lion

Released in 2013 by the Department of the Environment, the Recovery Plan for the Australian Sea Lion establishes a strategic integrated framework so that all relevant jurisdictions work together to address threats to this species. The recovery plan sets out the research and management actions necessary to stop the decline of, and support the recovery of, the ASL throughout its range.

The overarching objective of the recovery plan is to halt the decline and assist the recovery of the ASL throughout its range in Australian waters by increasing the total population size while maintaining the number and distribution of breeding colonies with a view to:

- improve the population status, leading to future removal of the ASL from the threatened species list of the EPBC Act
- ensure that anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future.

AFMA contributes to this plan in the area of its jurisdiction through the Australian Sea Lion Management Strategy. The recovery plan is available on the Department of Environment website at: www.environment.gov.au/marine/marine-species/seals-and-sea-lions

Bycatch and discarding workplans

AFMA's bycatch and discarding program for Commonwealth managed fisheries was released in March 2008. The program develops fishery specific bycatch and discard workplans for general bycatch and discarding issues, with a particular focus on high risk species as identified through the ERA process. These strategies are updated biennially, or when new high risk species are identified. They are also subject to periodic reviews, including final review after two years.

The SESSF has bycatch and discarding workplans for each sector of the fishery. The workplans are developed to support the objectives this ERM strategy:

- reduce the number of high risk species assessed through AFMA's ERA process
- minimise interactions with species listed under the EPBC Act to as close to zero as practically possible
- minimise overall bycatch in the fishery over the long-term to as close to zero as practically possible.

The main action items of the workplans are spatial closures, maintenance of observer coverage, gear improvements, improved handling practices for chondrichthyans, and improving the identification and reporting of high risk species. Action items for each sectors workplan are detailed in section four.

Guidelines and codes of conduct

In addition to the strategies described above, industry implements voluntary measures in co-operation with AFMA such as voluntary closures, voluntary gear restrictions and industry codes of conduct.

Chondrichthyan Guide for Fisheries Managers

The Chondrichthyan Guide for Fisheries Managers (the Guide) was developed to assist fishery managers and stakeholders to adopt and implement management arrangements for chondrichthyan species. The Guide was developed by the Chondrichthyan Technical Working Group (CTWG). The working group consisted of recognised shark experts, as well as representatives from non-government organisations, government departments and the fishing industry. The guide provides fisheries managers with practical mitigation options for chondrichthyans, TEPs and high risk species. The guide provides mitigation options for

different methods including spatial and temporal closures, handling practices, gear restrictions and reduced effort.

Improving the identification of all high risk species, and consequently the data collected on them, was identified by the CTWG as a priority. An identification guide was developed to help improve the identification of upper-slope dogfish by fishers. In addition, an ‘at risk’ species field manual for the CTS was developed so that interactions can be recorded more accurately.

South East Trawl Fishery: Seal Bycatch – Guidelines for reporting and data collection

This is part of a larger industry-based education and monitoring program and encourages more accurate and regular reporting of interaction with seals in the CTS. The booklet provides an identification guide for species found in Australian waters and those likely to be encountered in the CTS, and includes information on biology and population dynamics of Australian and New Zealand fur seals.

Fishers are required to report all seal interactions and mortalities in logbooks in order to:

- assist in meeting requirements under the EPBC Act
- find out where most interactions are happening
- understand changes in space and time in seal bycatch rates.

Industry Code of Practice to Minimise Interactions with Seals

Developed by the South East Trawl Fishing Industry Association (SETFIA), the Industry Code of Practice to Minimise Interactions with Seals contains specific guidelines to minimise incidental bycatch of seals in the CTS, and was developed to be read in conjunction with the guidelines for reporting and data collection. The specific objectives of the code are to:

- make fishers aware of relevant legislation and policies governing fisheries, bycatch and protected species
- provide clear guidelines on best available fishing practices to help fishers minimise the accidental bycatch of seals
- provide clear advice on the conditions of use of available technologies to help fishers minimise the accidental bycatch of seals
- provide clear guidelines on how to safely handle seals when brought onto the vessel and how to release seals caught in nets
- encourage fishers to assist, where practical, in research to progress further mitigation of seal bycatch.

The code provides instructions on how to report interactions with seals, as required under the EPBC Act, as well as options for modification of gear and fishing practices to reduce seal interactions.

Code of Practice for Automatic Longline Operators Encountering Gulper Sharks

The code of practice details the arrangements and procedures that are to be implemented for the conduct of automatic longline operators when a gulper shark is encountered. The code was developed by automatic longline operators in consultation with scientists and fisheries managers to cover five species of gulper sharks identified in Australian waters: southern dogfish (*Centrophorus uyato*); endeavour dogfish (*Centrophorus moluccensis*); Harrison's dogfish (*Centrophorus harrissoni*); leafscale gulper shark (*Centrophorus squamosus*); and the gulper shark (*Centrophorus granulosus*). The code provides operators with a better understanding of the biology and distribution of the species and practical information on how to reduce the incidental mortality of gulper sharks that may be accidentally caught as a bycatch, including species identification and tag and release procedures.

4. Ecological Risk Management Strategy for the SESSF

Otter board trawl method in the Commonwealth Trawl Sector

The otter board trawl method in the CTS covers the area of the AFZ extending southward from Barrenjoey Point (north of Sydney) around the New South Wales, Victorian and Tasmanian coastline to Cape Jervis in South Australia. There are two types of otter board trawls used in Commonwealth fisheries: demersal trawls and midwater trawls. Demersal trawls are used to catch fish or prawns that live on the bottom of the ocean, whereas midwater trawls operate in the water column and rarely make contact with the bottom.

Trawlers targeting finfish often use one net (this is called a single trawl) or two nets (twin trawl), whereas prawn trawlers may use a twin-rig (towing two nets) or quad-rig (towing four nets). Both demersal and midwater trawls use otter boards to keep the mouth of the net open.

Most of the trawl vessels are wet boats (fishing vessels that store fresh fish on ice or brine) that use demersal trawls, but a small number of factory vessels periodically operate in the Winter Grenadier Fishery off western Tasmania using midwater trawls. Midwater trawling is not assessed as a separate method in the ERA process. Midwater trawlers rarely make contact with the bottom so their impact on the benthic habitat is likely to be minimal. Larger factory trawlers are required to use Seal Excluder Devices, are subject to high levels of observer coverage, and have individual vessel management plans.

Priority species list

The ERA results have been consolidated to form a priority list (Table 4) for otter board trawling in the CTS comprising:

- 9 chondrichthyan or teleost species identified as extreme high risk, precautionary extreme high risk, high risk or precautionary high risk through Level 3 SAFE assessments
- One marine bird family (TEP), and one marine mammal (TEP) identified as high risk through application of the Level 2 residual risk assessment
- 201 TEP species identified through the ERA: three chondrichthyan, 79 marine birds, 49 marine mammals, seven marine reptiles and 63 teleosts.

Habitats

A Level 2 PSA identified 158 habitats. Habitat types were classified based on substratum, geomorphology, and dominant fauna, using photographic data. Of the 158 habitat types, 46 were assessed to be at high risk, 58 medium, and 54 low. The high risk habitats are comprised of:

- 0 on the inner shelf (0-100m)
- 18 on the outer shelf (100-200m)

- 12 on the upper slope (200-700m)
- 16 on the mid slope (700-1500m).

For detailed methodology and results refer to the following documents:

- *Ecological Risk Assessment (ERA) for Effects of Fishing – Report for the Otter Trawl Sub-Fishery of the Commonwealth Trawl Sector of the Southern and Eastern Scalefish and Shark Fishery 2007.* Australian Fisheries Management Authority.
- *Residual Risk Assessment of the Level 2 Ecological Risk Assessment – Non-Teleost and Non-Chondrichthyan Species. Report for the Otter Board Trawl Method of the Commonwealth Trawl Sector Fishery,* July 2012. Australian Fisheries Management Authority.
- *Zhou et al 2012, Sustainability assessment of fish species potentially impacted in the Southern and Eastern Scalefish and Shark Fishery: 2007-2010.* June 2012, Australian Fisheries Management Authority.
- *Residual Risk Assessment – Teleost and Chondrichthyan Species. Report for the Otter Board Trawl Method of the Commonwealth Trawl Sector.* June 2014. Australian Fisheries Management Authority.

Table 4 The priority species for the otter board trawl method in the CTS which AFMA will focus ERM efforts.

Scientific Name	Common Name	Role in Fishery	Highest Level of Assessment	Risk Score	Action to address high risk
Marine Mammal					
<i>Arctocephalus pusillus doriferus</i>	Australian Fur Seal	TEP	L2 Residual Risk	High	1a, 2, 3, 4, 12
Chondrichthyan					
<i>Centrophorus squamosus</i>	Nilson's Deepsea Dogfish	BC	SAFE	Precautionary High Risk	5c, 5d, 6, 7, 8, 9, 12
<i>Centrophorus harrissoni</i>	Harrison's Dogfish	BC	SAFE	Extreme High Risk	5a, 5c, 5d, 6, 7, 8, 9, 12
<i>Centrophorus zeehaani</i>	Southern Dogfish	BC	SAFE	Extreme High Risk	5a, 5c, 5d, 6, 7, 8, 9, 12
<i>Squalus chloroculus</i>	Greeneye Spurdog	BC	SAFE	Extreme High Risk	5a, 5c, 5d, 6, 7, 8, 9, 12
<i>Urolophus sufflavus</i>	Yellow-backed Stingaree	BC	SAFE	Precautionary Extreme High Risk	5c, 5d, 7b, 7c, 7d, 8, 9, 12
<i>Dipturus australis</i>	Common Skate	BC	SAFE	Extreme High Risk	7b, 7c, 7d, 8, 9, 12

<i>Dipturus canutus</i>	Grey Skate	BC	SAFE	Precautionary Extreme High Risk	5c, 5d, 7b, 7c, 7d, 8, 9, 12
<i>Hydrolagus lemures</i>	Bight Ghost Shark	BC	SAFE	High Risk	5c, 5d, 7b, 7c, 7d, 8, 9, 12
<i>Trygonorrhina fasciata</i>	Eastern Fiddler Ray	BC	SAFE	High Risk	5c, 5d, 7b, 7c, 7d, 8, 9, 12
Teleost					
<i>Azygopus pinnifasciatus</i>	Righteye Flounder	BC	SAFE	Precautionary Extreme High Risk	12
<i>Ventrifossa nigrodorsalis</i>	Rattail	BC	SAFE	Precautionary High Risk	11, 12
Seabird					
Family - Diomedidae	Albatrosses – species unidentified	TEP	L2 Residual Risk	High	13, 14, 15

In addition to the high risk species identified through the ERA process, this ERM Strategy focuses on the broader aspects of bycatch when using otter board trawl method in the CTS. Priority areas are described here by taxonomic group.

Marine mammals

1. Gear restrictions:
 - a. Seal excluder devices on all freezer processing vessels
2. Actions under the Bycatch and Discarding Workplan 2014-16:
 - a. Continue to encourage innovation (AMC gear competition)
 - b. Shortened codend investigation (seal bycatch).
 - c. Review available AFMA data for seal interactions and reporting rates
3. South East Trawl Fishery: Seal Bycatch – Guidelines for reporting and data collection
4. Industry Code of Practice to Minimise Interactions with Seals

Sharks, skates and rays

5. Obligations under permit conditions:
 - a. Fishers must not retain Harrison's dogfish, endeavour dogfish, southern dogfish and greeneye spurdog.
 - b. School shark and gummy shark must exceed 450 mm in length.
 - c. Fishers must not carry or possess any detached shark dorsal, pectoral, caudal, pelvic or anal fins.

- d. Shark liver must be landed with carcass (Reg 9ZP)
- 6. Spatial closures
 - a. Closures described in the Upper-Slope Dogfish Management Strategy
 - b. Bass Straight trawl closure
 - c. 700 m depth closure
- 7. Actions under the Bycatch and Discarding Workplan 2014-16:
 - a. Develop mitigation devices for dogfish species when fishing for royal red prawns.
 - b. Develop and distribute chondrichthyan (sharks and rays) best handling practices guide to all operators in the CTS.
 - c. Distribute high risk species identification guide to operators.
 - d. Implement a chondrichthyan (sharks and rays) identification guide and catch composition project in the CTS.
- 8. Chondrichthyan Guide for Fisheries Managers
- 9. National Plan of Action for the Conservation and Management of Sharks
- 10. Trigger limits

Teleost

- 11. Gear restrictions
 - a. Mesh size restrictions, including:
 - o at least 90 mm single twine mesh; or
 - o double twine mesh of at least 102 mm (4 inch) or greater; or
 - o at least 90 mm double twine mesh with one or more bycatch reduction devices.
- 12. Actions under the Bycatch and Discarding Workplan 2014-16:
 - a. Distribute high risk species identification guide to operators.

Seabirds

- 13. Seabird Management Plan
- 14. Actions under the Bycatch and Discarding Workplan 2014-16:
 - a. Review all vessel Seabird Management Plans across the fishery.
 - b. Distribute seabird identification guides to all vessels in the CTS.
 - c. Distribute high risk species identification guide to operators
- 15. SETFIA gear trials

Habitats

Due to the nature of demersal otter board trawling, the impact on benthic habitats is higher than more passive methods. Sixteen habitats were assessed as at high risk on the mid-slope in waters between 700-1500 m. The 700 m depth closure was initially introduced to protect stocks of orange roughy and other deepwater species, but has effectively eliminated trawling in that area.

Approximately 86 per cent of trawl grounds have been closed within the CTS, including large areas of Bass Strait and coastal areas in South Australia (Appendix B, Fig. 7). Trawling that does occur tends to be over grounds that have been trawled historically, i.e. the trawling footprint is not expanding. CSIRO is currently investigating the representation of various habitats in closed areas and the effect of different trawl methods on the ecosystem.

Spatial closures

- As described in Appendix A, Table 2

Danish seine method in the Commonwealth Trawl Sector

Danish seine trawling is part of the CTS. The method involves setting weighted rope in a triangular pattern with a seine trawl net in the back of the triangle. The gear is towed for approximately 30 minutes in waters up to 250 m depth until the gear is closed. The fishing operation then ceases and the gear is winched back onto the vessel. The operation (shot) takes approximately 1 hour and 20 minutes.

The majority of Danish seine trawlers operate out of Lakes Entrance in Victoria and these boats can fish up to 100 km into Bass Strait, as far as Point Hicks to the east and Port Welshpool to the west. There are currently another four Danish seine boats operating out of other Victorian ports.

Priority species list

The ERA results have been consolidated to form a priority list for the Danish seine method in the CTS comprising:

- 0 chondrichthyan or teleost species identified as extreme high risk, precautionary extreme high risk, high risk or precautionary high risk through Level 3 SAFE assessment
- One TEP species, Australian fur seal, identified as high risk through application of the Level 2 residual risk assessment (Table 5)
- 197 TEP species identified through the ERA: three chondrichthyan, 77 marine birds, 49 marine mammals and 62 teleosts and seven marine reptiles.

Habitats

The Level 2 PSA identified 82 habitats. Habitat types were classified based on substratum, geomorphology, and dominant fauna, using photographic data. Of the 82 habitat types, three were assessed to be at high risk, 20 medium, and 59 low. High risk habitats are comprised of:

- 0 on the inner shelf (0-100m)
- Three on the outer shelf (100-200m)
- 0 on the upper slope (200-700m).

For detailed methodology and results refer to the following documents:

- *Ecological Risk Assessment for Effects of Fishing – Report for the Danish Seine Sub-Fishery of the Commonwealth Trawl Sector of the Southern and Eastern Scalefish and Shark Fishery 2007.* Australian Fisheries Management Authority
- *Residual Risk Assessment of the Level 2 Ecological Risk Assessment – Non-Teleost and Non-Chondrichthyan Species. Report for the Danish Seine Fishery.* July 2012. Australian Fisheries Management Authority

- Zhou et al 2012, Sustainability assessment of fish species potentially impacted in the Southern and Eastern Scalefish and Shark Fishery: 2007-2010. June 2012, Australian Fisheries Management Authority

Table 5 The priority species for the Danish seine method in the CTS which AFMA will focus ERM efforts.

Scientific Name	Common Name	Role in Fishery	Highest Level of Assessment	Risk Score	Action to address high risk
Marine Mammal					
<i>Arctocephalus pusillus doriferus</i>	Australian Fur Seal	TEP	L2 Residual Risk	High	1, 2

In addition to the high risk species identified through the ERA process, this ERM strategy focuses on the broader aspects of bycatch when using Danish seine in the CTS. Priority areas are described here by taxonomic group.

The fishing area of Danish seine vessels in the CTS and the foraging areas of Australian fur seals overlap. As some of the prey species eaten by fur seals are also of commercial importance, it is inevitable that the fishery will have interactions with these species.

Interactions can be operational (seals interact with fishing gear and boats, which may be detrimental to the seal, fishers or both) or ecological (indirect competition for common prey species). The operational interactions that affect fisheries include damage or loss of catch, damage to fishing gear, and disturbance of operations.

Over the last decade, fur seal populations around south eastern Australia have increased significantly. This has resulted in increased levels of interactions with fishing vessels and higher levels of incidental capture of seals. The SETFIA Industry Code of Practice to Minimise Interactions with Seals provides mitigation options to avoid the capture of seals in the nets and avoid attracting seals to the fishery grounds by setting out voluntary guidelines and standards of behaviour for responsible fishing practices.

Marine mammals

1. South East Trawl Fishery: Seal Bycatch – Guidelines for reporting and data collection
2. Industry Code of Practice to Minimise Interactions with Seals

Sharks, skates and rays

3. Obligations under permit conditions include:
 - a. School shark and gummy shark must exceed 450 mm.
 - b. Fishers must not carry or possess any detached shark dorsal, pectoral, caudal, pelvic or anal fins.

4. Actions under the Bycatch and Discarding Workplan 2014-16:
 - a. Develop and distribute chondrichthyan (sharks and rays) best handling practices guide to all operators in the CTS.
 - b. Implement a chondrichthyan (sharks and rays) I.D guide and catch composition project in the CTS.
5. Chondrichthyan Guide for Fisheries Managers

Teleost

6. Obligations under permit conditions:
 - a. Trip limit for pink ling (*Genypterus blacodes*) per calendar day of each trip from waters east of Longitude 147°.
7. Gear restrictions:
 - a. Mesh size must not be less than 38 mm at any part.

Habitats

The overall impact of Danish seine is quite low in the CTS. The Level 2 PSA identified three outer shelf benthic habitats as high risk. These are on generally smooth bottom supporting erect epifauna such as large sponges.

Spatial Closures

- Closures as described in Appendix A, Table 2

Otter board trawl method in the Great Australian Bight Trawl Sector

The GABT Sector extends from Cape Leeuwin, Western Australia, to Cape Jervis near Kangaroo Island, South Australia. The Sector excludes State (SA and WA) fishery shelf waters to the extreme east and west which have traditionally been fished by State based fishers (Appendix B, Fig. 4). The GABT is primarily a demersal and developmental mid-water trawl sector based on regular trawling of inshore species and sporadic trawling for the deeper dwelling slope species such as blue grenadier and gemfish.

All Statutory Fishing Right (SFR) owners are members of Great Australian Bight Fishing Industry Association (GABIA). This situation has allowed industry to work closely with AFMA, researchers and other stakeholders to pursue sustainable, practical and well-informed management arrangements for the fishery.

Priority species list

The ERA results have been consolidated to form a priority list for otter board trawling in the GABT comprising:

- 0 chondrichthyan or teleost species identified as extreme high risk, precautionary extreme high risk, high risk or precautionary high risk through Level 3 SAFE assessment
- Two invertebrate families (byproduct) identified as high risk through application of the level 2 Residual Risk Assessment (Table 6)
- 135 TEP species identified through the ERA: three chondrichthyan, 49 marine birds, 43 marine mammals and 40 teleosts.

Habitats

A Level 2 PSA identified 77 habitats. Habitat types were classified based on substratum, geomorphology, and dominant fauna, using photographic data. Of the 77 habitat types, 21 were assessed to be at high risk, 32 medium, and 24 low. High risk habitats comprised of:

- 0 on the inner shelf (0-100m)
- Eight on the outer shelf (100-200m)
- Five on the upper slope (200-700m)
- Eight on the mid slope (700-1500m).

For detailed methodology and results refer to the following documents:

- *Ecological Risk Assessment (ERA) for Effects of Fishing – Report for the Great Australian Bight Trawl Sub-Fishery of the Southern and Eastern Scalefish and Shark Fishery 2007*. Australian Fisheries Management Authority.

- *Residual Risk Assessment of the Level 2 Ecological Risk Assessment – Non-Teleost and Non-Chondrichthyan Species. Report for the Otter Board Trawl Method of the Great Australian Bight Fishery.* July 2012. Australian Fisheries Management Authority.
- *Zhou et al 2012, Sustainability assessment of fish species potentially impacted in the Southern and Eastern Scalefish and Shark Fishery: 2007-2010.* June 2012, Australian Fisheries Management Authority.
- *Residual Risk Assessment – Teleost and Chondrichthyan Species. Report for the Otter Board Trawl Method of the Great Australian Bight Trawl Sector. June 2014.* Australian Fisheries Management Authority.

Table 6 The priority species for the GABT Fishery which AFMA will focus ERM efforts.

Scientific Name	Common Name	Role in Fishery	Highest Level of Assessment	Risk Score	Action to address high risk
Invertebrate					
<i>Sepidae - undifferentiated</i>	Cuttlefish	BP	L2 Residual Risk	High	1
<i>Order Octopoda - Undifferentiated</i>	Octopod	BP	L2 Residual Risk	High	1

In addition to the high risk species identified through the ERA process, this ERM strategy also focuses on the broader aspects of bycatch when using otter board trawl in the GABT. Priority areas are described here by taxonomic group.

Invertebrates

1. Actions under the Bycatch and Discarding Workplan 2014-16
 - a. Refine ISMP to add ERA high risk species (cuttlefishes and octopods) to GABT priorities for catch composition reporting to species level by onboard observers.

AFMA is currently developing a policy to address any gaps in the management of byproduct species in Commonwealth fisheries. Cuttlefish and octopods will fall under this policy once developed. In the meantime, these species will be addressed as part of the GABT Bycatch and Discard Workplan 2014-16.

The GABT has previously developed a strategy for byproduct species, which increases the data and analysis requirements as the catch increases. For most of the key non-quota species in the GABT, key biological samples (otoliths and length frequencies) are currently being collected, and if catches increase to a pre-determined level, fishing for that species ceases and/or industry provide funding for data analysis. These arrangements are to be systematically

reviewed to ensure the measures in place are precautionary, recognising the developmental nature of the slope component of the GABT.

Marine mammals

2. Actions under the Bycatch and Discard Workplan 2014-16:
 - a. Investigate the capability of e-logs to meet requirements for TEP reporting.
 - b. Develop a series of YouTube videos to show skippers and crew how to record bycatch, discards and wildlife interactions on e-logs.

Sharks, skates and rays

3. Obligations under permit conditions
 - a. School shark and gummy shark must exceed 450 mm in length.
 - b. Fishers must not retain Harrison's dogfish, southern dogfish, endeavour dogfish and greeneye dogfish.
 - c. Fishers must not carry or possess any detached shark dorsal, pectoral, caudal, pelvic or anal fins.
 - d. Shark liver must be landed with carcass (Reg 9ZP)
4. Actions under the Bycatch and Discarding Workplan 2014-16
 - a. Refine IMSP priorities to add teleost and chondrichthyan reporting to species level as a priority.
 - b. Develop and distribute chondrichthyan (sharks and rays) best handling practices guide to all operators in the GABT.
5. Upper-Slope Dogfish Management Strategy
6. Chondrichthyan Guide for Fisheries Managers
7. National Plan of Action for the Conservation and Management of Sharks
8. Identification guides in Boat Operating Procedures Manual

Teleost

9. Gear restrictions
 - a. Mesh size must not be less than 90 mm at any apart.
 - b. T90 gear extension must be used in waters shallower than 200 m.
10. Actions under the Bycatch and Discarding Workplan 2014-16
 - a. Develop and deliver skipper education program to improve consistency of reporting of discards.
 - b. Investigate feasibility of GABT becoming a zero-discards fishery.

- c. Investigate how GABT fishers can improve markets for under-utilised species such as latchet.

Seabirds

11. Seabird Management Plan

12. Actions under the Bycatch and Discarding Workplan 2014-16

- a. Review all vessel Seabird Management Plans across the SESSF.
- b. Investigate the capability of e-logs to meet requirements for TEP reporting.
- c. Distribute seabird identification guides to all vessels in the GABT.
- d. Develop a series of YouTube videos to show skippers and crew how to record bycatch, discards and wildlife interactions on e-logs.

Habitats

The impact of fishing activities on habitats in the GABT is relatively low, with 21 habitat types assessed as at high risk after Level 2 PSA analysis. The areas of high risk habitats are unknown in the GABT. There is some level of protection afforded by spatial closures.

Spatial closures

- Closures as described in Appendix A, Table 2

Scalefish Automatic longline method of the Gillnet, Hook and Trap Sector

The area fished using automatic longline (ALL) in the GHAT includes Commonwealth waters of the AFZ off South Australia, Victoria, Tasmania and to some extent NSW and QLD (Appendix B, Fig. 3). Current management arrangements restrict fishing by ALL vessels to waters deeper than 183 m to primarily prevent targeting of school shark and gummy shark.

A single permit holder operated in the fishery from 1993 until 2002 when the number of SFRs expanded to 15. During the 2012-13 fishing season there were 37 scalefish hook permits, and 15 active vessels. The amount of effort in this sector peaked in 2005 with 9 776 448 hooks set. In recent years (2013-14) effort has stabilised at two to three boats setting a total of around three million hooks.

Ecological Risk Assessment results

The ERA results have been consolidated to form a priority list (Table 7) for the fishery comprising:

- Six chondrichthyan and one teleost species identified as extreme high risk, precautionary extreme high risk, high risk or precautionary high risk through Level 3 SAFE assessment (Table 7)
- 0 invertebrates identified as high risk through application of the Level 2 residual risk assessment
- 212 TEP species identified through the ERA: three chondrichthyan, 81 marine birds, 50 marine mammals, 10 marine reptiles and 68 teleosts.

Habitats

A Level 2 PSA identified 149 habitats. Habitat types were classified based on substratum, geomorphology, and dominant fauna, using photographic data. Of the 149 habitat types, 17 were assessed to be at high risk, 98 medium, and 34 low. High risk habitats are comprised of:

- 0 on the inner shelf (0-100m)
- Two on the outer shelf (100-200m)
- 15 on the upper slope (200-700m)
- 0 on the mid slope (700-1500m).

For detailed methodology and results refer to the following documents:

- *Ecological Risk Assessment (ERA) for Effects of Fishing – Report for the Automatic Longline sub-fishery of the Southern and Eastern Scalefish and Shark Fishery, 2007.* Australian Fisheries Management Authority.

- *Residual Risk Assessment of the Level 2 Ecological Risk Assessment - Non-Teleost and Non-Chondrichthyan Species. Report for the Auto-longline Sector of the Gillnet Hook and Trap Fishery*, July 2012. Australian Fisheries Management Authority.
- *Zhou et al 2012, Sustainability assessment of fish species potentially impacted in the Southern and Eastern Scalefish and Shark Fishery: 2007-2010*. June 2012, Australian Fisheries Management Authority.
- *Residual Risk Assessment – Teleost and Chondrichthyan Species. Report for the Scalefish Automatic Longline Method of the Gillnet Hook and Trap Sector*. June 2014. Australian Fisheries Management Authority.

Table 7 The priority species for the auto-longline method in the GHAT which AFMA will focus ERM efforts.

Scientific Name	Common Name	Role in Fishery	Highest Level of Assessment	Risk Score	Action to address high risk
Chondrichthyan					
<i>Centrophorus harrissoni</i>	Harrison's Dogfish	BC	SAFE	Extreme High	4d, 4e, 4f, 4g 5, 6c, 7a, 7b, 8, 10, 11
<i>Centrophorus zeehaani</i>	Southern Dogfish	BC	SAFE	Extreme High	4d, 4e, 4f, 4g, 5, 6b, 6c, 7, 8, 10, 11
<i>Squalus chloroculus</i>	Greeneye Spurdog	BC	SAFE	Extreme High	4d, 4e, 4f, 4g, 5, 6b, 6c, 7, 8, 10, 11
<i>Dipturus canutus</i>	Grey Skate	BC	SAFE	High	4f, 4g, 5, 6a, 6b, 7, 8, 10
<i>Figaro boardmani</i>	Sawtail Catshark	BC	SAFE	High	4f, 4g, 5, 6a, 6b, 7, 8, 10
<i>Hydrolagus lemures</i>	Blackfin Ghost Shark	BP	SAFE	High	4f, 4g, 5, 6a, 6b, 7, 8, 10
Teleost					
<i>Polyprion oxygeneios</i>	Hapuku	BP	SAFE	Precautionary Extreme High	16, 17b, 17c, 18

Ecological Risk Management Strategy

In addition to the high risk species identified through the ERA process, this ERM strategy focuses on the broader aspects of bycatch using automatic longline in the GHAT. Priority areas are described here by taxonomic group.

Marine mammals

No marine mammals were identified at high risk from automatic longline. The following measures have been implemented for other reasons but may contribute to reducing the risk to marine mammals.

1. Spatial closure
 - a. automatic longline shallow water closure
2. Gear restrictions
 - a. Limit of 15 000 hooks set per day
 - b. Gear must be anchored to the sea floor.
3. Actions under the Bycatch and Discarding Workplan 2014-16
 - a. Install electronic monitoring on all auto longline vessels.

Sharks, skates and rays

4. Obligations under permit conditions
 - a. School shark and gummy shark must exceed 450 mm in length.
 - b. Gummy shark trigger limit of 10 t per season
 - c. School shark trigger limit of 5 t per season
 - d. Fishers must not retain Harrison's dogfish, southern dogfish, endeavour dogfish and greeneye dogfish.
 - e. Mandatory handling practices for species of the family *Centrophoridae* (excluding *Deania sp.*) and *Squalidae*.
 - f. Fishers must not carry or possess any detached shark dorsal, pectoral, caudal, pelvic or anal fins.
 - g. Shark liver must be landed with carcass (Reg 9ZP)
5. Gear restrictions
 - a. 15 000 hook limit per day
 - b. Wire trace is prohibited
 - c. Longlines must be anchored to the sea floor
6. Spatial and temporal closures
 - a. Automatic longline fishing for scalefish is prohibited inside the 183 m depth contour.
 - b. Closure south of Kangaroo Island between 1 September and 31 October to protect breeding school shark populations.

- c. Closures under the Upper-Slope Dogfish Management Strategy.
- 7. Actions under the Bycatch and Discarding Workplan 2014-16
 - a. Develop and distribute a deepwater shark I.D guide for industry.
 - b. Develop and distribute chondrichthyan (sharks and rays) best handling practices guide to all operators.
- 8. Chondrichthyan Guide for Fisheries Managers
- 9. Upper and lower reference limits for species of concern
- 10. National Plan of Action for the Conservation and Management of Sharks
- 11. Upper-slope Dogfish Management Strategy

Industry implemented a code of conduct to improve the handling practices and encourage the release of all live sharks, including dogfish. The bycatch working group has noted that most of the shark species identified at high ecological risk reach the surface of the water alive and there is potential for them to be released.

Seabirds

Seabirds are not identified as a high risk species through the ERA process. This is primarily due to the strict management arrangements AFMA have introduced through the TAP process to ensure the impact of fishing with automatic longlines is minimised. The following management arrangements are employed in the GHAT when using automatic longline:

- 11. Threat Abatement Plan (2014) for the incidental catch (or bycatch) of seabirds
- 12. Monitoring obligations
 - a. Monitoring is relatively high (minimum of 10 percent of hook set) due to obligations under the TAP.
- 13. Gear restrictions
 - a. mandatory use of tori lines to deter birds while setting gear
 - b. specified sink rates for setting line to get hooks out of the reach of birds
 - c. mandatory use of brickle curtains to deter birds while hauling the line
 - d. prohibited use of frozen baits to reduce baited hooks floating to the surface
- 14. Spatial and temporal closures
 - a. requirement to set at night if a seabird mortality occurs during a trip
- 15. Actions under the Bycatch and Discarding Workplan 2014-16
 - a. Develop an individual responsibility model for seabird interactions to work in conjunction with the TAP.

- b. Increase observer monitoring of seabird interactions for the demersal longline sector.
- c. Develop and distribute seabird mitigation fact sheets to auto longline fishers.

Teleost

16. Gear restrictions

- a. 15 000 hook limit per day
- b. Longlines must be anchored to the sea floor.

17. Spatial closure

- a. Automatic longline fishing for scalefish is prohibited inside the 183 m depth contour.
- b. Closures under Upper-slope Dogfish Management Strategy
- c. Closure south of Kangaroo Island between 1 September and 31 October.

18. Actions under the Bycatch and Discarding Workplan 2014-16:

- a. Install electronic monitoring on all auto longline vessels.

Habitat

There are several habitat types that are at least potentially at risk from automatic longline fishing. A key uncertainty is the effect of movement of the main line itself on large, erect and fragile epifauna. Areas closed to fishing are likely the most effective way to mitigate risk from fishing.

Spatial closures

- Closures as described in Appendix A, Table 2

Shark gillnet method in the gillnet, hook and trap sector

Shark gillnet is a method used in the GHAT, a sub-fishery of the larger SESSF. The shark gillnet sector set demersal gillnets to target gummy shark. The sector covers an area from the New South Wales/Victorian border to the South Australian/Western Australian border including waters around Tasmania; from the low water mark to the extent of the AFZ (Appendix B, Fig. 3).

Over time, gear restrictions, including mesh size and depth have changed. In coastal waters and waters adjacent to South Australia, the maximum permitted headrope length is 4 200 m. In all other Commonwealth waters the maximum length is 6 000 m. These specifications include a maximum of 20 meshes deep and a mesh size of 15-16.5 cm. Some Commonwealth fishers targeting school shark in Tasmanian and South Australian coastal waters are further restricted to 1 200 m and 1 800 m of net respectively.

There were 61 gillnet SFRs in the 2012-13 season and 46 active vessels. The amount of effort in this sector peaked in 2003 at 46 010 km of net set. The effort for the 2012-13 season was 32 897 km.

Ecological Risk Assessment results

The ERA results have been consolidated to form a priority list for the gillnet in the GHAT comprising:

- Six chondrichthyan species identified as extreme high risk, precautionary extreme high risk, high risk or precautionary high risk through level 3 SAFE assessment (Table 8)
- Four marine mammals identified as high risk through application of the Level 2 residual risk assessment (Table 8)
- 192 TEP species identified through the ERA: 3 chondrichthyan, 74 marine birds, 47 marine mammals, seven marine reptiles and 61 teleosts.

Habitat

A Level 2 PSA identified 102 habitats. Habitat types were classified based on substratum, geomorphology, and dominant fauna, using photographic data. Of the 102 habitat types, 22 were assessed to be at high risk, 18 medium, and 64 low. High risk habitats are comprised of:

- 0 on the inner shelf (0–100 m)
- 22 on the outer shelf (100–200 m)
- 0 on the upper slope (200–700 m)
- 0 on the mid slope (700–1500 m).

For detailed methodology and results refer to the following documents:

- *Ecological Risk Assessment (ERA) for Effects of Fishing – Report For the Shark Gillnet Sub-Fishery of the Commonwealth Gillnet Hook and Trap Sector of the Southern and Eastern Scalefish and Shark Fishery, 2007.* Australian Fisheries Management Authority.
- *Residual Risk Assessment of the Level 2 Ecological Risk Assessment – Non-Teleost and Non-Chondrichthyan Species. Report for the Otter Board Trawl Method of the Great Australian Bight Fishery.* July 2012. Australian Fisheries Management Authority.
- *Zhou et al 2012, Sustainability assessment of fish species potentially impacted in the Southern and Eastern Scalefish and Shark Fishery: 2007-2010.* June 2012, Australian Fisheries Management Authority.
- *Residual Risk Assessment – Teleost and Chondrichthyan Species. Report for the Shark Gillnet Method of the Gillnet Hook and Trap Sector.* June 2014. Australian Fisheries Management Authority.

Table 8 The priority species for the shark gillnet method in the GHAT which AFMA will focus ERM efforts.

Scientific Name	Common Name	Role in Fishery	Highest Level of Assessment	Risk Score	Action to address high risk
Marine Mammal					
<i>Arctocephalus forsteri</i>	New Zealand Fur Seal	TEP	L2 Residual Risk	High	1, 2, 4, 5, 6
<i>Neophoca cinerea</i>	Australian Sea Lion	TEP	L2 Residual Risk	High	1, 2, 4, 5, 6
<i>Arctocephalus pusillus doriferus</i>	Australian Fur Seal	TEP	L2 Residual Risk	High	1, 2, 4, 5, 6
<i>Delphinus delphis</i>	Common Dolphin	TEP	L2 Residual Risk	High	1, 2, 3, 4, 5, 6
Chondrichthyan					
<i>Carcharodon carcharias</i>	White Shark	TEP	SAFE	Extreme High	7d, 7e, 8, 9, 10, 11a
<i>Carcharhinus brachyurus</i>	Bronze Whaler	BP	SAFE	Extreme High	7d, 7e, 8, 9, 10, 11a, 11c
<i>Sphyrna zygaena</i>	Smooth Hammerhead	BC	SAFE	Precautionary Extreme High	7d, 7e, 8, 9, 10, 11a
<i>Notorynchus cepedianus</i>	Broadnose Shark	BP	SAFE	Precautionary High	7d, 7e 8, 9, 10, 11a

<i>Furgaleus macki</i>	Whiskery Shark	BP	SAFE	Precautionary Extreme High	7d, 7e, 8, 9, 10, 11a
<i>Galeorhinus galeus</i>	School Shark	BP	SAFE	Precautionary Extreme High	7a, 7b, 7e, 8d, 8, 9, 11a, 11c

In addition to the high risk species identified through the ERA process, this ERM strategy focuses on the broader aspects of bycatch when using gillnet to catch shark in the GHAT. Priority areas are described here by taxonomic group.

Marine mammals

1. Australian Sea Lion Management Strategy
2. Monitoring obligations
 - a. 100 per cent monitoring in the ASL management zone and dolphin observation area (Appendix B, Fig. 12)
 - b. 100 per cent monitoring in South Australia.
3. Dolphin Strategy
4. Gear Restrictions
 - a. maximum headrope length of 4 200 m in South Australian waters and 6 000 m in all other Commonwealth waters
 - b. maximum net drop of 20 meshes deep
 - c. mesh size must be between 150 mm and 165 mm
 - d. mandatory use of monofilament line
 - e. nets must not be able to drift
5. Actions under the Bycatch and Discarding Workplan 2014-16
 - a. Develop and distribute best practice options for minimising marine mammal interactions.
 - b. Conduct gear survey after best practice guidelines distributed.
 - c. Establish baseline for TEP species interactions with gillnets.
6. Offal management
 - a. no offal in net when setting
 - b. no discarding of offal when setting

Sharks, skates and rays

7. Obligations under permit conditions
 - a. School shark landing must not exceed 20 per cent of gummy shark landings.
 - b. School shark and gummy shark must exceed 450 mm in length.
 - c. Fishers must not retain Harrison's dogfish, southern dogfish, endeavour dogfish and greeneye dogfish.
 - d. Fishers must not carry or possess any detached shark dorsal, pectoral, caudal, pelvic or anal fins.
 - e. Shark liver must be landed with carcass (Reg 9ZP)
8. Gear restrictions
 - a. as described under marine mammals
9. Actions under the Bycatch and Discarding Workplan 2014-16:
 - a. Develop and distribute chondrichthyan (sharks and rays) best handling practices guide to all operators
10. Upper and lower reference limits for species of concern
11. Spatial closures
 - a. shark gillnet fishing prohibited outside 183 m depth contour
 - b. closures under the Upper-Slope Dogfish Strategy
 - c. Schedule 1, 4, 6, 7, 8 and 10 as described in Appendix A, Table 2.

The School Shark Rebuilding Strategy (the Strategy) was developed in 2008 and updated in 2015 under the HSP, which requires formal rebuilding strategies for all species below their biomass limit reference point. The Strategy is not part of this ERM Strategy, but is an additional measure under the HSP to mitigate the risk to school shark.

Management actions the Strategy focus on reducing the incidental catch of larger mature school shark as well as ensuring that targeted fishing for school shark is not occurring. This is primarily achieved through:

- spatial closures to protect school shark nursery areas and large breeding fish
- gear restrictions which reduce the likelihood of incidentally catching large mature school shark
- catch limits for auto longline and scalefish hook operators to reduce the potential for targeted fishing in breeding areas.

Teleosts

12. Gear restrictions

- a. as described under marine mammals

13. Spatial closures

- a. Gillnet fishing for scalefish is prohibited outside the 183 m depth contour.

Habitats

The high risk habitats on the outer shelf include 13 hard bottom types (low relief, gravels or outcrops) covered with large, erect or delicate epifauna and nine soft bottom habitat types covered with large, erect or delicate epifauna. A large part of the fishing effort is in less than 80 m depth, and the footprint over high risk areas is relatively low.

Spatial closure

- Closures as described in Appendix A, Table 2

Cumulative risk across SESSF fishing methods

The 2012 SAFE assessed the cumulative impact of fishing across the SESSF for 508 species among which 100 are chondrichthyans and 408 are teleosts.

After application of residual risk guidelines and expert overrides, and including uncertainty in both estimated fishing mortality rate and biological reference points, 24 species (21 chondrichthyans and three teleosts) are at risk (Table 9).

Instantaneous fishing mortality rate (F) is used to represent the impact of fishing activities on a species. Highlighted F values in Table 9 represent impacts which have been identified under gear-specific SAFE assessments and mitigation efforts have been described in the ERM strategies above. While the cumulative impact needs to be considered, focusing mitigation efforts on smaller impacts (low F values) is unlikely to result in a lower risk score. For example, greeneye dogfish are addressed as a high risk species in the ERM strategies for otter board trawl in the CTS ($F = 0.09$) and scalefish automatic longline in the GHAT ($F = 0.14$). The impact of otter board trawl in GABT ($F = 0.01$) does not significantly contribute to the overall risk, and efforts to mitigate this impact are unlikely to result in a lower risk score.

The estimated F values for velvet dogfish, white-spotted dogfish and piked dogfish are below their respective maximum sustainable fishing mortality (F_{msm}) values. The precautionary risk scores are due to uncertainty in either the biological reference points, or the estimated impact of fishing. Interactions with all high risk species will be monitored as part of this ERM Strategy.

Two grey nurse sharks were captured in the CTS between April and June 2011, however, grey nurse shark interactions are infrequent in the SESSF. Grey nurse shark interactions are monitored and reported to the Department of the Environment and are discussed at the National Shark Recovery Group (NSRG) which is responsible for monitoring the Grey Nurse Shark Recovery Plan. The NSRG was satisfied that the level of interactions between AFMA fisheries and grey nurse sharks is minimal and, therefore, likely to have minimal if any effect on recovery of the species.

Table 10 lists the species which were identified as at risk under the SAFE, but were subsequently removed as part of the residual risk assessment process.

Table 9 Species assessed as at risk due to the cumulative impacts of fishing methods in the SESSF.

Common Name	Cumulative Risk Score	Estimated F						Maximum sustainable fishing mortality (mean)
		Trawl	GABT	Gill	Danish	Auto	Cum	
Teleost								
Hapuku	Extreme High	0.1	0.1	0	0	0.13	0.24	0.12
Righteye Flounder	Precautionary Extreme High	0.19	0	0	0	0	0.19	0.25
Rattail	Precautionary High	0.11	0	0	0	0	0.11	0.20
Chondrichthyan								
Harrison's Dogfish	Extreme High	0.14	0	0	0	0.36	0.49	0.06
Southern Dogfish	Extreme High	0.14	0	0	0	0.29	0.43	0.06
Sawtail Shark	Extreme High	0.12	0.01	0	0	0.15	0.29	0.13
Bight Ghost Shark	Extreme High	0.18	0	0	0	0.11	0.29	0.11
Grey Skate	Extreme High	0.14	0	0	0	0.13	0.27	0.08
Green-Eyed Dogfish	Extreme High	0.09	0.01	0	0	0.14	0.24	0.07
Smooth Hammerhead	Extreme High	0.02	0	0.17	0	0	0.19	0.08
Bronze Whaler	Extreme High	0.01	0	0.18	0	0	0.19	0.04
Ogilby's Ghost Shark	High Risk	0.13	0	0	0	0.04	0.17	0.10
White Shark	Extreme High	0.03	0	0.13	0	0	0.17	0.05
Yellow-backed Stingaree	Precautionary Extreme High	0.13	0	0	0.01	0	0.15	0.11
Eastern Fiddler Ray	High Risk	0.13	0	0	0	0	0.13	0.08
Greynurse Shark	Precautionary Extreme High	0.04	0	0.05	0	0	0.1	0.09
School Shark	Precautionary Extreme High	0	0	0.09	0	0.01	0.1	0.06
Broadnose Sevengill Shark	Precautionary Extreme High	0.02	0	0.08	0	0	0.1	0.10
Whiskery Shark*	Precautionary Extreme High	0	0	0.07	0	0	0.08	0.09
Common Skate	Extreme High	0.08	0	0	0	0	0.08	0.04
Piked Dogfish	Precautionary High	0.04	0	0	0	0.02	0.06	0.07
Nilson's Deepsea Dogfish	Precautionary Extreme High	0.05	0	0	0	0	0.05	0.05
White-spotted Dogfish	Precautionary High	0	0	0.04	0	0	0.04	0.06
Velvet Dogfish	Precautionary High	0.01	0	0	0	0.01	0.02	0.04

Table 10 Species removed as part of the residual risk assessment of Level 3 results

Common Name	Cumulative Risk Score	Estimated F					
		Trawl	GABT	Gill	Danish	Auto	Cum
Platypus Shark	Extreme High	0.1	0	0	0	0.11	0.22
Bight Skate	Extreme High	0.15	0.01	0	0	0.14	0.31
Whitefin Swell Shark	Extreme High	0.13	0	0	0	0.19	0.32
Blackbelly Lantern Shark	Extreme High	0.12	0	0	0	0.08	0.2
Brier Shark	Precautionary Extreme High	0.05	0	0	0	0.04	0.09
Black Shark	Precautionary Extreme High	0	0	0.02	0	0.04	0.06
Deepwater Dogfish	Precautionary Extreme High	0.09	0	0	0	0.01	0.09
Ocean Perch	Precautionary Extreme High	0	0	0	0	0.14	0.14
Big-eyed Cardinalfish	Precautionary Extreme High	0.06	0	0	0	0	0.06
Plunket's Shark	Precautionary Extreme High	0.07	0	0	0	0	0.07
Robust Cardinalfish	Precautionary Extreme High	0.05	0	0	0	0	0.05
Spiky Oreo	Precautionary Extreme High	0.08	0	0	0	0.02	0.1
Tiger Shark	Precautionary Extreme High	0.1	0	0	0	0	0.1
White Cardinalfish	Precautionary Extreme High	0.04	0	0	0	0	0.04
Common Saw Shark	Precautionary High	0	0	0.08	0	0	0.09

5. Implementation, monitoring and improvement process

The approach to developing an ERM Strategy is described earlier in this ERM Strategy. Figure 4 shows the ERM performance management system, and this section focuses on implementation, monitoring and improvement steps.

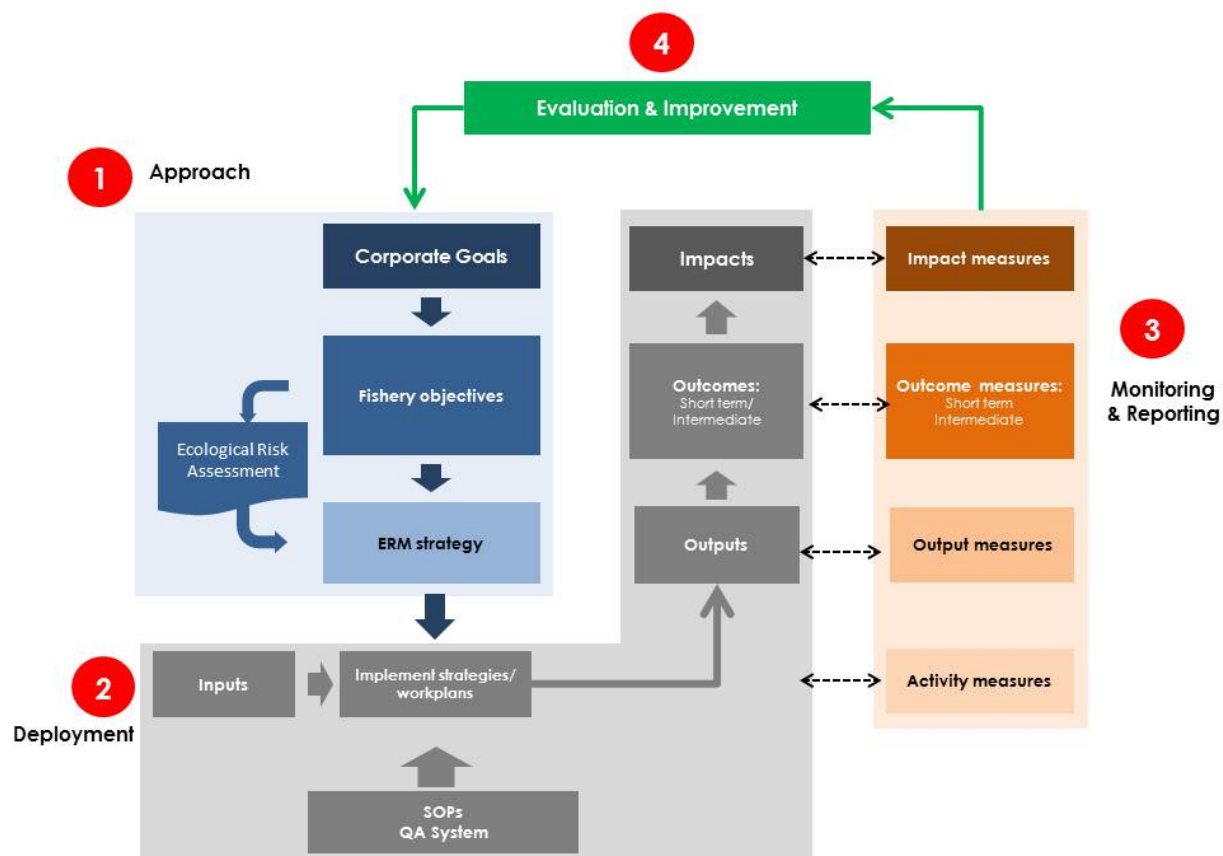


Figure 4 Performance management process map

Implementation

The implementation stage is where the management tools, strategies and workplans described in each fishery ERM Strategy are implemented to mitigate the impact of fishing activities. Fisheries are encouraged to consider cross fishery solutions when implementing measures for species that are identified as at high risk across more than one fishery and/or where fishing methods cross fishery boundaries.

The implementation stage consists of two parts:

- 1) The first part involves what AFMA does. That is, it involves the activities that convert inputs into outputs. AFMA has direct control over how it performs these activities.

To assure all stakeholders that these activities are performed to a high level of quality, and consistently over time and across personnel, AFMA uses a set of standard operating procedures (SOPs) and a quality assurance (QA) system. The SOPs ensure consistency in the development and implementation of strategies and workplans. For example, Bycatch and Discarding Workplans should be developed in consultation with MACs and RAGs and include clear and measurable performance indicators, defined timeframes, responsible parties and milestones to ensure that project managers can keep track of progress. The QA system monitors AFMA's use of the SOPs to ensure they remain relevant and in use, and to identify opportunities for improvement.

2) The second part of implementation involves the development of outcomes from AFMA's outputs. AFMA produces outputs that lead to outcomes, and it is the outcomes that are critical. AFMA has some influence, but not control, over short term outcomes, however, its influence decreases as outcomes develop over the medium and longer terms.

Short term outcomes usually involve changes to practices and attitudes as AFMA's activities start to take effect. Over the intermediate term these changed practices lead to changes in interactions with target species, bycatch and TEP species, or to the impact of fishing on habitats and communities. Over the longer term these changes lead to the achievement of AFMA's aspirational goal - ecologically sustainable and economically efficient fisheries.

Performance monitoring and reporting

The next stage involves monitoring the inputs, activities, outputs and outcomes (short, medium and longer term) to ensure the outcomes develop as planned and to alert AFMA when remedial action is required.

The indicators and limits (triggers for action) are developed during the planning stage. During monitoring, data is collected to measure these indicators and to report on performance. Monitoring frequency will vary depending on the indicator, difficulty of collecting data, and the time expected to see a detectable change in the indicator value. Fisheries managers will review the performance indicators on an annual basis and initiate corrective action if an indicator shows that some management arrangements are not producing the expected results.

Evaluation and Improvement

Evaluation and Improvement operates at two levels:

1) The first involves an annual evaluation of the ERM outputs. These include implementation of management arrangements, action items from bycatch and discard workplans and any industry initiatives designed to mitigate the impact of fishing.

2) The second involves measuring performance data against the objectives of this ERM Strategy (Table 11). Performance data includes TEP interactions, discard rates, bycatch information and in the longer term the number of high risk species. Each fishery reviews the

performance data and determines whether the strategies and plans (ERM outputs) are working or whether they need updating or refining for the coming year.

On a broader scale the outputs from the annual reviews will be used to form the response to any Wildlife Trade Operation (WTO) accreditation or exemption in place in the fishery.

Table 11 Objectives and outcomes for measuring performance of this ERM Strategy

- Objective 1** implement management arrangements to respond to high risk species and habitats assessed through AFMA’s Ecological Risk Assessment process
- Objective 2** minimise interactions with species listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) excluding conservation dependent species

Outcome Hierarchy	Assumptions	Indicator	Target	Limits	Source	Timeframe	Responsibility
Outcome 1	Implement management arrangements to respond to high risk species and habitats	Number of high risk species Number of high risk habitats	Nyr5 < Nyr0 (no.)	$Nyr5 \leq Nyr0$	ERA	5 years Reviewed annually	AFMA
Outcome 2	Minimise interactions with TEP species	Interaction rates Number of high risk TEPs	Nyr5 < Nyr0	$Nyr5 \leq Nyr0$	Logbooks ISMP ERA	5 years Reviewed annually	AFMA Industry
Outputs	Bycatch and discard workplans Management arrangements Industry initiatives	Action items Changes to management arrangements Changes to industry initiatives	Complete all action items N/A N/A	Complete action items where practical	Periodic review AFMA management AFMA management & Industry	Every two years Reviewed annually Periodic Periodic	AFMA Industry
Activities	As listed in this ERM Strategy						

GLOSSARY

Attribute	A general term for a set of properties relating to the productivity or susceptibility of a particular unit of analysis.
Bycatch	That part of fisher's catch which is returned to the sea either because it has no commercial value or regulations preclude it from being retained and; that part of the catch that does not reach the deck of the fishing vessel but is affected by the interaction with the fishing gear.
Byproduct	A non-target species captured in a fishery that has value to the fisher and may be retained for sale.
Component	The marine ecosystem is broken down into five components for the risk assessment: target species (TA); byproduct (BI) and bycatch species (DI); protected (TEP) species; habitats; and ecological communities.
ERA	Ecological risk assessment for the effects of fishing as developed by AFMA and CSIRO.
Gear	The equipment used for fishing, e.g. gillnet, Danish seine, pelagic longline, midwater trawl, purse seine, trap etc.

Level 3 SAFE risk categories

F_{msm}	instantaneous fishing mortality corresponding to the maximum sustainable death due to fishing (maximum sustainable mortality of fishing, MSM) at B_{msm} (biomass that supports MSM). This is similar to the F_{msy} that supports a maximum sustainable yield for target species.
F_{lim}	instantaneous fishing mortality corresponding to limit biomass B_{lim} where B_{lim} is defined as half of the biomass that supports a maximum sustainable fishing mortality ($0.5B_{msm}$).
F_{crash}	minimum unsustainable fishing mortality that, in theory, will lead to population extinction in the longer term.

Level 2 PSA

Residual Risk	In the context of this document residual risk means the residual risk after the Level 2 PSA assessment.
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Scoping	A general step in an ERA or the first step in the ERAEF involving the identification of the fishery history, management, methods, scope and activities.
Susceptibility	Used in Level 2 PSA assessment to calculate the impact on an ecological component due to a fishing activity. The extent of the impact due to the fishing activity, determined by the affect of the fishing activities on the unit.

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Appendix A

Table A. 1 Threatened, endangered and protected species which occur in the SESSF, but are not considered to be at risk from the impacts of fishing.

Chondrichthyans	
<i>Carcharias taurus</i>	grey nurse shark
<i>Rhincodon typus</i>	whale shark
Marine Birds	
<i>Anous minutus</i>	Black Noddy
<i>Anous stolidus</i>	Common Noddy
<i>Calonectris leucomelas</i>	Streaked Shearwater
<i>Catharacta skua</i>	Great Skua
<i>Daption capense</i>	Cape Petrel
<i>Eudyptula minor</i>	Little Penguin
<i>Fregetta grallaria</i>	White-bellied Storm-Petrel
<i>Fregetta tropica</i>	Black-bellied Storm-Petrel
<i>Fulmarus glacialisoides</i>	Southern fulmar
<i>Garrodia nereis</i>	Greyback Storm Petrel
<i>Halobaena caerulea</i>	Blue Petrel
<i>Larus dominicanus</i>	Kelp Gull
<i>Larus novaehollandiae</i>	Silver Gull
<i>Larus pacificus</i>	Pacific Gull
<i>Lugensa brevirostris</i>	Kerguelen Petrel
<i>Macronectes giganteus</i>	Southern Giant-Petrel
<i>Macronectes halli</i>	Northern Giant Petrel
<i>Morus capensis</i>	Cape gannet
<i>Morus serrator</i>	Australasian Gannet
<i>Oceanites oceanicus</i>	Wilson's storm petrel
<i>Pachyptila turtur</i>	Fairy Prion
<i>Pelagodroma marina</i>	Whiteface Storm Petrel
<i>Pelecanoides urinatrix</i>	Common Diving-Petrel

<i>Phaethon rubricauda</i>	Red-tailed Tropicbird
<i>Phalacrocorax fuscescens</i>	Black faced cormorant
<i>Procellaria aequinoctialis</i>	Whitechin Petrel
<i>Procellaria cinerea</i>	Grey petrel
<i>Procellaria parkinsoni</i>	Black Petrel
<i>Procellaria westlandica</i>	Westland Petrel
<i>Procelsterna cerulea</i>	Grey Ternlet
<i>Pseudobulweria rostrata</i>	Tahiti Petrel
<i>Pterodroma cervicalis</i>	White-neck Petrel
<i>Pterodroma heraldica</i>	Herald Petrel
<i>Pterodroma lessoni</i>	Whitehead Petrel
<i>Pterodroma leucoptera</i>	Gould's Petrel
<i>Pterodroma macroptera</i>	Great-winged Petrel
<i>Pterodroma mollis</i>	Soft-plumaged Petrel
<i>Pterodroma neglecta</i>	Kermadec Petrel (western)
<i>Pterodroma nigripennis</i>	Black-winged Petrel
<i>Pterodroma solandri</i>	Providence Petrel
<i>Puffinus assimilis</i>	Little Shearwater (Tasman Sea)
<i>Puffinus bulleri</i>	Buller's Shearwater
<i>Puffinus carneipes</i>	Flesh-footed Shearwater
<i>Puffinus gavia</i>	Fluttering Shearwater
<i>Puffinus griseus</i>	Sooty Shearwater
<i>Puffinus huttoni</i>	Hutton's Shearwater
<i>Puffinus pacificus</i>	Wedge-tailed Shearwater
<i>Puffinus tenuirostris</i>	Short-tailed Shearwater
<i>Sterna albifrons</i>	Little tern
<i>Sterna anaethetus</i>	Bridled Tern
<i>Sterna bengalensis</i>	Lesser Crested Tern
<i>Sterna bergii</i>	Crested Tern
<i>Sterna caspia</i>	Caspian Tern
<i>Sterna dougallii</i>	Roseate tern
<i>Sterna fuscata</i>	Sooty tern

<i>Sterna hirundo</i>	Common tern
<i>Sterna nilotica</i>	Gull-billed tern
<i>Sterna paradisaea</i>	Arctic tern
<i>Sterna striata</i>	White-fronted Tern
<i>Sterna sumatrana</i>	Black-naped tern
<i>Sula dactylatra</i>	Masked Booby
<i>Sula leucogaster</i>	Brown Booby
<i>Thalassarche bulleri</i>	Buller's Albatross
<i>Thalassarche carteri</i>	Indian Yellow-nosed Albatross
<i>Thalassarche cauta</i>	Shy Albatross
<i>Thalassarche chlororhynchus</i>	Yellownose Albatross
<i>Thalassarche chrysostoma</i>	Grey-headed Albatross
<i>Thalassarche eremita</i>	Chatham albatross
<i>Thalassarche impavida</i>	Campbell Albatross
<i>Thalassarche melanophrys</i>	Black-browed Albatross
<i>Thalassarche nov. sp.</i>	Pacific Albatross
<i>Thalassarche salvini</i>	Salvin's albatross
<i>Thalassarche steadi</i>	White-capped Albatross
Marine Mammals	
<i>Arctocephalus tropicalis</i>	Subantarctic fur seal
<i>Balaenoptera bonaerensis</i>	Antarctic Minke Whale
<i>Balaenoptera acutorostrata</i>	Minke Whale
<i>Balaenoptera borealis</i>	Sei Whale
<i>Balaenoptera edeni</i>	Bryde's Whale
<i>Balaenoptera musculus</i>	Blue Whale
<i>Balaenoptera physalus</i>	Fin Whale
<i>Berardius arnuxii</i>	Arnoux's Beaked Whale
<i>Caperea marginata</i>	Pygmy Right Whale
<i>Dugong dugon</i>	Dugong
<i>Eubalaena australis</i>	Southern Right Whale
<i>Feresa attenuata</i>	Pygmy Killer Whale
<i>Globicephala macrorhynchus</i>	Short-finned Pilot Whale
<i>Globicephala melas</i>	Long-finned Pilot Whale
<i>Grampus griseus</i>	Risso's Dolphin

<i>Hydrurga leptonyx</i>	Leopard seal
<i>Hyperoodon planifrons</i>	Southern Bottlenose Whale
<i>Kogia breviceps</i>	Pygmy Sperm Whale
<i>Kogia simus</i>	Dwarf Sperm Whale
<i>Lagenodelphis hosei</i>	Fraser's Dolphin
<i>Lagenorhynchus cruciger</i>	Hourglass Dolphin
<i>Lagenorhynchus obscurus</i>	Dusky Dolphin
<i>Lissodelphis peronii</i>	Southern Right Whale Dolphin
<i>Megaptera novaeangliae</i>	Humpback Whale
<i>Mesoplodon bowdoini</i>	Andrew's Beaked Whale
<i>Mesoplodon densirostris</i>	Blainville's Beaked Whale
<i>Mesoplodon ginkgodens</i>	Ginkgo Beaked Whale
<i>Mesoplodon grayi</i>	Gray's Beaked Whale
<i>Mesoplodon hectori</i>	Hector's Beaked Whale
<i>Mesoplodon layardii</i>	Strap-toothed Beaked Whale
<i>Mesoplodon mirus</i>	True's Beaked Whale
<i>Mirounga leonina</i>	Elephant Seal
<i>Neophoca cinerea</i>	Australian Sea-lion
<i>Orcaella brevirostris</i>	Irrawaddy Dolphin
<i>Orcinus orca</i>	Killer Whale
<i>Peponocephala electra</i>	Melon-headed Whale
<i>Physeter catodon</i>	Sperm Whale
<i>Pseudorca crassidens</i>	False Killer Whale
<i>Sousa chinensis</i>	Indo-Pacific Humpback Dolphin
<i>Stenella attenuata</i>	Spotted Dolphin
<i>Stenella coeruleoalba</i>	Striped Dolphin
<i>Stenella longirostris</i>	Long-snouted Spinner Dolphin
<i>Steno bredanensis</i>	Rough-toothed Dolphin
<i>Tasmacetus shepherdi</i>	Tasman Beaked Whale
<i>Tursiops aduncus</i>	Indian Ocean bottlenose dolphin
<i>Tursiops truncatus</i>	Bottlenose Dolphin
<i>Ziphius cavirostris</i>	Cuvier's Beaked Whale

Marine Reptiles

<i>Acalyptophis peronii</i>	Horned Seasnake
<i>Astrotia stokesii</i>	Stokes' Seasnake
<i>Caretta caretta</i>	Loggerhead
<i>Chelonia mydas</i>	Green turtle
<i>Dermochelys coriacea</i>	Leathery turtle
<i>Eretmochelys imbricata</i>	Hawksbill Turtle
<i>Hydrophis elegans</i>	Elegant Seasnake
<i>Hydrophis ornatus</i>	Seasnake
<i>Natator depressus</i>	Flatback Turtle
<i>Pelamis platurus</i>	Yellow-bellied Seasnake
Teleosts	
<i>Acentronura australe</i>	Southern Pygmy Pipehorse
<i>Acentronura breviperula</i>	Mud Pipefish
<i>Campichthys galei</i>	Gale's Pipefish
<i>Campichthys tryoni</i>	Tryon's Pipefish
<i>Corythoichthys amplexus</i>	Fijian Banded Pipefish
<i>Corythoichthys ocellatus</i>	Hairy Pygmy Pipehorse
<i>Cosmocampus howensis</i>	Lord Howe Pipefish
<i>Cosmocampus howensis</i>	Lord Howe Pipefish
<i>Festucalex cinctus</i>	Girdled Pipefish
<i>Filicampus tigris</i>	Tiger Pipefish
<i>Halicampus boothae</i>	[a pipefish]
<i>Halicampus grayi</i>	Mud Pipefish, Gray's Pipefish
<i>Halicampus macrorhynchus</i>	[a pipefish]
<i>Haliporoides sibogae</i>	Brown-banded Pipefish
<i>Heraldia nocturna</i>	Upside-down Pipefish
<i>Heraldia sp. 1 [in Kuitert, 2000]</i>	Western upsidedown pipefish
<i>Heteroclinus perspicillatus</i>	Common weedfish
<i>Hippichthys cyanospilos</i>	Blue-speckled Pipefish
<i>Hippichthys heptagonus</i>	Madura Pipefish
<i>Hippichthys penicillus</i>	Beady Pipefish
<i>Hippocampus abdominalis</i>	Big-bellied seahorse
<i>Hippocampus angustus</i>	Western Spiny Seahorse
<i>Hippocampus bleekeri</i>	Pot-bellied seahorse

<i>Hippocampus breviceps</i>	Short-head Seahorse
<i>Hippocampus kelloggi</i>	Kellogg's Seahorse
<i>Hippocampus kuda</i>	Spotted Seahorse
<i>Hippocampus minotaur</i>	Bullneck Seahorse
<i>Hippocampus planifrons</i>	Flat-face Seahorse
<i>Hippocampus procerus</i>	Pipefish
<i>Hippocampus queenslandicus</i>	Kellogg's Seahorse
<i>Hippocampus subelonas</i>	West Australian Seahorse
<i>Hippocampus taeniopterus</i>	Spotted Seahorse
<i>Hippocampus tristis</i>	Pipefish
<i>Hippocampus whitei</i>	White's Seahorse
<i>Histiogamphelus briggsii</i>	Briggs' Crested Pipefish
<i>Histiogamphelus cristatus</i>	Rhino Pipefish
<i>Hypselognathus horridus</i>	Shaggy Pipefish
<i>Hypselognathus rostratus</i>	Knife-snouted Pipefish
<i>Idiotropiscis australe</i>	Southern Pygmy Pipehorse
<i>Kaupus costatus</i>	Deep-bodied Pipefish
<i>Kimblaesus bassensis</i>	Trawl Pipefish, Kimbla Pipefish
<i>Leptoichthys fistularius</i>	Brushtail Pipefish
<i>Lissocampus caudalis</i>	Australian Smooth Pipefish
<i>Lissocampus fatiloquus</i>	Prophet's Pipefish
<i>Lissocampus runa</i>	Javelin Pipefish
<i>Maroubra perserrata</i>	Sawtooth Pipefish
<i>Micrognathus andersonii</i>	Anderson's Pipefish
<i>Micrognathus pygmaeus</i>	Pipefish
<i>Microphis manadensis</i>	Manado River Pipefish
<i>Mitotichthys meraculus</i>	Western Crested Pipefish
<i>Mitotichthys mollisoni</i>	Mollison's Pipefish
<i>Mitotichthys semistriatus</i>	Half-banded Pipefish
<i>Mitotichthys tuckeri</i>	Tucker's Pipefish
<i>Nannocampus subosseus</i>	Bony-headed Pipefish
<i>Neoplatycephalus aurimaculatus</i>	Toothy Flathead
<i>Neoplatycephalus richardsoni</i>	Flathead
<i>Notiocampus ruber</i>	Red Pipefish

<i>Phycodurus eques</i>	Leafy Seadragon
<i>Phyllopteryx taeniolatus</i>	Weedy Seadragon
<i>Platycephalus bassensis</i>	Sand Flathead
<i>Platycephalus caeruleopunctatus</i>	Bluespot Flathead
<i>Platycephalus speculator</i>	Yank Flathead
<i>Pugnaso curtirostris</i>	Pug-nosed Pipefish
<i>Sillago flindersi</i>	School Whiting
<i>Solegnathus dunckeri</i>	Duncker's Pipehorse
<i>Solegnathus guentheri</i>	Indonesian Pipefish
<i>Solegnathus robustus</i>	Robust Spiny Pipehorse
<i>Solegnathus</i> sp. 1 [in Kuitert, 2000]	Pipehorse
<i>Solegnathus spinosissimus</i>	spiny pipehorse
<i>Solenostomus cyanopterus</i>	Blue-finned Host Pipefish
<i>Solenostomus paradoxus</i>	Harlequin Ghost Pipefish
<i>Stigmatopora argus</i>	Spotted Pipefish
<i>Stigmatopora nigra</i>	Wide-bodied Pipefish
<i>Stipecampus cristatus</i>	Ring-backed Pipefish
<i>Syngnathoides biaculeatus</i>	Double-ended Pipehorse
<i>Trachyrhamphus bicoarctatus</i>	Bend Stick Pipefish
<i>Urocampus carinirostris</i>	Hairy Pipefish
<i>Vanacampus margaritifer</i>	Mother-of-pearl Pipefish
<i>Vanacampus phillipi</i>	Port Phillip Pipefish
<i>Vanacampus poecilolaemus</i>	Australian Long-snout Pipefish
<i>Vanacampus vercoi</i>	Verco's Pipefish

Table A. 2 SESSF Closure Directions. Note: These Directions may be ceased and/or superseded by subsequent versions during the time this ERM is operational. For up to date Directions see AFMA website

Closure Direction No. 1 – Permanent		
Schedule No.	Closure Name	Reason for closure
1	Murat Bay	Closed to gillnet methods to protect stocks of Bronze Whalers, Snapper and Mulloway
2	Cascade Plateau	Closed to hook methods as a precautionary approach until more is known about Blue Eye Trevalla population dynamics
3	Kent Group National Park	Closed to all fishing methods
4	Bass Strait Trawl Closure	Closed to demersal otter trawl gear to protect School and Gummy Shark habitat in Bass Strait
5	St Helens Hill Closure	Closed to all trawl methods to protect Orange Roughy stocks
6	Seal Bay	Closed to all fishing to protect the breeding grounds of Australian Sea Lions
7	Pages Island	Closed to all fishing to protect White Sharks and Australian Sea Lions
8	Head of the Great Australian Bight	Closed to all fishing to protect School Shark populations
9	East Coast Deepwater Trawl Sector Exclusion Zone	Closed to all trawl methods to protect the benthic habitats near Lord Howe Island
10	Backstairs Passage	Closed to gillnet methods to protect School Shark breeding stock
11	Kangaroo Island	Closed to all fishing methods to protect School Shark breeding stock
12	Victor Harbor to the Victorian border	Closed to all fishing methods to protect School Shark breeding stock
13	Shark Hook Boat SFR and Gillnet 183m gillnet closure	Closed to gillnet methods protecting large School Shark and prevent targeting of Deepwater Sharks
14	West Coast Shark Hook and Shark Gillnet Sector Depth Closure	Closed to shark hook and gillnet methods to protect mature breeding stocks of School and Gummy Shark stocks
15	Automatic Longline 183m Depth Closure	Closed to auto-longline methods to protect targeting of School and Gummy shark
16	Scalefish Hook Sector Gulper shark closure	Closed to hook methods to protect Southern Dogfish
17	Great Australian Bight Trawl Gulper	Closed to demersal otter trawl methods to protect Southern Dogfish

	Shark closure	
18	Gulper Shark Closure- Endeavour Dogfish	Closed to all fishing to protect Endeavour Dogfish populations
19	Gulper Shark Closure – Harrison’s Dogfish	Closed to all fishing trawl or hook methods to protect Harrison’s Dogfish stocks
20	Commonwealth South East Trawl Sector 700m Depth Closure	Closed to trawl methods to protect Orange Roughy stocks
21	Tasmanian Seamounts Marine Reserve	Closed to trawl methods due to a high number of endemic species in the area
22	Eastern South Australia Trawl Closure	Closed to trawl methods to reduce the catch of juvenile scalefish and to protect structured benthic habitat
23	Portland Area Trawl Closure	Closed to trawl methods to reduce the catch of juvenile scalefish and to protect structured benthic habitat
24, 25, 26	Great Australian Bight Deepwater Closures	Closed to trawling to protect deepwater species and Orange Roughy
27, 28, 29, 30	Great Australian Bight Orange Roughy Zones (West)	Closed to trawling methods to protect Orange Roughy stocks
31, 32, 33, 34, 35	Great Australian Bight Orange Roughy Zones (East)	Closed to trawling methods to protect Orange Roughy stocks
36, 37, 38, 39, 40, 41	Upper-Slope Dogfish Closures	Closed to various fishing methods in each area to protect Southern Dogfish and Harrison’s Dogfish stocks
Closure Direction No. 5 2013		
Schedule No.	Closure Name	Reason for closure
1	Shark Hook and Gillnet Deepwater Closure	Restricts shark hook and gillnet fishers to waters shallower than 183m to avoid capture of large breeding School and Gummy Shark
2	Automatic Longline Shallow Water Closure	Restricts automatic longline fishers to waters deeper than 183m to minimize capture of School and Gummy Shark

Closure Direction No. 6 2013		
Schedule No.	Closure Name	Reason for closure
1	Western Deepwater Shark Closure	Closed to trawling methods to protect Deepwater Shark and Orange Roughy
Closure Direction No. 7 2013		
Schedule No.	Closure Name	Reason for closure
1	Gillnet Colony Closure	Closed to gillnet fishing to protect Australian Sea Lion colonies
Closure Direction 10 2013		
Schedule No.	Closure Name	Reason for closure
1	Dolphin Gillnet Closure	Closed to gillnetting to protect dolphin populations
Closure Direction 11 2013		Reason for closure
1	Flinders Research Zone	Amended Flinders research zone closure to all fishing methods

Appendix B

Commonwealth Trawl Sector

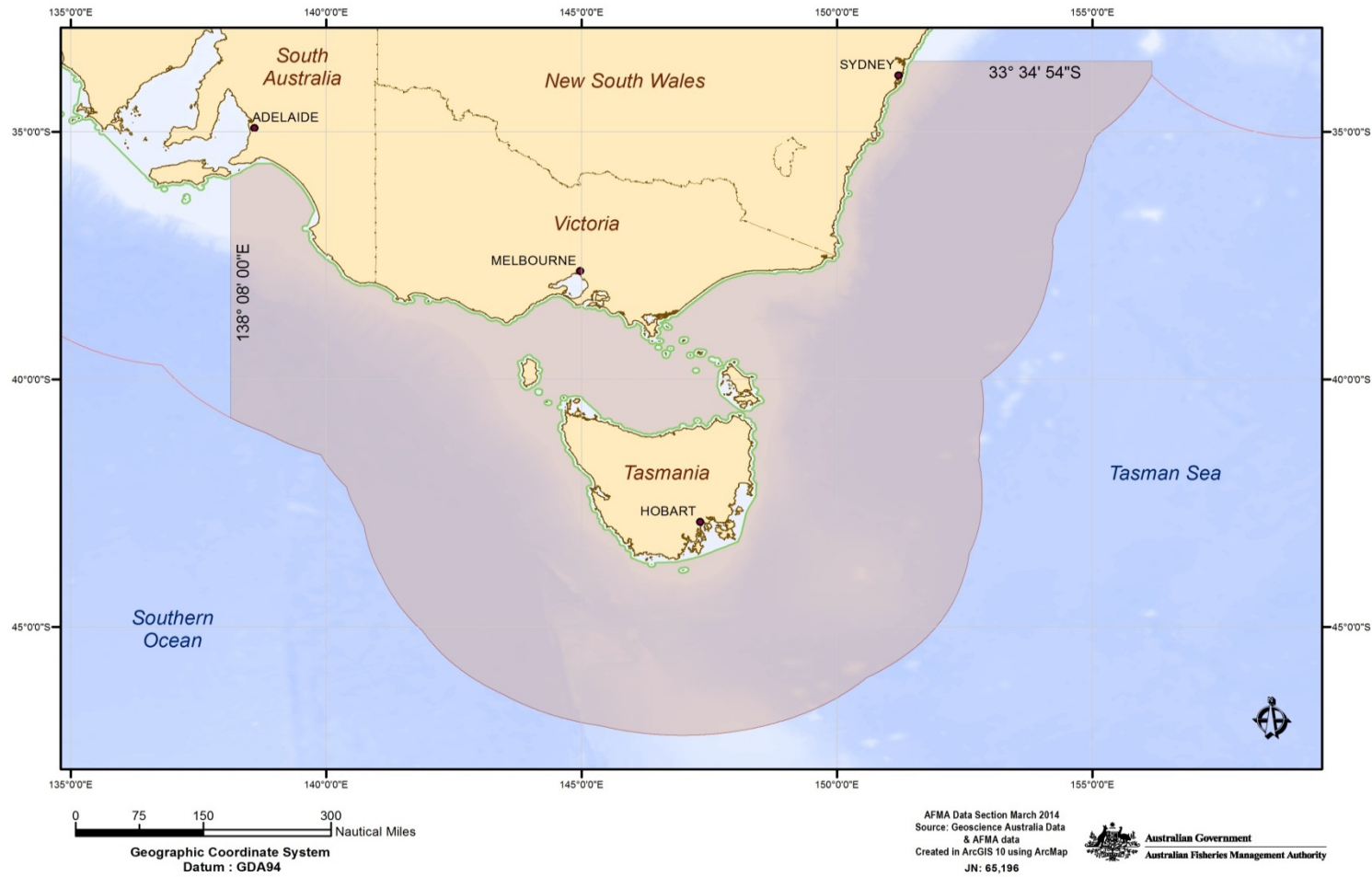


Figure B. 1 Map of Commonwealth Trawl Sector

Scalefish Hook Sector

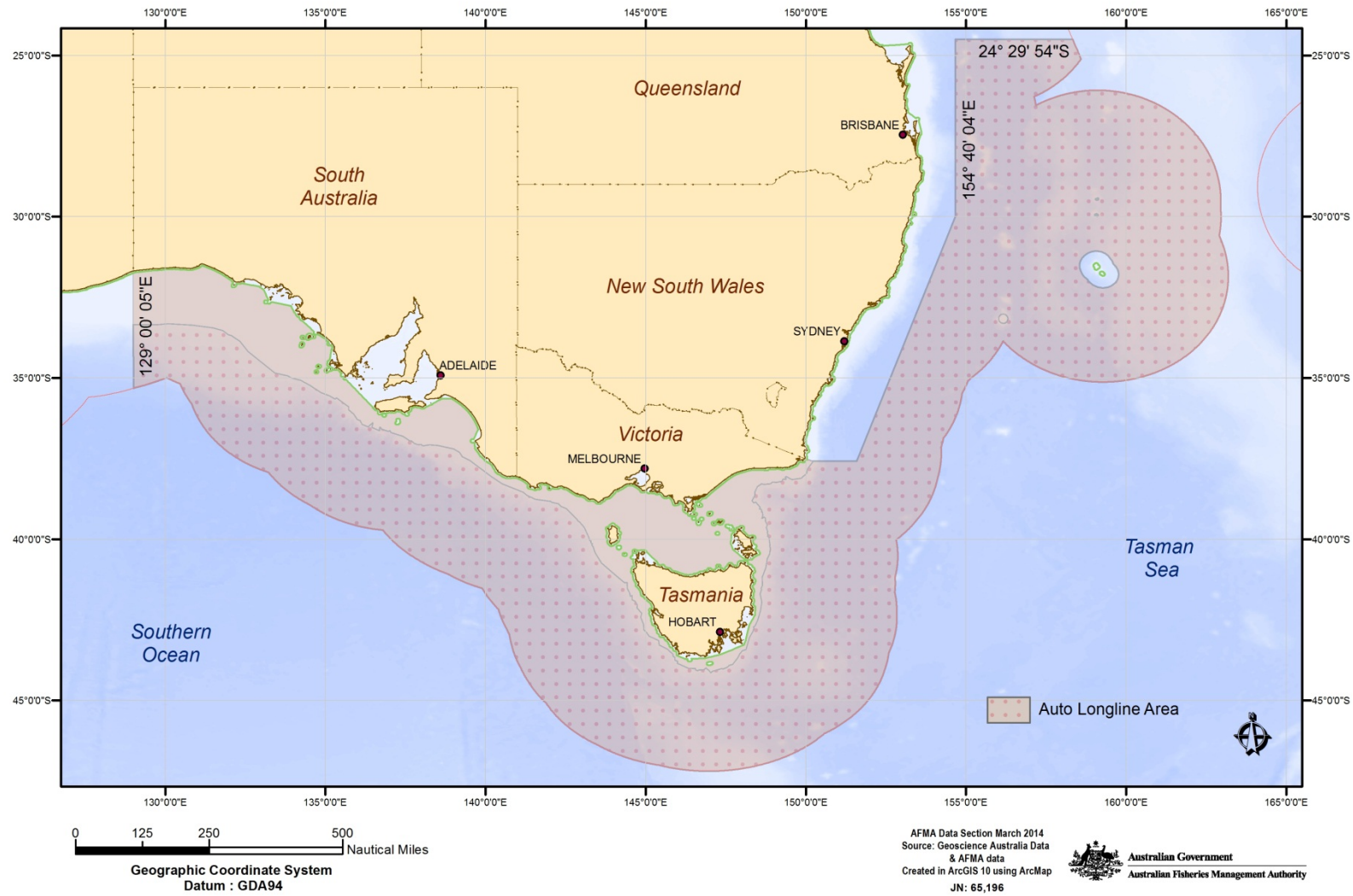


Figure B. 2 Map of Scalefish Hook Sector

Shark Hook and Gillnet Sector

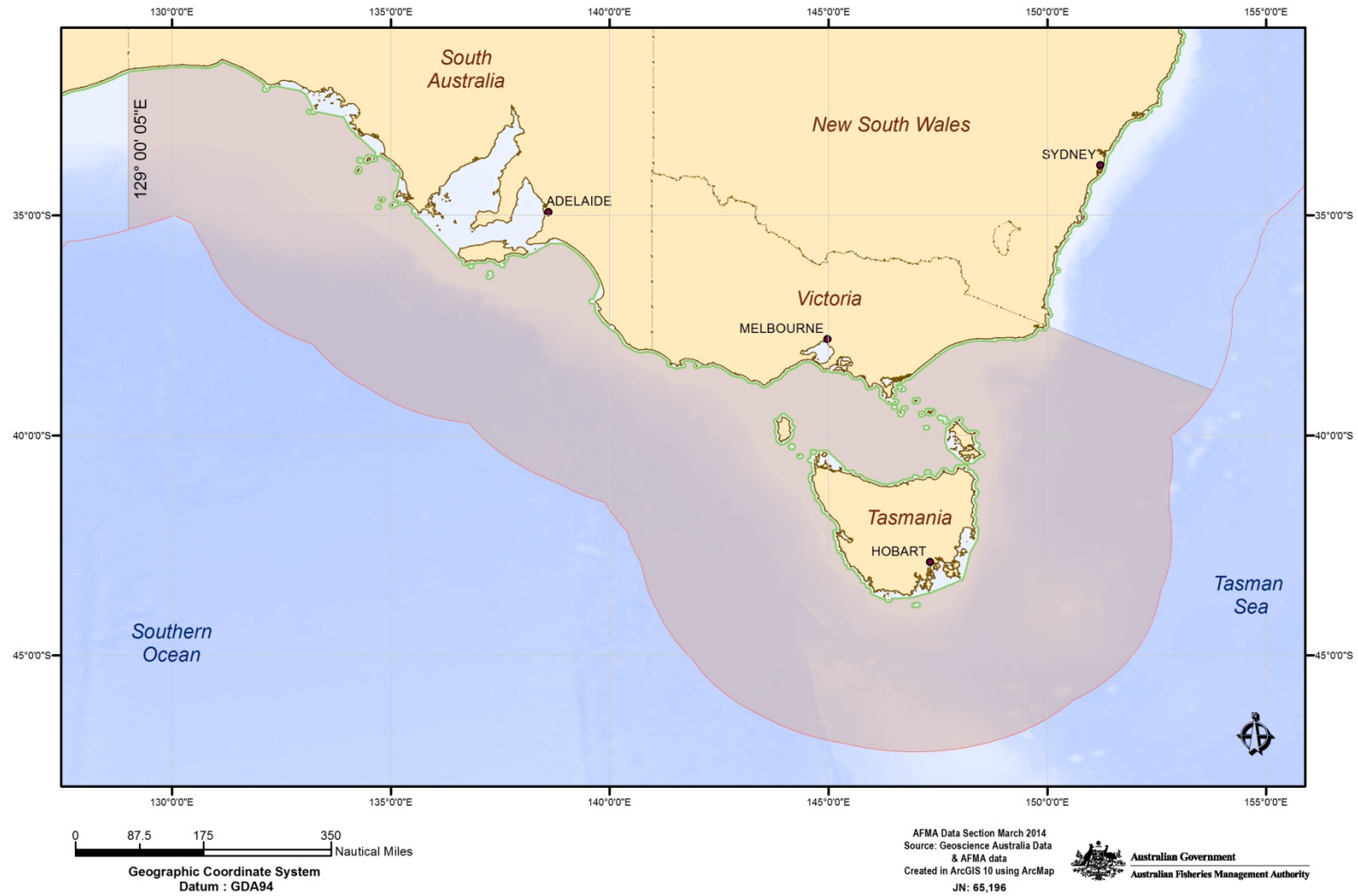


Figure B. 3 Map of Shark Hook and Gillnet Sector

Great Australian Bight Trawl Sector

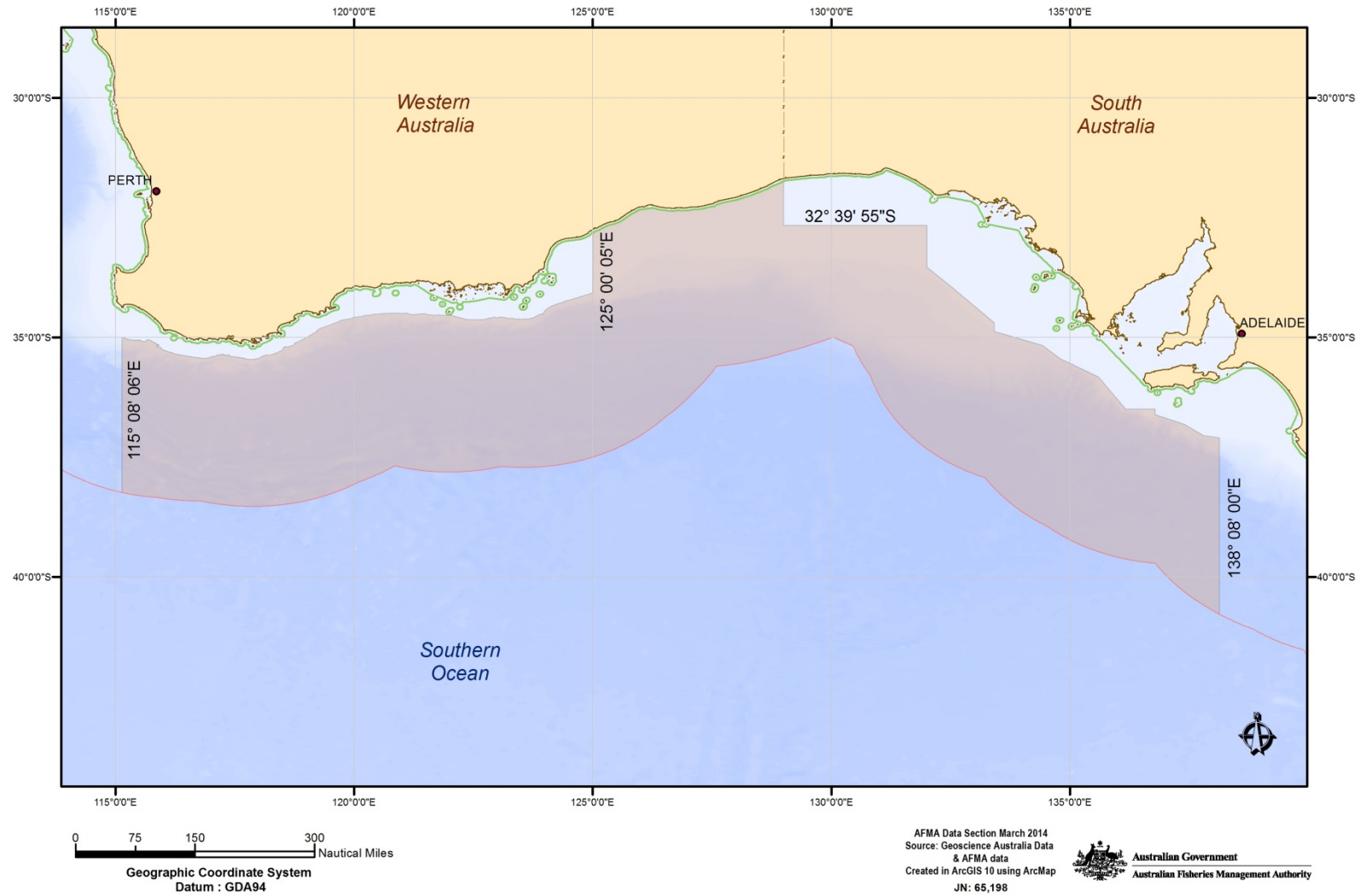


Figure B. 4 Map of Great Australian Bight Trawl Sector

Upper Slope Dogfish Closures

JN: 64,472

Indicative Map

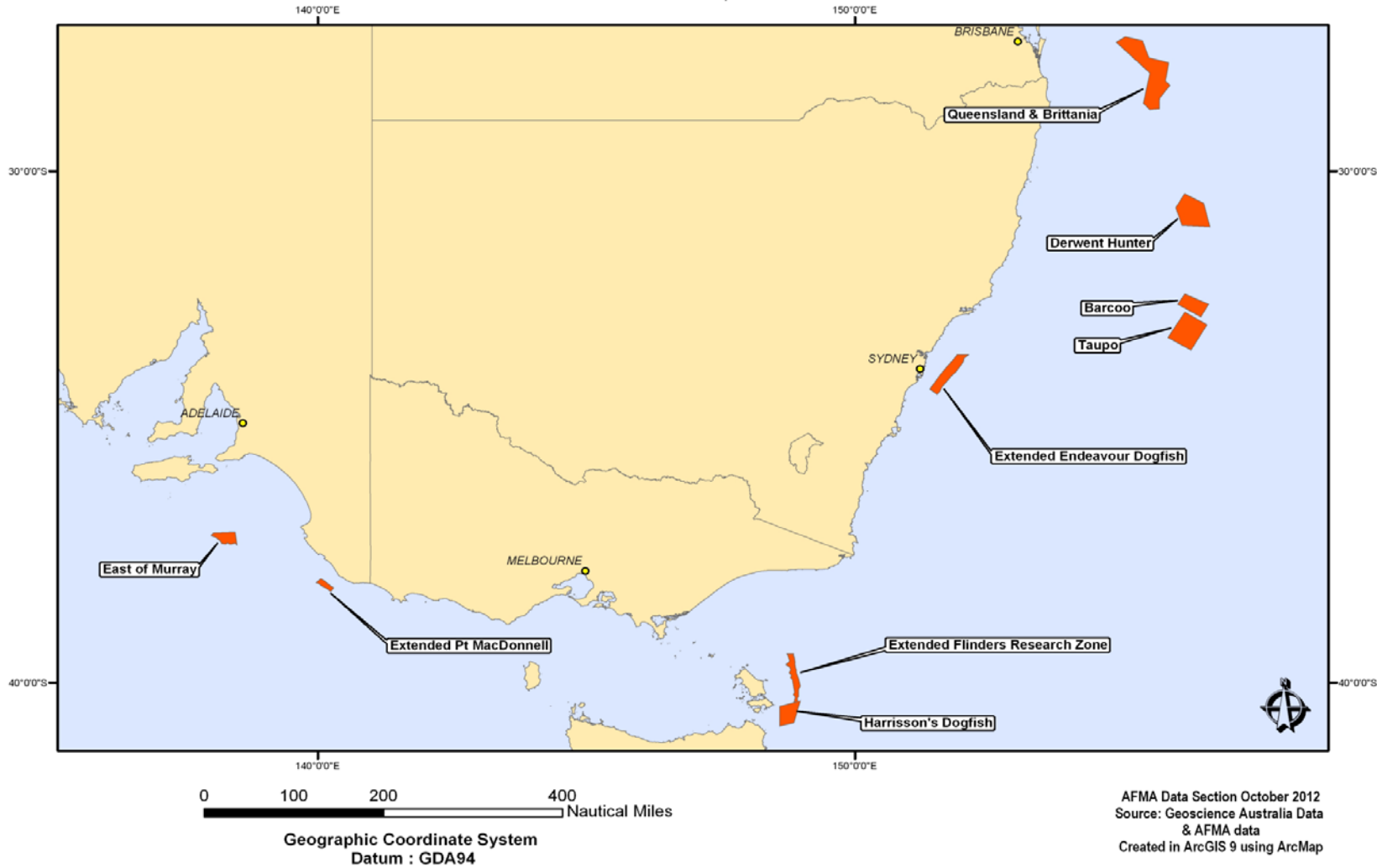


Figure B. 5 Map of all closures under the Upper Slope Dogfish Strategy

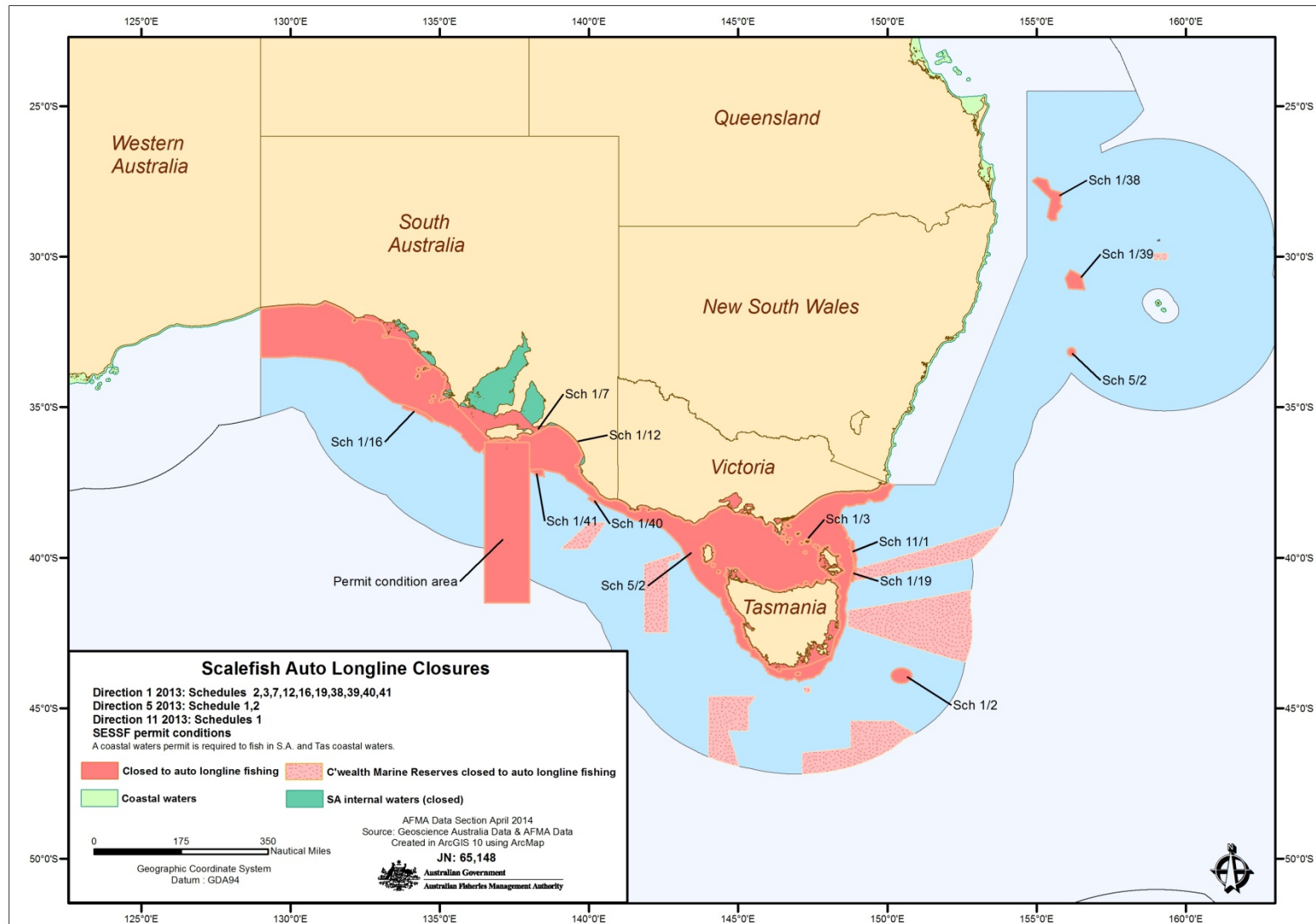


Figure B. 6 Automatic longline closures

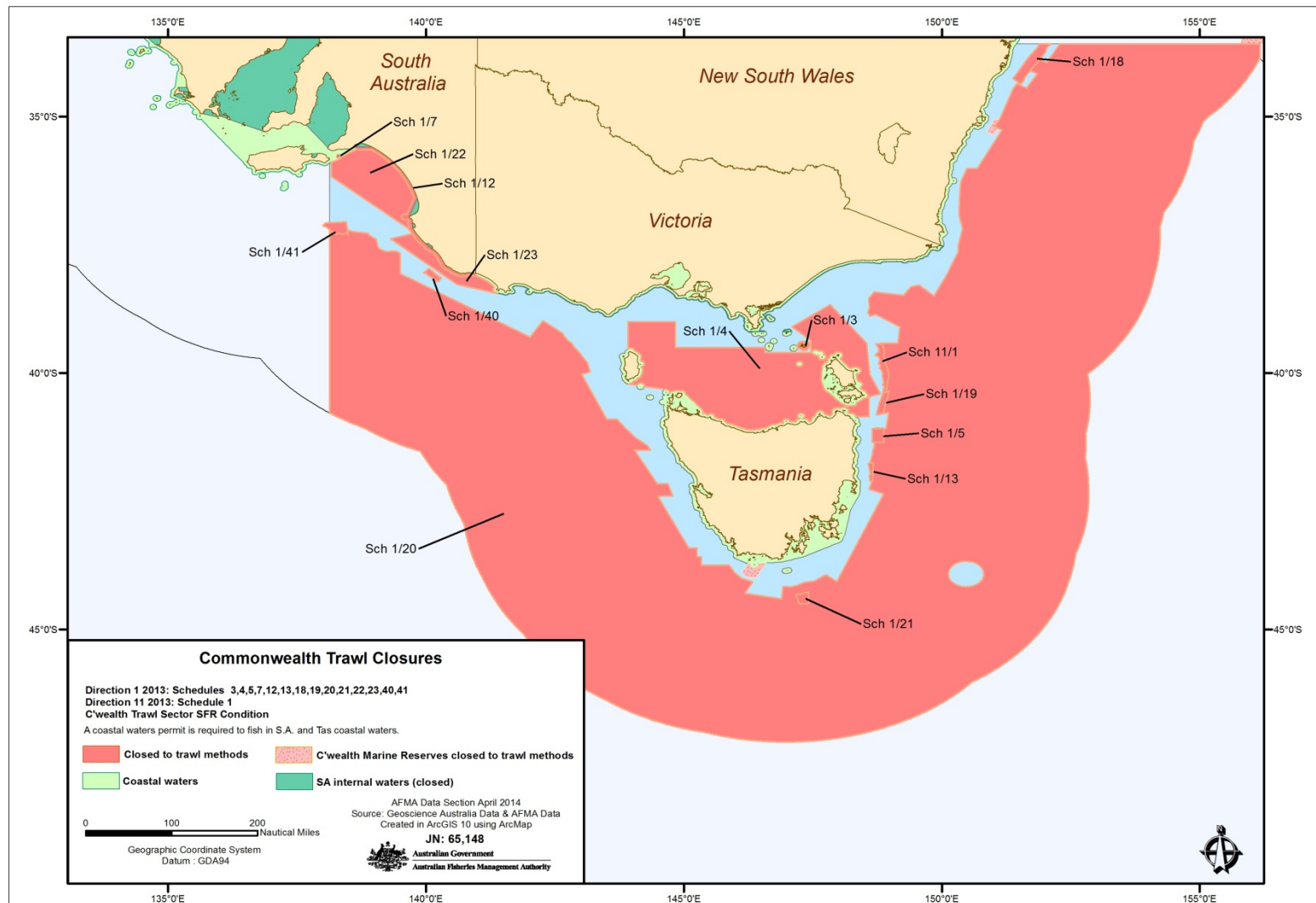


Figure B. 7 Commonwealth Trawl Closures

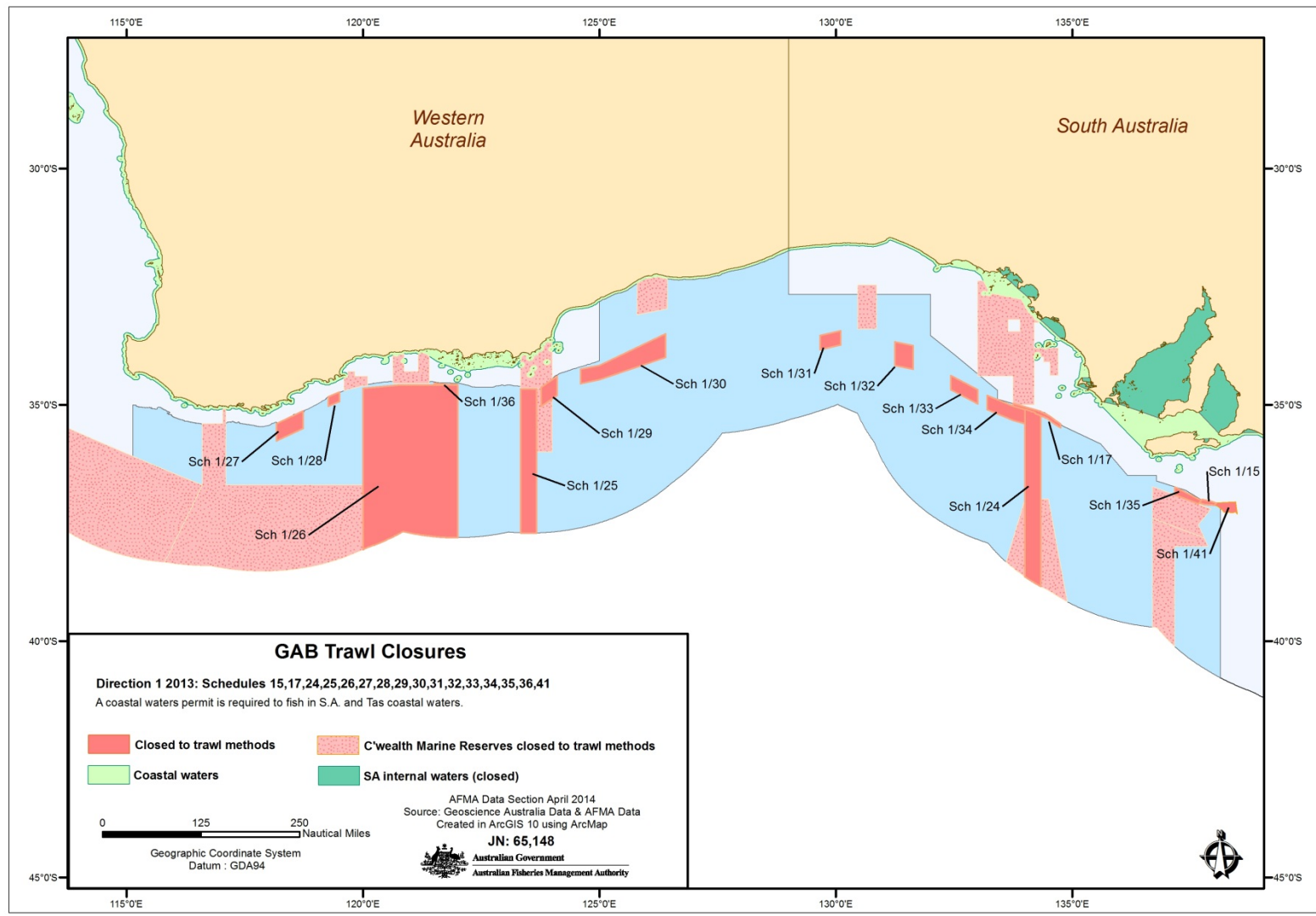


Figure B. 8 Great Australian Bight Trawl Closures

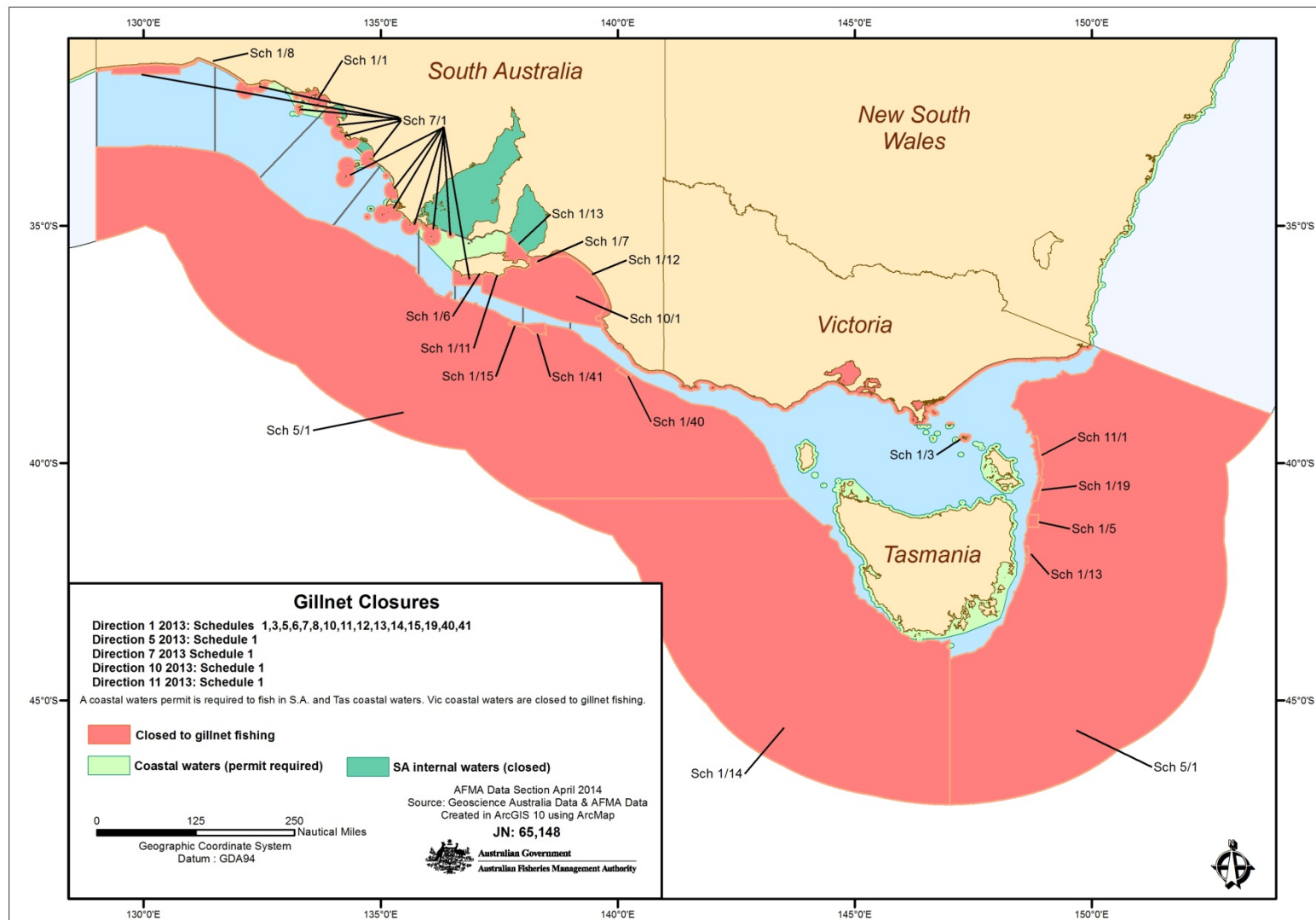


Figure B. 9 Shark Hook Closures

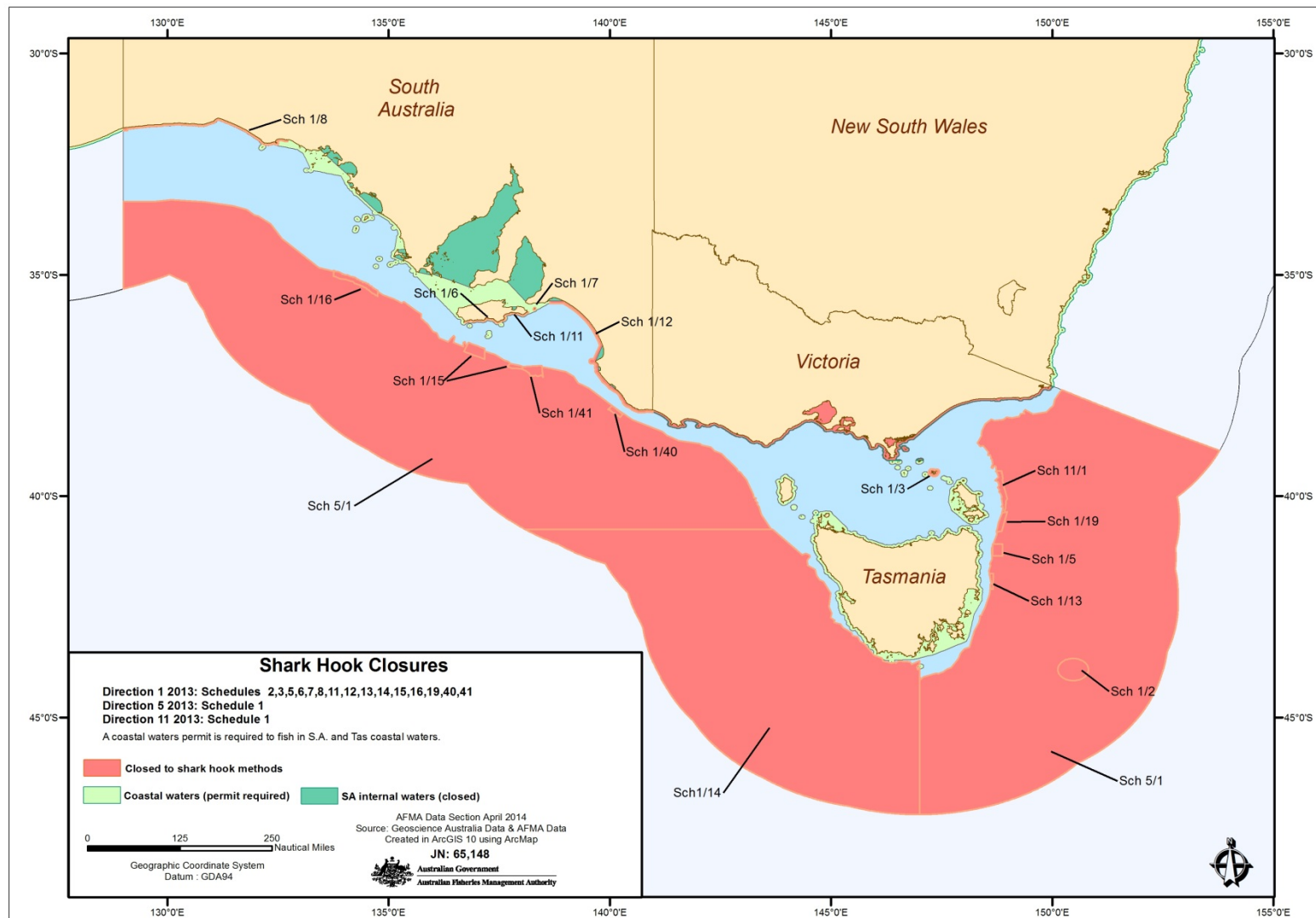


Figure B. 10 Shark Gillnet Closures

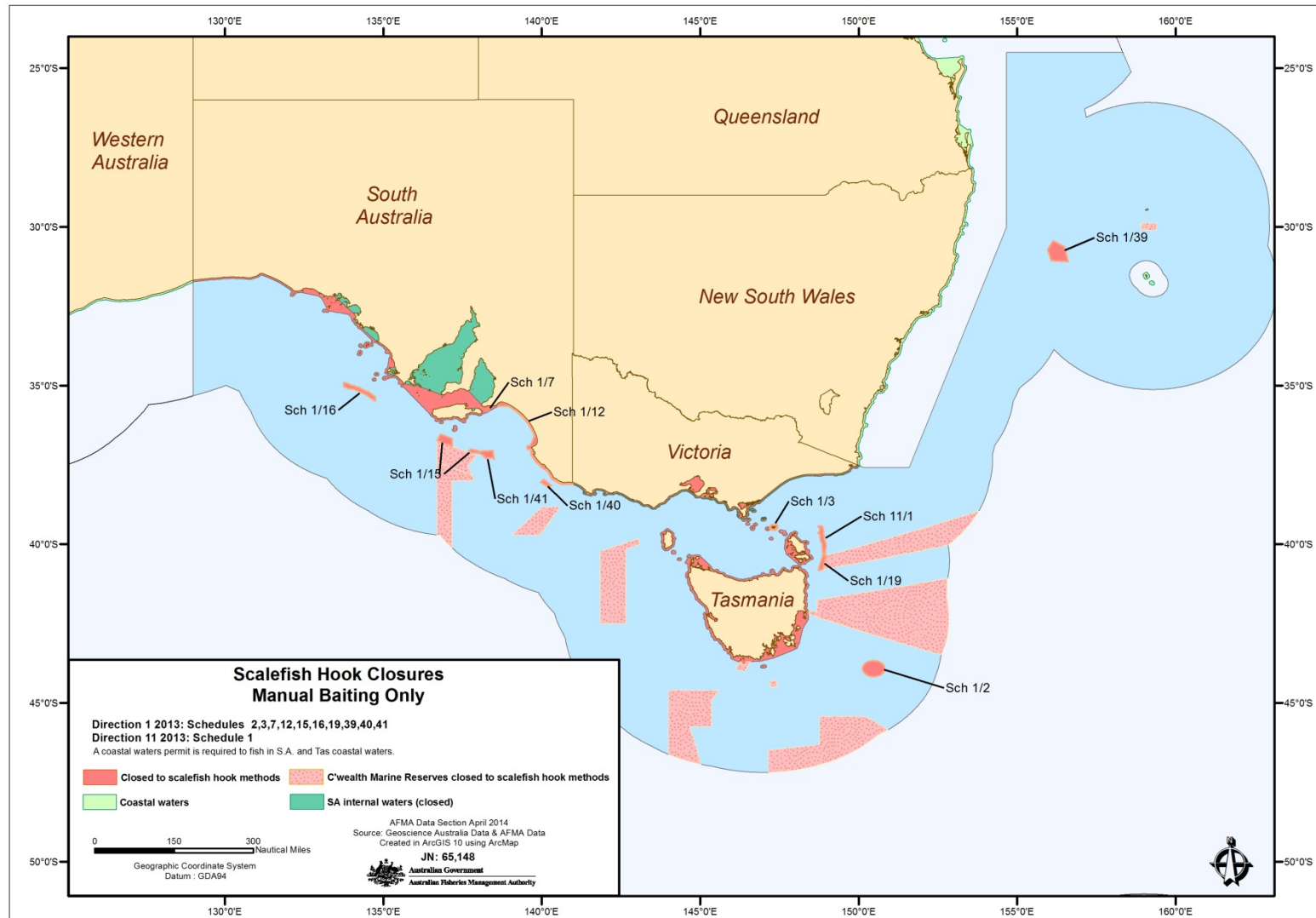


Figure B. 11 Scalefish Hook Closures

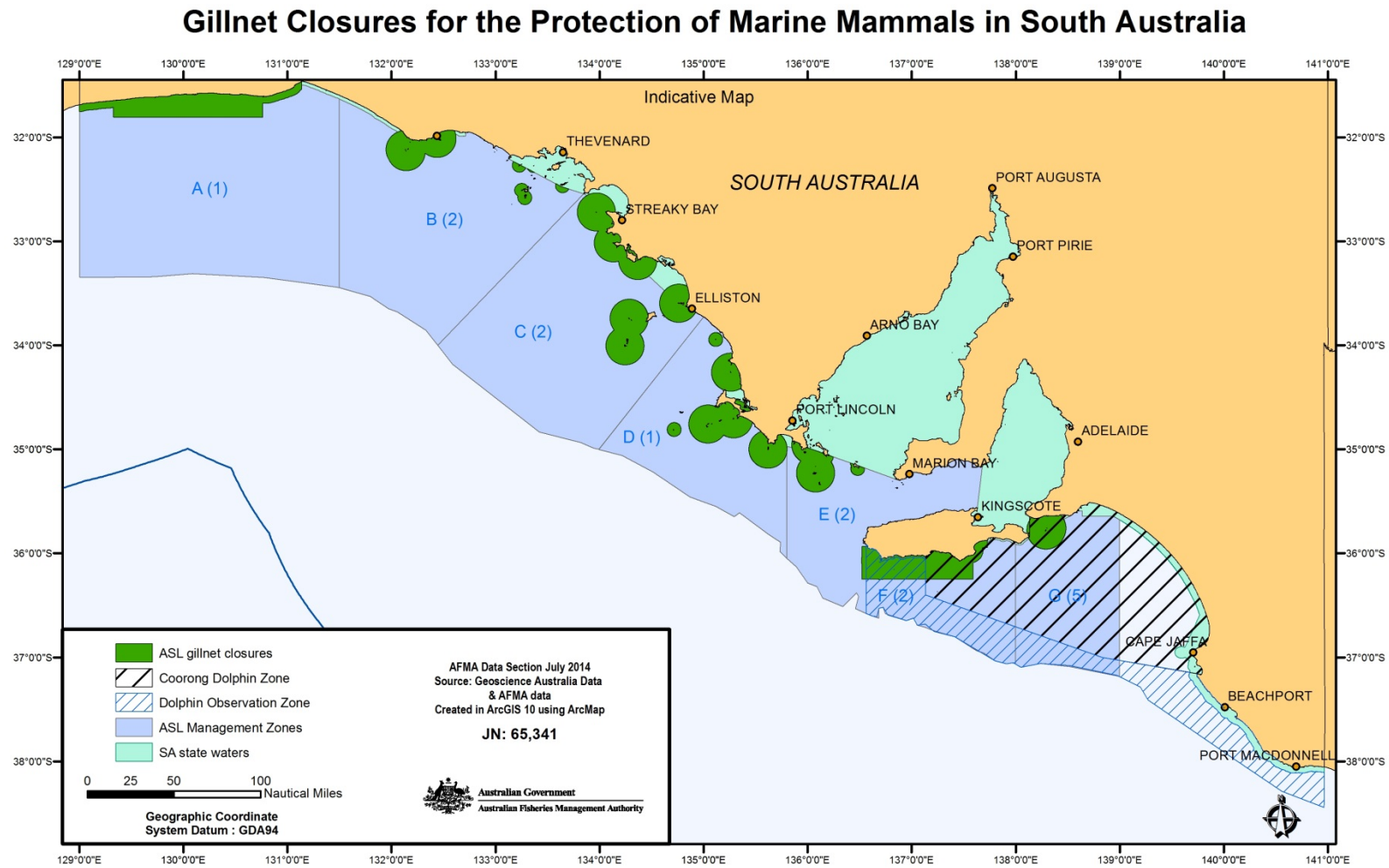


Figure B. 12 Map of all closures under the Australian Sea Lion Management Strategy