Australian Government

Department of Agriculture, Fisheries and Forestry

National Plan of Action for the Conservation and Management of Sharks 2012 Shark-plan 2

Images provided by:

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Foreword

Australian waters are home to a diverse and unique array of sharks, rays and related species, which are an important part of our aquatic biodiversity and ecosystems, and of some Australian fisheries. Australian governments are committed to the conservation and management of sharks and their long-term sustainable use. Australia's second *National Plan of Action for the Conservation and Management of Sharks 2012* (hereafter referred to as Shark-plan 2) will play a key role in achieving these goals. Shark-plan 2 builds on the lessons learned from Australia's 2004 *National Plan of Action for the Conservation and Management of Sharks* recognising its achievements and also identifying areas where improvements are still needed.

Shark-plan 2 provides an updated assessment of the conservation and management issues concerning sharks in Australian waters and identifies the research and management actions across Australia's state, territory and Commonwealth jurisdictions that will be pursued over the life of the plan (to be reviewed within four years of implementation).

Management actions focus mainly on fisheries activities, where Shark-plan 2 can have the most influence and impact. Australia's approach to conserving and managing sharks should be guided by the principles of ecologically sustainable development, with an emphasis on applying a precautionary approach in the absence of comprehensive information. A better understanding of Australia's trade in shark products will also help to guarantee the long-term sustainability of Australian shark populations. Improved shark-handling procedures may help to minimise the undesirable impacts of fishing on sharks.

Research actions remain fundamental to an improved understanding of shark biology, ecology, and population status, and to assessing the impact of human activities on sharks. While our information base has improved, our ability to address many shark conservation and management issues is still constrained by the quality of data on shark catch and effort. Shark-plan 2 calls for continued improvement in the identification of shark species caught, coordination of research and sharing of information. A more consistent approach to identifying and quantifying risks relating to shark conservation and management would result in better communication among government agencies and with the public, and better-informed decision-making.

Australia is a world leader in the ecologically sustainable management and use of natural resources. Shark-plan 2 provides a framework for the long-term conservation of Australia's shark populations, and for guiding the industries and communities that affect them.

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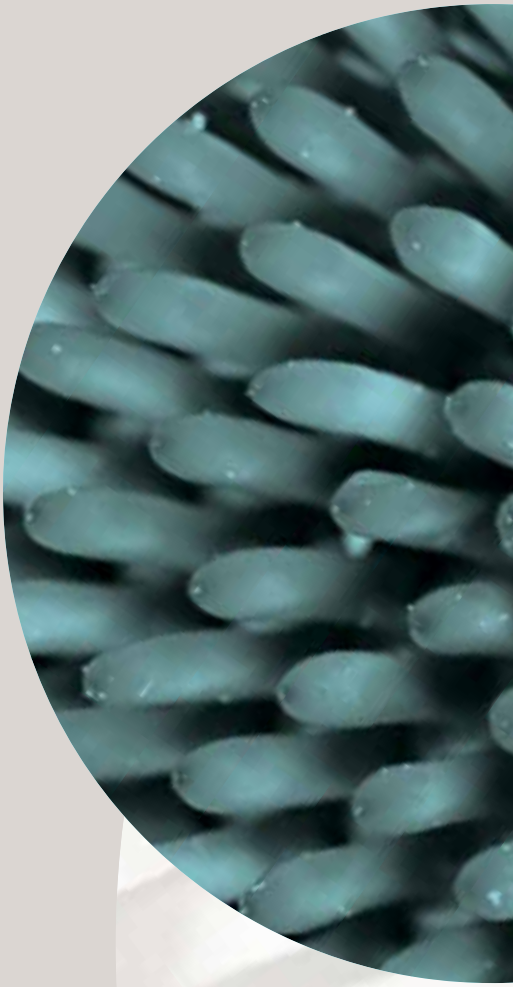
Explore the possibilities



Contents

Abbreviations

ABS	Australian Bureau of Statistics
AFMA	Australian Fisheries Management Authority
AQIS	Australian Quarantine and Inspection Service
CITES	Convention on International Trade in Endangered Species
CMS	Convention on Migratory Species
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	The Department of Agriculture, Fisheries and Forestry
EPBC	The Environment, Protection and Biodiversity Conservation Act
ERAEF	Ecological Risk Assessment for the Effects of Fishing
ESD	Ecologically Sustainable Development
FAO	United Nations Food and Agriculture Organisation
FRDC	Fisheries Research and Development Corporation
IPOA	International Plan of Action
MERI	Natural Resource Management Monitoring, Evaluation, Reporting and Improvement Framework
NGO	Non-Government Organisation
NPOA	National Plan of Action
NRM	Natural Resource Management
RFMO	Regional Fisheries Management Organisation
SAFE	Sustainability Assessment for Fishing Effects
SAR	Shark Assessment Report
SIRC	Shark-plan Implementation and Review Committee

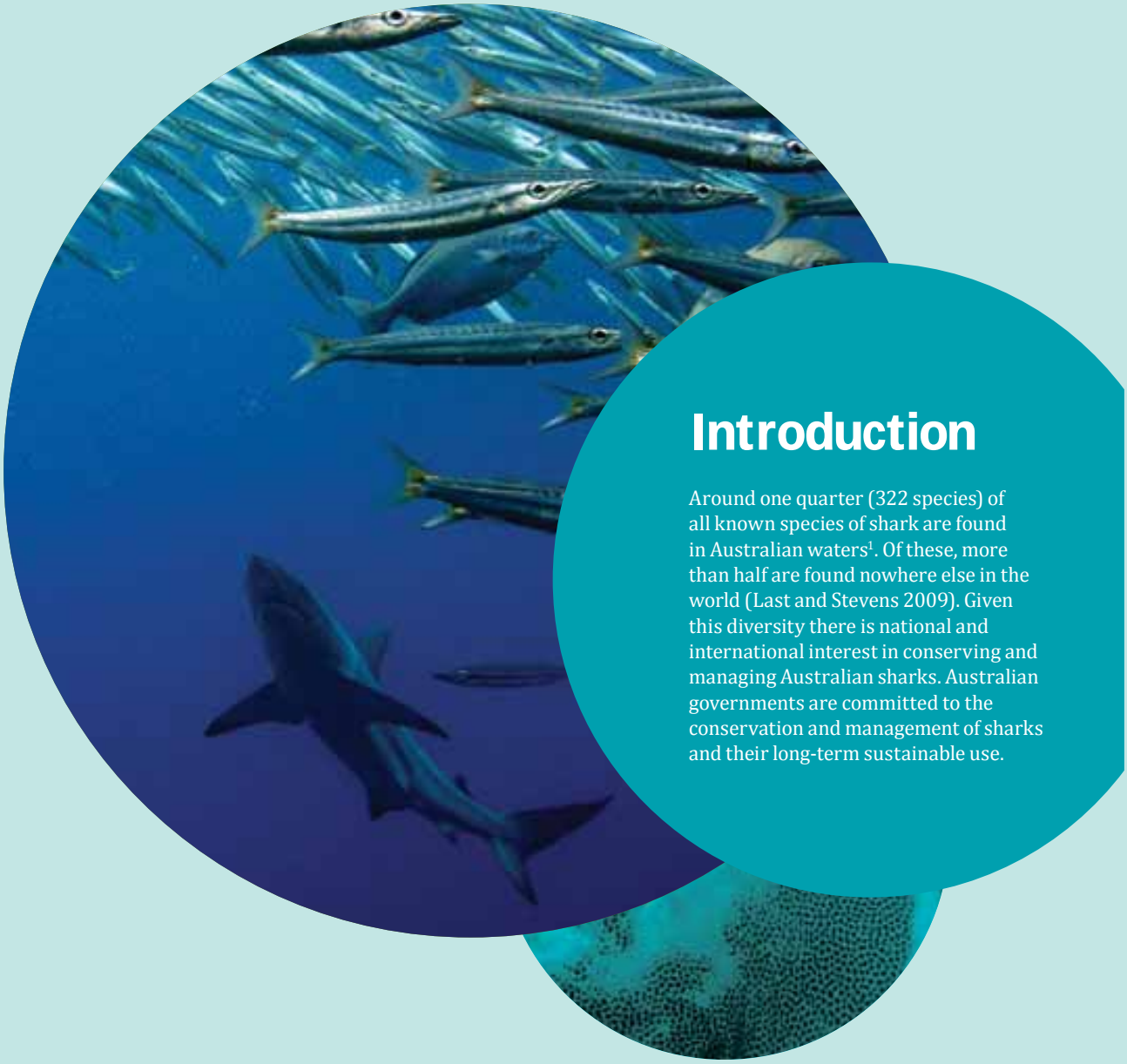
Glossary

Customs – Australian Customs and Border Protection Service.

Jurisdiction – a collective term to describe the Commonwealth and state/territory governments and their agencies.

Commonwealth – Australian Government.

Precautionary Approach – Knowing that our knowledge is limited, we should apply the precautionary principle while employing adaptive management approaches using new science and practical experience. The precautionary principle is that lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there are threats of serious or irreversible environmental damage (Natural Resource Management Ministerial Council 2010).



Introduction

Around one quarter (322 species) of all known species of shark are found in Australian waters[1]. Of these, more than half are found nowhere else in the world (Last and Stevens 2009). Given this diversity there is national and international interest in conserving and managing Australian sharks. Australian governments are committed to the conservation and management of sharks and their long-term sustainable use.

Fishing is one of the main human activities that interact with sharks. Some fisheries target shark species, while others catch them incidentally while targeting other species. There is global concern that high levels of shark catch are affecting shark species in several areas of the world's oceans (FAO 1999; Clarke 2009). In general, sharks are more vulnerable to fisheries impacts than bony fish, as they tend to be slow-growing, mature at a later age and have few young (Last and Stevens 1994). Some shark species also have naturally small population sizes, which makes them especially vulnerable. These characteristics mean that, in the absence of scientific advice, a precautionary approach to managing fisheries and other human impacts on sharks is necessary (FAO 2000).

Fisheries management in Australia is generally of a high standard (Pitcher et al. 2009). For the small number of shark species that are targeted by fisheries there are formal fisheries management arrangements, complemented by monitoring and research. However, a large part of the Australian shark catch is incidental (non-target)—being either kept and sold (byproduct) or discarded (bycatch). For these components of the catch there is generally less known about the species' biology or the full extent of the catch.

1. The term 'shark' refers to all species of shark, skates, rays and chimaeras (Class Chondrichthyes) unless otherwise specified.

In 1999, member countries of the Food and Agriculture Organisation of the United Nations (FAO) developed the International Plan of Action for the Conservation and Management of Sharks (IPOA–Sharks) (FAO 1999) in recognition of the expanding global catch of sharks and the potential negative impacts on shark populations. The IPOA–Sharks is a voluntary international instrument developed for member nations to take positive action to ensure the conservation and management of sharks, and their long-term sustainable use. The IPOA–Sharks suggests that members develop a National Plan of Action if their vessels conduct targeted fishing for sharks or if they regularly catch sharks in fisheries targeting other species.

The following is an extract from the IPOA Sharks:

The IPOA-Sharks (FAO 1999) has the objective, 'to ensure the conservation and management of sharks and their long-term sustainable use' and prescribes the following aims:

- Ensure that shark catches from directed and non-directed fisheries are sustainable.
- Assess threats to shark populations, determine and protect critical habitats and implement harvesting strategies consistent with the principles of biological sustainability and rational long-term economic use.
- Identify and provide special attention, in particular to vulnerable or threatened shark stocks.
- Improve and develop frameworks for establishing and coordinating effective consultation involving all stakeholders in research, management and educational initiatives within and between States.
- Minimise unutilised incidental catches of sharks.
- Contribute to the protection of biodiversity and ecosystem structure and function.
- Minimise waste and discards from shark catches in accordance with article 7.2.2.(g) of the *Code of Conduct for Responsible Fisheries* (for example, requiring the retention of sharks from which fins are removed).
- Encourage full use of dead sharks.
- Facilitate improved species-specific catch and landings data and monitoring of shark catches.
- Facilitate the identification and reporting of species-specific biological and trade data.

Australia has been supportive of the IPOA-Sharks and proactive in developing its own National Plan of Action (hereafter called the Shark-plan). As a member of the United Nations FAO, Australia published its first *National Plan of Action for the Conservation and Management of Sharks* (Shark-plan 1) in 2004 (DAFF 2004). This document represents Australia's second iteration of this initiative, following Shark-plan 1. Shark-plan 1 was based on the first Shark Assessment Report (hereafter SAR1), published in 2001, which identified issues for the management of sharks and rays in Australian waters.

Shark-plan provides guidance to fisheries and conservation managers and the public to improve conservation and management of sharks, and details actions to encourage the effective and sustainable management of Australia's shark populations. Shark-plan relies on the FAO's technical guidelines for the conservation and management of sharks (FAO 2000) and encourages those responsible for implementing actions under the plan to consider this framework. Efforts have been made to address the objectives of IPOA-Sharks throughout Shark-plan 2, while acknowledging national and emerging priorities in Australia.

Development of Shark-plan 2

The IPOA-Sharks (FAO 1999) directs member states that implement a Shark-plan to assess its implementation at least every four years, in order to identify strategies for increasing the effectiveness of the plan. In 2008, the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) instigated a performance review of Shark-plan 1 in collaboration with the Shark-plan Implementation and Review Committee (SIRC). The *Review of Australia's 2004 National Plan of Action for the Conservation and Management of Sharks: Final report to the Department of Agriculture, Fisheries and Forestry* (Bodsworth et al. 2010) (hereafter called the Review) provides a comprehensive insight into the strengths and weaknesses of Shark-plan 1 and its implementation, and makes recommendations for consideration in the development of a new plan. At the same time, Australia's second Shark Assessment Report (Bensley et al. 2010) (hereafter SAR2) was published to support the review process. SAR2 and the Review are the primary documents that have been used in the formulation of Shark-plan 2.

Shark-plan 2 aims to coordinate action on shark conservation and management in Australia through existing fisheries management and conservation processes. It acknowledges the achievement of Australia's management jurisdictions over the life of Shark-plan 1 and sets the direction for shark conservation and management in the future.

This new plan, based on the objective and aims of IPOA-Sharks, builds on the conservation and management issues identified in Shark-plan 1 by prioritising these issues and identifying actions to address them.

Issues identified in Shark-plan 1

SAR1 identified 24 conservation and management issues for sharks in Australia. These were clarified and refined into 18 issues addressed in Shark-plan 1 (listed below). Given the significant investment of resources and expertise dedicated to the development of Shark-plan 1 (including SAR1), these issues form the basis for the development of Shark-plan 2. The Review and SAR2 were used to determine whether the issues identified by Shark-plan 1 remain relevant, to inform the prioritisation of issues and identify actions to be pursued.

Issue 1. Improved identification of shark species by all resource users.

Issue 2. Secure, accessible and validated data sets that record all catch data and are consistent over time with compatible resolution between jurisdictions over the full range of each species from all resource users.

Issue 3. Full utilisation of dead sharks and an improved understanding of the markets for and trade in shark products.

Issue 4. Coordination of shark research.

Issue 5. Continued effort to maintain and improve the standard of stock assessments for target shark species in dedicated shark fisheries.

Issue 6. Reliable assessments for bycatch and byproduct shark species.

Issue 7. Assessment of the adequacy of management for all shark species and more innovative approaches to dealing with identified shark management issues.

Issue 8. Improved understanding of the impacts of and, where required, implementation of better management for, recreational and game fishing.

Issue 9. Reduce cryptic fishing mortality of shark species.

Issue 10. Assessment of shark handling practices for the conservation and management of sharks.

Issue 11. Better understanding and, where necessary, recognition in management arrangements, of shark fishing by Indigenous people.

Issue 12. Risk assessments for all shark species from all impacts on those species.

Issue 13. Where necessary, develop strategies for the recovery of shark species and populations.

Issue 14. Reduce or, where necessary, eliminate shark bycatch.

Issue 15. Better understanding of the effects of shark fishing, control programs for bather protection and management practices on ecosystem structure and function.

Issue 16. Reduce the impact of environmental degradation on sharks.

Issue 17. More information on the impact on sharks of sound waves in the marine environment.

Issue 18. More information on the impact on sharks of electromagnetic fields, for example, high voltage electric cables and shark protection devices.

Recommendations from the review of Shark-plan 1

The Review evaluated the effectiveness of Shark-plan 1 against its stated objectives. The intention was that the findings would contribute to the development of Shark-plan 2. The Review used a systematic natural resource management (NRM) program evaluation methodology, referred to as the monitoring, evaluation, reporting and improvement (MERI) approach.

A review framework comprising targeted evaluation questions was used to assess the extent to which the objectives, issues, and actions defined in Shark-plan 1 had been addressed. Information was collected by reviewing the relevant literature, such as SAR2, conducting a series of regional stakeholder workshops and interviewing additional selected stakeholders.

Overall, the Review found that Shark-plan 1 had contributed to improved conservation and management outcomes for shark species occurring in Australian waters. However, it suggested that Shark-plan 1 had not been a major driver of these improvements. A number of stakeholders commented that fisheries' sustainability assessments under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) had been a major driver for commercial fisheries.

The Review found that considerable enhancements to management and supporting data systems were needed before fisheries taking sharks could be considered to fully comply with the *EPBC Act Guidelines for Ecologically Sustainable Management of Fisheries*.

Risk assessment methodologies were found to vary considerably among fisheries and jurisdictions. The Review notes:

> the nature and timing of management responses to risk assessment outcomes is also variable across jurisdictions, with reluctance in some cases to act on potential risks, or take a methodical approach to the mitigation of substantial risks for elasmobranch bycatch species. In many cases, except for higher value target species, there is little evidence that the effectiveness of shark focussed management responses has been assessed.

The Review found good examples of the precautionary approach being applied to address risks associated with sustainability. However, it also found examples where the precautionary approach was demonstrably not applied. Further, it found that ecosystem research had taken a back seat to more species-specific research activities such as understanding the impacts of exploitation rates on target species and/or higher-risk shark species.

Looking forward, the Review stated that Shark-plan 2 will benefit from more active engagement by all jurisdictions and greater clarity and accountability against Shark-plan outcomes. Resourcing for the implementation of actions, monitoring and evaluation will also be critical to the effectiveness of Shark-plan 2. The Review states that, for efficiency, Shark-plan 2 should link effectively with existing management strategies and build on proven initiatives that are already underway in the various jurisdictions. Determining an appropriate and low-cost NPOA performance management framework is important and warrants consideration.

The Review identified barriers to, and drivers for, the effectiveness of Shark-plan 1. It also made a number of recommendations for the development of Shark-plan 2 (listed below). Consult the Review (Bodsworth et al. 2010) for a full description of recommendations.

Group A: ecological sustainability

REV-A1. There is a need for greater use of the precautionary principle in the management of sharks, including non-target and high risk species.

REV-A2. The CSIRO/AFMA Ecological Risk Assessment approach (ERAEF, or SAFE), or the FRDC sponsored National ESD Risk Assessment approach for fisheries, are both well recognised risk assessment methods that can be scaled to suit fishery circumstances. Alternative methods that inform about fishery risks to ecological and/or ESD objectives to an equivalent standard are also available. The recent FRDC project *Development of national guidelines to improve the application of risk-based methods in the scope, implementation and interpretation of stock assessments for data poor species* (Scandol et al. 2009), also makes an important contribution.

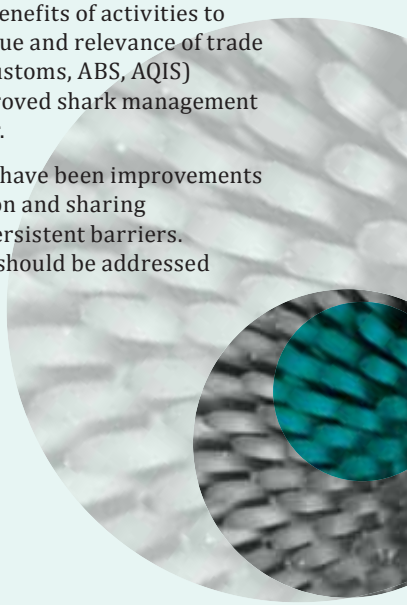
REV-A3. In the medium term (two to five years) fishery risk assessments and data sharing must evolve to the point where cumulative risks to vulnerable or high risk species are recognised and then addressed.

REV-A4. Credible and efficient fisheries risk assessments that can operate to species level where necessary, are a critically important tool for effective and efficient shark management at a range of spatial scales.

Group B: improved data and reporting

REV-B1. The costs and benefits of activities to improve the value and relevance of trade related data (Customs, ABS, AQIS) to support improved shark management need to be clear.

REV-B2. Although there have been improvements in data collection and sharing there remain persistent barriers. These barriers should be addressed systematically.



REV-B3. There is a need to understand how the timeliness and extension of shark related data/information to managers, researchers, and other key shark stakeholders like the public and environment NGOs, might be improved.

REV-B4. Noting some of the risks associated with heavy reliance on fishery dependent data, there should be greater adoption of carefully designed and targeted observer programs (or alternative independent monitoring strategies) to enable higher quality information on shark catch and the nature of fishing operations and impacts on sharks.

REV-B5. Strong examples of collaborative/ joint management, research initiatives, and/or policy instruments should be highlighted and supported, and used as models to drive improvements in these areas.

REV-B6. The ongoing constraints to obtaining better data and information on recreational, and to a lesser degree Indigenous shark catch (and the importance of sharks to Indigenous communities) require closer examination and more effective measures to address these gaps.

REV-B7. High quality risk assessments should be completed and implemented across all jurisdictions where they have not already been done.

Group C: engagement and empowerment

Coordination and priority setting

REV-C1. The Shark-plan could play a stronger role to coordinate shark research, particularly at a regional or national scale.

REV-C2. The Shark-plan could play a stronger role in helping to guide and prioritise national, multi-jurisdictional, and regional approaches to shark management, as well as on high-risk shark species.

REV-C3. Greater consideration should be given to the adequacy of funding for shark research, the advantages and disadvantages of having a national funding framework for shark research, and the potential for better understanding and alignment between the priorities of shark researchers and those of shark managers.

Regional capacity building

REV-C4. Australia should continue to engage strongly with relevant international and regional treaty arrangements (CITES, CMS), and push for the adoption of best practice shark management in RFMOs .

REV-C5. Species identification is still a major issue in Australian fisheries, and also throughout the region. Well considered and appropriate fisher education and engagement strategies will be fundamentally important in this regard. The current heavy reliance on high level and relatively bureaucratic bilateral and multilateral meetings will have limited impact on fisher behaviour in the region.

REV-C6. Improved consistency for anti-finning regulations in the jurisdictions may enable more effective regional negotiations on these issues.

REV-C7. More of a *bloc* approach to fisheries management and conservation initiatives in the Indian Ocean region may deliver improved shark conservation and management outcomes regionally.

REV-C8. A stronger more national focus for the Shark-plan is appropriate, particularly for more migratory and straddling shark stocks.

Governance

REV-C9. Provide the Shark-plan with more authority, credibility, and enable improved management and research coordination through a range of mechanisms.

REV-C10. The resourcing implications for implementation of actions and strategies, and performance monitoring for the Shark-plan need to be clearer.

Engagement, consultation and communications

REV-C11. The Shark-plan should include a well considered engagement strategy that can operate at a national, regional and jurisdictional level.

Group D: optimum use

REV-D1. A more complete understanding of the cumulative protection offered by the range of initiatives like marine parks, spatial closures, and large scale effort reductions would be valuable in determining the need for further protection of vulnerable and/or protected shark species.

REV-D2. The potential for the Shark-plan to contribute to broader community recognition of Australia's performance with regard to shark sustainability should be further considered.

REV-D3. The potential of trade related measures to reduce the risk of illegal shark finning should be investigated further, and barriers preventing a credible evaluation of the effectiveness of finning bans should be identified and addressed.

REV-D4. An evaluation of the need for further refinement of trade related shark catch data and processes associated with the collection, analysis, and use of these data should be considered.

Key findings of the second Shark Assessment Report (SAR2)

The second Shark Assessment Report (SAR2) builds upon the information provided in SAR1 and aims to identify substantial changes that have occurred in fisheries since the release of SAR1 and any new or ongoing concerns. SAR2 includes the presentation, and where possible, analysis of:

- resource information, including fishing methods, catch and effort data, and stock assessments
- conservation and management arrangements
- fisheries management arrangements, including regulatory frameworks.

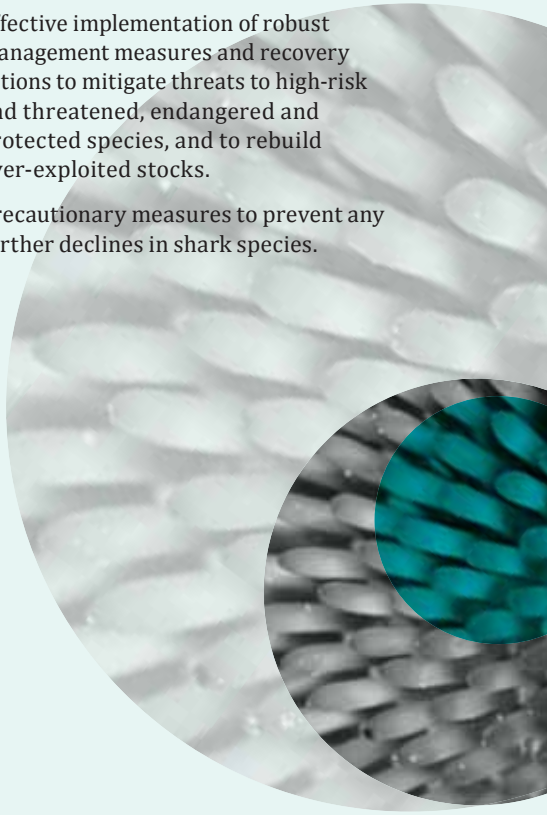
In summary, SAR2 found that, although it was evident that considerable work on shark conservation and management had been undertaken since SAR1, a range of issues were yet to be addressed.

It found that addressing many of the issues identified relied on the fundamental need for improvement in the quality of data on shark catch and effort. Significant data gaps and constraints to improving shark data collection and validation remain in all jurisdictions. SAR2 suggests that addressing these gaps and constraints is critical to ensuring significant progress in resolving shark conservation and management issues in the long term. As a priority in the short-term, there is a need for:

SAR2-1. Improved application of data verification methods (observer programs, targeted research and analysis, etc) in target and non-target shark fisheries.

SAR2-2. Effective implementation of robust management measures and recovery actions to mitigate threats to high-risk and threatened, endangered and protected species, and to rebuild over-exploited stocks.

SAR2-3. Precautionary measures to prevent any further declines in shark species.



SAR2 recommended that the development of actions to address these needs should be a priority for consideration during the development of Shark-plan 2. Addressing these issues would facilitate more rapid progress towards assessing a wider range of threats to Australian sharks and the ecosystem services that depend on them. SAR2 noted that, in the longer-term, there was a need to:

SAR2-4. Develop abundance or fishing mortality indices and conduct stock assessments for significant target and byproduct shark species.

SAR2-5. Ensure further and more consistent application of risk-based approaches to shark conservation and management.

SAR2-6. Assess the significance of cumulative fisheries and other impacts on high-risk species.

SAR2-7. Review the need for and, where necessary, the methods to obtain accurate market and trade data.

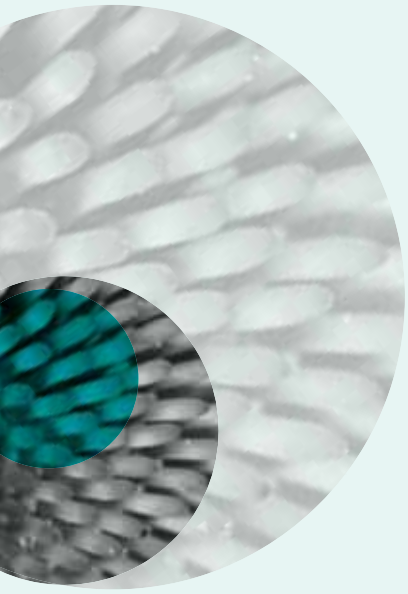
SAR2-8. Examine the need for improved management measures to reduce or restrict the targeting of sharks for the purpose of supplying shark fin to export markets.

SAR2-9. Support the development of more effective shark bycatch mitigation methods.

SAR2-10. Conduct assessments of the risk non-commercial fisheries pose to sharks.

SAR2-11. Continue to encourage the effective monitoring and management of the harvest and bycatch of pelagic shark species on the high seas.

SAR2-12. Assess the sustainability of imported shark products.



From recommendations to issues

The recommendations from the Review and the key findings of SAR2 have been used to determine whether the issues identified by Shark-plan 1 remain relevant for consideration in Shark-plan 2.

The Review and SAR2 were also considered for the identification of any new issues not identified by Shark-plan 1. In general, the conservation and management issues for sharks in Australia remain similar to those detailed in Shark-plan 1. Where problems with implementation or effectiveness were raised by the Review or SAR2, these have been addressed in Shark-plan 2 through associated actions and/or through the implementation, monitoring, and evaluation section. Shark-plan 2 has fewer actions than Shark-plan 1, and a greater emphasis is placed on the application of the precautionary approach within actions.

Shark-plan 1 provides a detailed description of how the individual issues relate to the overarching objective of the IPOA, so this has not been repeated here.

Table 1 presents the issues identified in Shark-plan 1 and the corresponding recommendations from the Review and findings from SAR2. An assessment is made of the relevance of the issue to Shark-plan 2.

Table 1: Issues identified in Shark-plan 1, recommendations from the Review, findings from SAR2 and the relevance of issues to the development of Shark-plan 2.

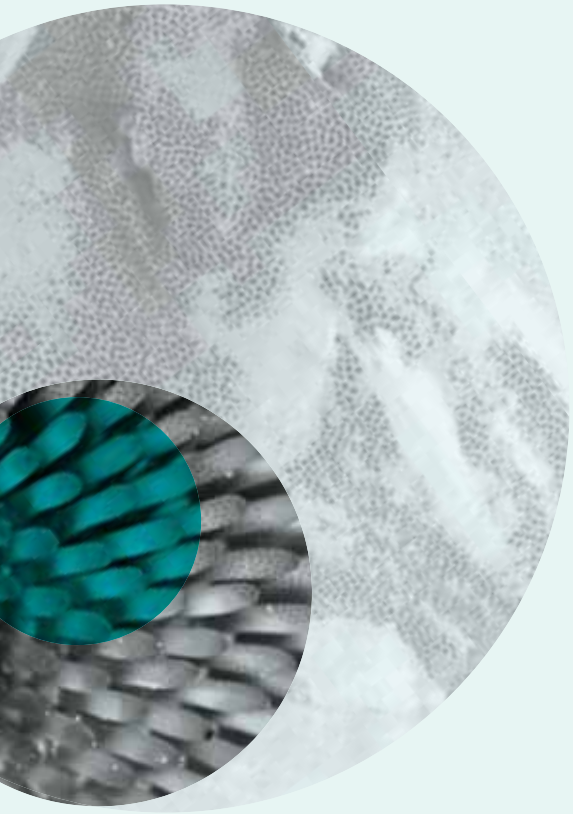
Issues for shark conservation and management identified in Shark-plan 1		Recommendations from the Review and findings from SAR2	Relevant to Shark-plan 2 (Yes/No)
Issue 1.	Improved identification of shark species by all resource users	The Review found that well considered and appropriate fisher education is fundamental to species identification, domestically and regionally (REV-C5). While not included in the list of key findings of SAR2, issues of species identification and the grouping of species under the one category in catch data are discussed in SAR2.	Yes
Issue 2.	Secure, accessible and validated data sets that record all catch data and are consistent over time with compatible resolution between jurisdictions over the full range of each species from all resource users	Improvements to data collection, validation, storage and sharing are addressed a number of times in the recommendations of the Review (REV-B1–REV-B6). The need to improve data collection is discussed as a key issue for effective conservation and management of sharks in Australia. Species identification, grouping of species in catch data and differences in catch reporting systems between jurisdictions are highlighted in SAR2 as key issues. The relatively poor quality of byproduct and bycatch reporting is also discussed. Improved data verification methods were identified as a key issue in SAR2-1. Importantly, SAR2 also notes that a lack of focus on data collection for sharks in the past now limits the scope for quantitative assessment for the majority of shark species.	Yes
Issue 3.	Full utilisation of dead sharks and an improved understanding of the markets for and trade in shark products	Improved anti-finning regulations and the use of trade-related mechanisms were identified by the Review (REV-C3, REV-D3 & REV-D4) as areas for consideration in the development of Shark-plan 2. Further clarity concerning the costs and benefits of improved trade-related data was also recommended (REV-B1). Review of the need for more accurate market and trade data was identified as a key finding in SAR2-7. Further investigation into the need for improved management measures to reduce or restrict targeting of sharks for fin markets was identified in SAR2-8.	Yes
Issue 4.	Coordination of shark research	Recommendations REV-B5, REV-C1, REV-C3 and REV-C9 from the Review covered several aspects of shark research. Examples include the need for strong collaborative research initiatives at a national level and the adequacy of resourcing. *Shark futures*[2] was also discussed in the Review. SAR2 discusses the need for targeted research and analysis in fisheries that interact with sharks, particularly to improve data verification. Also discussed is the need for research to improve survival rates of released sharks and to improve the benefits of tag-and-release studies.	Yes
Issue 5.	Continued effort to maintain and improve the standard of stock assessments for target shark species in dedicated shark fisheries	Although discussed in the Review, maintenance or improvements to stock assessments are not explicitly mentioned in the recommendations. The need for abundance indices and stock assessments are identified as an area for further development (in the longer term) for target and byproduct species (SAR2-4).	Yes
Issue 6.	Reliable assessments for bycatch and byproduct shark species	As per issue 5.	Yes
Issue 7.	Assessment of the adequacy of management for all shark species and more innovative approaches to dealing with identified shark management issues	Not explicitly covered in either the Review or SAR2. An assessment of the adequacy of management of shark species is undertaken to some extent through the completion of Shark Assessment Reports, as per the guidelines in the IPOA.	Yes

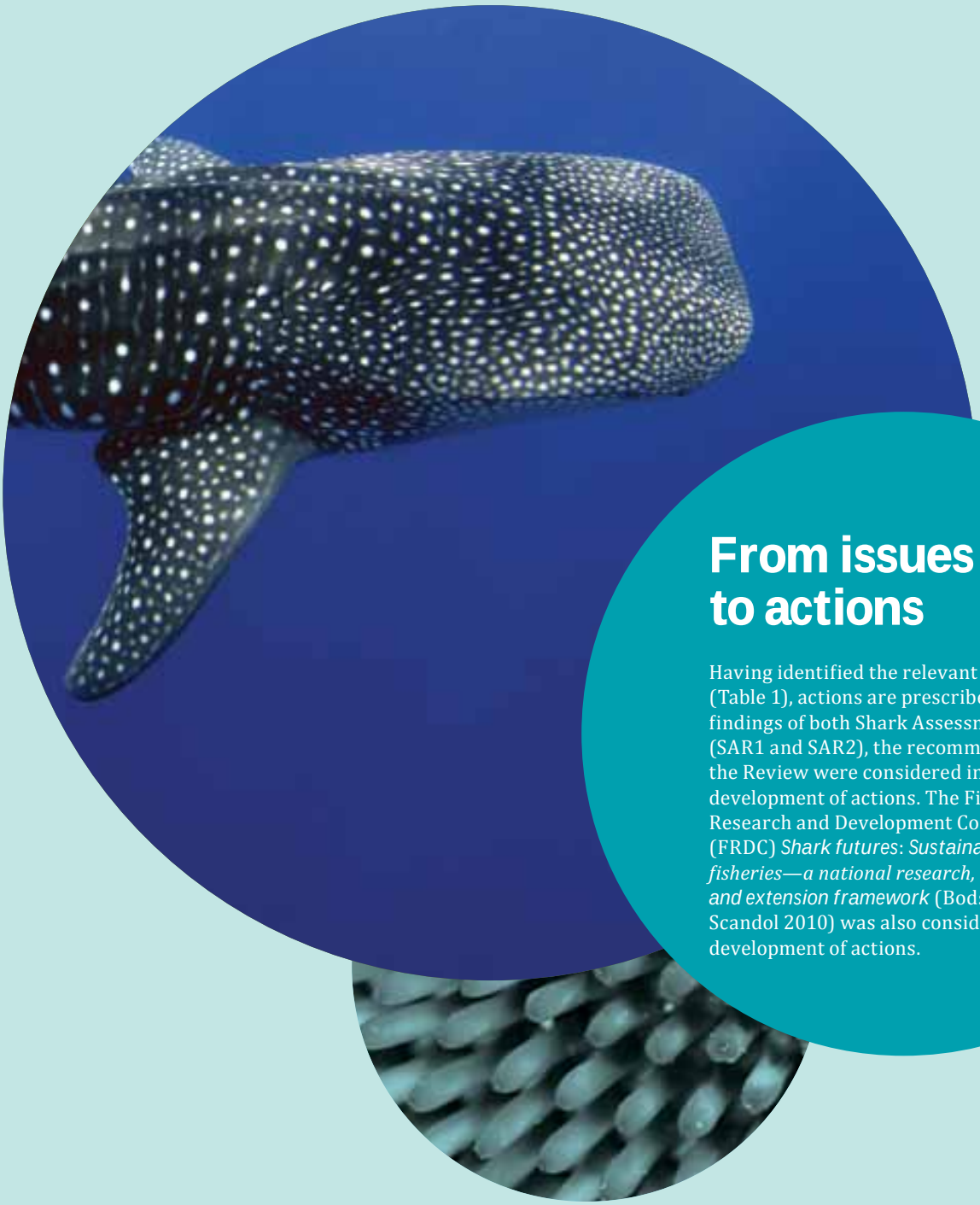
2. *Shark futures: Sustainable shark fisheries—A national research, development and extension framework*. Fisheries Research and Development Corporation (FRDC) project 2009–088.

Issues for shark conservation and management identified in Shark-plan 1		Recommendations from the Review and findings from SAR2	Relevant to Shark-plan 2 (Yes/No)
Issue 8.	Improved understanding of the impacts of and, where required, implementation of better management for, recreational and game fishing	While this issue is discussed in the Review, it is not explicitly mentioned in the recommendations. Assessment of the impacts of non-commercial fishing on sharks is discussed in SAR2-10. Data collection and verification are also addressed in SAR2. Understanding the impact of non-commercial fishing activities on sharks remains an important conservation and management issue for Shark-plan 2.	Yes
Issue 9.	Reduce cryptic fishing mortality[3] of shark species	This issue is discussed in the Review, but not explicitly mentioned in the list of recommendations. While cryptic mortality is not explicitly covered in SAR2's key findings, SAR2 does discuss the high degree of uncertainty about post-release survival. The development of more effective shark bycatch mitigation methods is discussed in SAR2-9.	Yes
Issue 10.	An assessment of shark handling practices for the conservation and management of sharks	While this issue is discussed in the Review and SAR2, it is not explicitly mentioned in the key findings or recommendations of either publication. However, development of more effective shark bycatch mitigation methods is discussed under SAR2-9. Effective handling practices are highlighted as one of the primary tools at the disposal of managers in the *Chondrichthyan guide for fisheries managers* (Patterson and Tudman, 2009). While refinement of shark-handling practices is prescribed in this reference, there remains a need for improved understanding of the issues in each fishery and a targeted approach to address the issues identified.	Yes
Issue 11.	Better understanding and, where necessary, recognition in management arrangements, of shark fishing by Indigenous people	Closer examination of constraints to obtaining better data on recreational and Indigenous shark catch is addressed in the Review (REV-B6). The need for better understanding of Indigenous shark fishing is not explicitly covered in the key findings of SAR2 but the need for improved data collection is discussed. SAR2 highlights the need for improved national data collection of commercial, recreational and Indigenous fishing activities involving taking sharks and the need for risk assessments looking at the impact of non-commercial fishing operations on sharks (SAR2-10).	Yes
Issue 12.	Risk assessments for all shark species from all impacts on those species	Credible and efficient risk assessments (to species level where necessary) are addressed in the Review (REV-A4). Implementation of high-quality risk assessments are also discussed (REV-B7). Further and more consistent application of risk-based approaches is addressed in SAR2-5.	Yes
Issue 13.	Where necessary, develop strategies for the recovery of shark species and populations	The Review discusses recovery strategies and listing processes but it makes no specific recommendations on associated issues. Implementation of effective management measures for high-risk, threatened, endangered and protected species and rebuilding of over-exploited stocks are addressed in SAR2-2.	Yes
Issue 14.	Reduce or, where necessary, eliminate shark bycatch	Greater use of the precautionary principle and the management of sharks, including non-target, high-risk and bycatch sharks, are discussed in the Review (REV-A1). While reducing or eliminating bycatch is not explicitly covered in any of the key findings, SAR2-9 advocates more effective bycatch mitigation methods in its acknowledgement that the impact of fisheries on non-target stocks should be as little as possible.	Yes

3. Definition of cryptic fishing mortality: unobserved fishing mortality, where individuals die due to being caught but this is not observed in normal fishing operations. Cryptic fishing mortality includes pre-catch losses (individuals that dropout of nets or off hooks) and post-release mortality (where an individual is released but dies due to injuries).

Issues for shark conservation and management identified in Shark-plan 1		Recommendations from the Review and findings from SAR2	Relevant to Shark-plan 2 (Yes/No)
Issue 15.	Better understanding of the effects of shark fishing, control programs for bather protection and management practices on ecosystem structure and function	While ecosystem structure and function are discussed in the Review and SAR2, they are not reflected in the key findings/recommendations. Shark-plan 2 has a role in advocating research to better understand this issue, making appropriate links with *Shark futures*. The Review notes that ecosystem-focused research in relation to sharks has been a lower priority than species-specific research aimed at better understanding the impacts of fishing on target or high-risk species. This also reflects the complexity and expense of broad-scale ecosystem research.	Yes
Issue 16.	Reduce the impact of environmental degradation on sharks	Not highlighted as a priority area in the Review or SAR2. Therefore, while the issue remains a research interest, it is not a key issue requiring specific action within this Shark-plan.	No
Issue 17.	More information on the impact on sharks of sound waves in the marine environment	Not highlighted as a priority area in the Review or SAR2. Therefore, while the issue remains a research interest, it is not a key issue requiring specific action under this Shark-plan.	No
Issue 18.	More information on the impact on sharks of electromagnetic fields, for example, high voltage electric cables and shark protection devices	Not highlighted as a priority area in the Review or SAR2. Therefore, while the issue remains a research interest, it is not a key issue requiring specific action under this Shark-plan.	No





From issues to actions

Having identified the relevant issues (Table 1), actions are prescribed. The findings of both Shark Assessment Reports (SAR1 and SAR2), the recommendations of the Review were considered in the development of actions. The Fisheries Research and Development Corporation's (FRDC) *Shark futures: Sustainable shark fisheries—a national research, development and extension framework* (Bodsworth and Scandol 2010) was also considered in the development of actions.

Action table

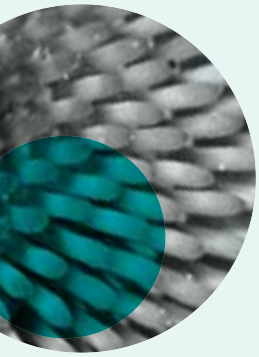
Table 2 details the issues relevant to Shark-plan 2, priority for implementation and corresponding actions. Performance management of Shark-plan 2 will be carried out by the responsible jurisdictions and through relevant shark groups or committees as discussed in the implementation, monitoring and evaluation section.

Table 2: Shark-plan 2 — Issues, actions and priorities

Issues for shark conservation and management identified in Shark-plan 1		Actions	Priority of issue
Issue 1.	Improved identification of shark species by all resource users	1. Review existing shark species identification guides (and any in development), implementing the best available identification guides in all relevant fisheries: • ensure guides are culturally appropriate, including the use of Indigenous species names where appropriate • ensure the best available guides have been provided to relevant user groups, including fishers, processors, compliance officers, observers and scientists. 2. Monitor the effectiveness of identification guides. 3. Investigate the potential for additional tools for shark identification, such as morphological diagnostic tools or DNA identification kits.	High
Issue 2.	Secure, accessible and validated data sets that record all catch data and are consistent over time with compatible resolution between jurisdictions over the full range of each species from all resource users	4. Develop and implement national minimum data standards for all commercial, recreational, bather protection and Indigenous fishing operations that take sharks. 5. Obtain better understanding of illegal, unregulated and unreported shark catch. 6. Develop and implement data verification systems with clear objectives and performance measures.	High
Issue 3.	Full utilisation of dead sharks and an improved understanding of the markets for and trade in shark products	7. Implement anti-finning measures for all Australian fisheries and assess their effectiveness across jurisdictions. Measures should be promoted for adoption regionally and internationally. 8. Assess the potential for more comprehensive trade data collection and analysis to improve shark conservation and management outcomes and implement a more comprehensive trade data collection system as appropriate.	Medium–high
Issue 4.	Coordination of shark research	9. Support the FRDC National Research, Development and Extension Framework, *Shark futures*. 10. Investigate opportunities for collaborative research initiatives to address the aims and objective of Shark-plan 2.	High
Issue 5.	Maintain and improve the standard of stock assessments for target shark species in dedicated shark fisheries	11. Maintain and/or improve stock assessments, risk assessments and status determination processes for target, bycatch and byproduct species. 12. Assess the need for implementation of formal harvest strategies to manage shark catch.	High
Issue 6.	Reliable assessments for shark bycatch/byproduct	Covered under Issue 5.	Medium
Issue 7.	Assessment of adequacy of management for all shark species and more innovative approaches to dealing with identified shark management issues	13. Iterative/ongoing jurisdictional assessment of the adequacy of shark management, including the implementation of harvest strategies and compliance, enforcement and education strategies to support sustainability objectives for sharks. 14. Explore mechanisms for greater collaboration among jurisdictions regarding research, assessment and management of shared stocks.	High

Issues for shark conservation and management identified in Shark-plan 1		Actions	Priority of issue
Issue 8.	Improved understanding of the impacts of and, where required, implementation of better management for, recreational and game fishing	15. Review the effectiveness of management measures for recreational and game fishing in achieving sustainability objectives for shark species and develop recommendations for future management approaches, should this be found to be necessary. 16. Assess the findings of the Review under action 16 and relevant recreational and Indigenous fishing surveys to: • identify gaps in existing monitoring and data collection programs for recreational, charter and Indigenous fishing • determine the nature and role of state and territory recreational fishing surveys • determine the required frequency of future national surveys • determine the adequacy of reporting on recreational and Indigenous fishing issues at national level • where necessary, update existing survey methodologies or introduce effective supplementary or alternative data collection mechanisms • review and where necessary revise recreational and game fishing management arrangements to ensure that impacts on sharks are sustainable • where necessary, increase education and enforcement programs in recreational and game-fishing sectors.	Medium
Issue 9.	Reduce cryptic fishing mortality of shark species	17. Improve understanding of the cryptic mortality of high-risk sharks in commercial, recreational and Indigenous fisheries. 18. Implement strategies to reduce cryptic mortality, noting the link with Theme 2 of *Shark futures*, which focuses on minimising the environmental impacts of fisheries on sharks. 19. Ensure cryptic mortality is accounted for in the setting of catch quotas (where information is available).	Medium–low
Issue 10.	Assessment of shark handling practices for the conservation and management of sharks	20. Investigate shark-handling practices to identify any areas of concern. 21. Implement solutions as required, giving consideration to increased training and enforcement requirements.	Medium–low
Issue 11.	Better understanding and, where necessary, recognition in management arrangements, of shark fishing by Indigenous people	22. Assess the extent of Indigenous fishing for sharks and incorporate into the overall management arrangements. Identify gaps in knowledge about Indigenous shark fishing and, where a need is identified, develop research proposals to address these gaps. 23. Assess the impact of existing management measures for sharks on Indigenous subsistence fishing practices.	Medium

Issues for shark conservation and management identified in Shark-plan 1		Actions	Priority of issue
Issue 12.	Risk assessments for all shark species from all impacts on those species	24. Implement management responses for species (or species groups) already assessed as high-risk. 25. Undertake best practice risk assessments for shark species not already assessed. 26. Continue to refine risk assessment processes for target, bycatch and byproduct shark stocks, seeking to include all available data and consideration of cumulative impacts. Collection of data on species biology and human impacts will be foundational to the success of this action. 27. Evaluate the methodologies for risk assessment and assess the need for national risk assessment guidelines. 28. Implement management measures for any subsequent high-risk species. 29. Identify important habitat and broader environmental and habitat requirements for shark species and appropriate protection and management of these areas.	Medium–high
Issue 13.	Develop strategies for the recovery of shark species and populations	30. For species designated as requiring recovery, implement recovery strategies. Recovery strategies should be monitored and revised as appropriate to ensure effectiveness.	Medium–high
Issue 14.	Reduce or, where necessary, eliminate shark bycatch	31. Initiate action (as required) to ensure effective bycatch reduction methods have been developed for all fisheries in which shark are caught as bycatch, giving priority to species identified through risk assessment as 'high-risk'. 32. Assess the effectiveness of current shark bycatch reduction measures in reducing shark mortality (including cryptic mortality) and develop performance measures for shark bycatch reduction. 33. Promote adoption of effective shark bycatch reduction measures internationally.	Medium–high
Issue 15.	Better understanding of effects of shark fishing, control programs for bather protection and management practices on ecosystem structure and function	34. Undertake periodic assessment/support research of the impact of targeted shark fishing on non-target species (particularly threatened species) and identify priority issues for management. 35. Undertake periodic assessment/support research of the impact of fishing operations on structure and function of shark species/stocks and identify priority issues for management. 36. Periodic assessment of the ecological impacts of shark control programs for bather protection. 37. Investigate methods for modelling the population ecology of sharks and distinguishing between natural and fishing-induced variation, so as to better understand population status and rates of recovery. 38. Consider ecosystem structure and function in the development and implementation of management measures, including trophic system interactions and how changes in systems may be measured.	Medium–low



Priority of issues

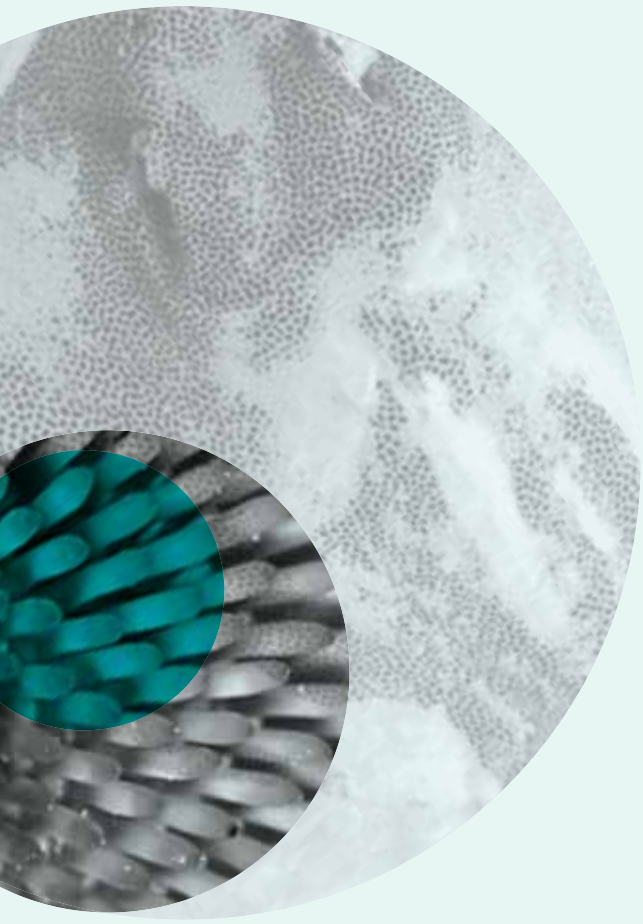
Issues are prioritised in light of a number of considerations. Higher priority is given to issues and associated actions that are fundamental to achieving the overarching aims and objectives of the plan. Priority is given to issues where there is an immediate information need or sustainability risk. Similarly, issues considered to be a lower immediate risk or that rely on the delivery of preceding actions are given a lower priority.

While this is a national plan of action, there will inevitably be some variation among jurisdictions in the timing and implementation of actions. Not all actions will be relevant to all jurisdictions and this will need to be captured effectively in the *Operational Strategy for Australia's National Plan of Action for the Conservation and Management of Sharks 2012 Shark-Plan 2*. It is anticipated that jurisdictions will identify, from the actions in Shark-plan 2, priority actions to be addressed over the life of the plan. Table 3 provides a guide to when actions should be initiated.

Given that the plan must be flexible and accommodate capacity and competing demands for resources, jurisdictions should follow the guidance given in the implementation, monitoring and evaluation section.

Table 3: Priority and implementation schedule for Shark-plan 2 issues and associated actions

Priority	Action initiated
High	Within 12 months of implementation of this plan
Medium	Within two years of implementation of this plan
Low	Within four years of implementation of the plan



Implementation, monitoring and evaluation

The Department of Agriculture, Fisheries and Forestry (DAFF) (Fisheries Branch) is the lead agency responsible for the development of Shark-plan 2 and will remain responsible for coordinating its implementation. Collectively, the SIRC or other representative shark group will be responsible for assessing the overall implementation of Shark-plan 2 during the operational period of the plan. The plan's structure, actions, prioritisation of issues and delivery timeline should enable relevant shark groups and their members to monitor progress. The group will ultimately report to DAFF, which reports to the Australian Government Minister for Agriculture, Fisheries and Forestry.

At the operational level, the state, Northern Territory and Australian governments have prime responsibility for implementing most of the actions identified in Shark-plan 2. The status and effectiveness of these actions to conserve and manage sharks in Australia will be subject to reassessment and review. The implementation and monitoring of actions in Shark-plan 2 will be underpinned by an operational strategy administered by DAFF, with input and reporting from each jurisdiction. It is unrealistic to expect that all of the issues identified in this plan will be fully addressed by all jurisdictions over the life of the plan. Instead, the *Operational Strategy for Australia's National Plan of Action for the Conservation and Management of Sharks 2012 Shark-Plan 2* will detail specific actions jurisdictions will implement, progress and report on over the life of Shark-plan 2.

The success of Shark-plan 2 will require strong cooperation among jurisdictions, and commercial fishers, Indigenous groups, conservation/environmental bodies, recreational and game-fishing associations and scientific and research organisations.

On conclusion of the operational period of Shark-plan 2, jurisdictions will evaluate its overall performance against its aims and objectives. Shark-plan 2 does not have a dedicated budget for its implementation. The delivery of the actions identified in the plan depends on the resources available within the existing budgets of fisheries management and conservation agencies. Supplementary funds for shark-related research may be obtained from other sources. Applications to FRDC should follow the guidance provided in the national research, development and extension framework, *Shark futures*.

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The biosphere is relevant to the work we do and aligns with our mission – we work to sustain the way of life and prosperity of all Australians. The biosphere imagery used in Shark-plan 2 represents the environment, habitat and shark and ray species relevant to the *National Plan of Action for the Conservation and Management of Sharks 2012 Shark-plan 2.*

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Australian Government

Department of Agriculture and Water Resources

National Plan of Action for Minimising Incidental Catch of Seabirds in Australian Capture Fisheries

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Foreword

Australian fisheries are among the best managed in the world. The Australian Government is working hard to keep them this way. An important part of this is ensuring that our fisheries resources continue to be managed sustainably and to minimise impacts of fishing activities on the marine environment.

I am pleased to release Australia's *National Plan of Action for Minimising Incidental Catch of Seabirds in Australian Capture Fisheries* (NPOA–Seabirds) which provides a national approach to mitigating the impact of fishing on seabirds.

Australia recognises the need to address the impact of fishing on seabirds. This action plan provides guidance on best-practice mitigation, monitoring and reporting of seabird interactions for all fishing activities. It will reduce duplication, target responses to areas that need it most and result in more uniform, efficient and cost-effective seabird bycatch management. Establishing minimum reporting standards will enable us to better understand the extent of seabird interactions across all Australia's capture fisheries.

NPOA–Seabirds demonstrates Australia's commitment to sustainable fishing practices internationally. It also fulfils our obligation to Food and Agriculture Organization (FAO) of the United Nations by aligning our national efforts with those of the FAO's International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (IPOA–Seabirds).

NPOA-seabirds will enhance the reputation of Australia's sustainable seafood industry, particularly in high-value export markets, and help strengthen our international seafood brand.

Most importantly, it will build trust among Australians and international consumers that our fisheries are managed under a sustainable and environmentally responsible fisheries management regime.

Senator the Hon. Richard Colbeck
Assistant Minister for Agriculture and Water Resources

Contents

Introduction

Fishing represents a substantial threat to some seabird populations. Most seabirds are primarily surface feeders, taking their prey from the top few metres of the water column (Harper, Croxall & Cooper 1985). Many species are at-sea scavengers, preying on dead fish, squid and other marine life found floating on the surface. The negative effects of fishing practices occur most often when fishing and seabird foraging behaviour overlap (Alexander, Robertson & Gales 1997; Baker et al. 2002; Birdlife International 1995; Croxall 1998; Croxall et al. 2012; Gales 1998). Scavenging seabirds supplement their diet by feeding on discards from vessels and baited hooks, and from fisheries catch as it is being hauled (Baker et al. 2002).

The incidental catch of seabirds in capture fisheries has been of international concern since the 1980s (Brothers 1991; Gales 1998). Studies highlighting the number of seabirds killed annually by fishing operations include Anderson et al. 2011; Brothers 1991; Brothers, Gales & Reid 1998; Gales 1998; Gales, Brothers and Reid 1998, Zydelis, Small & French 2013.

Each Australian jurisdiction has its own regulatory approach to addressing seabird interactions. Australia's 200-plus seabird species are protected under the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In accordance with the legislation, it is illegal to kill, injure, take, trade, keep or move these species in Commonwealth waters without a permit. Some species, such as albatrosses, petrels and shearwaters, are granted greater protection under the EPBC Act due to their 'threatened' species status. The Commonwealth Fisheries Bycatch Policy sets out a framework for minimising bycatch of species including seabirds that may be killed or injured as a result of interacting with fishing equipment. Protection of seabirds in state and Northern Territory waters is subject to the legislation and policies of those jurisdictions.

In 1999 the Food and Agriculture Organization of the United Nations (FAO) adopted the International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (IPOA–Seabirds) (FAO 1999). IPOA–Seabirds is a voluntary instrument within the framework of the FAO Code of Conduct for Responsible Fisheries. It sets out principles and international standards of behaviour for responsible fishing practices. In 2009 the FAO expanded the plan to cover interactions between seabirds and all types of fishing gear used by industrial, recreational and customary fishers.

Development and implementation of this *National Plan of Action for Minimising Incidental Catch of Seabirds in Australian Capture Fisheries* (NPOA–Seabirds) fulfils Australia's voluntary commitment to the FAO. NPOA–Seabirds has been developed in line with the FAO's best-practice guidelines for reducing incidental catch of seabirds in capture fisheries (Box 1). It also incorporates findings of a 2013 national assessment (Baker & Finley 2013). The assessment recommended that the plan focus on collecting and analysing data to improve knowledge of seabird–fishery interactions and assess mitigation performance. This process would be a precursor to implementation of further mitigation measures. NPOA–Seabirds promotes national coordination to better understand and mitigate impacts of fishing activities on seabirds across jurisdictions, recognising that the state, Northern Territory and Australian governments have separate regulatory authority in their own jurisdictions and are best placed to determine what mitigation measures are needed.

Box 1 FAO best-practice guidelines for reducing incidental catch of seabirds in capture fisheries

1. Address incidental catch of seabirds in all capture fisheries.
2. Advocate seabird bycatch mitigation in regional fisheries and conservation bodies.
3. Identify extent of seabird bycatch in capture fisheries.
4. Implement mitigation measures.
5. Conduct mitigation research and development.
6. Provide education, training and outreach.
7. Conduct independent monitoring.
8. Establish objectives to avoid and minimise incidental catch of seabirds.
9. Implement monitoring and reporting arrangements.

Source: FAO 2009

Chapter 1

Impact of fishing on Australian seabird populations

The impact of fishing on Australian seabird species differs depending on the method of fishing and the foraging behaviour of each bird species. Seabirds are known to follow fishing vessels in search of discarded fish scraps, unused baits (offal) and bait that is accessible when fishing gear is set, hauled or in the water. As a result, many seabirds are injured or die after becoming entangled or hooked in fishing gear.

Our understanding of the extent of fishing impacts on seabird populations in Australian capture fisheries is limited by a lack of reliable data on interactions and species behaviour. Baker & Finley (2010) found that risks to seabirds are evident from fishing activities, particularly south of 30° latitude.

Longline, trawl and net fishing methods are likely to have an impact on seabird populations. Incidental catch of seabirds primarily occurs during setting and hauling, when baits or nets are close to the surface.

Recreational and Indigenous fishing can result in the incidental injury or death of seabirds (Campbell 2013; McPhee, Leadbitter & Skilleter 2002). Recreational fishing activities are widespread along Australia's east coast and may become more prevalent as coastal communities continue to expand.

Commercial longline fisheries

The incidental catch of seabirds during longline fishing and its impact on populations internationally is well documented (Anderson et al. 2011). Australia already has measures in place to reduce the incidental catch of seabirds during longline fishing. In 1992 incidental catch of seabirds during oceanic longline fishing operations was nominated and subsequently listed under the EPBC Act as a key threat to seabirds. As a result the *Threat Abatement Plan for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations* (TAP–Seabirds) was developed in 1998. TAP–Seabirds sets out mandatory mitigation requirements for longline fishing operations in Commonwealth waters (Commonwealth of Australia 2014). The plan has been reviewed three times since its release (2006, 2014 and 2017). The reviews have found that the TAP has been successful in significantly reducing the impact of longline fishing on seabird species in Commonwealth-managed fisheries (Commonwealth of Australia 2014).

In addition to requirements under TAP–Seabirds, best-practice measures have been adopted by Commonwealth commercial fishers to prevent interactions with seabirds. These include not discharging offal while setting and bringing in lines, the use of tori line devices when setting gear, only setting lines at night and using sinkers to ensure baited hooks sink quickly.

In 2008 a national assessment of the extent of seabird bycatch in longline fisheries highlighted a lack of reliable data on seabird interactions with fishers outside Commonwealth jurisdiction, who aren't subject to the requirements of TAP–Seabirds (Baker & Finley 2010). Improved national data collection would provide a better understanding of the impacts of longline fishing on seabirds across all Australian fisheries, and help ensure national consistency in management and reporting.

Commercial trawl fisheries

The impact of trawl fishing on seabird populations internationally is well documented (Bartle 1991; González-Zevallos & Yorio 2006; Sullivan, Reid & Bugoni 2006; Weimerskirch, Capdeville & Duhamel 2000).

The impact of trawl fishing on seabird populations in Australia is difficult to gauge. Until recently, limited research was available and fishers were not required to keep extensive records of interactions. This was partly due to the difficulty of observing and recording interactions and related mortalities. The collection of seabird interaction data is now recognised as a priority for the management of bycatch in Commonwealth trawl fisheries. These fisheries are required to report all seabird interactions and are subject to electronic monitoring and/or observer coverage. This has significantly improved availability of bycatch data for these fisheries. Since 1 May 2017 Commonwealth trawl fishers have also been required to have one of three approved mitigation techniques in place:

- Warp deflectors (pinkie buoys)—these must sit alongside the trawl gear as a visual deterrent and physical barrier between birds and fishing gear, and may be used in combination with zero offal discharge while fishing; recent research shows that pinkie buoys reduce seabird interactions with warp wires by 75 per cent.
- Bird bafflers—a form of modified tori line .
- Seabird sprayers—the two booms, which extend beyond the stern and over the warps, pump water through nozzles to create a curtain of water around each warp.

Operators in some Commonwealth fisheries also continue to trial new mitigation devices to further reduce interactions. A better understanding of national seabird impacts from trawl fishing would help fisheries managers design tailored mitigation actions.

Commercial gillnet and entanglement net fisheries

International evidence suggests that gillnet fisheries contribute to high levels of seabird incidental mortality (Anderson et al. 2011; Zydelis, Small & French 2013). Diving seabird species, such as penguins, shearwaters, cormorants and gannets, are particularly susceptible to entanglement in net fisheries.

Limited information is available on seabird bycatch levels in Australian net fisheries. This is because many net fisheries do not require or enforce logbook recordings of seabird interactions. Without data on specific fisheries, it is difficult to determine the level of interaction or the impact net fisheries may have on seabirds. Data limitations have also restricted the validity of research on developing best-practice seabird mitigation measures for net fisheries. However, since 2014 the Commonwealth gillnet fishing fleet has been subject to electronic monitoring, allowing collection of crucial data on seabird interactions.

Improving reporting requirements and setting minimum data standards across Australian net fisheries will have several benefits. It will increase understanding of the impacts of seabird interactions and drive fishery managers and industry to implement actions to mitigate interactions.

Recreational and customary fishing

Recreational (including commercial game and charter) and customary fishing can result in the injury or death of seabirds that ingest baited hooks and fishing line or get entangled in crab pots (McPhee, Leadbitter & Skilleter 2002). Most seabird interactions with recreational and customary fishers are unrecorded because fishers are not required to formally report incidents in the coastal waters where most recreational fishing occurs. Estimates of interactions are based on data collected from seabird rescue groups.

The Australian Government has supported the development of the National Recreational Fishing Code of Practice, which was most recently revised by the Australian Recreational Fishing Foundation in 2016. The code sets standards that seek to improve recreational fisher stewardship of the marine environment, including through sustainable fishing practices and responsible use of aquatic resources.

Case study 1 Understanding the impact of recreational fishing on seabirds

According to a southern Queensland rescue group, in 2012 more than 1,000 seabirds were rescued in the waters between the Sunshine Coast and Redcliffe Peninsula (Campbell 2013).

The majority of birds rescued were Australian pelicans and white ibises that had been injured in interactions with discarded fishing tackle. Significant numbers of white-faced herons, pied cormorants, wood ducks and silver gulls were also rescued. Over 60 per cent of birds rescued had wing or foot injuries. Most were released after less than two weeks. However, around 6 per cent died or had to be euthanased and 30 per cent required long-term treatment for beak or internal injuries.

Chapter 2
Rationale

Internationally, fishing has been identified as a threat to seabird populations. Following the release of IPOA–Seabirds in 1999, the Australian Government prepared an assessment report on the extent and nature of incidental seabird catch in longline fisheries (Commonwealth of Australia 2003). The report concluded that TAP–Seabirds was largely fulfilling the role of a national plan for longline fisheries.

Past national assessments of seabird bycatch across Australian fisheries have found that little information is available on the impact of other fishing methods on seabird populations (Baker & Finley 2010; Commonwealth of Australia 2003). The assessments identified a need to improve reporting standards nationally to better understand the extent of seabird interactions. NPOA–Seabirds addresses the need for national coordination and consistency to better understand and mitigate the impacts of fishing activities on seabirds.

Chapter 3
Scope

Implementation of NPOA–Seabirds will contribute towards achieving and maintaining a favourable conservation status for seabirds (Box 2) by providing a comprehensive and consistent approach to reducing the impact of fishing on these species. The scope of this plan covers:

- all species of birds that occur naturally in Australian marine areas, including migratory and threatened seabird species listed under the EPBC Act
- all commercial, recreational, customary and other relevant capture fisheries
- all waters under the jurisdiction of Commonwealth, state and Northern Territory fisheries
- all fishing undertaken by Australian-flagged fishing vessels on the high seas, including areas governed by regional fisheries and conservation bodies.

NPOA–Seabirds does not include those general actions for reducing threats to the conservation status of a species that are not directly related to fishing activity, such as threats to seabird breeding sites or from marine debris. These issues are addressed through other environmental actions and measures, including recovery plans established under the EPBC Act.

Box 2 Favourable conservation status

'Conservation status' means the sum of the influences acting on seabird species that may affect their long-term distribution and abundance. Conservation status is considered favourable when any of these conditions are met:

- distribution and abundance of the species approach historic coverage and levels to the extent that potentially suitable ecosystems exist and are consistent with wise wildlife management
- population dynamics data indicate that the species is maintaining itself long term
- the range of the species is neither currently being reduced nor likely to be reduced long term
- sufficient habitat exists and will continue to exist in the foreseeable future to maintain the population of the species long term.
- Conservation status is considered unfavourable when any of these conditions are not met.

Source: FAO 2009

Chapter 4
Objectives

NPOA–Seabirds is a voluntary measure. It is not a regulatory instrument. It provides guidance for regulators on best-practice mitigation and reporting of seabird interactions across all fishing operations in Australian waters.

NPOA–Seabirds aims to establish a nationally coordinated approach to avoiding or minimising seabird deaths or injuries resulting from capture fishing activities. Implementation of the plan by jurisdictions is voluntary. Jurisdictions are encouraged to implement consistent measures to address data limitations. This will ensure that sufficient information is available to undertake a comprehensive national assessment of the impact of fishing activities on seabirds.

The goal of Australia's NPOA–Seabirds is to minimise and, where practicable, eliminate the incidental catch of seabirds in capture fisheries. To achieve this, NPOA–Seabirds has five objectives:

- **Objective 1** Understand the extent of the incidental catch of seabirds.
- **Objective 2** Implement best-practice seabird bycatch mitigation in capture fisheries to
  - minimise or, where practicable, eliminate the incidental catch of seabirds
  - contribute towards achieving and maintaining a favourable conservation status for seabirds.
- **Objective 3** Promote development of innovative mitigation procedures and technologies that are feasible, effective and efficient.
- **Objective 4** Increase awareness and understanding of the incidental catch of seabirds and best-practice mitigation.
- **Objective 5** Promote adoption of effective mitigation measures in regional fisheries and conservation bodies.

Chapter 5

Framework for achieving NPOA–Seabirds objectives

Objective 1 Understand the extent of the incidental catch of seabirds

Australia has a well-developed understanding of the extent of the incidental catch of seabirds in longline fisheries. However, many other fisheries in Australia are small-scale, low-value enterprises with limited capacity to support expensive monitoring programs. As a result, data on seabird interaction in these fisheries is limited. Action is needed to increase our understanding of the effects of different fishing gear types on seabirds in Australian fisheries.

To understand and manage the incidental catch of seabirds in capture fisheries across jurisdictions, fisheries managers need to:

- review available data about the incidental catch of seabirds
- validate data sources and, where appropriate, conduct more detailed investigations
- determine whether a problem exists based on
  - magnitude of seabird bycatch (rate or number)
  - species that are incidentally caught and their conservation status
  - spatial and temporal overlap of fishing effort
  - existing mitigation measures and their effectiveness
  - existing seabird monitoring programs and their effectiveness
- adopt a precautionary approach when information is lacking or unclear.

Fisheries managers should undertake risk assessments to determine the risk to seabirds from fishing operations. Where the risk is identified as high, managers should ensure appropriate management measures are in place. Managers can use a range of input, output and educational measures to reduce fishing-related mortalities. Measures can be targeted based on the identified risk.

Data collection and reporting programs, such as logbook reporting, e-monitoring and observer programs, should be designed to provide representative data on the incidental catch of seabirds, and be regularly reviewed. The size of the fishery and likelihood of interactions with seabirds should be considered when developing programs. Where possible, logbooks should be standardised to ensure information is collected and recorded consistently across jurisdictions and time. See Appendix A for a list of data categories that regulators should consider requiring fishers to collect. Suggested data fields for each category are provided at Appendix B.

If evidence indicates an incidental seabird catch problem, regulators should consider developing and implementing targeted programs to better understand or mitigate the impacts. Some government environmental agencies obtain data on seabird mortalities in coastal waters from seabird rescue groups.

Day-to-day monitoring will not always capture the information required to understand the extent of seabird incidental catch in a fishery. Jurisdictions may choose to undertake research or monitoring programs that focus on high risk and provide transparent and statistically robust estimates of seabird injury and mortality.

Under the EPBC Act, it is an offence to kill, take, trade, keep or move a listed species in a Commonwealth area, including Commonwealth waters, without a permit. Sometimes interactions with listed species are unavoidable. Under the EPBC Act, fishers must report such interactions to the Australian Government Department of the Environment and Energy within seven days of the incident occurring or face a fine. Fishers who promptly report interactions are meeting their legal obligations and helping the Australian Government protect marine species.

Objective 2 Implement best-practice seabird bycatch mitigation in capture fisheries

Feasible, effective and efficient seabird bycatch mitigation measures should be implemented in all capture fisheries where there is a risk of incidental catch of seabirds.

Seabird bycatch mitigation measures are ‘a modification to fishing practices and/or equipment that reduces the likelihood of seabird incidental catch’ (Brothers, Cooper & Løkkeborg 1999; Løkkeborg 2008, 2011). Measures can take many forms, including the use of bird-scaring devices, fishing gear modifications (for example, line weighting), temporal and seasonal restrictions and alignment with international best practice fisheries management (such as cleaning of nets or offal management).

Australia is a signatory to the international Agreement on the Conservation of Albatrosses and Petrels (ACAP), which coordinates international activity to mitigate known threats to these bird populations. ACAP develops best-practice advice for longline and trawl fisheries that jurisdictions can consider when regulating these types of fisheries (see summary in Appendix C). ACAP criteria for developing advice are summarised in Box 3.

Australia's current TAP–Seabirds prescribes actions that fisheries managers and longline fishing operators must take in Commonwealth waters to reduce incidental seabird catch. Requirements under the plan are consistent with ACAP best-practice advice. TAP–Seabirds was implemented in 1998. Since implementation, incidental bycatch rates for several Commonwealth longline fisheries have dropped well below the maximum permissible levels of 0.01 or 0.05 birds per 1,000 hooks. For fisheries that score above this rate, an investigation into their operators occurs which can lead to fisheries managers imposing additional measures on the fishing operators to ensure the rate does not rise. TAP–Seabirds will remain in place, independent of NPOA–Seabirds.

International best-practice advice for gillnet fisheries is still being developed. In the interim, ACAP has pointed to research demonstrating that increasing the visibility of the net can reduce seabird bycatch (Bull 2007), as a particle measure fisheries managers could regulate.

Wherever possible, fisheries managers and operators should adopt data-driven solutions—supported by in-fishery trials—that effectively manage seabird bycatch by meeting or exceeding international standards. However, guidance on international best practice should not override tailored approaches that accommodate the unique features of particular fisheries. Similarly, international best-practice guidelines should not constrain the pursuit of continuous improvement in the mitigation of seabird interactions.

Several Australian fisheries have introduced measures that extend beyond international best practice. These initiatives provide a model of adaptive management for other fisheries.

Box 3 Agreement on the Conservation of Albatrosses and Petrels—best-practice seabird bycatch mitigation criteria

1. Individual fishing technologies and techniques should be selected from those shown by experimental research to significantly reduce [statistically] the rate of seabird incidental mortality to the lowest achievable levels.
2. Fishing technologies and techniques, or a combination of the two, should have clear and proven specifications and minimum performance standards for their deployment and use.
3. Fishing technologies and techniques should be demonstrated to be practical, cost-effective and widely available.
4. Fishing technologies and techniques should, to the extent practicable, maintain catch rates of target species.
5. Fishing technologies and techniques should, to the extent practicable, not increase the bycatch of other taxa.
6. Minimum performance standards and methods of ensuring compliance should be provided for fisheries technologies and techniques, and should be clearly specified in fishery regulations.

A significant reduction in incidental seabird mortality can be determined by either a direct reduction in mortality or a reduction in seabird attack rates.

Source: Agreement on the Conservation of Albatrosses and Petrels

NPOA–Seabirds seeks to ensure that affected capture fisheries employ proven technical and operational seabird mitigation measures to prevent interactions. Measures adopted should be tailored for the type of fishery and individual fishing operations.

Regulators of recreational, customary and small-scale fisheries should consider lower-cost management measures. These could include education and extension programs such as implementing a code of practice. Appendix D lists principles for developing recreational fishing codes of practice. To ensure the application of best practice in seabird bycatch mitigation, jurisdictions should maintain a focus on strong stakeholder engagement throughout implementation. Jurisdictions should share information and provide opportunities for support and technical assistance, particularly for fishers at a regional level.

Case study 2 Sliding lead-weight technology—new seabird bycatch mitigation device for longline fisheries

Correct use of line-weighting in longline fisheries is an effective method of minimising seabird bycatch because it sinks fishing gear rapidly. However, many fishers are reluctant to adopt the method, partly because of safety concerns. If a line breaks during hauling, traditional leaded swivels can cause serious injury or fatality if they fly back towards the crew.

Sliding lead weights may be a solution to this problem. The device was developed in consultation with the Australian Fisheries Management Authority, the Australian Antarctic Division and the East Coast Tuna and Billfish Fishery. The device places a sliding lead at or near the hook. The lead slides down the line when fish bite. When a hook is pulled from the fish's mouth, on or near the surface, the lead slides down the line and dampens the energy of the recoiling line and hook, reducing the likelihood of fly-back.

Findings indicate that sliding lead-weighting configurations increase hook sink rates and result in a reduction in seabird mortalities, without reducing the target catch. Members of the Queensland tuna industry have voluntarily adopted sliding lead weights.

Objective 3 Promote development of innovative mitigation procedures and technologies that are feasible, effective and efficient

New or improved technical measures for seabird mitigation can significantly reduce seabird bycatch. International best-practice guidelines provide a benchmark, but this should not preclude development of better approaches for local situations.

Incentives to trial new and improved technical measures will help ensure that new procedures and technologies are feasible, effective and efficient. Jurisdictions have a role in supporting and encouraging stakeholder and industry-led research and testing. This includes working with stakeholders to mitigate risks and providing advice on experimental design. Jurisdictions also have a role in effectively converting the results of studies into fleet-based uptake of measures.

Case study 3 Industry–science collaboration reduces seabird interactions with trawl fisheries

As a condition of their fishing permit all trawlers in the South East Trawl Fishery must follow the directions of an approved seabird management plan at all times. This plan directs each vessel to manage offal in a particular way and deploy an approved physical mitigation device when fishing in daylight hours.

With Australian Government support, the South East Trawl Fishing Industry Association and the Great Australian Bight Fishing Industry Association have developed and trialled two effective seabird bycatch mitigation devices for trawl fisheries: the sprayer and the bird baffler.

The sprayer device sprays seawater at high pressure where the warp enters the water, deterring seabirds from the area. Trials recorded a 92 per cent reduction in warp–seabird interactions.

The bird baffler device prevents birds from accessing the area between the stern of the vessel and where the warp enters the water. It comprises two booms that extend perpendicular to the side of the vessel. The booms have droppers that hang down to the water line and act as a curtain. Trials indicate that bird bafflers reduce bird and warp interactions by 96 per cent.

Objective 4 Increase awareness and understanding of the incidental catch of seabirds and best-practice mitigation

Education, training, incentives and outreach programs can reduce seabird bycatch by driving changes in behaviour and practices. The commercial fishing industry and recreational and customary fishing sectors should be encouraged to share experiences and exchange skills through existing networks and jurisdictions.

All jurisdictions and fishing sectors should consider the use of training and extension programs for fishers, and the production of best-practice seabird identification and seabird handling guides. Education and extension activities are particularly important for recreational fisheries where regulatory oversight of fishing practices is limited.

Case study 4 Education and outreach programs to reduce seabird bycatch: OceanWatch TAngler bins

The OceanWatch TAngler bins project encourages recreational fishers to dispose of fishing line and tackle responsibly. Associated education programs help recreational fishers understand that keeping their fishing spots tidy and free of lost and littered fishing line will help preserve their fishing spots and local wildlife.

More than 300 TAngler bins have been installed across Victoria, New South Wales and Queensland, resulting in the collection of more than 10 tons of discarded fishing line.

This project is a partnership between OceanWatch, local and state governments, land managers and volunteer groups who join the TAngler Bin Network.

Objective 5 Promote adoption of effective mitigation measures in regional fisheries and conservation bodies

NPOA–Seabirds applies to Australian-flagged fishing vessels operating on the high seas and in areas managed by a Regional Fisheries Management Organisation.

Seabirds cross national boundaries and can spend most of their lives migrating and foraging in waters distant from their breeding grounds. As a result, mitigating risk to seabird populations requires regional and international cooperation driven by action undertaken by regional fisheries management organisations and regional conservation bodies.

Australia will continue to pursue stringent and effective seabird bycatch mitigation measures through engagement in regional fisheries management organisations, regional conservation bodies and ACAP.

Chapter 6
Implementation

NPOA–Seabirds seeks to ensure a nationally coordinated approach to addressing the incidental catch of seabirds in all Australian capture fisheries. Actions to implement NPOA–Seabirds are detailed in Appendix E. These actions are not intended to be prescriptive, as it is recognised that the level of incidental catch of seabirds is likely to vary significantly across jurisdictions due to geographic location and extent of fishing operations. When prioritising the actions, jurisdictions will take into account factors including the nature and size of their fisheries and the seabird interaction risks. Implementation of these actions is subject to available funding and resources.

Implementation is expected to take four years and should recognise existing practices and management arrangements for Australian capture fisheries.

Government subcommittee

Implementation of NPOA–Seabirds will be overseen by the existing fisheries management subcommittee of the Australian Fisheries Management Forum (AFMF). The committee will review the progress of implementation and consider current and emerging issues related to the impact of fishing activities on seabirds.

Fisheries management agencies will prepare reports for the subcommittee annually. Content of the reports will be stipulated by the subcommittee and should identify what implementation actions have been undertaken. Where agencies have not implemented actions proposed under NPOA–Seabirds, reports should provide relevant justification. The subcommittee can request further information from agencies where warranted. The Department of Agriculture and Water Resources will be responsible for collating annual reporting and making it available on the NPOA–Seabirds page of the department's website.

The subcommittee will also consider the benefits of holding periodic or ad hoc workshops to enable stakeholders to share experiences and exchange skills and knowledge.

Roles and responsibilities

Australian Government

The Australian Government will provide national policy leadership and help implement NPOA–Seabirds by providing impetus for whole-of-government approaches, coordinating the AFMF subcommittee, facilitating and encouraging research activities, and overseeing implementation of actions for fisheries managed by the Australian Government.

The Department of Agriculture and Water Resources will report to the FAO on the progress of developing and implementing NPOA–Seabirds as part of its biennial reporting on the FAO Code of Conduct for Responsible Fisheries. The Department of the Environment and Energy will report to ACAP.

State and Northern Territory governments

State and Northern Territory fisheries and government environment agencies will be responsible for overseeing implementation of actions in capture fisheries under their respective jurisdictions. Each jurisdiction will determine how best to do this. In some cases, current practices may already be consistent with the objectives of NPOA–Seabirds. Jurisdictions will provide input to the Department of Agriculture and Water Resources for annual reporting to the AFMF subcommittee.

Commercial, recreational and customary fishing sectors

The commercial, recreational and customary fishing sectors have a significant role to play in achieving and ensuring that the fishing practices of their stakeholders are ecologically sustainable and the objectives of NPOA–Seabirds are realised. Where possible, these sectors are encouraged to facilitate development and trialling of innovative mitigation measures and drive educational and outreach activities that promote best practice approaches to the mitigation of seabird interaction. Successful pursuit of ecologically sustainable practices by these sectors, in partnership with government agencies, will ensure that community support for fishing activities continues into the future.

Non-government sectors

Conservation groups, researchers, other interested organisations and members of the public can contribute to implementation of NPOA–Seabirds through on-ground activities and engagement with research, education and awareness programs.

Resourcing

Implementation of NPOA–Seabirds will require resourcing from all jurisdictions and fishing sectors, including financial in-kind commitments. Voluntary commitments from relevant stakeholders will help minimise the incidental catch of seabirds. However, resourcing remains the responsibility of anyone accessing or managing community-owned fisheries. Implementation of the plan recognises existing practices and management arrangements for Australian capture fisheries. This will help minimise resourcing pressures on stakeholders identified as delivering actions under the plan.

Issues and actions outlined in this plan will help responsible agencies guide and prioritise their own actions to minimise the incidental catch of seabirds in Australian capture fisheries.

Chapter 7
Evaluation and review

NPOA–Seabirds will be reviewed four years after its release. The Department of Agriculture and Water Resources will coordinate the review and communicate the outcomes.

The review will consider the effectiveness of the plan and any positive and negative effects of implementation. It will assess the extent to which NPOA–Seabirds objectives have been met and whether they have contributed to reducing seabird mortalities in capture fisheries. When evaluating the plan, the department will consider the effectiveness of other measures put in place to mitigate seabird bycatch, including TAP–Seabirds and state-specific measures. The review may make recommendations about developing and implementing a revised NPOA–Seabirds.

Ongoing evaluation and the four-year review will provide recommendations for improvements and future work, including any necessary changes to the plan. Consultation with key stakeholders will be central to the review.

Appendix A
Data collection categories

ABARES recommends using these data categories for recording interactions in fisheries logbooks and during observer programs.

TABLE A1 Minimum data categories and fields

Data category	Minimum data fields	Data use
Vessel specification	Vessel length, vessel type, gross registered tonnes, fishing master/ skipper, number of crew, gear types	For covariates for standardising interaction rates and analyses of the implementation and effectiveness of mitigation measures
Fishing effort	Fishing time, spatial location and fishing method, number of hooks set, hours trawled, fishing conditions (weather), offal discharged	For analyses to determine frequency of interactions by gear, location and time of day
Mitigation measures	Mitigation technique, time of deployment, where on vessel deployed, whether mitigation operated according to specifications or was deployed unsuccessfully (including partially)	To standardise description of which and how mitigation measures were deployed to analyse implementation and effectiveness of mitigation measures
Interaction details	Number of interactions, how birds interact with the gear and on which part of the gear/vessel the interactions occur	For analyses of general and specific interactions
Fate details	Condition of the seabird (alive, dead or injured)	For partitioning analyses to estimate mortalities and encounters
Seabird identification	Species identification or evidence for its identification	For species-specific analyses
Seabird biologicals	Seabird size, evidence of maturity, counts, behaviour, tissue samples, handling methods	For covariate inclusion in analyses (for example, maturity status or bird density)

Source: ABARES (forthcoming)

Appendix B
Minimum standards for collecting seabird interaction data

ABARES recommends that managers implement minimum data standards for recording interactions in fisheries logbooks and during observer programs.

TABLE B1 Minimum data standards

Data field and instructions	Observations to be recorded
Gear	Gear used [insert details]
Date and UTC time	Fishing started on [insert DD/MM/YYYY] and ended on [insert DD/MM/YYYY] Setting started on [insert DD/MM/YYYY, HH:MM UTC] and ended [insert DD/MM/YYYY, HH:MM UTC] Hauling started on [insert DD/MM/YYYY, HH:MM UTC] and ended on [insert DD/MM/YYYY, HH:MM UTC]
Latitude and longitude	Fishing started at latitude [insert DD, N for north and S for south], latitude [insert MM], longitude [insert DD, E for east and W for west], longitude [insert MM] Fishing ended at latitude [insert DD, N for north and S for south], latitude [insert MM], longitude [insert DD, E for east and W for west], longitude [insert MM]
Marine seabirds caught	Marine seabirds caught [select Yes/No] For each species: • Species name [insert name and species code] • Alive, unharmed [insert number] • Alive, harmed [insert number] • Dead [insert number]
Mitigation method	Mitigation method used [insert details]

TABLE B2 Recommended data standards for independent observer programs

Data field and instructions	Observations recorded
Trawl fishing activities	
Observer details	Observer name [insert family name first]
	Observation period start date[insert DD/MM/YYYY], end date [insert DD/MM/YYYY]
Gear details	Net ID [insert number]
	Net type [insert ISSFCV]
	Head rope length [insert metres]
	Ground rope length [insert metres]
	Bobbin diameter [insert centimetres]
	Otter board to wing length [insert metres]
	Horizontal opening [insert metres]
	Vertical opening [insert metres]
Codend mesh	Mesh size [insert centimetres]
	Codend circumference [insert centimetres]
	Orientation [select Diamond/Square]
Otter board	Board type [insert type], weight [insert kilograms]
Net design	Make [insert details]
	Model [insert number]
	Other features [insert details]
Trawl details	Trawl ID [insert number]
	Trawl type [select Research/Commercial]
	Observed [select Yes/No]
	Gear [insert type]
	Target species [insert FAO species code]
Start and end fishing	Trawl started [insert DD/MM/YYYY] at latitude [insert DD, N for north and S for south], latitude [insert MM], longitude [insert DD, E for east and W for west], longitude [insert MM]
	Trawl ended [insert DD/MM/YYYY] at latitude [insert DD, N for north and S for south], latitude [insert MM], longitude [insert DD, E for east and W for west], longitude [insert MM]
	Trawl depth [insert metres]
	Bottom depth [insert metres]

continued ...

TABLE B2 Recommended data standards for independent observer programs continued

Data field and instructions	Observations recorded
Seabird interactions	Marine seabirds caught [select Yes/No] For each species: • Species name [insert name and species code] • Alive, unharmed [insert number] • Alive, harmed [insert number] • Dead [insert number Bycatch mitigation measures employed [insert details] Bird-scaring (tori) lines in use [select Yes/No] Aerial extent of bird-scarer lines consistently extended at least 10 metres beyond point of entry of warps into the sea [select Yes/No] Bird bafflers in use [select Yes/No]
Trawl warp strike (monitored for 15 minutes immediately after net is deployed)	Mandatory 15 min monitoring started at [insert HH:MM UTC] and ended at [insert HH:MM UTC] Marine seabirds caught [select Yes/No] Heavy warp strikes for each species: • Species name [insert name and species code] • Alive, unharmed [insert number and select strike type Air/Water/Sinker] • Alive, harmed [insert number and select strike type Air/Water/Sinker] • Dead [insert number]Albatross [insert number and select strike type]
Offal management	Offal dumping position [select Port/Starboard/Stern] Offal dumping during shooting [select Never/Occasionally/Always] Offal dumping during hauling [select Never/Occasionally/Always]
Seabird abundance observation	Seabirds present in observation area [select Yes/No, insert name and species code] Estimated numbers [insert number]
Other	Trawl speed [insert knots] Horizontal opening [insert metres] Total catch [insert kilograms]

continued ...

TABLE B2 Recommended data standards for independent observer programs continued

Data field and instructions	Observations recorded
Longline fishing activities	
Observer details	Observer name [insert family name first] Observation period start date[insert DD/MM/YYYY], end date [insert DD/MM/YYYY]
Longline description	Longline type [insert FFSSCV], Period when gear was used start date[insert DD/MM/YYYY], end date [insert DD/MM/YYYY] Target species [insert FAO species code] Main line: Material diameter [insert millimetres] Integrated weight [insert grams] Branch lines: material [insert type] Length [insert metres] Spacing [insert metres] Hooks: Type [insert details], make [insert details], total length [insert millimetres], shank[insert millimetres], gape [insert millimetres], throat[insert millimetres], front length [insert millimetres], usual setting position [insert position], line off bottom [insert metres], hooks off bottom [insert millimetres], baiting method [select Manual/Automatic], automatic baiting equipment [insert make and model]
Hook sinkers	Size [insert grams], position from hook [insert millimetres], longline setting position [select Port/Starboard/Stern], propeller rotation direction [select Clockwise/Anti-clockwise] Longline system: [select system single/double/trotline] • if single (auto) line [insert kilograms per metre] • if double (Spanish) line [insert kilograms per metre] • if trotline (vertical droppers/trots attached to a mainline) [insert kilograms per metre]
General streamer line description	Vessel equipped with streamer line [select Yes/No], Streamer line regularly set [insert number], Streamer line position [select Port/Starboard/Stern], Streamer line length [insert metres], Streamer length min/max [insert metres], Attached height above water [insert metres], Distance between streamers [insert metres] Streamers [insert number], Streamer design [select Single/Paired], Aerial extent of line [insert metres], Method used to assess aerial extent [insert details] Streamer material [insert details], Streamer line diameter [insert millimetres], Streamer colours [insert details] Streamer line over bait entry position? [select Yes/No], Distance from stern to bait entry point [insert metres], towed object [select Yes/No], Horizontal distance from bait entry point to streamer line [insert metres]
Daily setting observations	Sets (as per catch and effort log entries) [insert number], Set type [select Research/Commercial], Longline type code [insert FSSCV], Trotline cetacean exclusion device used [select Yes/No]

continued ...

TABLE B2 Recommended data standards for independent observer programs continued

Data field and instructions	Observations recorded
Setting information	**Must be collected the same day as hauling information is.** Observation started on [insert DD/MM/YYYY], at [insert HH:MM UTC] and ended on [insert DD/MM/YYYY], at [insert HH:MM UTC]Vessel setting speed [insert knots], Sets unobserved since last set [insert number] Setting started at [insert HH:MM UTC], at latitude degrees [insert DD, N for north and S for south], latitude minutes [insert MM], longitude degrees [insert DD, E for east and W for west], longitude minutes [insert MM] Setting ended at [insert HH:MM UTC], at latitude degrees [insert DD, N for north and S for south], latitude minutes [insert MM], longitude degrees [insert DD, E for east and W for west], longitude minutes [insert MM] Setting information, Bottom depth [insert metres], total length of longline set [insert kilometres], hooks set [insert number]
Details of longline setting	Main line length [insert metres], Hooks set [insert number], Baskets/magazines set [insert number], Hooks per basket/magazine [insert number], Hooks baited [insert percentage], Distance between branches [insert millimetres], Distance of hooks off bottom [insert millimetres], Bait species [insert FAO species code], Deck lights during setting [select On/Off], Streamer lines used [select Yes/No], Number of streamer lines used [insert number], Aerial extent of bird scarer lines consistently achieved at least 100 metres? [select Yes/No], Bait entry position [select Port/Starboard/Stern]
Daily hauling observations	Sets [insert number]
Hauling information	Must be collected the same day as setting information is. Observation date[insert DD/MM/YYYY], Hooks observed (tally period) [insert number], Gear lost [insert number], Sections lost [insert number], Hooks lost that were attached to lost sections of the longline [insert number], Other hooks lost (excluding hooks attached to lost sections) [insert number]
Observed catch composition	Haul was observed for fish/invertebrate bycatch [select Yes/No], If yes, estimated percentage of haul observed for bycatch [insert percentage]
Offal management	Offal dumping position [select Port/Starboard/Stern], Offal dumping during setting [select Never/Occasionally/Always], Offal dumping during hauling [select Never/Occasionally/Always]
Seabird interactions	Marine seabirds caught [select Yes/No] For each species: Species name [insert name and species code], Alive, unharmed [insert number], Alive, harmed [insert number], Dead [insert number]

continued ...

TABLE B2 Recommended data standards for independent observer programs continued

Data field and instructions	Observations recorded
Trapping/potting fishing activities	
Observer details	Observer name [insert family name first], Observation period start date [insert DD/MM/YYYY], end date [insert DD/MM/YYYY]
Gear type	Pot type [insert type], Mesh size [insert millimetres]
Funnel position	Orientation [insert details], Aperture [insert centimetres], Chambers [insert number], Escape port present [select Yes/No], Dimensions of escape port [insert centimetres]
Processing details and conversion factors	Haul number [insert number], Observer name [insert family name first], Target species code [insert FAO species code], Processing code [insert number], Length range individuals [insert min and max length], Live weight [insert kilograms] Processed weight [insert kilograms], Grade [insert details], Conversion factor [insert details]
Set and haul details	Observation date [insert DD/MM/YYYY], Set number [insert number], Set type [select Research/Commercial], Target species [insert FAO species code]] Set start time [insert HH:MM UTC], latitude [insert DD; N for north and S for South], latitude [insert MM.mm], longitude [insert DD; E for east and W for west], longitude [insert MM.mm], bottom depth [insert metres] Set end time [insert HH:MM UTC], latitude [insert DD; N for north and S for South], latitude [insert MM.mm], longitude [insert DD; E for east and W for west], longitude [insert MM.mm], bottom depth [insert metres] Haul Start time [insert HH:MM UTC], latitude [insert DD; N for north and S for South], latitude [insert MM.mm], longitude [insert DD; E for east and W for west], longitude [insert MM.mm], bottom depth [insert metres] Haul end time [insert HH:MM UTC], latitude [insert DD; N for north and S for South], latitude [insert MM.mm], longitude [insert DD; E for east and W for west], longitude [insert MM.mm], bottom depth [insert metres]
Gear details	Length of line [insert metres], type of line [insert line description], Pot spacing [insert metres], bait [insert type] Setting : Pots set [insert number], pots observed [insert number] Hauling: Pots hauled [insert number], pots observed [insert number]
Observed interactions with birds or marine mammals	Marine species observed [list FAO species code] Setting: Species abundance (within 500 metre radius) [insert number for each observed species], gear interaction [select Yes/No] Hauling: Species abundance (500 metre radius) [insert number for each observed species], gear interaction [select Yes/No]
Offal management	Offal dumping position [select Port/Starboard/Stern] Offal dumping during setting [select Never/Occasionally/Always] Offal dumping during hauling [select Never/Occasionally/Always]
Seabird interactions	Marine seabirds caught [select Yes/No] For each species: Species name [insert name and species code], Alive, unharmed [insert number], Alive, harmed [insert number], Dead [insert number]
Seabird abundance observation	Seabirds present in observation area [select Yes/No] Estimated numbers of abundance [insert number by species]

continued ...

TABLE B2 Recommended data standards for independent observer programs continued

Data field and instructions	Observations recorded
Dahn/dropline fishing activity	
Observer details	Observer name [insert family name first], Observation period start date[insert DD/MM/YYYY], end date [insert DD/MM/YYYY]
Dahn/dropline description	Line type [insert description], Period when gear was used, start date [insert DD/MM/YYYY], end date [insert DD/MM/YYYY], Target species [insert FAO species code]
Main line	Line material [insert description] Line diameter [insert mm], Integrated line weight [insert gm]
Hooks	Hook type[insert description], Hook make[insert description], Total length [insert millimetres], shank [insert millimetres], gape [insert millimetres] throat [insert millimetres], Front length [insert millimetres]
Setting position	Line off bottom [insert metres], Hooks off bottom [insert metres], Baiting method [select Manual/Automatic], Automatic baiting equipment [insert make and model]
Offal management	Offal dumping position [select Port/Starboard/Stern], Offal dumping during hauling [select Never/Occasionally/Always], Propeller rotation direction [select Clockwise/Anti-clockwise]
General streamer line description	Vessel equipped with streamer line [select Yes/No], Streamer lines regularly set [insert number], Streamer line position [select Port/Starboard/Stern], Streamer line length [insert metres] Streamer length min/max [insert metres], Attached height above water [insert metres] Distance between streamers [insert metres], Number of streamers [insert number], Streamer design [select Single/Paired], Ariel extent of line [insert metres], Method used to assess aerial extent [insert details] Streamer material [insert details], Streamer line diameter [insert millimetres], Streamer colours [insert details] Streamer line over bait entry position [select Yes/No], Distance from stern to bait entry point [insert metres], Horizontal distance from bait entry point to streamer line [insert metres]

continued ...

TABLE B2 Recommended data standards for independent observer programs continued

Data field and instructions	Observations recorded
Details of dahn/ dropline setting	Main line length [insert metres], Hooks set [insert number], Hooks baited [insert percentage] Distance between branches/snoods [insert metres], Distance of hooks off bottom [insert metres] Bait species [insert species], Bait size [insert size mm], Bait proportion [insert details], Deck lights during setting [select On/Off] Streamer lines used [select Yes/No], streamer lines used [insert number], Daylight period – Moonlight, bait entry position [select Port/Starboard/Stern], Vessel setting speed [insert knots] Set start time [insert HH:MM UTC], latitude [insert DD; N for north and S for South], latitude [insert MM.mm], longitude [insert DD; E for east and W for west], longitude [insert MM.mm], bottom depth [insert metres] Set end time [insert HH:MM UTC], latitude [insert DD; N for north and S for South], latitude [insert MM.mm], longitude [insert DD; E for east and W for west], longitude [insert MM.mm], bottom depth [insert metres] Haul Start time [insert HH:MM UTC], latitude [insert DD; N for north and S for South], latitude [insert MM.mm], longitude [insert DD; E for east and W for west], longitude [insert MM.mm], bottom depth [insert metres] Haul end time [insert HH:MM UTC], latitude [insert DD; N for north and S for South], latitude [insert MM.mm], longitude [insert DD; E for east and W for west], longitude [insert MM.mm], bottom depth [insert metres]
Gear lost	Sections lost [insert number] Hooks lost that were attached to lost sections of the dahn/dropline [insert number] Other hooks lost (excluding hooks attached to lost sections) [insert number]
Seabird interactions	Marine seabirds caught [select Yes/No] For each species: Species name [insert name and species code], Alive, unharmed [insert number], Alive, harmed [insert number], Dead [insert number]
Seabird abundance observation	Seabirds present in observation area [select Yes/No], Estimated numbers of abundance [insert number by species]

Appendix C
ACAP recommended best-practice approaches for longline and trawl fisheries

Summarised from the International Agreement on the Conservation of Albatrosses and Petrels.

TABLE C1 Trawl fisheries

Mitigation	Description	Objective of mitigation action
Nets		
Net binding	Net binding is when 3-ply sisal string is applied to the net on the deck, at intervals of around 5 metres.	Reduce seabird entanglements by preventing the net from lofting and mesh from opening.
Net weights	Adding weight on or near the codend to increase the angle of ascent of the net during hauling operations.	Reduce the time the net is on the water's surface, reducing seabird entanglements.
Net cleaning	Net cleaning involves removing all fish stickers and other material from nets.	Reduce net entanglement during shooting.
Cables		
Bird-scaring lines for warp cables	Attachment of a bird-scaring line to both the port and starboard sides of a vessel, above and outside the warp blocks.	Reduce seabird access to the danger zone, where warps enter the water.
Avoid use of net monitoring cables or employ bird-scaring lines	Net-monitoring cables should not be used. Where this is impracticable: • deploy bird-scaring lines positioned to deter birds from net-monitoring cables during fishing operations, and • install a snatch block at the stern of the vessel to draw the net-monitoring cable close to the water to reduce its aerial extent.	Avoid or minimise risk of bird strikes.

continued ...

TABLE C1 Trawl fisheries continued

Mitigation	Description	Objective of mitigation action
Offal		
Full retention—recommended as best option	All waste material is converted into fish meal and fully retained.	Reduce the number of seabirds attracted to vessel.
Mealing—recommended when full retention is not possible	Mealing converts fish waste into fish meal, reducing the quantity of fish waste discharge. Discharging of meal should not occur during shooting and hauling.	Reduce the number of seabirds attracted to vessels.
Batching—recommended (when full retention or mealing not possible)	Where meal production from offal and full retention are impracticable, batching of waste (preferably for two hours or longer) should occur.	Reduce the number of seabirds attached to vessels.
General measures		
Area closures	Avoiding fishing at during periods of intense bird foraging activity.	Reduce seabird bycatch.

TABLE C2 Pelagic longline fisheries

Mitigation	Description	Objective of mitigation action
Branch line weighting—recommended for simultaneous use with night setting and bird scanning	Branch lines should be weighted to sink the baited hooks rapidly out of the diving range of feeding seabirds. Recommended minimum standards for branch line weighting configurations are either: • 40 grams or greater attached within 0.5 metres of the hook • 60 grams or greater attached within 1 metre of the hook, or • 80 grams or greater attached within 2 metres of the hook.	Reduce seabird attacks on baited hooks.
Night setting—recommended for simultaneous use with branch line weighting and bird scanning	Most vulnerable seabirds are inactive at night. Setting longlines at night, between nautical twilight and nautical dawn, avoids contact with seabirds.	Reduce seabird bycatch.
Bird-scaring lines for vessels >35 metres long—recommended for simultaneous use with branch line weighting and night setting	Bird-scaring lines run from a high point at the stern (minimum of 8 metres above the water at the stern) to a device or mechanism that creates drag at its terminus, and consistently achieve an aerial extent of 100 metres. Vessels >35 metres long should use two bird-scaring lines, one on each side of the sinking longline. Streamers for vessels >35 metres long should be brightly coloured and a mix of long and short, placed at intervals of no more than 5 metres.	Reduce seabird attacks on baited hooks.
Hook-shielding devices—recommended for use in addition to the other mitigation measures listed in Table C2 (where required)	Hook-shielding devices to be deployed before setting to deter birds from accessing baited hooks. Hook-shields should be positioned at the hook and encapsulate the barb and point of the hook during setting. Hook shields should remain attached till they reach a minimum depth of 10 metres or a minimum immersion time of 10 minutes. Hook shields should meet minimum standards for branch line weighting.	Reduce risk of seabird bycatch on baited hooks.
Cables		
Time-area fishery closures	Temporary closure to fishing of important seabird foraging areas (for example, areas adjacent to important seabird colonies during the breeding season or highly productive waters when large numbers of aggressively feeding seabirds are present).	Avoid seabird bycatch.

TABLE C3 Demersal longline fisheries

Mitigation	Description	Objective of mitigation action
General		
Area and seasonal closures	Temporary closure to fishing of important seabird foraging areas (for example, near seabird colonies during the breeding season, when large numbers of aggressively feeding seabirds are present).	Reduce seabird bycatch.
Line setting		
Line weighting	Lines should be weighted to get the baited hooks rapidly out of the range of feeding seabirds. Weights should be deployed before line tension occurs to ensure that the line sinks rapidly out of reach of seabirds.	Reduce seabird attacks on baited hooks.
External weighted line: Spanish system	In the Spanish system the buoyant longlines are deployed with steel weights (minimum 5 kilograms) attached at intervals of 4 metres to make them sink.	Reduce seabird attacks on baited hooks.
External weighted line: Chilean method	This variant of the traditional Spanish double-line method uses a net sleeve or cachalotera, which envelops captured fish during hauling. Hooks are clustered on secondary lines that have steel weights (minimum of 5 kilograms) attached at intervals of 40 metres. Weights are deployed directly below the hooks. Hook-bearing lines sink in a vertical profile, resulting in very fast hook sink rates.	Reduce seabird attacks on baited hooks.
External weighted line: autoline	Autoline gear consists of a single line with steel weights (minimum of 5 kilograms) at intervals of 40 metres. These lines sink fast and consistently, with a near-linear profile from the surface.	Reduce seabird attacks on baited hooks.
Night setting	Most vulnerable seabirds are inactive at night. Setting longlines at night, between nautical twilight and nautical dawn, avoids contact with seabirds.	Reduce seabird bycatch.
Bird-scaring lines for vessels >35 metres long	Bird-scaring lines run from a high point at the stern to a device or mechanism that creates drag at its terminus. Vessels >35 metres long should use two bird-scaring lines, one on each side of the sinking longline. Streamers for vessels >35 metres long should be brightly coloured and a mix of long and short, placed at intervals of no more than 5 metres.	Reduce seabird attacks on baited hooks.

continued ...

TABLE C3 Demersal longline fisheries continued

Mitigation	Description	Objective of mitigation action
Bird-scaring lines for vessels <35 metres long	Bird-scaring lines run from a high point at the stern to a device or mechanism that creates drag at its terminus. Small vessels should use a single bird-scaring line—either long and short streamers or short streamers only. Streamers for vessels <35 metres long should be brightly coloured. Short streamers (>1 metre long) should be placed at intervals of 1 metre along the length of the aerial extent.	Reduce seabird attacks on baited hooks.
Offal and discard management	Offal and discards should be retained on board. If this is not possible, these should be either retained on board during hauling (preferable) or released on the opposite side of the vessel to the hauling bay.	Reduce seabird bycatch.
Line hauling		
Bird exclusion device (BED/brickle curtain)	A BED or brickle curtain is a horizontal support several metres above the water that encircles the entire line-hauling bay. Vertical streamers are positioned between the support and water surface.	Deter birds from flying into the area where the line is being hauled and prevent birds that on the surface from swimming into the hauling bay area.
Offal and discard management	Offal and discards should be retained on board. If this is not possible, these should be either retained on board during hauling (preferable) or released on the opposite side of the vessel to the hauling bay.	Reduce seabird bycatch.

Appendix D

Principles for recreational fishing codes of practice

Principle 1 Reduce seabird attraction to fishing activity

- Avoid bird feeding and nesting areas.
- Look out for diving birds, which may take bait when lines are cast.
- Avoid discarding fish waste in areas where you are actively fishing.
- Avoid fishing near fish-cleaning tables because seabirds are attracted to these areas.

Principle 2 Use responsible fishing practices

- Do not leave your fishing equipment unattended at any time.
- Avoid using alloy or stainless steel hooks; these remain intact indefinitely and can cause serious or fatal infections in seabirds.
- Use single hooks, barbless hooks and circle hooks to minimise harm.
- Don't leave anything behind—take all your tackle home and dispose of discarded fishing line, other gear or rubbish responsibly.

Principle 3 Promote best-practice hook removal

- If you accidently hook a bird, carefully pull the bird in and if possible carefully de-hook it.
- If the hook is too deep to remove, contain the bird and call for help, or take it to the nearest vet so the hook can be surgically removed. Most vets will treat native wildlife for free.
- If the bird breaks free of the line, call for help immediately and keep the creature in sight so that a rescuer can find it.

Principle 4 Promote best-practice seabird handling

- Keep handling to a minimum to avoid causing stress to an injured seabird. Remain calm, speak quietly and refrain from sudden movements.
- Immobilise the beak and feet with a firm hold and gently restrain the rest of the bird.
- Do not hold birds around the neck. This restricts breathing and can cause muscle damage.
- When handling birds with long legs, hold the legs of the bird at the top of the femur where the legs and body meet. Hold the bird at waist height, away from your face.
- Protect your eyes and other body parts from birds with sharp beaks and claws.
- To minimise stress, attempt to create a quiet, dark, ventilated and temperature-controlled environment when holding and transporting birds.

Appendix E

Voluntary implementation actions

Objective 1

Understand the extent of the incidental catch of seabirds.

TABLE E1 Actions to achieve Objective 1, NPOA–Seabirds

Action	Responsible	Time frames
1.1 Conduct a qualitative or quantitative assessment of the level of incidental catch of seabirds and current use of mitigation measures in all relevant fisheries (Appendix A).	• Fisheries management agencies	By 2019
1.2 Develop a national data standard for logbook reporting of incidental catch of seabirds and the use of mitigation measures in commercial fisheries (Appendix B).	• Department of Agriculture and Water Resources • ABARES	By 2019
1.3 Implement national data standard for logbook reporting, ensuring comparable, representative and verifiable time-series information.	• Fisheries management agencies	By 2020
1.4 Identify gaps in existing monitoring and data collection programs for recreational fishing to understand the incidental catch of seabirds.	• Fisheries management agencies • Department of the Environment and Energy	By 2021
1.5 In capture fisheries with uncertain seabird catch levels, conduct independent monitoring to provide impartial and representative data.	• Fisheries management agencies • Commercial fisheries	By 2021
1.6 Investigate potential for additional tools for seabird identification, such as morphological diagnostic tools or DNA identification kits.	• Fisheries management agencies • Industry bodies • Research and development institutions	By 2020
1.7 Analyse collected information to determine the extent of incidental catch of seabirds in capture fisheries.	• Department of Agriculture and Water Resources (lead) • ABARES • Australian Fisheries Management Forum subcommittee	By 2020

Source: ABARES (forthcoming)

Objective 2

Have best-practice seabird bycatch mitigation in capture fisheries to:

- minimise or, where practicable, eliminate the incidental catch of seabirds
- contribute towards achieving and maintaining a favourable conservation status for seabirds.

TABLE E2 Actions to achieve Objective 2, NPOA–Seabirds

Action	Responsible	Time frames
2.1 Identify and review use of existing mitigation measures in all relevant capture fisheries against best practice (using ACAP advice where appropriate).	• Fisheries management agencies • Department of the Environment and Energy	By 2020
2.2 Assess the need for mitigation practices in all capture fisheries and implement best-practice mitigation where identified.	• Fisheries management agencies	By 2021

ACAP Agreement on the Conservation of Albatrosses and Petrels.

Objective 3

Promote development of innovative mitigation procedures and technologies that are feasible, effective and efficient.

TABLE E3 Actions to achieve Objective 3, NPOA–Seabirds

Action	Responsible	Time frames
3.1 Encourage and support innovation in mitigation, including through research, development and extension.	• Fisheries management agencies • Department of Agriculture and Water Resources • Department of the Environment and Energy • Commercial fisheries • Recreational fishing representative organisations	Ongoing
3.2 Assess the need for changed mitigation practices in all capture fisheries and implement best-practice mitigation where identified.	• Fisheries management agencies	By 2019
3.3 Develop national guidelines for conducting research on seabird bycatch mitigation.	• Department of Agriculture and Water Resources • Department of the Environment and Energy	By 2019
3.4 Develop a set of effective technologies that can be applied to different fisheries.	• Fisheries management agencies	By 2019
3.5 Develop management arrangements that complement best-practice mitigation measures.	• Fisheries management agencies	By 2019

Objective 4

Increase awareness and understanding of the incidental catch of seabirds and best-practice mitigation.

TABLE E4 Actions to achieve Objective 4, NPOA–Seabirds

Action	Responsible	Time frames
4.1 Incorporate within commercial and recreational education programs information about the incidental catch of seabirds and effective mitigation techniques.	• Fisheries management agencies • Commercial fisheries • Non-government environmental groups	By 2019
4.2 Promote methods for recognising and reporting interactions with seabirds.	• Fisheries management agencies • Commercial fisheries • Non-government environmental groups	Ongoing
4.3 Develop and promote duty of care and seabird handling techniques, especially for hooked and entangled seabirds.	• Fisheries management agencies • Commercial fisheries • Non-government environmental groups	Ongoing
4.4 Provide guidance and raise awareness on best practice for minimising interactions with fishing gear and discarded gear.	• Fisheries management agencies	Ongoing
4.5 Promote best-practice mitigation of seabird interactions in codes of conduct.	• Fisheries management agencies • Commercial fisheries • Non-government environmental groups	Ongoing

Objective 5

Promote adoption of effective mitigation measures in regional fisheries and conservation bodies.

TABLE E5 Actions to achieve Objective 5, NPOA–Seabirds

Action	Responsible	Time frames
5.1 Advocate for effective mitigation measures in regional fisheries and conservation bodies.	• Australian Government agencies on behalf of the government	Ongoing
5.2 Encourage collaborative research between countries.	• Australian Government agencies on behalf of the government	Ongoing

Glossary

Term	Definition
ACAP	International Agreement on the Conservation of Albatrosses and Petrels.
AFMF	Australian Fisheries Management Forum, an informal network for sharing information between Australian, state and territory government agencies involved in managing fisheries and aquaculture in Australia.
bycatch	A species that is incidentally taken in a fishery and returned to the sea or killed or injured (but not taken) as a result of interacting with fishing equipment in the fishery.
capture fishery	Refers to all kinds of harvesting of naturally occurring living fish resources, including industrial, small-scale and recreational fishing.
ecologically sustainable development	under the *Environment Protection and Biodiversity Conservation Act 1999* this is defined as using, conserving and enhancing community resources to maintain ecological processes and ensure quality of life into the future.
incidental catch	See 'bycatch'.
interaction	Any physical contact with a species and all catches (for example, hooked, netted, entangled), discards, releases and collisions with these species.
IPOA–Seabirds	The FAO's International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries.
NPOA–Seabirds	National Plan of Action for Minimising the Incidental Catch of Seabirds in Australian Capture Fisheries.
offal (marine)	Discarded waste from processing fish (such as discarded fish and other organisms and unused baits), discarded food and food scraps.
seabird	A species of the class Aves that frequents coastal waters and the open ocean, such as albatrosses, cormorants, gannets, gulls, pelicans, petrels and shearwaters.
TAP–Seabirds	Australia's Threat Abatement Plan 2014 for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations.

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Australian Antarctic Division

THREAT ABATEMENT PLAN

for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations (2018)

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Glossary

ACAP	*Agreement on the Conservation of Albatrosses and Petrels*, done 19 June 2001, 2258 UNTS 257 (entered into force 1 February 2004).
AFMA	Australian Fisheries Management Authority.
Antarctic Fishery	An existing, new and exploratory fishery operating under the framework of the *Convention on the Conservation of Antarctic Marine Living Resources*, done 20 May 1980, 1329 UNTS 47 (entered into force 7 April 1982).
Australian Fishing Zone	Area of waters between three nautical miles and 200 nautical miles seaward of the baselines.
Branch line	Secondary line with an individual baited hook and attached to the mainline of a longline by a clip.
Bycatch	Unintentional catch of a seabird during longline fishing.
Bycatch rate	Number of seabirds observed caught per 1000 hooks set during longline fishing (see also definition of *interaction*).
Caught	Where a seabird is either hooked or entangled in fishing gear, regardless of whether the seabird is landed on board the fishing vessel.
CMS	*Convention on the Conservation of Migratory Species of Wild Animals*, done 23 June 1979, 1651 UNTS 333 (entered into force 1 November 1983).
Coral Sea Fishery	A fishery defined under the *Fisheries Management Regulations 1992* and managed under the *Fisheries Management Act 1991*.
Criteria	Maximum permissible bycatch rate at or above which a management response is required.
Dead seabird	A seabird caught by a longline shall be considered to be dead if: 1. it is obviously dead (i.e. shows no muscle movement or corneal reflex); or 2. it is landed alive, but displays any of the following pathologies that may lead to death on its release: a. fracture of a wing bone, a leg bone or beak; b. broken feather shafts on more than two primary feathers on either wing; c. substantial damage to the patagial tendon (indicated by a drooping wing or the inability to fly upon release); d. an open wound (other than superficial injuries in which there is no subcutaneous muscle damage); e. waterlogged or hydrocarbon-soiled plumage; or f. any bird released with a hook in situ.

Demersal fish	Fish that live close to or in contact with the seabed.
Electronic monitoring system	Video recording system involving cameras positioned on a fishing vessel enabling fishing operations (including setting and hauling) to be recorded, and where the recordings are subject to independent auditing. Auditing is conducted for fishery management purposes including to ensure accurate reporting by fishing concession holders of hooks set, seabird interactions and the effectiveness of mitigation measures.
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999.*
Eastern Tuna and Billfish Fishery	A fishery defined in the *Eastern Tuna and Billfish Fishery Management Plan 2010* (AFMA 2016a).
Fishing areas	Areas within the Eastern Tuna and Billfish Fishery or Western Tuna and Billfish Fishery south of the parallel of 25 degrees South divided for the purposes of the criteria into five degree latitudinal bands.
Fishing gear	Any longline fishing gear deployed by a fishing vessel including seabird mitigation devices.
Fishing operator	Legal or natural person who holds a fishing concession, as defined under the *Fisheries Management Act 1991.*
Fishing seasons	Seasons defined, for the purposes of the criteria, into two: summer 1 September–30 April, and winter 1 May–31 August.
Heard Island and McDonald Islands Fishery	A fishery defined in the *Heard Island and McDonald Islands Fishery Management Plan 2002* (AFMA 2016b).
Independent monitoring	Using an AFMA scientific observer or other independent observer approved by AFMA and/or an electronic monitoring system approved by AFMA to independently monitor and record fishing activities including seabird bycatch.
Interaction	In the context of this threat abatement plan an interaction with a seabird occurs where a seabird is observed as caught under one of the following situations: 1. dead not landed on board – birds observed to be killed by direct interaction with fishing gear, but not landed on the fishing vessel; 2. dead landed on board – birds killed by direct interaction with fishing gear and landed on the fishing vessel; 3. alive landed on board the fishing vessel following direct interaction with fishing gear: a. injured; or b. released uninjured; or

	4. alive and released while not on board the fishing vessel following direct interaction with fishing gear: a. injured; or b. released uninjured.
IUCN	International Union for Conservation of Nature.
Longline fishing	Setting and hauling of one or more single lines (mainline) that contains many individual hooks on branch lines. The mainline can either be anchored or drifting. It can be oriented vertically or horizontally, and vary considerably in length and number of hooks. Longline fishing includes using any configuration of a pelagic or drifting longline, demersal longline, trotline, or dropline (AAD 2005).
Macquarie Island Toothfish Fishery	A fishery defined in the *Macquarie Island Toothfish Fishery Management Plan 2006* (AFMA 2016c).
Night	Period after nautical dusk and before nautical dawn. Nautical dusk and nautical dawn are defined as set out in the Nautical Almanacs for relevant latitude, local time and date.
Night setting	Setting of all hooks deployed by a fishing vessel during night.
Observed caught	Number of seabirds observed as caught by an AFMA scientific observer or other independent observer approved by AFMA, and/or reported as caught by the fishing operator in compliance with arrangements for the fishery where longline fishing is subject to independent monitoring using an electronic monitoring system approved by AFMA.
Observed hooks set and hauled	Number of hooks observed as set and hauled by an AFMA scientific observer or other independent observer approved by AFMA, and/or reported as set and hauled by the fishing operator in the logbook records in compliance with arrangements for the fishery, where longline fishing is subject to independent monitoring using an electronic monitoring system approved by AFMA.
Offal	Discarded waste from the processing of fish (including, among other things, discarded fish and other organisms, and used baits). The discharge of offal from fishing vessels is regulated by Part 12 of the *Fisheries Management Regulations 1992*.
Pelagic finfish	Fish that live in the upper layers of the sea.
Seabird	A bird that frequents the sea or coast. For the purposes of the criteria established by this plan, a seabird includes all species in the Class Aves that are caught by any part of the fishing gear and observed to be either dead or alive.

Southern and Eastern Scalefish and Shark Fishery	A fishery defined in the *Southern and Eastern Scalefish and Shark Fishery Management Plan 2003* (AFMA 2016d).
Stakeholder group	Forum established by the Department of the Environment and Energy to discuss implementation and effectiveness of provisions of this threat abatement plan. Participation includes representatives from government, the fishing industry, and environmental non-governmental organisations and experts closely involved with alleviating the impact of longline fishing on Australian seabirds.
Western Tuna and Billfish Fishery	A fishery defined in the *Western Tuna and Billfish Fishery Management Plan 2005* (AFMA 2016e).

Summary

Oceanic longlining is a fishing method used to target pelagic and demersal fish species. Longlining occurs in almost all Australian waters.

The adverse impact of longline fishing activities on seabirds was not fully realised until the 1980s. The incidental catch (or bycatch) of seabirds during oceanic longline fishing operations was listed by the then Minister as a key threatening process on 24 July 1995. Threat abatement plans for this key threatening process have been in place since 1998 with the current plan, *Threat Abatement Plan the incidental catch (or bycatch) of seabirds during longline fishing operations (2018)*, made in 2018. The ultimate aim of this plan is to achieve zero bycatch of seabirds from longline fishing in Commonwealth fisheries.

Considerable progress has been made under successive threat abatement plans to reduce the impact of longlining on seabirds. This has been achieved through the combined efforts of the fishing industry, researchers and non-governmental stakeholders working with government to reduce seabird bycatch in longline fisheries in a feasible, effective and efficient way. The prescriptions in this plan recognise this success and seek to further reduce the incidental capture of seabirds.

Threat abatement plans provide a national strategy to guide the activities of government, industry and research organisations in abating the impact of key threatening processes. The content of a plan must provide for the research, management and other actions necessary to reduce the key threatening process to an acceptable level. Content requirements and matters to be taken into consideration are outlined in s 271 of the *Environment Protection and Biodiversity Conservation Act 1999*. Accordingly, this plan, among other things, states the objective to be achieved; specifies the actions to achieve the objective; states the criteria to measure performance of the plan; identifies the organisations and persons involved in evaluating the performance of the plan; and identifies albatross and other seabird species affected by the key threatening process. The plan is subject to review within five years.

Introduction

This *Threat Abatement Plan for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations (2018)* replaces the *Threat Abatement Plan 2006 for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations* (Department of the Environment and Heritage 2006) that was varied by the *Threat Abatement Plan 2014 for the incidental catch (or bycatch) of seabirds during longline fishing operations* (Department of the Environment 2014). It has been developed by the Department of the Environment and Energy to continue to implement existing, as well as new actions needed to abate the listed key threatening process of incidental catch (or bycatch) of seabirds during oceanic longline fishing operations in a feasible, effective and efficient way. The plan binds the Commonwealth and its agencies in responding to the impact of longline fishing activities on seabirds, and identifies the research, management and other actions needed to reduce the impacts of this key threatening process on affected seabird species. The plan will be reviewed within five years.

Threat abatement plans

Under s 270A of the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) the Commonwealth Government develops threat abatement plans; implements the actions under these plans that are its direct responsibility; and facilitates the implementation of actions where other groups share the implementation responsibilities (e.g. fishers, states and territories). Part 13 of the EPBC Act describes the process, content and consultation required when making or varying a threat abatement plan. The legislation requires the Government to implement the plans to the extent to which they apply in areas under Commonwealth control and responsibility. In addition, government agencies must not take any actions that contravene a threat abatement plan. Where a plan applies outside Commonwealth areas in states or territories, the Commonwealth must seek the cooperation of the affected jurisdiction, with a view to jointly implementing the threat abatement plan.

Background

Oceanic longline fishing is a method used to target pelagic and demersal fish species. This method involves setting one or more single mainlines containing many individual hooks on branch lines. The mainline can either be anchored or drifting. It can be oriented vertically or horizontally in the water column, and can vary considerably in length and number of hooks. Longline fishing includes using any configuration of a pelagic or drifting longline, demersal longline, trotline, or dropline (AAD 2005). Longline fishing occurs in almost all Australian waters today. The adverse impact of longline fishing activities on seabirds was not fully realised until the 1980s when seabird bycatch was first reported and then documented (e.g. Brothers 1991; Morant et al, 1983; Tomkins 1985; Weimerskirch & Jouventin 1987).

The incidental catch (or bycatch) of seabirds during oceanic longline fishing operations was listed by the then Minister as a key threatening process on 24 July 1995. Under Commonwealth legislation, now the EPBC Act, an initial threat abatement plan was prepared and approved by the then Minister in 1998. Following review after five years a second plan was approved by the then Minister in 2006. A review of that plan was undertaken in 2011 with a variation released in 2014. This *Threat Abatement Plan for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations (2018)* replaces the plan made in 2006 (as varied).

This threat abatement plan meets the requirements of the EPBC Act and coordinates national action to alleviate the impact of longline fishing activities on seabirds in Australian waters. Its content reflects changes and improvements which have occurred during the life of the previous plan and highlights the expectation of best and improving practice in all longline fisheries in achieving the ultimate goal and interim objective of this plan. It applies to all longline fisheries under Commonwealth jurisdiction.

Historically, seven longline fisheries operating in the Australian Fishing Zone have been identified as having significant and potential seabird bycatch problems: Antarctic Fishery, Coral Sea Fishery, Eastern Tuna and Billfish Fishery, Heard Island and McDonald Islands Fishery, Macquarie Island Toothfish Fishery, Southern and Eastern Scalefish and Shark Fishery (scalefish hook, shark hook and automatic longline sectors), and Western Tuna and Billfish Fishery (AAD 2005). These fisheries are managed by the Australian Fisheries Management Authority (AFMA). Over the life of the previous threat abatement plans, substantial progress has been achieved towards reducing the key threatening process in each fishery. The incidental bycatch rates in several fisheries are now generally well below 0.01 or 0.05 birds per 1000 hooks in each fishing season and fishing area, the maximum permissible levels set as a performance indicator under the previous plan. The prescriptions in this plan recognise this success and seek to further reduce the incidental capture of seabirds.

Information on the level and nature of interactions between seabirds and fishing gear has increased significantly since 1995, and there is now extensive information available upon which to base decision-making. Considerable research and development activities have been undertaken into seabird bycatch mitigation measures including at-sea trials. This work could not have been achieved without the continued engagement and support of industry.

The prescriptions in this threat abatement plan also draw on best and improving practices in seabird bycatch mitigation for longline fishing developed under the *Agreement on the Conservation of Albatrosses and Petrels* (ACAP) (ACAP 2016a; 2016b). This international agreement, to which Australia is a Party, aims to achieve and maintain a favourable conservation status for albatrosses and petrels. ACAP has been developed under the auspices of another international agreement, the *Convention on the Conservation of Migratory Species of Wild Animals* (CMS).

There is now increased confidence concerning the effectiveness of several mitigation measures, particularly line weighting strategies, use of bird-scaring lines, retention of offal during line setting and hauling, night setting (in certain instances), spatial and temporal closures, and use of hook-shielding devices (ACAP 2016a; 2016b). These mitigation measures form the basis of the prescriptions set out in this threat abatement plan.

This threat abatement plan is closely linked to other plans and policies concerning seabird species, particularly the *Threat Abatement Plan for the impacts of marine debris on vertebrate marine life* (Department of the Environment and Energy 2017); Australia's *National Plan of Action for minimising the incidental catch of seabirds in Australian capture fisheries* (DAWR 2017b) that has been prepared to meet Australia's commitment to the *International Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries* (FAO 1999) and associated technical guidelines (FAO 2009); and the *Commonwealth Fisheries Bycatch Policy* (DAWR 2017a) that is near finalisation. This threat abatement plan relies on recovery plans to collect specific data on population trends of those threatened seabird species found breeding in Australia. Of particular relevance is the *National recovery plan for threatened albatrosses and giant petrels* (DSWEPC 2011), which updates the first recovery plan for albatrosses and giant petrels that was released in 2001. The recovery plan sets out a coordinated conservation strategy for albatrosses and giant petrels listed as threatened under the EPBC Act. It considers threats to albatrosses and giant petrels both at terrestrial breeding sites and at sea in their foraging habitat.

This threat abatement plan represents an important component of Australia's domestic contribution to the global conservation of seabirds by managing the threat of incidental catch (or bycatch) of seabirds during longline fishing operations. However, conservation of migratory seabird species relies on more than Australian action. Mitigation strategies, such as those outlined in this plan, should also be applied during oceanic longline fishing operations in international waters and waters under the jurisdiction of other nations, particularly those in the southern hemisphere. Australia is actively pursuing such action through, among other things, those regional fisheries management organisations to which it is a Party, the Commission for the Conservation of Antarctic Marine Living Resources, ACAP and CMS.

The following sets out the threat abatement plan for the listed key threatening process of *incidental catch (or bycatch) of seabirds during oceanic longline fishing operations*.

Objective

Threat abatement plans must state the objective to be achieved (EPBC Act s 271(2)(a)). The ultimate aim of this threat abatement plan is to achieve a zero bycatch of seabirds, especially threatened albatross and petrel species, in all longline fisheries. However, using currently available mitigation methods, this aim may not be realistic in the short-term, although it is expected that improved and emerging mitigation measures will mean near-zero bycatch is feasible within the life of this plan. Therefore, the objective of this threat abatement plan is to seek to further reduce the seabird bycatch and bycatch rate during oceanic longline fishing operations in the Australian Fishing Zone.

As many seabird species have large distributional ranges, actions by Australia alone are unlikely to be sufficient to prevent any decline in some populations. Accordingly, Commonwealth Government agencies will pursue, in additional to domestic actions under this threat abatement plan, the global adoption of bycatch and other threat mitigation strategies through international conservation and fisheries management forums.

The objective of this threat abatement plan is to be achieved through six key actions:

1. **Mitigation** – effective measures will continue to be applied, both through legislative frameworks and fishing practices, to avoid seabird bycatch or minimise seabird bycatch and bycatch rates, recognising the importance of other factors such as safety, practicality and the characteristics of the fishery.

2. **Education** – results from data analysis will continue to be communicated throughout the community, stakeholder groups and international forums, and programs will continue or be established to provide information and education to longline operators.

3. **International initiatives** – advocacy in international conservation and fisheries management forums in support of global adoption of seabird bycatch mitigation measures across the range of affected seabird species including trigger and other limits, and effective bycatch and other threat mitigation methods that are complementary with those outlined in this threat abatement plan.

4. **Research and Development and Uptake** – continued support of research into developing and reviewing the efficiency, effectiveness and uptake of new and improved mitigation measures.

5. **Innovation** – innovation in ‘bird friendly’ fishing measures and devices will continue to be encouraged.

6. **Data collection and analysis** – data will be collected and analysed to assess the performance of this threat abatement plan including mitigation measures and to improve knowledge of seabird-longline interactions and the conservation status of seabirds.

Actions to achieve the objective

Threat abatement plans must specify actions needed to achieve the objective(s) (EPBC Act s 271(2)(c)). This threat abatement plan requires that government agencies identified below implement the following actions. The EPBC Act also requires that all government agencies act in a manner that is consistent with and does not undermine the provisions of this plan.

Mitigation actions

1. AFMA will require all pelagic longline tuna fishers operating within either the Eastern Tuna and Billfish Fishery or the Western Tuna and Billfish Fishery, or both fisheries, southwards of the parallel of 25 degrees South to:

    a. employ a line-weighting strategy approved by AFMA that enables the bait to be rapidly taken below the reach of most seabirds;

    b. employ either of the following:

        i. at least one bird-scaring line constructed to a specified standard approved by AFMA, or use another proven mitigation measure approved by AFMA for use without such a line; or

        ii. only set longlines at night;

    c. not discharge offal during line setting; and

    d. employ, as part of an adaptive management approach to seabird bycatch mitigation, such other mitigation measures as AFMA may stipulate following consultation with the Department of the Environment and Energy

    (including, but not limited to, use of bird scaring lines, bird exclusion devices and/or managing offal discharge during line hauling, night setting, and area closures).

2. AFMA will continue to require domestic and foreign vessels in all longline 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. The relevant requirements for each fishery are summarised in Table 1 below.

Table 1 Summary of seabird bycatch mitigation measures in longline fisheries (the following provides information about seabird bycatch mitigation measures for longline fisheries affected by this threat abatement plan, as at 1 February 2018).

Mitigation	Antarctic Fishery	Coral Sea Fishery		Eastern Tuna and Billfish	Heard Island and McDonald Islands Fishery
		Autolongline	Other line		
Bird scaring line (tori line)	√	√		√ (or night setting)	√ (2 tori lines)
Line weighting	√			√ (or hook-shields)	√
Night setting	√ (if limit exceeded)			√ (or tori line)	Undertaken
Offal management	√	√	√	√ (setting only)	√
Bird exclusion devices	Encouraged				√
Hook-shields				√ (or line weighting)	
Deck lighting	√				√
Observers	√	√ (upon request)	√ (upon request)	√ (upon request)	√
Electronic monitoring				√	
Season closures*	√				√
Area closures*	√			√	√
Performance criteria	√	√	√	√	√
Absolute number limits	√				√

* Where closure of an area or season is for seabird conservation purposes, as opposed to fishery management purposes.

Mitigation	Macquarie Island Toothfish Fishery	Southern and Eastern Scalefish and Shark Fishery		Western Tuna and Billfish Fishery
		Autolongline	Set demersal longline**	
Bird scaring line (tori line)	√ (2 tori lines)	√		√ (or night setting)
Line weighting	√	√		√ (or hook-shields)
Night setting	√	√ (if criterion exceeded)		√ (or tori line)
Offal management	√	√	√	√ (setting only)
Bird exclusion devices	√	√		
Hook-shields				√ (or line weighting)
Deck lighting	√			
Observers	√	√ (upon request)	√ (upon request)	√ (upon request)
Electronic monitoring		√	√	√
Season closures*	√			
Area closures*	√			
Performance criteria	√	√	√	√
Absolute number limits	√			

* Where closure of an area or season is for seabird conservation purposes, as opposed to fishery management purposes.

** Scalefish hook, and shark hook sectors.

3. AFMA will implement an appropriate management response in a longline fishery (described in Table 2 below) if the circumstances described in the table below occur, or data analysis indicates that the performance criteria, defined in this threat abatement plan, have not been met in any fishing area, season or fishery, or that independent monitoring has dropped below acceptable levels. Consistent with an adaptive management approach, the management response will be implemented as soon as practical, but no later than within three months of identification of a problem.

Table 2. Management responses in longline fisheries to bycatch incidents, when performance criteria are exceeded, and when independent monitoring does not meet coverage levels

Problem	Management response
1. Bycatch incidents where more than one seabird is observed caught on a single trip by an individual longline fishing vessel	AFMA will investigate and determine if the cause was as a result of inadequate or non-compliant implementation of mitigation measures and/or a lack of effectiveness of mitigation measures. In the event of non-compliance, AFMA will take appropriate corrective action, including monitoring of future compliance. Any information of possible ineffectiveness of mitigation measures will be reviewed in consultation with the Department of the Environment and Energy and agreement reached on what corrective and monitoring actions, if any, are required.
2. Criterion for a longline fishery exceeded in a fishing area or fishery during one season	AFMA will: a. review the mitigation measures currently deployed in the fishing area or fishery and the relevant circumstances — environmental conditions and fishing practices including compliance — this review will include examination of all relevant seabird interaction data, independent monitoring reports and other information; b. assess, in consultation with the Department of the Environment and Energy, whether it is feasible and desirable to further improve existing mitigation measures; and c. if identified, implement improved mitigation measures designed to enable the criterion to be achieved in future.
3. Criterion for a longline fishery exceeded in a fishing area or fishery in the next corresponding season	AFMA will implement additional mitigation measures, if identified, for individual vessels that have exceeded the criterion. AFMA must consider suspension from fishing using longline fishing methods until AFMA and the Department of the Environment and Energy are satisfied with mitigation measures implemented on affected vessels. AFMA may also close the fishing area or fishery to fishing using longline fishing methods until AFMA and the Department of the Environment and Energy are satisfied that mitigation measures are available for deployment to enable the criterion to be achieved.

Problem	Management response
4. Independent monitoring of a fishing area, fishery and/or season does not meet coverage levels in the criteria	AFMA will take such actions as are necessary to promptly increase independent monitoring levels to meet specified levels.

4. AFMA will consider the different demersal longline sectors in the Southern and Eastern Scalefish and Shark Fishery (scalefish hook, shark hook and scalefish automatic longline) when applying a management response.

5. AFMA will take into account the conservation status of seabirds caught during longline fishing operations in determining whether a more rigorous management response is required, in addition to that required in Table 2 (see above).

6. AFMA and the Department of the Environment and Energy will report annually to the stakeholder group on progress towards achieving the objective of this threat abatement plan, implementation of actions under the plan, and changes to the conservation status of threatened seabird species.

7. AFMA will implement extension and training programs for longline fishers, where appropriate.

8. AFMA will implement a risk based compliance strategy to ensure that all requirements of this threat abatement plan relevant to the mitigation of seabird bycatch are complied with. AFMA will provide to the stakeholder group annual summary compliance reports. These reports will include an assessment of the effectiveness of implementation of all mitigation measures, and will describe any incidents of non-reporting of interactions or mortalities in Australia's domestic and high seas oceanic longline fisheries.

9. AFMA and the Department of Agriculture and Water Resources will communicate the results of implementing this threat abatement plan, and will promote seabird bycatch mitigation and the need to use effective mitigation measures to foreign fishers through international fisheries forums. This advocacy will focus on ensuring that seabird bycatch mitigation measures across the range of affected seabird species are complementary with those outlined in this threat abatement plan. The Department of Agriculture and Water Resources will report annually to the stakeholder group on progress made on this action.

10. The Department of the Environment and Energy will communicate the results of implementing this threat abatement plan. It will promote seabird bycatch mitigation and the need to use effective mitigation measures in relevant international conservation forums, including ACAP and CMS. This advocacy will focus on ensuring that seabird bycatch mitigation measures across the range of affected seabird species are complementary with those outlined in this threat abatement plan. The Department of the Environment and Energy will report annually to the stakeholder group on progress made on this action.

Research and development, and innovation

11. AFMA, the Department of Agriculture and Water Resources and the Department of the Environment and Energy will promote and support research and development of new and existing mitigation measures, including by facilitating access to and awareness among stakeholders of fisheries research funding programs, particularly those conducting research and development on measures to mitigate seabird bycatch mortalities.

12. AFMA will support trials of seabird bycatch mitigation measures and devices under operational conditions by granting individual scientific permits to operators. The Department of the Environment and Energy will provide advice to help in ensuring the experimental design of trials is scientifically robust. Measures will be tested for a sufficient amount of fishing effort and in a manner that takes proper account of differences across seasons and between boats, and gives confidence in the results. Once a new seabird bycatch mitigation measure or device has been demonstrated to consistently and effectively meet the threat abatement plan criteria, it may be included in the management arrangements for fisheries.

13. AFMA will encourage innovation in the research, development, adoption and review of effective seabird bycatch mitigation measures and devices including international research.

Other actions

Data collection and analysis

14. AFMA will collect data on the bycatch of seabirds, and effectiveness of mitigation measures. In addition to collecting these data from fishing operator logbook reports AFMA will independently monitor fishing activities through the use of AFMA scientific observers or other independent observers approved by AFMA and/or electronic monitoring systems approved by AFMA. Independent monitoring occurs for a range of fishery management purposes including monitoring seabird bycatch. For the purposes of this threat abatement plan the level of independent monitoring shall be commensurate with the nature and level of seabird bycatch in each fishing area, season and fishery, and will comply with the requirements set out below.

15. The minimum level of on-board observer coverage by AFMA scientific observers or other independent observers is set out in Table 3 below.

Table 3. Minimum on board observer coverage levels for longline fisheries

Fishery	Minimum level of on board observer coverage
Antarctic Fishery	20% of all hooks set, and 40% of all hooks hauled
Coral Sea Fishery	10% of all hooks set and hauled
Eastern Tuna and Billfish Fishery	5% of all hooks set and hauled in each fishing area
Heard Island and McDonald Islands Fishery	20% of all hooks set, and 40% of all hooks hauled
Macquarie Island Toothfish Fishery	20% of all hooks set, and 40% of all hooks hauled
Southern and Eastern Scalefish and Shark Fishery: scalefish hook, shark hook and scalefish automatic longline sectors	10% of all hooks set and hauled in each of the demersal longline sectors
Western Tuna and Billfish Fishery	5% of all hooks set and hauled in each fishing area
All other longline fisheries (including new and developing fisheries)	10% of all hooks set and hauled

16. Video footage collected as part of independent monitoring using an electronic monitoring system will be subject to independent auditing. AFMA will ensure auditing results in accurate reporting by fishing operators of hooks set, seabird interactions and the effectiveness of mitigation measures.

17. AFMA will continue to require that all seabirds killed on longlines deployed by Commonwealth fishing vessels in the Australian Fishing Zone are:

    a. if feasible, brought aboard the vessel;

    b. reported to AFMA;

    c. reported to the Australian Bird and Bat Banding Scheme, if banded;

    d. if feasible, collected whole or tissue sampled for analysis, and stored on board the vessel in a manner that limits decay, while meeting any vessel food safety requirements established by the Department of Agriculture and Water Resources; and

    e. if feasible, either transported, as a whole seabird specimen or tissue sample, to a storage and analysis facility nominated by the Department of the Environment and Energy, or undergo other analysis, as required by the Department with these costs met by the Department.

    The Department of the Environment and Energy will analyse collected seabird specimens or tissue samples to determine, as appropriate, species, subspecies, provenance (where possible), age, sex and breeding status and other relevant circumstances of the bycatch incident.

18. AFMA and the Department of the Environment and Energy will analyse and review seabird-fisheries interactions data to assess seabird bycatch levels by fishing area, season, fishery and fishing method to monitor compliance with the criteria. These analyses will be prepared annually and take into account possible biases in independent monitoring. The analyses will be provided to the stakeholder group and will show, for each fishing area, season and fishery, the observed and overall bycatch rates, together with the species composition of any seabird bycatch, if available.

19. AFMA will ensure that information collection procedures in longline fisheries enable accurate records about the following to be collected by fishing operators and reported through the logbook system, and collected and reported through independent monitoring:

    a. number of seabirds caught;

    b. species of seabirds caught;

    c. life status of seabirds caught;

    d. type of bait used;

    e. fishing gear and mitigation measures used and stage of operation when the seabird bycatch occurred;

    f. time of day/night of line setting and haul;

    g. date and location of the catch; and

    h. external factors (such as weather conditions and moon phase) that may influence seabird bycatch.

20. AFMA will use independent monitoring to validate seabird bycatch data collected by fishing operators and reported through the logbook system, and to identify potential benefits and/or deficiencies in existing programs, and will disseminate any findings among domestic longline fishers, and in relevant international forums, as appropriate.

21. AFMA, the Department of Agriculture and Water Resources and the Department of the Environment and Energy, together with representatives of key stakeholders and relevant experts, will collaborate to consider the impact of actions under this threat abatement plan on other marine species.

Criteria to measure performance of threat abatement plan

Threat abatement plans must state criteria against which achievement of the objective(s) is to be measured (EPBC Act s 271(2)(b)). This threat abatement plan requires that seabird bycatch in all fishing areas, seasons and fisheries is less than the bycatch rates set out in Table 4 below.

Table 4. Bycatch rate performance criteria in longline fisheries

Fishery	Bycatch rate
Antarctic Fishery	0.01 birds per 1000 hooks
Coral Sea Fishery	0.01 birds per 1000 hooks
Eastern Tuna and Billfish Fishery	0.05 birds per 1000 hooks in each fishing area
Heard Island and McDonald Islands Fishery	0.01 birds per 1000 hooks
Macquarie Island Toothfish Fishery	0.01 birds per 1000 hooks
Southern and Eastern Scalefish and Shark Fishery: scalefish hook, shark hook and scalefish automatic longline sectors	0.01 birds per 1000 hooks in each of the demersal longline sectors
Western Tuna and Billfish Fishery	0.05 birds per 1000 hooks in each fishing area
All other longline fisheries (including new and developing fisheries)	0.01 birds per 1000 hooks

Seabird bycatch occurs where a seabird is observed caught during longline fishing (see also the definition of *interaction*). This is the number of seabirds reported caught: (a) by an AFMA scientific observer or other independent observer approved by AFMA on board the fishing vessel, and/or (b) by the fishing operator in the logbook records in compliance with arrangements for the fishery where longline fishing is subject to independent monitoring using an electronic monitoring system approved by AFMA.

AFMA will monitor performance against these criteria at a fishery level and/or for individual vessels. AFMA may, as appropriate, hold individual vessels responsible for meeting the criteria and apply a management response to vessels that breach the criteria.

These criteria have been set on the basis of annual fishing levels at the time this threat abatement plan was approved. Trends in fishing effort will be reviewed annually and, if fishing levels increase or decrease significantly (by more than 20 per cent), AFMA and the Department of the Environment and Energy may review the maximum permissible bycatch rates identified above, taking into account spatial and temporal trends, and the vulnerability of seabird species encountered. AFMA, the Department of Agriculture and Water Resources and the Department of the Environment and Energy, may arrange more sophisticated analyses in any instances where bycatch rates are close to the maximum permissible levels and are uncertain.

Duration and cost of threat abatement process

Threat abatement plans may identify the duration and cost of the threat abatement process (EPBC Act s 271(4)(a)). This threat abatement plan will be reviewed within five years of its coming into force. The cost of this plan will be covered under the core business expenditure of the affected agencies. There are costs to industry in meeting the requirements set out in this plan. The overall costs should be similar to those incurred in implementing the previous plan, and are not expected to significantly increase, and may decrease in some instances as a result of this plan. These costs are an unavoidable consequence of the need to abate the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations in a feasible, effective and efficient manner.

Organisations and persons involved in evaluating the performance of threat abatement plan

Threat abatement plans may identify the organisations and persons involved in evaluating performance of the plan (EPBC Act s 271(4)(b)). The Department of the Environment and Energy will evaluate performance of this threat abatement plan in consultation with key stakeholders and relevant seabird experts. It will report the results of the review to the Minister for the Environment, through the Threatened Species Scientific Committee.

Major ecological matters that may be affected by threat abatement plan

Threat abatement plans may specify any major ecological matters that will be affected by the plan (EPBC Act s 271(4)(c)). This threat abatement plan is unlikely to affect other ecological matters, but all actions undertaken will take into account any impacts on the conservation status of non-seabird species including threatened sharks, marine mammals and marine reptiles.

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Annex A: Summary of the seabird species affected by longline fishing in the Australian Fishing Zone

The following reflects current information on the taxonomy and conservation status of each seabird species, including information from the IUCN Red List of Threatened Species Version 2017-3 (IUCN, 2018) and ACAP. A distinction is drawn between species that breed and forage in areas under Australian jurisdiction (Table 5 below) and species foraging, but not breeding in areas under Australian jurisdiction (Table 6 below). The likely incidence in longline bycatch is assessed in the absence of seabird mitigation measures.

Table 5. Species breeding and foraging in Australian jurisdiction that are affected by longline fishing

Species name	International conservation status	EPBC Act listing	Likely incidence in longline bycatch	Jurisdiction and location of breeding areas
Wandering albatross *Diomedea exulans*	Vulnerable	Vulnerable	Moderate	**Australia:** Heard Island, Macquarie Island **France:** Iles Crozet, Iles Kerguelen **South Africa:** Prince Edward Islands **United Kingdom/Argentina:** South Georgia (Islas Georgias del Sur)
Black-browed albatross *Thalassarche melanophris*	Least Concern	Vulnerable	High	**Australia:** Heard Island and McDonald Islands, Macquarie Island **Chile:** island groups of Diego de Almagro, Diego Ramirez, Evangelistas, and Ildefonso; islets in the Magallanes region, and Tierra del Fuego **France:** Iles Crozet, Iles Kerguelen **New Zealand:** Antipodes Island, Campbell Island **United Kingdom/Argentina:** Falklands Islands (Islas Malvinas), South Georgia (Islas Georgias del Sur)
Shy albatross *Thalassarche cauta*	Near Threatened	Vulnerable	Moderate	**Australia:** Tasmanian islands of Albatross, Mewstone, and Pedra Branca
Grey-headed albatross *Thalassarche chrysostoma*	Endangered	Endangered	Moderate	**Australia**: Macquarie Island **Chile:** island groups of Diego Ramirez, and Ildefonso **France**: Iles Crozet, Iles Kerguelen

Species name	International conservation status	EPBC Act listing	Likely incidence in longline bycatch	Jurisdiction and location of breeding areas
				South Africa: Prince Edward Islands **New Zealand:** Campbell Island **United Kingdom/Argentina:** South Georgia (Islas Georgias del Sur)
Light-mantled albatross *Phoebetria palpebrata*	Near Threatened	Not listed	Low	**Australia:** Heard Island, Macquarie Island **France:** Iles Crozet, Iles Kerguelen **New Zealand:** Antipodes Island, Auckland Islands, Campbell Island **South Africa:** Prince Edward Islands **United Kingdom/Argentina:** South Georgia (Islas Georgias del Sur)
Northern Giant Petrel *Macronectes halli*	Least concern	Vulnerable	Low	**Australia:** Macquarie Island **France:** Iles Crozet, Iles Kerguelen **New Zealand:** Antipodes Island, Auckland Islands, Campbell Island, Chatham Island **South Africa:** Prince Edward Islands **United Kingdom/Argentina:** South Georgia (Islas Georgias del Sur)
Southern Giant Petrel *Macronectes giganteus*	Least concern	Endangered	Low	**Antarctica:** Australian Antarctic Territory (Frazier, Hawker and Giganteus Islands), Antarctic Peninsula, South Orkney Islands, South Shetland Islands, Terre Adélie **Argentina:** Isla Arce, Isla de los Estados, Isla Gran Robredo, Isla Observatorio **Australia:** Heard Island and McDonald Islands, Macquarie Island **Chile:** Isla Noir, Islas Diego Ramirez **France:** Iles Crozet, Iles Kerguelen **Norway:** Bouvet Island **South Africa:** Prince Edward Islands **United Kingdom/Argentina:** Falklands Islands (Islas Malvinas), South Georgia (Islas Georgias del Sur), South Sandwich Islands (Islas Sandwich del Sur) **United Kingdom:** Gough Island

Species name	International conservation status	EPBC Act listing	Likely incidence in longline bycatch	Jurisdiction and location of breeding areas
Great-winged Petrel *Pterodroma macroptera*	Least Concern	Not listed	Moderate	**Australia:** southern and southwestern Australia **France:** Iles Crozet, Iles Kerguelen **New Zealand:** North Island **South Africa:** Prince Edward Island **United Kingdom:** Tristan da Cunha Group
Grey Petrel *Procellaria cinerea*	Near Threatened	Not listed	Moderate	**Australia:** Macquarie Island **France:** Iles Amsterdam, Iles Crozet, Iles Kerguelen **New Zealand:** Antipodes Islands, Campbell Islands **South Africa:** Prince Edward Islands **United Kingdom:** Tristan da Cunha Group
Wedge-tailed shearwater *Ardenna pacifica*	Least Concern	Not listed	Moderate	**Australia:** numerous island and coastal locations **Other:** extensive distribution
Flesh-footed shearwater *Ardenna carneipes*	Near Threatened	Not listed	High	**Australia:** southern Australia **France:** Ile St Paul **New Zealand:** North Island
Sooty shearwater *Ardenna griseus*	Near Threatened	Not listed	Low	**Australia:** southeastern Australia (including Macquarie Island) **Chile:** southern **New Zealand:** islands off New Zealand **United Kingdom/Argentina:** Falkland Islands (Islas Malvinas)
Short-tailed shearwater *Ardenna tenuirostris*	Least Concern	Not listed	Low	**Australia:** southern Australia
Southern skua *Catharacta antarcticus*	Least Concern	Not listed	Low	**Australia:** Heard Island and McDonald Islands, Macquarie Island **Other:** extensive distribution across sub-Antarctic

Table 6. Species foraging in Australian jurisdiction that are affected by longline fishing

Species name	International conservation status	EPBC Act listing	Likely incidence in longline bycatch	Jurisdiction and location of breeding areas
Tristan albatross *Diomedea dabbenena*	Critically endangered	Endangered	Low	**United Kingdom**: Tristan da Cunha Group
Antipodean albatross *Diomedea antipodensis*	Endangered	Vulnerable	Low	**New Zealand**: Antipodes Island, Auckland Islands, Campbell Island
Northern royal albatross *Diomedea sanfordi*	Endangered	Endangered	Low	**New Zealand**: Chatham Islands (Big Sister Island, Little Sister Island, Forty-fours Island), South Island (Otago Peninsula, Taiaroa Head)
Southern royal albatross *Diomedea epomophora*	Vulnerable	Vulnerable	Low	**New Zealand**: Auckland Islands, Campbell Island, South Island (Taiaroa Head)
Amsterdam albatross *Diomedea amsterdamensis*	Critically Endangered	Endangered	Low	**France**: Iles Amsterdam
Campbell albatross *Thalassarche impavida*	Vulnerable	Vulnerable	High	**New Zealand**: Campbell Island
Buller's albatross *Thalassarche bulleri*	Near Threatened	Vulnerable	Low	**New Zealand**: Chatham Islands, Snares Islands, Solander Islands, Three Kings Islands
White-capped albatross *Thalassarche steadi*	Near Threatened	Vulnerable	Moderate	**New Zealand**: Antipodes Islands, Auckland Islands, Chatham Islands
Salvin's albatross *Thalassarche salvini*	Vulnerable	Vulnerable	Low	**New Zealand**: Bounty Islands, Snares Islands
Chatham albatross *Thalassarche eremita*	Vulnerable	Endangered	Low	**New Zealand**: Chatham Island

Species name	International conservation status	EPBC Act listing	Likely incidence in longline bycatch	Jurisdiction and location of breeding areas
Atlantic yellow-nosed albatross *Thalassarche chlororhynchos*	Endangered	Not listed	Low	**United Kingdom**: Tristan da Cunha Group
Indian yellow-nosed albatross *Thalassarche carteri*	Endangered	Vulnerable	Moderate	**France**: Iles Amsterdam, Iles Crozet, Iles Kerguelen, Iles St Paul **South Africa**: Prince Edward Islands
Sooty albatross *Phoebetria fusca*	Endangered	Vulnerable	Low	**France:** Iles Amsterdam, Iles Crozet, Iles Kerguelen, Iles St Paul **South Africa:** Marion Island, Prince Edward Island **United Kingdom**: Tristan da Cunha Group
White-chinned Petrel *Procellaria aequinoctialis*	Vulnerable	Not listed	Moderate	**France**: Iles Crozet, Iles Kerguelen **New Zealand**: Antipodes Islands, Auckland Islands, Campbell Islands **South Africa**: Prince Edward Island **United Kingdom/Argentina**: Falklands Islands (Islas Malvinas), South Georgia (Islas Georgias del Sur)
Westland Petrel *Procellaria westlandica*	Endangered	Not listed	Low	**New Zealand**: South Island (Punakaiki)
Black Petrel *Procellaria parkinsoni*	Vulnerable	Not listed	Low	**New Zealand**: Great Barrier Island, Little Barrier Island

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