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Developing a Stock Status Report for Rays and Sharks

The Shark and Ray Report Card

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In submitting this report, the researcher has agreed to FRDC publishing this material in its edited form.

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Executive Summary

In response to increasing concerns for the status of shark and ray populations world-wide, and increasing pressure to ensure Australia's shark and ray species are effectively managed and conserved, this project synthesised the scattered information, assessed individual species' status and provided a clear and concise overview of the state of Australia's shark and rays. Project staff from the Institute of Marine and Antarctic Studies at the University of Tasmania collected available data from peer-reviewed literature, government reports, observer programs and fellow scientists to produce comprehensive databases on species and management measures with input from CSIRO on the most recent taxonomy of this diverse group. The Status of Australian Fish Stocks (SAFS)-aligned status assessments were undertaken for all 331 species, and 341 stocks of Australian shark, ray and chimaera. A workshop of experts reviewed the proposed status all species before they were finalised to ensure consistent and peer-reviewed outcomes. A Report Card overview indicates that the majority of species are sustainable and in a healthy state; and while Australia's approach to managing its shark stocks has to date been very good, this needs to be maintained and supported by ongoing research, monitoring and assessment. The significant resources generated by the project will be available publicly to ensure wide uptake of the outputs.

Australia has one of the most diverse and distinctive shark and ray faunas in the world. About a quarter of the more than 330 species occurring in Australian waters are endemic, and effectively managing these species is important for the sustainable use of marine resources as well as maintenance of biodiversity. One of the greatest challenges for the sharks and rays is that more than any other taxa they exist across the spectrum of interests from sustainable fisheries resources to threatened species requiring conservation. Australia's abilities both in management of sharks and rays, and the science that underpins it, are recognised as world-leading. Despite this, there remain many challenges that face our sharks and rays. There is a need for decision makers in government to have access to comprehensive and accurate information. Currently, the available information is fragmentary and difficult to access, and most assessment is focused on only a few species targeted by fisheries. The growing information needs of initiatives such as Shark-Plan 2, Environment Protection Biodiversity Conservation Act listing and Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) regulation of trade, and other programs struggle to be met because of the lack of a synthesis of information across this group. Locally relevant information on the status of sharks and rays, and the synthesis of knowledge about them is critical to addressing the challenges that face this group in Australian waters.

The project aim was to synthesise available information on sharks and rays in Australian waters, and to produce a report card on the status of Australia's sharks and rays. The status of all the species was assessed through consideration of existing status assessments, the other available information on the species and assessment against a set of standardised criteria.

The data synthesis of all the available information and the status assessments were compiled in 331 individual species summaries. The format for all individual species summaries was consistent and headed by the Australian SAFS status and the International Union for the Conservation of Nature (IUCN) Red List status followed by a summary paragraph about the species, habitat, threats and any documented declines. This information was then detailed in short sections on distribution, stock structure and status, fisheries and habitat and biology followed by links to the CAAB Code, IUCN Red List and Shark References webpages and a list of references.

The individual species summaries and their status were collated and summarised in an Australian Shark and Ray Report Card document that describes the status of species, and identifies those most at-risk, those that require management intervention and gaps in management. The Report Card found that overall, Australia's sharks and shark-like rays are in relatively good condition. Two hundred and thirty stocks (68%) were assessed as Sustainable. A further 48 (14%) were assessed as Negligible, meaning they are rarely, if ever, encountered by fisheries. Eighteen were assessed as Undefined, meaning there was insufficient information to determine their status. There was no information to suggest most of these Undefined stocks are under immediate threat from human pressures, including fishing. Therefore, the

majority of the Undefined stocks are likely to be sustainable but further investigation is needed to better understand the status of these mainly deepwater species. The primary potential threat to most Australian sharks is fishing. However, the results of the assessment indicate that for the large majority of species, the interactions with fisheries has not led to unsustainable outcomes. Of the 341 stocks, only 19 (6.0%) were assessed as Depleted. Importantly, further examination of these shows that all but five of these species have specific fisheries management measures under Commonwealth, state or Territory regulations or legislation to attempt to reverse the status.

The major implication of the project is that Australia is effectively managing the vast majority of its sharks, rays and chimaeras. It highlighted the species of concern that are either still in decline or overfished, and species for which management needs to be introduced to ensure stocks do not become overfished. Managers and decision makers can use the project outputs to develop fishery and bycatch management plans, Ecologically Sustainable Development of Fisheries (ESD) assessments, identify future research priorities and to inform international treaty processes such as CITES, Convention on the Conservation of Migratory Species of Wild Animals (CMS) and Shark-Plan 2 (FAO International Plan of Action for Sharks). Industry representatives may use the generated information to advance discussions on industry requirements to meet management targets. The public, consumers and seafood businesses including retailers can easily access information on Australian sharks and rays and be cognisant of the good management that is in place, the species that are of concern and the actions that are needed to maintain the sustainability of these species.

There are three recommendations that would further disseminate and develop the results of the project: ensure the Shark and Ray Report Card and associated documents are available on a website with long-term support, such as the FRDC website or the SAFS website; carry out the process of information synthesis, assessment and reporting developed in the project at regular intervals to ensure the information and status are updated and remain relevant and current; and ensure that improved management is implemented for those species for which additional management was identified.

Keywords

Shark, ray, chimaera, stock status, sustainability

Introduction

Background

Australia has one of the most diverse and distinctive cartilaginous fish (sharks, rays and chimaeras) faunas in the world. With more than 330 species occurring in Australian waters (Last and Stevens 2009) and about a quarter of them endemic (White and Kyne 2010), effectively managing these species is important for the sustainable use of marine resources as well maintenance of biodiversity.

Sharks, rays and chimaeras (hereafter sharks and rays) have an inherent vulnerability to exploitation, a result of their life history which is generally less productive than bony fish and invertebrates (Simpfendorfer et al. 2011). Thus in situations where fishing mortality is poorly controlled, and exceeds critical levels, populations can decline rapidly and are slow to recover. Despite this general inherent vulnerability, there is considerable diversity in the life history of sharks and rays that means that some species can sustain valuable fisheries (e.g. 2,200 tonnes (t) of gummy shark is sustainably caught in southern Australia each year), while others decline rapidly with relatively limited fishing (Simpfendorfer and Dulvy 2017). The result of this diversity of life histories is that unlike almost any other taxa, sharks and rays exist across a spectrum from sustainable fishery targets to species of conservation need (Dulvy et al. 2017).

The challenge for fisheries and biodiversity managers, and decision makers, is to recognize the position of species within this spectrum of vulnerability. To do this, managers and decision makers need to have access to the best available information on these species. However, all too often this information is hard to locate, difficult to interpret and not directly comparable between species, or worse – not available. This project developed out of discussions with managers and decision makers in several state and federal government departments or agencies that highlighted the difficulties in accessing high quality information. That information is also often viewed in isolation, and the ability to place it within the broader context of other shark and ray species would enhance managers' abilities to priortise actions towards species with the greatest need. Often these priorities are distorted because of the lack of comparative information and misconceptions based on media or public bias.

Development of this project grew out of the realisation that decision makers may not have access to locally relevant information. This is especially important as globally the status of sharks becomes a topic of considerable importance, driven by declines in many species that mean >37.5% of known species are globally threatened with an elevated risk of extinction (Dulvy et al. 2021). While these global concerns are relevant to Australian decision makers, it is also important to understand that Australia has some of the best management of sharks and rays globally (Simpfendorfer and Dulvy 2017) that is supported by some of the best research. Thus, providing decision makers with locally relevant information will be critical to best-practice decision making on sharks and rays.

In 2019, the Shark Report Card was released to address these knowledge gaps, but was only able to cover sharks and a few of the shark-like rays (Simpfendorfer et al. 2019). This assessment used the same categories to describe the status of shark populations as the Status of Australian Fish Stocks process (SAFS, www.fish.gov.au) to ensure consistency in messaging to resource managers. Report Card assessments were largely derived from national Red List status that was determined at a national workshop of shark experts held as part of the project. In 2021, the National Environmental Science Programme's Marine Biodiversity Hub delivered national Red List assessments for all sharks and rays in "The Action Plan for Australian Sharks and Rays 2021" (Kyne et al. 2021). These national assessments were the starting point for the current project to deliver SAFS-compliant assessments for all of Australia's sharks and rays.

Need

With growing concerns for the status of shark and ray populations world-wide, and increasing pressure to ensure Australia's 330+ species are effectively managed and conserved, there is a need for decision makers in government, conservation advocates, scientists and the public to have access to comprehensive and accurate information. One of the greatest challenges for the sharks and rays is that more than any other taxa they exist across the spectrum of interests from sustainable fisheries resources to threatened species requiring conservation. Further complicating the assessment and management of these species is the fact that many species' ranges extend beyond Australia's territorial waters, where management is implemented differently and populations may have a very different status. Australia's abilities both in management of sharks and rays, and the science that underpins it, are recognised as world-leading. Nonetheless, challenges for our sharks and rays remain, but they may not always be those that are faced by other nations in our region. Available information is often fragmentary and difficult to access, and most assessment is focused on only a few species targeted by fisheries. The growing information needs of initiatives such as Shark-Plan 2 (FAO International Plan of Action for Sharks), the Convention on International Trade in Endangered Species of Flora and Fauna (CITES), the Convention on the Conservation of Migratory Species of Wild Animal (CMS), Wildlife Trade Operation certification of Australian fisheries to ensure Environmentally Sustainable Development goals are met, and threatened species listing under the Environment Protection and Biodiversity Conservation Act (EPBC Act), struggle to be met because information across this group is poorly synthesised. Locally relevant information on the status of sharks and rays, and the synthesis of knowledge about them, is thus critical to identifying and addressing the challenges that face this group in Australian waters, and for demonstrating the successes of Australia's management of this group. With the publication of the Shark Report Card, these deficiencies were partly addressed. However, that project covered only a small portion of the ray species that occur in Australian waters. This project is a step in synthesising this knowledge and developing a report card for all of Australia's sharks and rays, including the updating of assessments for species covered in the first Shark Report Card (Simpfendorfer et al. 2019).

Objectives

1. Compile and synthesise information on the status, and interaction of fisheries, for all species of Australian rays and chimeras.
2. Produce accounts for each ray species that are compatible with the Shark Report Card and the Status of Australian Fish Stocks.
3. Produce accounts for each chimaera species that are compatible with the Shark Report Card and the Status of Australian Fish Stocks.
4. Update the Shark Report Card for species that have had a material change in their status since the completion of the original version.
5. Communicate the results of the Shark and Ray Report Card to relevant stakeholders.

In addition to the contract objectives, the third objective (to assess the status of chimaera species that occur in Australian waters) was added to ensure that the full suite of cartilaginous fishes was included in the Shark and Ray Report Card. The small number of chimaera species (14) meant that this was not large amount of work and achieved by the project team within the resources provided.

Method

This project used methods similar to those used for the Shark Report Card (FRDC Project 2013/009) that was delivered in 2019 (Simpfendorfer et al. 2019). The work focused on ray species not covered in the Shark Report Card (all but those in the Order Rhinopristiformes – sawfish, wedgefishes, giant guitarfish, guitarfish and banjo rays). However, it also updated those covered in the Shark Report Card if there had been substantial new information available.

Synthesis of available information

While some information on sharks and rays is widely available through the published literature, much more is less accessible in places such as university theses, state and federal government research agency reports, reports to funding agencies and state and federal fisheries databases. With the available information on sharks and rays currently fragmented, a key part of this project was to synthesise information across all species for which it is available. To achieve this several tasks were undertaken:

a. Potential sources of information were identified using the knowledge of the project team, and well as species experts identified by the project team. These sources of information included government reports, government websites, reports from conservation groups, ecological risk assessment documentation, stock assessment documents, scientific publications and more. The materials collated in the Shark Report Card project were also used as this included a wide variety of information.

b. Collection of information on the management measures relevant to sharks and rays. This information was used to populate a database that outlines the management of sharks and rays by all jurisdictions and fisheries in Australia. This information was collated during the Shark Report Card project and updated as necessary for the current project. This information allowed the specific fisheries in which species were taken to be identified.

c. Production of individual species summaries that provide information on distribution, key life history and demographic parameters, threats and status of the Australian stock or stocks. This species summary aligns closely to SAFS assessments and is designed to meet the information requirements of management decision-makers and point to more detailed information required.

Information to populate the databases was gathered through computer searches, personal contact with key researchers and managers, and the collective resources of the project team. The taxonomic scope of the project covered all extant shark, ray and chimaera species in Australian waters; at the time of production this was 331 species (Last et al. 2016; Last and Stevens 2009; Kyne et al. 2021).

Assessment of Australian status

Several forms of information are currently available on the status of some species in this group: stock assessments, ecological risk assessments, threatened species listing assessments and IUCN Red List of Threatened Species assessments. To assess the status of all of the shark and ray species requires consideration of these existing status assessments along with compilation of all other available information and assessment against a set of standardised criteria. To facilitate this process, a workshop was held in 2015 to bring together experts in the field and the best available science on these species (largely through the data accumulated by the above process) and applied to established IUCN Red List Categories and Criteria (Figure 1; http://www.iucnredlist.org/technical-documents/categories-and-criteria). The IUCN Red List Categories and Criteria are the established International standard protocols for assessing species, and provide the basis for assessing species

status under the new common assessment method being used by the Commonwealth and most State governments. More information on the common assessment method is available at: http://www.environment.gov.au/biodiversity/threatened/cam.

Australian Red List assessments were updated in 2021 where necessary as part of the National Environmental Science Programme's Marine Biodiversity Hub project "The Action Plan for Australian Sharks and Rays 2021" (Kyne et al. 2021). These most recent national Red List assessments were the starting point for the SAFS-aligned assessments in the Shark and Ray Report Card.

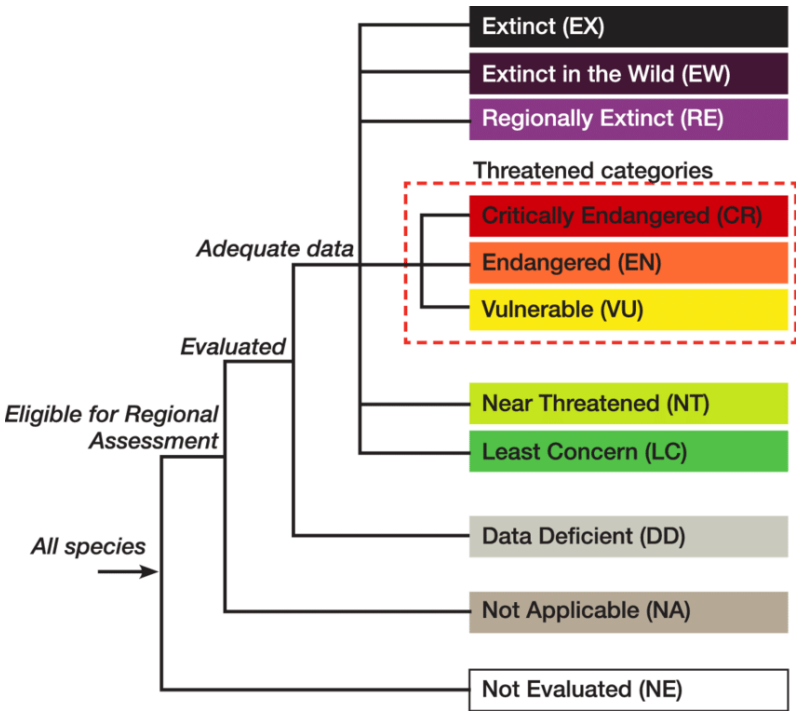

Figure 1. The IUCN Red List Categories

Report card

The data synthesis and IUCN Red List assessments were incorporated into individual species summaries for each Australian shark and ray. To indicate the sustainability of each species or stock in Australian fisheries, the status for each individual species or stock was generated from the IUCN Red List Category using the categories and criteria of the Australian Government's Status of Key Australian Fish Stocks Reports (SAFS) (Table 1). To translate the IUCN Red List extinction risk approach to the SAFS framework of sustainability of stocks, an equivalency table was created by the project. In this table, each of the six relevant IUCN Red List Categories (Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern and Data Deficient) are translated into one of the six relevant SAFS categories (Depleted, Depleting, Recovering, Sustainable, Undefined and Negligible) (Table 1). As the IUCN Red List extinction risk and SAFS framework of sustainability of stocks use different terminology and criteria for the categories, a rationale that linked the two was developed and employed. The majority of Australian sharks and rays do not have stock assessments, and accordingly a synthesis of stock assessments, which SAFS does, was not a viable approach to consistently apply to all species and stocks. Rather, the IUCN risk based approach was employed with the SAFS criteria as a comparison using available information and expert interpretation. The equivalency table is presented in Appendix B.

Table 1. State of Australian Fish Stocks categories used in the Australian Shark and Ray Report Card (from www.fish.gov.au).

Stock status	Description	Potential implications for management of the stock
Sustainable	Biomass (or proxy) is at a level sufficient to ensure that, on average, future levels of recruitment are adequate (recruitment is not impaired) and for which fishing mortality (or proxy) is adequately controlled to avoid the stock becoming recruitment impaired (overfishing is not occurring).	Appropriate management is in place.
Depleting	Biomass (or proxy) is not yet depleted and recruitment is not yet impaired, but fishing mortality (or proxy) is too high (overfishing is occurring) and moving the stock in the direction of becoming recruitment impaired.	Management is needed to reduce fishing mortality and ensure that the biomass does not become depleted.
Recovering	Biomass (or proxy) is depleted and recruitment is impaired, but management measures are in place to promote stock recovery, and recovery is occurring.	Appropriate management is in place, and there is evidence that the biomass is recovering.
Depleted	Biomass (or proxy) has been reduced through catch and/or non-fishing effects, such that recruitment is impaired. Current management is not adequate to recover the stock, or adequate management measures have been put in place but have not yet resulted in measurable improvements.	Management is needed to recover this stock; if adequate management measures are already in place, more time may be required for them to take effect.
Undefined	Not enough information exists to determine stock status.	Data required to assess stock status are needed.
Negligible	Catches are so low as to be considered negligible and inadequate information exists to determine stock status.	Assessment will not be conducted unless catches and information increase.

To provide a level of peer-review of the Report Card assessments, a workshop was run in July 2022 with species experts, especially those with expertise related to rays. The preliminary results of assessments were presented to the workshop for their consideration. The workshop also considered a range of broader issues related to the project and the assessment of status (e.g. the best approach to dealing with species that are highly migratory and so affected by pressures outside of Australian waters). A summary of the workshop outcomes is provided in Appendix C.

The individual species summaries and their status were collated and summarised in a report card document that describes the status of species, and identifies those most at-risk, those that require management intervention and gaps in management. The report card provided a simple framework for interpreting the extensive range of information synthesised during the project to enable it to be understood by a wide range of stakeholders and the public.

Data sources

A wide range of data are available for the status assessments and while there is a considerable amount of information in the peer-reviewed literature, there is also a large amount of data that is available but not always formally published. The main sources of this type of data synthesised for the individual species summaries and report card were from observer programs, shark control programs, fisheries data, stock and fisheries assessments and expert knowledge and opinion. Shark-reference.com website (http://shark-references.com/) is also a valuable source of the most up-to-date peer-reviewed literature and was used for the species summaries.

Observer programs

Observer programs are essential for ongoing monitoring of species caught incidentally in fisheries with a number of different observer programs in place across Australian jurisdictions and fisheries. In the Commonwealth fisheries, the Australian Fisheries Management Authority (AFMA) has an Observer Program that operates across all of the approximately 20 fisheries. The majority of these fisheries interact with sharks and rays. Detailed information of the type and frequency of observer coverage along with data from the Observer Program is available in a range of publicly available reports produced by AFMA and the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for each of the Commonwealth fisheries, such as Bycatch Action and Work Plans, Data Summaries, Status Reports, Assessment Reports and Wildlife Trade Operation Reports. The state and Territory fisheries each have their own Observer Programs that vary in scope and range of fisheries covered. Most of the state and Territory observer information and data is publicly available in a wide range of bycatch and fishery reports that are compiled by both state and Commonwealth agencies.

Shark Control Programs

Two long term shark control programmes operate in Australia: the New South Wales (NSW) Shark Meshing Program since the 1930s and the Queensland (Qld) Shark Control Program since the 1960s. Detailed catches and catch rates are available for the sharks and rays taken in these two programs and provided a useful source of information on shark catches, with data on species, size and sex available online for Qld catches from 2001 and for NSW catches since 2012.

Fisheries data

Some specific datasets on sharks and rays that cover both large areas and a large number of species were used in this project to inform the individual species summaries. These data sets include two from Commonwealth and two from state fisheries. The two Commonwealth fisheries that have some of the most comprehensive monitoring and analyses of sharks and rays are the Northern

Prawn Fishery (NPF) and the Southern and Eastern Scalefish and Shark Fishery (SESSF). The NPF shark and ray bycatch was intensively studied in the late 1990s with the data available in some published papers, but the most detailed information was provided in an FRDC Report (2002/064) (Salini et al. 2007) . The SESSF has extensive shark and ray data, both from logbooks (1970–2006) and an Integrated Scientific Monitoring Program on sharks, rays and holocephalans (1994–2006). This data has been presented in detail and analysed in Walker and Gasson (2007).

In New South Wales, a comparison of catches between 1976–77 and 1996–97 provides a comparative study of shark and ray catches over 20 years and is a valuable source of data for this region with the original data provided in Andrew et al. (1997) and subsequently published in Graham, Andrew, and Hodgson (2001). In Queensland, a study of prawn trawl bycatch during the early 2000s generated a significant quantity of data on catches of sharks and rays that is presented in the most detail in Courtney et al. (2007).

Stock and fisheries assessments

Some shark species in Australia have been subject to quantitative stock assessments that generate measures of stock status and levels of sustainable catch. Assessments of these stocks occur regularly and many are reported in the Status of Key Australia Fish Stocks Reports (SAFS) that are available online (http://fish.gov.au/). The species and stocks that have been assessed in these SAFS Reports are: Common Blacktip Shark (*Carcharhinus limbatus*), Australian Blacktip Shark (*Carcharhinus tilstoni*), Dusky Shark (*Carcharhinus obscurus*), Sandbar Shark (*Carcharhinus plumbeus*), Bronze Whaler (*Carcharhinus brachyurus*), Gummy Shark (*Mustelus antarcticus*), School Shark (*Galeorhinus galeus*), Sawsharks (*Pristiophorus cirratus* and *P. nudipinnis*), Eastern Shovelnose Ray (*Aptychotrema rostrata*) and Elephant Fish (*Callorhinchus milii*).

In addition to full stock assessments, many sharks and rays caught in Australian fisheries have been assessed as part of ecological risk assessments (ERA). The ERAs identify those species that may be at risk from a specific fishery and need to have this risk mitigated through an appropriate mechanism. These ERAs have been conducted in all the Commonwealth fisheries and are publicly available both through AFMA and the DCCEEW. All Australian fisheries that involve an export component are required to provide submissions to DCCEEW that demonstrate the fishery complies with the Ecological Sustainable Development of Fisheries (ESD). These submissions are publicly available through DCCEEW and are a useful source of information on bycatch that can include sharks and rays, which is required to be included in the submission.

Expert knowledge and opinion

In Australia, there are now a significant number of scientists studying sharks and rays. The majority of their knowledge is available in peer-reviewed publications, but not all the specific data is published and the more recent data is yet to be published. The workshop for this project brought together some of these experts (Appendix C) and provided the opportunity for their expertise on different taxa to be collected and used in the species assessments. It also enabled a forum for discussion on the status of species, particularly where there were minimal data or difficulty in assigning status.

Results

The main output from this project was the Shark and Ray Report Card and the associated documents, in particular the individual species accounts (Appendix D). This document reports on the SAFS-aligned status of all 331 species of shark and ray known from Australian waters. This included a number of species with multiple stocks, each of which was assessed individually. In total 341 stocks were assessed. In total, 193 shark stocks, 134 ray stocks, and 14 chimaera stocks were assessed.

A summary of the status of each of the groups, and the total across all species, is provided in Table 2. The majority of stocks across all groups were assessed as Sustainable. Six percent (19) of all species were assessed as Depleted, while 4% (15) were Depleting and 3% (11) Recovering. The report card document provides a full summary of the outcomes of the assessments, and access to species level information in the species compendium. Where species are listed as Depleted or Depleting the primary threat is fishing in almost all situations. For most species that were Depleted there are already conservation actions in place.

Table 2. Number of stocks assessed in each of the Status of Australian Fish Stocks categories by group and total.

Status	Sharks	Rays	Chimaeras	Total
Sustainable	119	98	13	230
Recovering	8	2	1	11
Depleting	7	8		15
Depleted	11	8		19
Undefined stock	9	9		18
Negligible	39	9		48
Total	**193**	**134**	**14**	**341**

Discussion

The majority of Australian sharks and rays are currently considered to be sustainably fished. The stock levels and management of 68% of the 341 stocks assessed are sufficient to ensure adequate levels of recruitment, and hence long-term stability. A further 14% of stocks were assessed as Negligible, meaning that they they encounter such low levels of fishing mortality in Australian watersthat fishing is unlikely to pose a threat to the population; and 5% were Undefined stocks, meaning there was insufficient information to determine the status. There are just 6% of Australian species considered overfished, and with either ongoing levels of fishing mortality that prevent rebuilding, or that have not exhibited population rebuilding in response to management action. Of these species, nearly all are either protected or being actively managed through rebuilding plans and associated legislation, or currently being assessed for protection under the EPBC Act.

Good management of Australian sharks and rays was further evident in the updated IUCN Red List assessments. These indicate that while 11% of the 331 species assessed to be in a threatened category (Critically Endangered, Endangered or Vulnerable) in Australia, at a global scale the percentage threatened is greater than double this rate. This indicates that globally, these same species face either greater fishing pressure or less stringent management, or a combination of both. In terms of number of species, this means that 107 species have a better status in Australian waters than globally.

The project identified five Depleted species in Australian waters that are not currently protected or managed: Whitefin Swellshark, Greeneye Spurdog, Australian Longnose Skate, Grey Skate and Coastal Stingaree. All of these are endemic to Australia (Last and Stevens 2009) and are taken incidentally in fisheries, with the majority of the take in trawl fisheries. All species would likely benefit from improvements in research, monitoring and management. Four of the five species are currently undergoing assessment for listing as threatened under the EPBC Act.

Comparison of the outcomes of the Shark Report Card produced in 2019 (Simpfendorfer et al. 2019) to the shark species contained in the Shark and Ray report (this report) reveal that 115 of 193 stocks retained the same status, while 78 changed status. Many of these changes were for technical reasons, such as the addition of the Negligible category (37 stocks), non-inclusion in the Shark Report Card (5 species, mostly newly identified species), and separation of a species into multiple stocks (1). New information becoming available to improve assessments was the second most common reason for a difference in status (23 stocks). Greater alignment with regional status was achieved for highly migratory species by incorporating information from regional assessment (4 stocks); and alignment with new Status of Australian Fish Stock assessments changed the status of six stocks.

Conclusion

The project has synthesised a large and scattered literature on Australian sharks and rays to make it more easily understood and accessible to a broad audience of managers, decision makers and the public. The individual species summaries provide consistent and comparable descriptions of the status, distribution, biology and threats for all species in Australia. This provides a significant resource that will enhance the understanding of these species by a much wider range of people, including the general public. The description of the status of each species in terms of sustainability in Australian fisheries enables fishery and conservation managers to have a more comprehensive understanding of their status. The concise, non-technical status summaries provided in the Australian Shark and Ray Report Card places all species in context along the spectrum of vulnerability and enhances the ability to recognise the species of greatest concern and prioritise recovery actions for those species. The project has greatly improved the availability of information and understanding of Australian shark and ray species and can be used to help manage these species for sustainability and biodiversity conservation.

Implications

The major implication of the project is that Australia is effectively managing its sharks and rays as the majority are considered sustainable or rarely if ever encounter fisheries. The project has highlighted the species of concern that are either still in decline or overfished and species for which management needs to be introduced to ensure stocks do not become overfished. This implies that although management is effective, it needs to be maintained with ongoing research and monitoring critical to maintain the healthy status of the stocks. These implications are valuable for a range of end users that can implement the required actions. Domestic fisheries management can use the project to benefit development of state and federal fishery management plans, bycatch management plans and ESD assessments, and to identify future research priorities. Federal government agencies also benefit with more reliable, accessible and comparable information to inform international treaty processes such as CITES, CMS and Shark-Plan 2.

Industry representatives will be able to present the locally relevant status of the sharks and rays that their fisheries interact with and discuss their effective management with members and advisory groups. This can advance discussions on industry requirements to meet management targets. Finally, the public and consumers can now much more easily access information on Australian species and be cognisant of the good management that is in place, the species that are of concern and the actions that are needed to maintain the sustainability of these species.

Recommendations

There are three main recommendations that would further disseminate and develop the results of the project:

1. Migrate the Australian Shark and Ray Report Card and associated documents, including the species compendium, to an appropriate online site that is supported long-term.
2. Carry out the assessment process developed in the project at regular intervals.
3. Further conservation or management action is implemented for species or stocks that are Depleted but currently lack specific management.

The rationale for the recommendations are:

1. The major output of the project was the Australian Shark and Ray Report Card, including the individual species accounts. Availability of this information will be compromised without continuing support, which can be difficult to secure. To ensure the outputs of the project are available in the long-term and disseminated, it is recommended that consideration be given to migrating the main materials of the project to an appropriate and relevant website where long-term support can be provided. The FRDC website or the Status of Australian Fish Stocks Reports website, where the Shark Report Card information is held, may be suitable and relevant candidate sites.

2. It is recommended that the process of information synthesis, assessment and reporting undertaken in the project occur in the future at regular intervals. This would help to ensure that the healthy status of Australian sharks and rays continues and that management improves for species of concern. It would provide a standard mechanism to incorporate new biological, fisheries and ecological data and changes to habitat and climate to update the locally relevant Australian assessment of the species' sustainability.

4. Where specific management was not identified for stocks that were assessed as Depleted or Depleting it will be important that additional management is introduced to address concerns about their status. Many of these species are currently undergoing assessment for listing as threatened under the EPBC Act, which will potentially afford them protection in the future. Where species are not being assessed, consideration should be given to whether they require assessment, or if other suitable actions might be implemented.

Extension and Adoption

The project was communicated and extended to stakeholders in a variety of ways. A media release at the inception of the project provided information to a broad range of stakeholders. This story was amplified through social media channels.

Project coverage

Media Release

A media release by the Institute of Marine and Antarctic Studies at the University of Tasmania was made on 26 November 2021: https://www.imas.utas.edu.au/news/news-items/assessing-australias-rays-for-sustainability-report-card

This media release was amplified on Facebook, Instagram and Twitter.

Other communications

Updates on the progress of the project were provided to the Shark Reference Group for Australia's National Plan of Action (Sharks) at meetings in November 2021 and November 2022.

A synopsis of the project was also provided to the Department of Climate Change, Energy, the Environment and Water in November 2022 in relation to the potential use of the outputs to assist in the development of CITES Non-Detriment Findings for shark and ray species listed on Appendix II of CITES.

Project materials developed

The project developed the Australian Shark and Ray Report Card, including individual species accounts for all 341 stocks of sharks and rays and a summary of the results. This Report Card is provided at Appendix D.

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Appendices

Appendix A. List of researchers and project staff

Project PI: Professor Colin Simpfendorfer
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Other staff: Dr Cassandra Rigby
Private contractor
Kuranda, Queensland

Appendix B. Equivalency table between Status of Australian Fish Stocks categories and IUCN Red List status as used in the Shark and Ray Report Card.

IUCN Red List category	Aligns to SAFS category	Rationale	Comments
Extinct	**Not Applicable**	An Extinct species cannot be fished and thus cannot be included in a SAFS report. Thus, there is no corresponding SAFS category.	There are no sharks in this category (globally)
Extinct in the Wild	**Not Applicable**	A species that is Extinct in the Wild cannot be fished and thus cannot be included in a SAFS report. Thus, there is no corresponding SAFS category.	There are no sharks in this category (globally)
Critically Endangered (CR)	**Depleted**	The VU, EN, and CR categories describe scenarios where significant (>30% to >90%) population reductions have occurred over the last ten years or three generations, may occur in the future or occur over a time period encompassing both the past and the future This scenario aligns with *Depleted* in the SAFS assessment framework which indicates scenarios where recruitment levels are significantly reduced and *current management is not adequate to recover the stock*[#]. However, a VU or EN species may also align with *Recovering* where management has halted and is reversing previous declines; and also with *Depleting* where stocks *are not yet depleted but overfishing is occurring and moving stocks* towards becoming depleted[#]. A shark listed as VU, EN or CR may not be subject to targeted fishing pressure. However, VU, EN and CR species may still be incidentally taken as bycatch, and fishing pressure is the causative factor in the VU, EN and CR assessment for almost all sharks. Consequently, *Depleted* is an appropriate term that could be applied to all three IUCN categories. The exception to this are some species assessed as VU where stocks have been depleted but *management measures are now in place to promote stock recovery, and recovery is occurring*[#] (Recovering).	Using IUCN assessment Criteria A1, A2, A3 and A4 which assess population trends; Criteria B that assess restricted ranges and includes continuing decline in range and/or mature individuals; and Criteria C which assess declines in mature individuals. Where fishing mortality on these species has demonstrably ceased or decreased, the Report Card *Species Assessment Summary* will highlight that while stocks are still in a reduced state, overfishing was historical and is no longer occurring. Population/stock recovery depends on management intervention.
Endangered (EN)	**Depleted**		
Vulnerable (VU)	**Depleting**		
	Recovering		
	Sustainable		

Near Threatened (NT)	**Sustainable**	NT indicates that population reduction has occurred over the last ten years or three generations, or may occur in the future, to levels approaching the >30% population reduction threshold (VU category). However, population reductions have not yet, or are not predicted to, reach levels that are likely to threaten the species with extinction. Fishing may also reduce a stock to a depleted but *stable* state where further reductions toward extinction are unlikely, due to management. This scenario aligns with the SAFS category for sustainable fishing (Sustainable) where a depleted but stable population is being held at Maximum Sustainable Yield; OR categories where fishing pressure is *moving the stock in the direction of becoming recruitment overfished#* (Depleting).	The Report Card *Species Assessment Summary* will specify if the species is considered to be Sustainable, Recovering or Depleting. In transitional stocks (Recovering or Depleting), new management intervention may be needed to halt and reverse a decline, or existing management needs to be maintained to continue population/stock recovery to target levels.
Least Concern (LC)	**Sustainable**	LC indicates that the species is not at risk of extinction. This category aligns with the SAFS *Sustainable* category which describes scenarios where stock levels are sufficient to ensure adequate levels of future recruitment and where existing management is sufficient to maintain adequate recruitment levels.	Existing management continued to maintain current population/stock levels.
	Negligible	Species can be assessed as Least Concern if there is little information on their status, but where it is possible to demonstrate a lack of threats. In the case where a species is assessed as LC (and possibly NT) but where it is known to very rarely interact with Australian fisheries it can be assessed as Negligible	
Data Deficient (DD)	**Undefined Stock**	Both are categories that indicate there is insufficient information to assess the status of the population/stock against the assessment criteria.	Data required to assess populations/stocks.
Data Deficient (DD)	**Negligible**	Both are categories that indicate there is insufficient information to assess the status of the population/stock against the assessment criteria. This category aligns with the SAFS *Negligible* category where in addition, catches of the stock are so low as to be considered negligible.	Data required to assess populations/stocks when catches increase.
Not Evaluated (NE)	**No corresponding category**	The SAFS is a fisheries assessment, so a fished species that is not assessed is not included in the SAFS report. Thus, there is no corresponding SAFS category.	

Appendix C. Workshop Report – Ray Report Card project, July 12-13 2022, Lenna Hotel, Hobart

The workshop was convened as part of the Ray Report Card project funded by FRDC. The aims of the workshop were:

- Provide input on the process of developing report card assessments
- Gather input from participants for the individual species accounts
- Endorse the status for each of the 134 rays, 14 chimaeras, and updated sharks (updated to reflect status changes since Shark Report Card released in 2019)

More detail on the background to the workshop, the detailed agenda, and participants list are provided in Attachment A. Experts were selected based on jurisdictional representation and knowledge of ray (and shark) statuses.

This report provides a summary of the main topics discussed and recommendations from workshop participants.

How species assessments are produced

Individual species assessments start with the status and information provided by the Action Plan For Australian Sharks and Rays 2021 (https://www.nespmarine.edu.au/document/action-plan-australian-sharks-and-rays-2021), which produced IUCN Red List assessments for all of Australia's chondrichthyan species. However, since the Report Card is a sustainability assessment (i.e. is fishery focused and uses fishery-relevant reference points), not an extinction risk assessment (as is the Red List approach, and is conservation focused), the project uses an equivalency table to convert Red List categories to sustainability categories. The Report Card uses the same sustainability categories as the Status of Australian Fish Stocks process (www.fish.gov.au) to ensure comparability. The Workshop considered the Equivalency Table in a separate item and the discussion on that is in the next section.

In addition to the information from the Action Plan for Australian Sharks and Rays, the Report Card species assessments also considered additional information on the status of species (Figure 1). In particular, full Status of Australian Fish Stock (SAFS) assessments are now available for nine species of sharks (blacktip sharks [two species], Spot-Tail Shark, Dusky Whaler, Bronze Whaler, Sandbar Shark, Gummy Shark, School Shark, sawsharks [3 species]) and one species of chimaeran (Elephantfish). Where full SAFS species assessments were available, the Report Card provides a summary of the SAFS evaluation as it was considered the most recent assessment of sustainability.

Ecological Risk Assessments (ERAs), for which there are many for fisheries Australia wide, were extensively used in Report Card assessments as they can provide significant information on the interaction of species with fisheries, and the risk these interactions pose.

Where species have been through a recent threatened species assessment under the *Environmental Protection and Biodiversity Conservation Act 1999*, this information was also considered, but were only available for a small number of species (e.g. Scalloped Hammerhead). Some shark and ray species that have been through listing have been listed as Conservation Dependent (e.g. School Shark, Southern Dogfish, Harrisson's Dogfish). Conservation Dependent species can continue to be caught in fisheries where a management plan is in place that will ensure their recovery, but they are not considered Matters of National Environmental Significance. Where species are listed as

Conservation Dependent, they also have an EPBC threatened category provided as they must also be eligible for a threatened category to be listed Conservation Dependent.

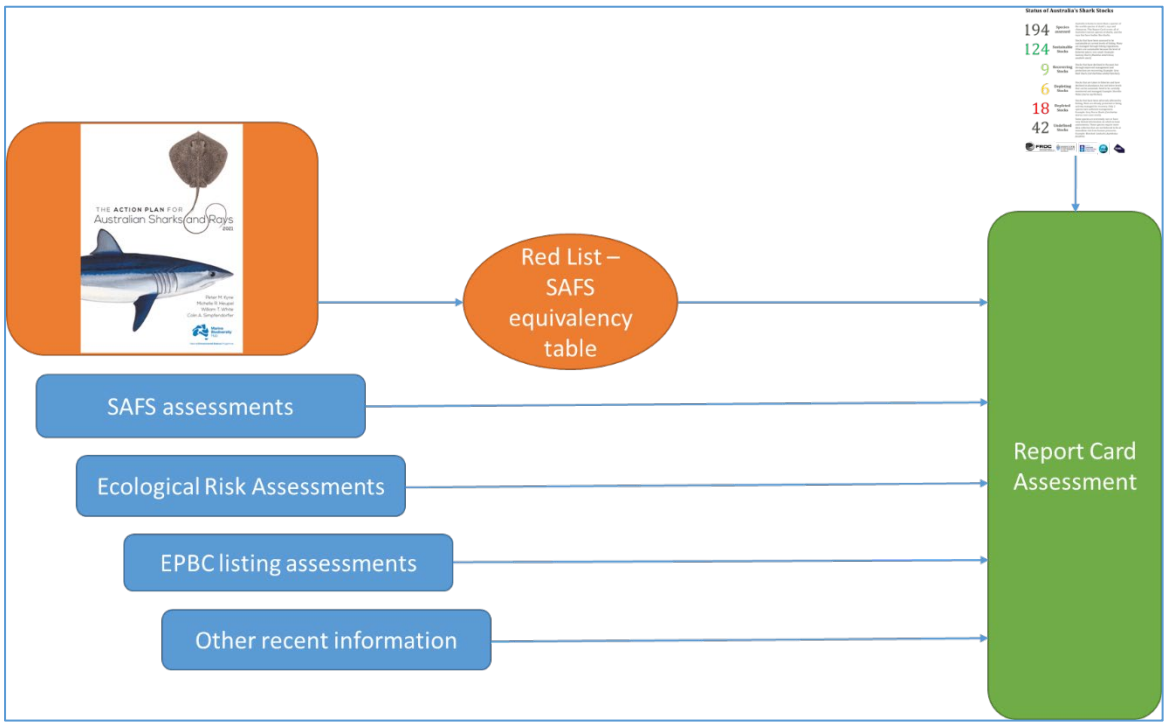

Figure 1. General approach to producing species assessments. SAFS – Status of Australian Fish Stocks; EPBC – Environmental Protection and Biodiversity Conservation Act; Red List – IUCN Red List of Threatened Species.

Other information sources informing the assessments include recent stock assessments, published scientific studies, global Red List Assessments (available from www.redlist.org), and expert knowledge.

Species assessments take this wide range of information into account, and look to align the status between source documents, to provide consistency in outcomes to reduce confusion amongst users of these assessments and ensure policy consistency. In rare instances where there is necessary inconsistency between documents, the reasoning behind the differences is explained in the Report Card assessments.

Recommendations from Workshop

1. The workshop participants endorsed the approach taken for the production of Report Card species assessments.
2. The workshop participants endorsed the approach to providing consistency with source documents, especially SAFS assessments.
3. The workshop participants strongly encouraged clear evidence-based information be provided where differences in sustainability status occur between Report Assessments and other documents.

Red List – SAFS Equivalency Table

As indicated in the previous section, an equivalency table is used to convert criteria and classifications used in national Red List Assessments provided in the Action Plan for Australian Sharks and Rays to a SAFS-equivalent sustainability status (Table 1). The Equivalency Table was developed as part of the Shark Report Card process, and has received a few small updates in the current project to align it with recent minor changes in SAFS categories.

Table 1. Red List - Status of Australian Fish Stocks (SAFS) equivalency table used in the Ray Report Card assessment process.

IUCN Red List category	Aligns to SAFS category	Rationale	Comments
Extinct	**Not Applicable**	An Extinct species cannot be fished and thus cannot be included in a SAFS report. Thus, there is no corresponding SAFS category.	There are no sharks° in this category (globally)
Extinct in the Wild	**Not Applicable**	A species that is Extinct in the Wild cannot be fished and thus cannot be included in a SAFS report. Thus, there is no corresponding SAFS category.	There are no sharks in this category (globally)
Critically Endangered (CR)	**Depleted**	The VU, EN, and CR categories describe scenarios where significant (>30% to >90%) population reductions have occurred over the last ten years or three generations, may occur in the future or occur over a time period encompassing both the past and the future*. This scenario aligns with *Depleted* in the SAFS assessment framework which indicates scenarios where recruitment levels are significantly reduced and *current management is not adequate to recover the stock*#. However, a VU or EN species may also align with *Recovering* where management has halted and is reversing previous declines; and also with *Depleting* where stocks *are not yet depleted but overfishing is occurring and moving stocks* towards becoming depleted#. A shark listed as VU, EN or CR may not be subject to targeted fishing pressure. However, VU, EN and CR species may still be incidentally taken as bycatch, and fishing pressure is the causative factor in the VU, EN and CR assessment for almost all sharks. Consequently, *Depleted* is an appropriate term that could be applied to all three IUCN categories. The exception to this are some species assessed as VU where stocks have been depleted but *management measures are now in place to promote stock recovery, and recovery is occurring*# (Recovering).	Using IUCN assessment Criteria A1, A2, A3 and A4 which assess population trends; Criteria B that assess restricted ranges and includes continuing decline in range and/or mature individuals; and Criteria C which assess declines in mature individuals. Where fishing mortality on these species has demonstrably ceased or decreased, the Report Card *Species Assessment Summary* will highlight that while stocks are still in a reduced state, overfishing was historical and is no longer occurring. Population/stock recovery depends on management intervention.
Endangered (EN)	**Depleted**		
Vulnerable (VU)	**Depleting** / **Recovering**		
Near Threatened (NT)	**Sustainable**	NT indicates that population reduction has occurred over the last ten years or three generations, or may occur in the future, to levels approaching the >30% population reduction threshold (VU category). However, population reductions have not yet, or are not predicted to, reach levels that are likely to threaten the species with extinction. Fishing may also reduce a stock to depleted but	The Report Card *Species Assessment Summary* will specify if the species is considered to be Sustainable, Recovering or Depleting.
		stable state where further reductions toward extinction is unlikely due to management. This scenario aligns with the SAFS category for sustainable fishing (Sustainable) where a depleted but stable population is being held at Maximum Sustainable Yield; OR categories where fishing pressure is *moving the stock in the direction of becoming recruitment overfished*# (Depleting).	In Transitional stocks (Recovering or Depleting), new management intervention may be needed to halt and reverse a decline, or existing management needs to be maintained to continue population/stock recovery to target levels.
Least Concern (LC)	**Sustainable**	LC indicates that the species is not at risk of extinction. This category aligns with the SAFS *Sustainable* category which describes scenarios where stock levels are sufficient to ensure adequate levels of future recruitment and where existing management is sufficient to maintain adequate recruitment levels.	Existing management continued to maintain current population/stock levels.
Data Deficient (DD)	**Undefined Stock**	Both are categories that indicate there is insufficient information to assess the status of the population/stock against the assessment criteria.	Data required to assess populations/stocks.
Data Deficient (DD)	**Negligible**	Both are categories that indicate there is insufficient information to assess the status of the population/stock against the assessment criteria. This category aligns with the SAFS *Negligible* category where in addition, catches of the stock are so low as to be considered negligible.	Data required to assess populations/stocks when catches increase.
Not Evaluated (NE)	**No corresponding category**	The SAFS is a fisheries assessment, so a fished species that is not assessed is not included in the SAFS report. Thus, there is no corresponding SAFS category.	

The workshop participants discussed the Equivalency Table in general, but also considered some specific questions related to it. These species questions included:

- The Equivalency Table was designed with the Red List A criteria (population decline), but not other criteria. The vast majority of shark and ray species are assessed in the Action Plan for Australian Sharks and Rays using the A criteria, and so status determination is relatively straightforward for most species. However, a small number of species are assessed under the B (small range) or C (small population size) criteria. In these cases, the use of the

Equivalency Table is less intuitive and participants needed to considered its applicability in these situations. However, it was noted that the B and C categories do have sub-criteria related to ongoing population decline.

- The most complex Red List category to deal with is Vulnerable. Depending on the trend in population abundance a species can be assessed as Depleting (if the abundance is continuing to decline), Recovering (if the abundance is increasing), or Sustainable (if the abundance is stable and considered to be at or above the level that would support catches at the Maximum Sustainable Yield level (MSY)). This latter situation can occur because the Vulnerable category has a decline level of 30-50% over 3 generations, a level at which some species can maintain catches at MSY level. Species assessed as Vulnerable were not considered to have been overfished, and so were not considered to be eligible for Depleted status.
- The Status of Australian Fish Stocks category of Undefined Stock is where there is insufficient information to determine the status of the species. In many situations, this category is equivalent to the Red List Data Deficient category.
- The Status of Australian Fish Stocks also has a category of Negligible, which is defined as "Catches are so low as to be considered negligible and inadequate information exists to determine stock status". This category was not used in the 2019 Shark Report Card, but will be used in the Ray Report Card project.

Recommendations:

4. The Workshop participants endorsed the use of the Equivalency Table for converting Red List categories to SAFS categories for species listing using the A criteria.
5. The Workshop participants recommended that a case-by-case consideration be given to the determination of SAFS status categories for species using Red List criteria B and C. Where there is a clear demonstration of decline (e.g. Maugean skate), then the Equivalency Table can be applied. However, in cases where the decline of the population is not clear, additional information needs to be considered in determination of status because the SAFS categories are relative to sustainability. It is possible that a species listed as threatened in a Red List Assessment using the B or C criteria could be considered sustainable (i.e. where the ongoing decline is limited and the population has not been depleted below the level that can support catches at MSY level).
6. The workshop participants recommended that the Negligible SAFS category be used wherever a species is rarely encountered in Australian fisheries and there is difficulty determining status (e.g. in some cases where a species is defined as Data Deficient in a Red List Assessment). This may include situations where a species is assessed as being in a category other than Data Deficient using Red List criteria. In particular, the participants identified the situation where a species is listed as Least Concern in a Red List Assessment because of the fact that limited fisheries interactions make it unlikely to be threatened with extinction. However, such an approach may not be consistent with the second part of the definition (i.e. "and there is difficulty determining status") since the Red List Assessment was able to reach a conclusion via inference. The other situation where Negligible might be used is for some species listed as threatened in Red List Assessments using criteria B or C. Consultation with SAFS staff was encouraged to ensure a consistent use of the term.

Status of species that have stocks that extend beyond the Australian Exclusive Economic Zone (EEZ)

Some shark species are broadly distributed and individuals can move distances that take them beyond the edge of the Australian EEZ. In these situations, the individuals of the species that occur in Australian waters are often part of a broader regional stock, and as such it may be appropriate for assessments to consider that the status in Australian waters is equivalent to the regional status. However, a range of movement scenarios occur on a continuum from all individuals of a regional stock moving in and out of Australian waters frequently and maintaining a single regional stock, to where very limited movements of individuals occur between Australian waters and our regional neighbours. In the latter of the extremes, a single panmictic population (single regional stock) can still be suggested by genetic analyses because genetic connectivity can be maintained from the movement of as few as one individual per year. However, such low level of movement and exchange is not sufficient for any threats or fishing mortality in one locality to affect another locality. Therefore, Workshop organisers posited that regional status should only be considered the indicator of Australia sustainability status for species for which a significant number of individuals move between Australian waters and regional neighbours. The Australian context was therefore considered for species with limited movement of individuals, regardless of genetic connectivity.

Recommendations:

7. The Workshop participants endorsed the approach suggested by the Workshop organisers, i.e. to only use regional status where there was good evidence of regular movements between Australia and our regional neighbours.
8. Table 2 identified the approach recommended by the Workshop participants on the use of regional assessments for the determination of sustainability status. Participants recommended that information on movements, not just genetic connection was required to underpin a decision to use a regional assessment status rather than an Australian assessment status. Note that Workshop participants identified the pelagic stingray as a species that required the use of the regional assessment. The participants also discussed the situations of species (mostly skates) taken on the Kerguelen Plateau in the Southern Ocean where the Australian EEZ abuts the French EEZ. However, based on the information available from tag recaptures of skates in this region that show very limited movement, it was concluded that regional assessment should not be considered.

Table 2. Species for which the use of a regional assessment status was considered by the Workshop participants, and the conclusions reached.

Scientific name	Common name	Regional or Australian assessment relevant	Notes
RAYS			
Aetobatus ocellatus	Spotted Eagle Ray	National	Limited evidence of movement on time frames relevant to management
Aetomylaeus caeruleofasciatus	Bluebanded Eagle Ray	National	No evidence of movement on time

			frames relevant to management
Aetomylaeus vespertilio	Ornate Eagle Ray	Regional	Some evidence of regional movements
Mobula alfredi	Reef manta ray	National	Evidence of relatively limited scale geographic movements from tracking studies
Mobula birostris	Giant manta ray	Regional	Evidence of long-distance oceanic movements
Mobula eregoodoo	Long-horned Pygmy Devilray	National	Small devilrays have limited movements
Mobula kuhlii	Kuhl's Devilray	National	Small devilrays have limited movements
Mobula mobular	Giant Devilray	Regional	Large devilrays have evidence of large-scale oceanic movements
Mobula tarapacana	Chilean Devilray	Regional	Large devilrays have evidence of large-scale oceanic movements
Mobula thurstoni	Bentfin Devilray	Regional	Large devilrays have evidence of large-scale oceanic movements
Anoxypristis cuspidata	Narrow Sawfish	National	Genetic evidence of stock separation between Australian and PNG. No evidence of movement of sawfish from Australia to regional neighbours
Pristis clavata	Dwarf Sawfish	National	No evidence of movement of sawfish from Australia to regional neighbours
Pristis pristis	Largetooth Sawfish	National	No evidence of movement of sawfish from Australia to regional neighbours
Pristis zijsron	Green Sawfish	National	No evidence of movement of sawfish from Australia to regional neighbours
Glaucostegus typus	Giant Guitarfish	National	No evidence of movement from Australia to regional neighbours

Rhina ancylostoma	Shark Ray	National	No evidence of movement from Australia to regional neighbours
Rhynchobatus australiae	Whitespotted Guitarfish	National	No evidence of movement from Australia to regional neighbours
Rhynchobatus palpebratus	Eyebrow Wedgefish	National	No evidence of movement from Australia to regional neighbours
Pteroplatytrygon violacea	Pelagic Stingray	Regional	Widespread pelagic species that is likely to move long distances
SHARKS			
Alopias pelagicus	Pelagic Thresher	Regional	Widespread pelagic species that is likely to move long distances. Use status from WCPFC and IOTC
Alopias superciliosus	Bigeye Thresher	Regional	Widespread pelagic species that is likely to move long distances. Use status from WCPFC and IOTC
Alopias vulpinus	Common Thresher	Australia	More coastal than other thresher shark species. Less likely to interact with other regions.
Carcharhinus falciformis	Silky Shark	Regional	Evidence of long-distance oceanic movements. Use status from WCPFC and IOTC
Carcharhinus galapagensis	Galapagos Shark	Regional	Widespread pelagic species that is likely to move long distances. Use global status
Carcharhinus longimanus	Oceanic Whitetip Shark	Regional	Evidence of long-distance oceanic movements. Use global status as appear similar in all oceans
Prionace glauca	Blue shark	Regional	Evidence of long-distance oceanic movements. Use global status

Isurus oxyrinchus	Shortfin Mako	Regional	Evidence of long-distance oceanic movements. Use Western Central Pacific status if possible. Global status is not indicative of regional status in Pacific Ocean
Isurus paucus	Longfin Mako	Consider Negligible category	Limited evidence for the interaction of this species with Australian fishing. If additional research shows sufficient interaction use same status as that of Shortfin Mako
Lamna nasus	Porbeagle	Regional	Evidence of long-distance oceanic movements. Use southern hemisphere status, possibly from CCSBT
Megachasma pelagios	Megamouth Shark	Negligible	One record from Australian and not taken by fishing (i.e. washed up)
Mitsukurina owstoni	Goblin Shark	Negligible	Very few records from Australian fisheries – occurs too deep
Pseudocarcharias kamoharai	Crocodile Shark	Regional	Widespread pelagic species that is likely to move long distances.
Rhincodon typus	Whale Shark	Regional	Large amount of tracking data that shows widespread movement of this species at ocean basin scale
Carcharodon carcharias	White Shark	Regional	The Australian close-kin population estimate on which the Shark Action Plan for Australian Sharks and Rays is based includes animals from regional neighbours (i.e. New Zealand)

Dealing with SESSF species

Previous analysis by the NESP program showed that the continental slope of NSW and eastern Victoria has one of the greatest concentrations of threatened shark and ray species in Australian waters (Figure 2). This includes five species of sharks and seven species of rays listed as threatened in the Action Plan for Australian Sharks and Rays. With this region not well represented by Workshop participants the approach to resolving the status of these species was discussed.

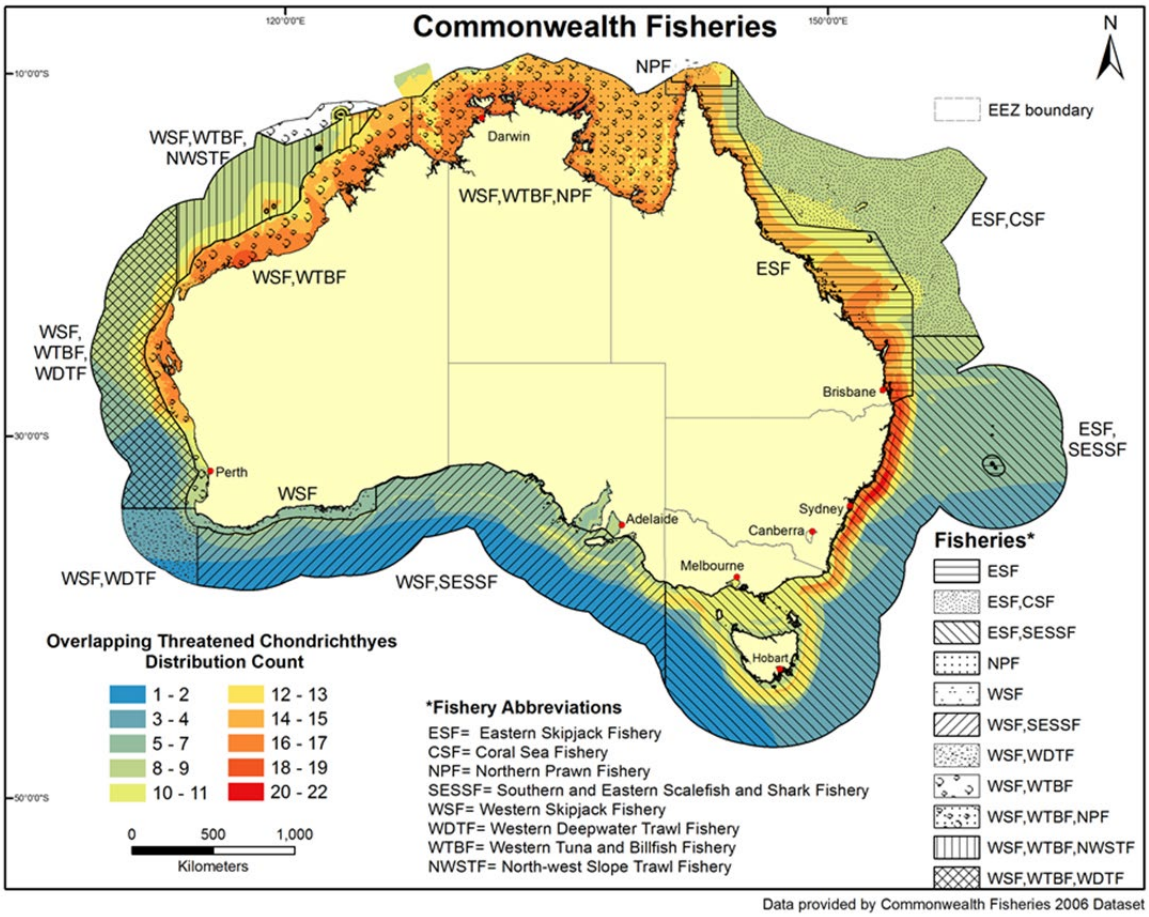

Figure 2. Distribution of threatened shark and ray species in Australian waters. Source: https://www.nespmarine.edu.au/project/project-a11-shark-action-plan

One of the significant issues identified was that the information used in the Action Plan for Australian Sharks and Rays is dated, with the two main published sources of information being:

- Graham, K. J., Andrew, N. L., and Hodgson, K. E. (2001). Changes in relative abundance of sharks and rays on Australian South East Fishery trawl grounds after twenty years of fishing. Marine and Freshwater Research 52(4), 549-561. [Kapala surveys]
- Walker, T.I. and Gason, A.S. 2007. Shark and other chondrichthyan byproduct and bycatch estimation in the Southern and Eastern Scalefish and Shark Fishery. Final report to Fisheries and Research Development Corporation Project No. 2001/007. July 2007. vi + 182 pp. [SESSF observer data]

The Workshop identified a recent report by Ross Daley and Charles Gray that included recent information for some species:

- Daley, R. and Gray, C. (2020) "On-the-water management solutions to halt the decline and support the recovery of Australia's endemic elasmobranchs" report for AMCS and HSI (https://sharkchampions.org.au/wp-content/uploads/2021/04/V10F-Endemics.pdf)

It was noted that this new data largely related to logbook-reported catches of some threatened species that occur in this area/fishery, and some information on discard rates from observer records.

The workshop participants also noted that there is considerable data in observer records and from fishery-independent surveys.

Recommendations:

9. The Workshop participants recommended that more information on threatened species taken in the SESSF will help resolve their status, and without such data there will be a level of uncertainty about the status given that nearly 20 years has passed since data on CPUE were analysed and that there has been significant management change in the fishery (e.g. reductions in effort, changes in fishing gear used [from gillnets to longline in SA], closures for gulper shark conservation).
10. The Workshop participants recommended:
    a. Exploring obtaining observer and logbook data from AFMA and NSW that might inform on status. Participants also noted that the time available in the Ray Report Card project would make this difficult. However, they noted that such work would be widely beneficial and should be pursued beyond the current project if necessary.
    b. Use results from ERAs to help inform on status. The SESSF has had some SAFE assessments for some sectors and these may contain useful information on status.
    c. Discussion with AFMA to understand the magnitude of management changes and how they may have affected these species.
    d. Discussion with industry groups (e.g. SETFIA, SSIA) to gain an industry perspective on these species, their status and how management may have affected them.
    e. That it will be important to communicate the uncertainty on status given the time that has passed since the last abundance time series ended.

Likely status outcomes for individual species

The workshop considered the status of individual species (330) to provide input and endorsement of a likely sustainability status outcome. In particular, the Workshop focused on species:

- Where there was uncertainty about their sustainability status, especially where they were assessed in the Action Plan for Australian Sharks and Rays using criteria B or C.
- That may have required the consideration of a regional rather than a national assessment to resolve status.
- That were assessed as Vulnerable or Data Deficient in the Action Plan for Australian Sharks and Rays.
- That Workshop participants considered may be classified as meeting criteria for listing as Negligible.

Recommendations:

11. Table 3 contains the endorsed sustainability status by species for rays
12. Table 4 contains the endorsed sustainability status by species for sharks
13. Table 5 contains the endorsed sustainability status by species for chimaeras

Table 3. Ray status endorsed by Workshop participants

Scientific Name	Common Name	SAFS 2019 Status	Global Red List	Shark Action Plan	July 2022 SAFS Workshop	Notes
Aetobatus ocellatus	Spotted Eagle Ray		VU	LC	Sustainable	
Aetomylaeus caeruleofasciatus	Bluebanded Eagle Ray		LC	LC	Sustainable	
Aetomylaeus vespertilio	Ornate Eagle Ray		EN	NT	Sustainable	
Amblyraja georgiana	Antarctic Starry Skate		DD	Not included	Undefined Stock	
Amblyraja hyperborea	Boreal Skate		LC	LC	Sustainable	Not discussed at workshop as taxonomy uncertain
Amblyraja taaf	Whiteleg Skate		DD	Not included	Undefined Stock	Not discussed at workshop as taxonomy uncertain
Anoxypristis cuspidata	Narrow Sawfish	Depleted	EN	VU	Depleting	
Aptychotrema rostrata	Eastern Shovelnose Ray	Sustainable	LC	LC	Sustainable	
Aptychotrema timorensis	Spotted Shovelnose Ray	Undefined Stock	VU	VU	Negligible	
Aptychotrema vincentiana	Western Shovelnose Ray	Sustainable	LC	LC	Sustainable	
Bathyraja eatonii	Eaton's Skate		LC	LC	Sustainable	
Bathyraja irrasa	Kerguelen Skate		VU	LC	Sustainable	
Bathyraja ishiharai	Abyssal Skate		DD	LC	Sustainable	
Bathyraja maccaini	McCain's Skate		LC	DD	Undefined Stock	
Bathyraja murrayi	Murray's Skate		LC	LC	Sustainable	
Bathyraja richardsoni	Richardson's Skate		LC	LC	Sustainable	
Bathytoshia brevicaudata	Smooth Stingray		LC	LC	Sustainable	
Bathytoshia lata	Brown Stingray		VU	LC	Sustainable	

Dentiraja endeavouri	Endeavour Skate		NT	NT	Sustainable	Not discussed at workshop
Dentiraja australis	Sydney Skate		NT	VU	Recovering	Decline data are fairly old, newer data would be helpful
Dentiraja cerva	Whitespotted Skate		NT	NT	Sustainable	Not discussed at workshop
Dentiraja confusa	Australian Longnose Skate		CR	CR	Depleted	
Dentiraja falloarga	False Argus Skate		DD	LC	Sustainable	
Dentiraja flindersi	Pygmy Thornback Skate		DD	DD	Sustainable	
Dentiraja healdi	Heald's Skate		LC	LC	Sustainable	
Dentiraja lemprieri	Australian Thornback Skate		LC	LC	Sustainable	
Dentiraja oculus	Australian Ocellate Skate		LC	LC	Sustainable	
Dentiraja polyommata	Argus Skate		LC	LC	Sustainable	
Dipturus acrobelus	Australian Deepwater Skate		LC	LC	Sustainable	
Dipturus apricus	Pale Tropical Skate		LC	LC	Sustainable	
Dipturus canutus	Grey Skate		EN	EN	Depleted	
Dipturus grahamorum	Graham's Skate		LC	LC	Sustainable	
Dipturus gudgeri	Bight Skate		NT	NT	Sustainable	Not discussed at workshop as taxonomy uncertain
Dipturus melanospilus	Blacktip Skate		DD	LC	Sustainable	
Dipturus queenslandicus	Queensland Deepwater Skate		DD	LC	Sustainable	
Dipturus wengi	Weng's Skate		LC	LC	Sustainable	
Glaucostegus typus	Giant Shovelnose Ray changed to Giant Guitarfish	Sustainable	CR	LC	Sustainable	
Gymnura australis	Australian Butterfly Ray		LC	LC	Sustainable	

Hemitrygon fluviorum	Estuary Stingray		NT	VU	Recovering	
Hemitrygon parvonigra	Dwarf Black Stingray		DD	DD	Negligible	
Hexatrygon bickelli	Sixgill Stingray		DD	LC	Sustainable	
Himantura australis	Australian Whipray		LC	LC	Sustainable	
Himantura leoparda	Leopard Whipray		VU	LC	Sustainable	
Hypnos monopterygius	Coffin Ray		LC	LC	Sustainable	
Insentiraja laxipella	Eastern Looseskin Skate		DD	LC	Sustainable	
Insentiraja subtilispinosa	Western Looseskin Skate		LC	LC	Sustainable	
Irolita waitii	Southern Round Skate		LC	LC	Sustainable	
Irolita westraliensis	Western Round Skate		DD	LC	Sustainable	
Leucoraja pristispina	Sawback Skate		LC	LC	Sustainable	
Maculabatis astra	Blackspotted Whipray		LC	LC	Sustainable	
Maculabatis toshi	Brown Whipray		LC	LC	Sustainable	
Megatrygon microps	Smalleye Stingray		DD	DD	Undefined Stock	
Mobula alfredi	Reef Manta Ray		VU	LC	Sustainable	
Mobula birostris	Giant Manta Ray		EN	EN	Depleted	
Mobula eregoodoo	Long-horned Pygmy Devilray		EN	LC	Sustainable	
Mobula kuhlii	Kuhl's Devilray		EN	LC	Sustainable	
Mobula mobular	Giant Devilray		EN	NT	Depleted	Based on regional /global assessment
Mobula tarapacana	Chilean Devilray		EN	NT	Depleted	Based on regional /global assessment
Mobula thurstoni	Bentfin Devilray		EN	NT	Depleted	Based on regional /global assessment
Myliobatis hamlyni	Purple Eagle Ray		NT	VU	Recovering/Depleting	Needs further investigation on recent trend
Myliobatis tenuicaudatus	Southern Eagle Ray		LC	LC	Sustainable	
Narcinops lasti	Western Numbfish		LC	LC	Sustainable	

Narcinops nelsoni	Eastern Numbfish		LC	LC	Sustainable	
Narcinops ornata	Ornate Numbfish		LC	LC	Sustainable	
Narcinops tasmaniensis	Tasmanian Numbfish		LC	LC	Sustainable	
Narcinops westraliensis	Banded Numbfish		LC	LC	Sustainable	
Neotrygon annotata	Plain Maskray		NT	NT	Sustainable	
Neotrygon australiae	Australian Bluespotted Maskray		NT	LC	Sustainable	
Neotrygon leylandi	Painted Maskray		LC	LC	Sustainable	
Neotrygon ningalooensis	Ningaloo Maskray		DD	LC	Sustainable	
Neotrygon picta	Speckled Maskray		LC	LC	Sustainable	
Neotrygon trigonoides	Coral Sea Maskray		LC	LC	Sustainable	
Notoraja azurea	Blue Skate		LC	LC	Sustainable	
Notoraja hirticauda	Ghost Skate		DD	LC	Sustainable	
Notoraja ochroderma	Pale Skate		DD	LC	Sustainable	
Notoraja sticta	Blotched Skate		LC	LC	Sustainable	
Okamejei arafurensis	Arafura Skate		LC	LC	Sustainable	
Okamejei leptoura	Australian Thintail Skate		LC	LC	Sustainable	
Pastinachus ater	Broad Cowtail Ray		VU	LC	Sustainable	
Pateobatis fai	Pink Whipray		VU	LC	Sustainable	
Pateobatis hortlei	Hortle’s Whipray		NT	DD	Undefined Stock	
Pateobatis jenkinsii	Jenkin's Whipray		VU	LC	Sustainable	
Pavoraja alleni	Allen's Skate		LC	LC	Sustainable	
Pavoraja arenaria	Sandy Skate		DD	DD	Sustainable	
Pavoraja mosaica	Mosaic Skate		LC	LC	Sustainable	
Pavoraja nitida	Peacock Skate		LC	LC	Sustainable	
Pavoraja pseudonitida	False Peacock Skate		LC	LC	Sustainable	
Pavoraja umbrosa	Dusky Skate		LC	LC	Sustainable	
Plesiobatis daviesi	Giant Stingaree		LC	LC	Sustainable	
Pristis clavata	Dwarf Sawfish	Depleted	CR	EN	Depleted	

Pristis pristis	Largetooth Sawfish	Depleted	CR	CR	Depleted	
Pristis zijsron	Green Sawfish	Depleted	CR	CR	Depleted	
Pteroplatytrygon violacea	Pelagic Stingray		LC	LC	Sustainable	
Rajella challengeri	Challenger Skate		LC	LC	Sustainable	
Rhina ancylostoma	Shark Ray	Sustainable	CR	NT	Sustainable	
Rhinobatos sainsburyi	Goldeneye Shovelnose Ray	Sustainable	LC	LC	Sustainable	
Rhinoptera neglecta	Australian Cownose Ray		DD	LC	Sustainable	
Rhynchobatus australiae	Whitespotted Guitarfish	Sustainable	CR	NT	Sustainable	
Rhynchobatus palpebratus	Eyebrow Wedgefish	Sustainable	NT	NT	Sustainable	
Sinobatis bulbicauda	West Australian Legskate		LC	LC	Sustainable	
Sinobatis caerulea	Indigo Legskate		DD	LC	Sustainable	
Sinobatis filicauda	East Australian Legskate		DD	LC	Sustainable	
Spiniraja whitleyi	Melbourne Skate		VU	VU	Recovering	
Taeniura lymma	Bluespotted Fantail Ray		LC	LC	Sustainable	
Taeniurops meyeni	Blotched Fantail Ray		VU	LC	Sustainable	
Tetronarce nobiliana	Great Torpedo		LC	LC	Sustainable	
Trygonoptera galba	Yellow Shovelnose Stingaree		LC	LC	Sustainable	
Trygonoptera imitata	Eastern Shovelnose Stingaree		LC	LC	Sustainable	
Trygonoptera mucosa	Western Shovelnose Stingaree		LC	LC	Sustainable	
Trygonoptera ovalis	Striped Stingaree		LC	LC	Sustainable	
Trygonoptera personata	Masked Stingaree		LC	LC	Sustainable	
Trygonoptera testacea	Common Stingaree		NT	NT	Sustainable	
Trygonorrhina dumerilii	Southern Fiddler Ray	Sustainable	LC	LC	Sustainable	
Trygonorrhina fasciata	Eastern Fiddler Ray	Sustainable	LC	LC	Sustainable	
Urogymnus acanthobothrium	Mumburarr Whipray		DD	DD	Undefined Stock	
Urogymnus asperrimus	Porcupine Ray		VU	LC	Sustainable	

Urogymnus dalyensis	Freshwater Whipray		LC	LC	Sustainable	
Urogymnus granulatus	Mangrove Whipray		VU	LC	Sustainable	
Urolophus bucculentus	Sandyback Stingaree		VU	VU	Recovering	Not discussed at workshop
Urolophus circularis	Circular Stingaree		LC	LC	Sustainable	
Urolophus cruciatus	Banded Stingaree		LC	LC	Sustainable	
Urolophus expansus	Wide Stingaree		LC	LC	Sustainable	
Urolophus flavomosaicus	Patchwork Stingaree		LC	LC	Sustainable	
Urolophus gigas	Spotted Stingaree		LC	LC	Sustainable	
Urolophus kapalensis	Kapala Stingaree		NT	NT	Sustainable	
Urolophus lobatus	Lobed Stingaree		LC	LC	Sustainable	
Urolophus mitosis	Mitotic Stingaree		LC	LC	Sustainable	
Urolophus orarius	Coastal Stingaree		EN	EN	Depleted	Needs further investigation
Urolophus paucimaculatus	Sparsely-spotted Stingaree		LC	LC	Sustainable	
Urolophus piperatus	Coral Sea Stingaree		LC	LC	Sustainable	
Urolophus sufflavus	Yellowback Stingaree		VU	VU	Depleting	
Urolophus viridis	Greenback Stingaree		VU	VU	Depleting	
Urolophus westraliensis	Brown Stingaree		LC	LC	Sustainable	
Zearaja maugeana	Maugean Skate		EN	EN	Depleted	

Table 4. Shark status endorsed by Workshop participants

Scientific Name	Common Name	2019 SAFS Status	Global Red List	Shark Action Plan	Proposed SAFS Status	Notes
Alopias pelagicus	Pelagic Thresher	Sustainable	EN	EN	Depleted	
Alopias superciliosus	Bigeye Thresher	Sustainable	VU	VU	Depleting	
Alopias vulpinus	Common Thresher	Sustainable	VU	NT	Sustainable	
Brachaelurus colcloughi	Colclough's Shark	Depleted	VU	VU	Undefined stock	VU by C criteria, little information on decline, so use Undefined
Brachaelurus waddi	Blind Shark	Sustainable	LC	LC	Sustainable	
Carcharhinus albimarginatus	Silvertip Shark	Sustainable	VU	LC	Sustainable	
Carcharhinus altimus	Bignose Shark	Sustainable	NT	LC	Sustainable	
Carcharhinus amblyrhynchoides	Graceful Shark	Sustainable	VU	LC	Sustainable	
Carcharhinus amblyrhynchos	Grey Reef Shark	Recovering	EN	NT	Sustainable	
Carcharhinus amboinensis	Pigeye Shark	Sustainable	VU	LC	Sustainable	
Carcharhinus brachyurus	Bronze Whaler	Sustainable	VU	LC	Undefined	
Carcharhinus brevipinna	Spinner Shark	Sustainable	VU	LC	Sustainable	
Carcharhinus cautus	Nervous Shark	Sustainable	LC	LC	Sustainable	
Carcharhinus coatesi	Australian Blackspot Shark	Sustainable	LC	LC	Sustainable	
Carcharhinus falciformis	Silky Shark	Sustainable	VU	VU	Depleting	Consider WCPFC and IOTC information
Carcharhinus fitzroyensis	Creek Whaler	Sustainable	LC	LC	Sustainable	
Carcharhinus galapagensis	Galapagos Shark	Sustainable	LC	LC	Sustainable	
Carcharhinus leucas	Bull Shark	Sustainable	VU	LC	Sustainable	

Carcharhinus limbatus	Common Blacktip Shark	Sustainable	VU	LC	Sustainable (North, west, east stocks); Undefined (GoC stock)	
Carcharhinus longimanus	Oceanic Whitetip Shark	Depleted	CR	CR	Depleted	
Carcharhinus macloti	Hardnose Shark	Sustainable	NT	LC	Sustainable	
Carcharhinus melanopterus	Blacktip Reef Shark	Sustainable	VU	LC	Sustainable	
Carcharhinus obscurus	Dusky Shark	Recovering	EN	NT	Recovering (western stock); Sustainable (eastern stock)	
Carcharhinus plumbeus	Sandbar Shark	Recovering	EN	NT	Recovering (western stock); Sustainable (eastern stock)	
Carcharhinus sorrah	Spot-tail Shark	Sustainable	NT	LC	Sustainable	
Carcharhinus tilstoni	Australian Blacktip Shark	Sustainable	LC	LC	Sustainable (North and west, east stocks); Undefined (GoC stock)	
Glyphis garricki	Northern River Shark	Depleted	VU	VU	Recovering	
Glyphis glyphis (	Speartooth Shark	Depleted	VU	VU	Recovering	Consider crab trap issues for this species in Qld
Loxodon macrorhinus	Sliteye Shark	Sustainable	NT	LC	Sustainable	
Negaprion acutidens	Lemon Shark	Sustainable	EN	LC	Sustainable	
Prionace glauca	Blue Shark	Sustainable	NT	NT	Sustainable	
Rhizoprionodon acutus	Milk Shark	Sustainable	VU	LC	Sustainable	
Rhizoprionodon oligolinx	Grey Sharpnose Shark	Not Done for 2019 RC	NT	DD	Negligible	Rarely caught, may be vagrant
Rhizoprionodon taylori	Australian Sharpnose Shark	Sustainable	LC	LC	Sustainable	

Triaenodon obesus	Whitetip Reef Shark	Recovering	VU	NT	Sustainable	
Centrophorus granulosus	Gulper Shark	Depleted	EN	LC	Sustainable	
Centrophorus harrissoni	Harrisson's Dogfish	Depleted	EN	EN	Depleted	
Centrophorus moluccensis	Endeavour Dogfish	Recovering (east), Sustainable (west)	VU	LC	Sustainable	
Centrophorus squamosus	Leafscale Gulper Shark	Undefined Stock	EN	LC	Sustainable	
Centrophorus westraliensis	Western Gulper Shark	Undefined Stock	DD	LC	Sustainable	
Centrophorus uyato	Southern Dogfish	Not Done for 2019 RC		EN	Depleted	
Deania calcea	Brier Shark	Sustainable	NT	NT	Sustainable	
Deania quadrispinosa	Longsnout Dogfish	Recovering	VU	NT	Sustainable	
Cetorhinus maximus	Basking Shark	Undefined Stock	EN	NT	Sustainable	May be Negligible as very few encountered in fisheries
Chlamydoselachus anguineus	Frill Shark	Sustainable	LC	LC	Sustainable	May be Negligible as very few encountered in fisheries
Dalatias licha	Black Shark	Sustainable	VU	NT	Sustainable	
Euprotomicrus bispinatus	Pygmy Shark	Sustainable	LC	LC	Sustainable	
Isistius brasiliensis	Cookie-cutter Shark	Sustainable	LC	LC	Sustainable	May be Negligible
Isistius plutodus	Largetooth Cookie-cutter Shark	Sustainable	LC	LC	Sustainable	May be Negligible
Squaliolus aliae	Smalleye Pygmy Shark	Sustainable	LC	LC	Sustainable	May be Negligible
Echinorhinus brucus	Bramble Shark	Undefined Stock	EN	DD	Undefined Stock	
Echinorhinus cookei	Prickly Shark	Sustainable	DD	DD	Undefined Stock	
Centroscyllium kamoharai	Bareskin Dogfish	Undefined Stock	LC	LC	Sustainable	
Etmopterus granulosus	Southern Lanternshark	Sustainable	LC	LC	Sustainable	

Etmopterus bigelowi	Slender Lanternshark	Sustainable	LC	LC	Sustainable	
Etmopterus brachyurus	Short-tail Lanternshark	Undefined Stock	DD	LC	Sustainable	
Etmopterus dianthus	Pink Lanternshark	Sustainable	LC	LC	Sustainable	
Etmopterus dislineatus	Lined Lanternshark	Sustainable	LC	LC	Sustainable	
Etmopterus evansi	Blackmouth Lanternshark	Sustainable	LC	LC	Sustainable	
Etmopterus fusus	Pygmy Lanternshark	Sustainable	LC	LC	Sustainable	
Etmopterus lucifer	Blackbelly Lanternshark	Sustainable	LC	LC	Sustainable	
Etmopterus molleri	Moller's Lanternshark	Undefined Stock	DD	LC	Sustainable	
Etmopterus pusillus	Smooth Lanternshark	Sustainable	LC	LC	Sustainable	
Etmopterus unicolor	Bristled Lanternshark	Undefined Stock	DD	LC	Sustainable	
Galeocerdo cuvier	Tiger Shark	Depleting	NT	NT	Sustainable (West) Depleting (East)	Workshop suggested movement data may support two stocks with different status
Nebrius ferrugineus	Tawny Shark	Sustainable	VU	LC	Sustainable	
Hemigaleus australiensis	Australian Weasel Shark	Sustainable	LC	LC	Sustainable	
Hemipristis elongata	Fossil Shark	Sustainable	VU	LC	Sustainable	
Chiloscyllium punctatum	Grey Carpetshark	Sustainable	NT	LC	Sustainable	
Hemiscyllium hallstromi	Papuan Epaulette Shark		VU	LC	Sustainable	
Hemiscyllium ocellatum	Epaulette Shark	Sustainable	LC	LC	Sustainable	
Hemiscyllium trispeculare	Speckled Carpetshark	Sustainable	LC	Lc	Sustainable	
Heterodontus galeatus	Crested Hornshark	Sustainable	LC	LC	Sustainable	
Heterodontus portusjacksoni	Port Jackson Shark	Sustainable	LC	LC	Sustainable	
Heterodontus zebra	Zebra Hornshark	Sustainable	LC	DD	Negligible	Taxonomic issues

Heptranchias perlo	Sharpnose Sevengill Shark	Sustainable	NT	LC	Sustainable	
Hexanchus griseus	Bluntnose Sixgill Shark	Sustainable	NT	LC	Sustainable	
Hexanchus nakamurai	Bigeye Sixgill Shark	Undefined Stock	NT	LC	Sustainable	
Notorynchus cepedianus	Broadnose Sevengill Shark	Sustainable	VU	LC	Sustainable	
Carcharodon carcharias	White Shark	Recovering	VU	VU	Depleted/Recovering	CKMR suggests stable (Depleted), check NSW shark control for evidence of increasing trend (Recovering)
Isurus oxyrinchus	Shortfin Mako	Depleting	EN	VU	Depleting	Pacific status is in better shape than global status
Isurus paucus	Longfin Mako	Undefined Stock	EN	VU	Depleting	Possibly Negligible
Lamna nasus	Porbeagle	Sustainable	VU	LC	Sustainable	Southern hemisphere stock
Megachasma pelagios	Megamouth Shark	Sustainable	LC	DD	Negligible	1 specimen
Mitsukurina owstoni	Goblin Shark	Sustainable	LC	LC	Sustainable	Maybe Negligible
Carcharias taurus	Grey Nurse Shark	Depleted (east). Sustainable (West)	CR	VU	Depleted (east), Sustainable (west)	
Odontaspis ferox	Smalltooth Sand Tiger Shark	Depleted	VU	NT	Sustainable	Possibly Undefined
Eucrossorhinus dasypogon	Tasselled Wobbegong	Sustainable	LC	LC	Sustainable	
Orectolobus floridus	Floral Banded Wobbegong	Sustainable	LC	LC	Sustainable	
Orectolobus halei	Gulf Wobbegong	Sustainable	LC	LC	Sustainable	
Orectolobus hutchinsi	Western Wobbegong	Sustainable	LC	LC	Sustainable	
Orectolobus maculatus	Spotted Wobbegong	Sustainable	LC	LC	Sustainable	

Orectolobus ornatus	Ornate Wobbegong	Sustainable	LC	LC	Sustainable	
Orectolobus parvimaculatus	Dwarf Spotted Wobbegong	Sustainable	LC	LC	Sustainable	
Orectolobus reticulatus	Network Wobbegong	Undefined Stock	DD	DD	Undefined stock	
Orectolobus wardi	Northern Wobbegong	Sustainable	LC	LC	Sustainable	
Sutorectus tentaculatus	Cobbler Wobbegong	Sustainable	LC	LC	Sustainable	
Oxynotus bruniensis	Prickly Dogfish	Undefined Stock	NT	NT	Sustainable	
Parascyllium collare	Collar Carpetshark	Sustainable	LC	LC	Sustainable	
Parascyllium elongatum	Elongate Carpetshark	Undefined Stock	DD	DD	Undefined stock	
Parascyllium ferrugineum	Rusty Carpetshark	Sustainable	LC	LC	Sustainable	
Parascyllium sparsimaculatum	Ginger Carpetshark	Undefined Stock	DD	DD	Undefined stock	
Parascyllium variolatum	Varied Carpetshark	Sustainable	LC	LC	Sustainable	
Apristurus albisoma	White-bodied Catshark	Sustainable	LC	LC	Sustainable	
Apristurus ampliceps	Roughskin Catshark	Sustainable	LC	LC	Sustainable	
Apristurus australis	Pinocchio Catshark	Sustainable	LC	LC	Sustainable	
Apristurus bucephalus	Bighead Catshark	Undefined Stock	DD	LC	Sustainable	
Apristurus longicephalus	Smoothbelly Catshark	Sustainable	LC	LC	Sustainable	
Apristurus melanoasper	Fleshynose Catshark	Sustainable	LC	LC	Sustainable	
Apristurus pinguis	Bulldog Catshark	Sustainable	LC	LC	Sustainable	
Apristurus platyrhynchus	Bigfin Catshark	Sustainable	LC	LC	Sustainable	
Apristurus sinensis	Freckled Catshark	Undefined Stock	DD	LC	Sustainable	
Asymbolus analis	Grey Spotted Catshark	Sustainable	LC	LC	Sustainable	
Asymbolus funebris	Blotched Catshark	Undefined Stock	DD	DD	Negligible	
Asymbolus occiduus	Western Spotted Catshark	Sustainable	LC	LC	Sustainable	
Asymbolus pallidus	Pale Spotted Catshark	Sustainable	LC	LC	Sustainable	
Asymbolus parvus	Dwarf Catshark	Sustainable	LC	LC	Sustainable	

Asymbolus rubiginosus	Orange Spotted Catshark	Sustainable	LC	LC	Sustainable	
Asymbolus submaculatus	Variegated Catshark	Sustainable	LC	LC	Sustainable	
Asymbolus vincenti	Gulf Catshark	Sustainable	LC	LC	Sustainable	
Bythaelurus incanus	Dusky Catshark	Undefined Stock	DD	DD	Negligible	
Figaro boardmani	Sawtail Shark	Sustainable	LC	LC	Sustainable	
Figaro striatus	Northern Sawtail Shark	Undefined Stock	DD	LC	Sustainable	
Galeus gracilis	Slender Sawtail Shark	Undefined Stock	DD	DD	Negligible	
Halaelurus sellus	Speckled Catshark	Sustainable	LC	LC	Sustainable	
Parmaturus bigus	Short-tail Catshark	Undefined Stock	DD	DD	Negligible	
Pristiophorus cirratus	Common Sawshark	Sustainable	LC	LC	Sustainable	
Pristiophorus delicatus	Tropical Sawshark	Sustainable	LC	LC	Sustainable	
Pristiophorus nudipinnis	Southern Sawshark	Sustainable	LC	LC	Sustainable	
Pseudocarcharias kamoharai	Crocodile Shark	Sustainable	LC	LC	Sustainable	
Pseudotriakis microdon	False Catshark	Sustainable	LC	DD	Negligible	
Rhincodon typus	Whale Shark	Depleted	EN	EN	Depleted	
Atelomycterus fasciatus	Banded Catshark	Sustainable	LC	LC	Sustainable	
Atelomycterus macleayi	Marbled Catshark	Sustainable	LC	LC	Sustainable	
Atelomycterus marnkalha	Eastern Banded Catshark	Undefined Stock	DD	LC	Sustainable	
Aulohalaelurus labiosus	Blackspotted Catshark	Sustainable	LC	LC	Sustainable	
Cephaloscyllium albipinnum	Whitefin Swellshark	Depleted	CR	CR	Depleted	
Cephaloscyllium cooki	Cook's Swellshark	Undefined Stock	DD	DD	Negligible	
Cephaloscyllium hiscosellum	Reticulate Swellshark	Sustainable	LC	LC	Sustainable	
Cephaloscyllium laticeps	Draughtboard Shark	Sustainable	LC	LC	Sustainable	
Cephaloscyllium signourum	Flagtail Swellshark	Undefined Stock	DD	LC	Sustainable	May be Negligible
Cephaloscyllium speccum	Speckled Swellshark	Undefined Stock	DD	LC	Sustainable	May be Negligible

Cephaloscyllium variegatum	Saddled Swellshark	Depleting	NT	NT	Sustainable	
Cephaloscyllium zebrum	Narrowbar Swellshark	Undefined Stock	DD	DD	Negligible	
Centroscymnus coelolepis	Portuguese Dogfish	Sustainable	NT	LC	Sustainable	
Centroscymnus owstonii	Owston's Dogfish	Sustainable	VU	NT	Sustainable	
Centroselachus crepidater	Golden Dogfish	Sustainable	NT	LC	Sustainable	
Scymnodon macracanthus	Plunket's Dogfish	Sustainable	VU	NT	Sustainable	
Scymnodalatias albicauda	Whitetail Dogfish	Undefined Stock	DD	DD	Undefined Stock	
Scymnodalatias sherwoodi	Sherwood's Dogfish	Undefined Stock	DD	DD	Undefined Stock	
Somniosus antarcticus	Southern Sleeper Shark	Undefined Stock	LC	LC	Sustainable	
Zameus squamulosus	Velvet Dogfish	Undefined Stock	LC	LC	Sustainable	
Eusphyra blochii	Winghead Shark	Sustainable	EN	VU	Depleting	
Sphyrna lewini	Scalloped Hammerhead	Depleted	CR	EN	Depleted	EPBC assessment pending
Sphyrna mokarran	Great Hammerhead	Depleted	CR	EN	Depleted	
Sphyrna zygaena	Smooth Hammerhead	Sustainable	VU	NT	Sustainable	
Cirrhigaleus australis	Mandarin Shark	Undefined Stock	DD	DD	Undefined Stock	
Squalus acanthias	Whitespotted Spurdog	Sustainable	VU	LC	Sustainable	
Squalus albifrons	Eastern Highfin Spurdog	Undefined Stock	LC	LC	Sustainable	
Squalus altipinnis	Western Highfin Spurdog	Undefined Stock	DD	LC	Sustainable	
Squalus chloroculus	Greeneye Spurdog	Recovering	EN	EN	Depleted	
Squalus crassispinus	Fatspine Spurdog	Undefined Stock	LC	LC	Sustainable	
Squalus edmundsi	Edmunds' Spurdog	Sustainable	NT	LC	Sustainable	
Squalus grahami	Eastern Longnose Spurdog	Recovering	NT	NT	Sustainable	
Squalus megalops	Piked Spurdog	Sustainable	LC	LC	Sustainable	

Squalus montalbani	Philippine Spurdog	Recovering	VU	NT	Recovering	Long time frames so do not move category yet
Squalus nasutus	Western Longnose Spurdog	Undefined Stock	NT	LC	Sustainable	
Squalus notocaudatus	Bartail Spurdog	Undefined Stock	LC	LC	Sustainable	
Squatina albipunctata	Eastern Angelshark	Depleting	VU	VU	Depleting	
Squatina australis	Australian Angelshark	Sustainable	LC	LC	Sustainable	
Squatina pseudocellata	Western Angelshark	Sustainable	LC	LC	Sustainable	
Squatina tergocellata	Ornate Angelshark	Sustainable	LC	LC	Sustainable	
Stegostoma fasciatum	Zebra Shark	Sustainable	EN	LC	Sustainable	
Furgaleus macki	Whiskery Shark	Sustainable	LC	LC	Sustainable	
Galeorhinus galeus	School Shark	Recovering	CR	EN	Depleted	
Hemitriakis abdita	Darksnout Houndshark	Undefined Stock	DD	DD	Negligible	
Hemitriakis falcata	Sicklefin Houndshark	Sustainable	LC	LC	Sustainable	
Hypogaleus hyugaensis	Pencil Shark	Sustainable	LC	LC	Sustainable	
Iago garricki	Longnose Houndshark	Sustainable	LC	LC	Sustainable	
Mustelus antarcticus	Gummy Shark	Sustainable	LC	LC	Sustainable (southern stock), Undefined (eastern stock)	
Mustelus ravidus	Grey Gummy Shark	Sustainable	LC	LC	Sustainable	
Mustelus stevensi	Western Spotted Gummy Shark	Sustainable	LC	LC	Sustainable	

Table 5. Chimeran status endorsed by Workshop participants

Scientific Name	Common Name	Global Red List	Shark Action Plan	Proposed SAFS Status	Notes
Callorhinchus milii	Elephant Fish	LC	LC	Sustainable	Full SAFS assessment
Chimaera argiloba	Whitefin Chimaera	LC	LC	Sustainable	
Chimaera fulva	Southern Chimaera	LC	LC	Sustainable	
Chimaera lignaria	Giant Chimaera	LC	LC	Sustainable	
Chimaera macrospina	Longspine Chimaera	LC	LC	Sustainable	
Chimaera obscura	Shortspine Chimaera	LC	LC	Sustainable	
Chimaera ogilbyi	Ogilbys Ghostshark	NT	NT	Sustainable	
Harriotta haeckeli	Smallspine Spookfish	LC	LC	Sustainable	
Harriotta raleighana	Bigspine Spookfish	LC	LC	Sustainable	
Hydrolagus homonycteris	Black Ghostshark	LC	LC	Sustainable	
Hydrolagus marmoratus	Marbled Ghostshark	LC	LC	Sustainable	
Hydrolagus trolli	Abyssal Ghostshark	LC	LC	Sustainable	
Rhinochimaera africana	Paddlenose Spookfish	DD	LC	Sustainable	
Rhinochimaera pacifica	Pacific Spookfish	LC	LC	Sustainable	

Attachment A – Workshop agenda

Ray Report Card Workshop

12–13 July 2022, Hobart

Background

The Ray Report Card aims to synthesise information from a large number of previous and current research projects to produce status information on Australian rays based on sustainability, and compatible with the Status of Australian Fish Stocks process. Locally relevant information on the status of rays and the synthesis of knowledge about them is critical to identifying and addressing the challenges that face this group in Australian waters, and for demonstrating the successes of Australia's management of this group. The Project will produce a companion to the currently available Shark Report Card. It will generate individual species accounts and a summary report card on the status of sharks, rays, and chimaeras in Australia that will be easily and readily available to all stakeholders, including the general public by inclusion on the Status of Australian Fish Stocks website.

The Workshop will focus on endorsement of the sustainability status of all Australian rays (134 species), all Australian chimaeras (14 species) and sharks for which the global Red List status has been updated in the last few years. The sustainability status is for the Australian part of their ranges only and is based on the IUCN Red List Categories and the Status of Australian Fish Stock Categories for which we have developed an equivalency framework to align the two statuses, which we will explain at the workshop.

We will seek your input and review available information on range, stock structure, fisheries, and habitat and biology for the species. Some species are fairly straightforward while others will need some discussion, for which the recently published Action Plan for Australian Sharks and Rays is a very useful starting point. We have been working through the rays and some of the sharks have drafted almost two-thirds of the ray, and some of the shark and chimaera, species accounts. Consequently, we have a range of general questions on fisheries operations and regulations, along with some species-specific questions on range, life history, reported catches, and observer data.

Objective of the Workshop

- Endorse the status for each of the 134 rays, 14 chimaeras, and updated sharks (updated to reflect global Red List status changes since Shark Report Card).
- Gather input from participants for the individual species accounts.

Preliminary Agenda

Tuesday 12 July 2022	
Time	Agenda
9:00-10:30	Workshop Opening & Housekeeping Overview FRDC Ray Report Card & Ray Sustainability Status FRDC Perspective on Report Card How report assessments are done Overview of IUCN Red List assessments Red List-SAFS Equivalency Framework Taxonomy update (Will White, CSIRO)
10:30-10:45	Morning Tea
10:45-12:30	Antarctic Skate Recent Work (Jaimie Cleeland, AAD) Australian-regional connectivity effect on status – sawfish, mobulids, wedgefish, pelagic sharks SESSF/GAB species issues Fisheries Interaction Overview General Fisheries questions
12:30-13:30	Lunch
13:30-15:00	Species-specific ray questions and discussion & endorsement of status
15:15-15:30	Afternoon Tea
15:30-17:00	Species-specific ray questions and discussion & endorsement of status
Dinner	Workshop dinner – Blue Eye (7pm)

Wednesday 13 July 2022	
Time	Agenda

9:00-10:30	All remaining ray species discussion & endorsement of status
10:30-10:45	Morning Tea
10:45-12:30	Shark updates – overview Species-specific shark status questions and discussion & endorsement of status
12:30-13:30	Lunch
13:30-16:00	Chimaeras- discussion & endorsement of status Workshop overview, next steps, and close.
Dinner	Informal dinner

Workshop Participants

Name	Institution	Email
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Bailee Woolley	University of Tasmania	bailee.woolley@utas.edu.au

Appendix D. The Australian Shark and Ray Report Card

A Report Card for Australia's Sharks and Rays

Colin Simpfendorfer and Cassandra Rigby

Status of Australian Shark and Ray Stocks

331	Species assessed	Australia is home to more than a quarter of the world's shark, ray and chimaera species. This report card covers all covers all known species in 341 stocks (some species have multiple stocks)
230	Sustainable stocks	Stocks that have been assessed to be sustainable at current levels of fishing. Most are managed through fisheries regulations, and some may also have very small catches. Example: Gummy Shark (southern stock)
11	Recovering stocks	Stocks that have declined in the past, but through improved management and protection are recovering. Examples: Melbourne Skate, Dusky Shark (western stock)
15	Depleting stocks	Stocks that are taken in fisheries and have declined in abundance, but not below levels that cause sustainability issues. Require careful management to avoid further decline. Examples: Bight Skate, Shortfin Mako
19	Depleted stocks	Stocks that have been adversely affected by fishing or other threats. Most are already protected or being actively managed for recovery. Examples: Maugean Skate, Grey Nurse Shark (eastern stock)
18	Undefined stocks	Some species lack sufficient information to determine their status. These species require more data collection, but are not believed to be at immediate risk. Examples: Antarctic Starry Skate, Southern Mandarin Dogfish

48 Negligible stocks

Some species rarely, if ever, interact with fisheries in Australia, because they occur outside the range of fisheries (e.g. very deep sea) or are of a size that precludes their capture. Examples: Blue Skate, Basking Shark

Australia's sharks, rays and chimaeras

Australia's waters contain a rich and diverse range of cartilaginous (chondrichthyan) fishes – sharks, rays and chimaeras. At the time of production there were 331 species described that are known to occur here: 183 sharks, 134 rays and 14 chimaeras. When the Shark Report Card was first produced in 2019 the total was 322 species, and scientists continue to survey our waters and describe new species. These species account for the more than a quarter of the global biodiversity of this group. Importantly, nearly a half of these species are endemic to Australian waters, that is, they are found nowhere else in the world (White and Kyne 2010). This rich diversity of species provides Australia with considerable benefit. Some species are economically important to Australia's fisheries (e.g. Gummy Shark, which supports sustainable annual catches of over 2000 t), and have wide ranging social and economic values, including by supporting tourism (e.g. Whale Sharks at Ningaloo Reef, Reef Manta Rays at Lady Elliot Island). Sharks and rays are also important to many Indigenous Australians featuring in the traditions, cultures and livelihoods of Aboriginal and Torres Strait Islander peoples. In addition to these direct benefits to Australians, these animals play important roles in maintaining and regulating marine ecosystems, keeping marine systems in balance, and thus providing indirect benefits via a healthy marine environment (Dulvy et al. 2017).

Unfortunately, many species of sharks and rays are also vulnerable to threats such as fishing, habitat loss and climate change. Slow growth and limited numbers of offspring mean that many species can be quickly depleted and, once depleted, can take long periods to recover (Simpfendorfer et al. 2011). Globally, sharks and rays are under increasing pressure, with more than a third of known species threatened with an elevated risk of extinction according to the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species (Dulvy et al. 2021). While Australia's marine waters do not face the same intensity of fishing pressure experienced in many other parts of the world, some species occurring in Australia's water are at significant risk due to a combination of historical and ongoing pressures, and ecological and life-history characteristics that make them sensitive to these pressures. Some species have disappeared from large parts of their historic range because of human pressures. For example, the Green Sawfish has disappeared from the New South Wales and southern Queensland coast.

Purpose

Given the global threats to sharks, and concerns about the status of this group of key marine predators, it is important that there is a broad understanding of the status of this group in Australia's waters. Such a knowledge ensures that environmental managers, policy makers, advocacy groups and the public can act to address any species that are identified as needing improved management. This Report Card of Australia's Sharks and Rays is designed to fulfil this purpose. It reports the status of all shark, ray and chimaera species known from Australia's waters to provide a snapshot of the health of Australia's stocks[1]. It provides a summary for each of the 331 species assessed and compiles a summary of the outcomes of the assessments into this report card document. The Shark Report Card was first produced in 2019 (Simpfendorfer et al. 2019), but only covered all of Australia's sharks and a few of the rays. The new version provides comprehensive coverage of all species from all of the groups.

[1] Individual species can form separate populations in different geographical areas that are referred to as stocks. For example, the Grey Nurse Shark has two separate Australian stocks – one on the west coast, the other on the east coast.

Methodology

The Australian Shark and Ray Report Card presents a systematic assessment of the status of all of Australia's sharks, rays and chimaerans, the majority of which are probably unknown to most Australians. In doing so, the Report Card provides a scientifically robust account of what is happening to Australia's shark and ray resources, identifying the species and stocks that are currently healthy and likely to be healthy into the future, and those species that are in decline and need further management intervention and conservation.

The standard against which species were assessed was the same as that used by the Status of Australian Fish Stocks (SAFS, www.fish.gov.au). This standard is aimed at identifying the sustainability of each species in Australian fisheries, or stock if more than one has been identified for a species. The SAFS standard has six statuses (Table 1), four categories from Sustainable to Depleted, and two categories for species for which insufficient knowledge of catch occurs to conduct an assessment. The information requirements to carry out assessments using quantitative estimates of biomass and fishing mortality (the preferred SAFS approach) are large, and this occurs for only a handful of shark and ray species. To carry out assessments for species with limited data a different approach based on a proxy was required. This was achieved using the decline criterion used by the IUCN Red List of Threatened Species since national Red List assessments are available for almost all of Australia's shark, ray and chimaera species. These Red List assessments were originally developed at a workshop attended by 23 of Australia's leading shark and ray scientists held at James Cook University in 2015 as part of the original Shark Report Card project. These Red List assessments were added to and updated by the Action Plan for Australian Shark and Rays project in 2021. A workshop of species experts was held in Hobart in July 2022 to further reviewed the Red List and SAFS assessments, with a particular focus on rays, to ensure the latest available information was identified and used.

The IUCN Red List Categories and Criteria are the established International standard protocols for assessing species' extinction risk, and provide the basis for assessing species' status under the new Common Assessment Method being used by the Commonwealth and most state and territory governments. The stock status was determined from the IUCN Red List category using a guide specifically developed for this purpose (Appendix A). This approach can be applied to sharks and rays because almost all of them are assessed using the IUCN Red List A criterion (population decline) which is a proxy for biomass level. However, there are a few species that are assessed using the B (small range size) and C (small population size) criteria (e.g. Colclough's shark, Northern River Shark) that make this approach more difficult. For these species additional information was sourced to help resolve their status. However, for many of them they were assessed as Undefined stocks because of a lack of information on the level of population decline.

The Australian Shark and Ray Report Card assessed the status of a total of 331 species. Seven species (e.g. Australian Blacktip Shark, Grey Nurse Shark) had two or more separate stocks in Australian waters, giving a total of 341 stocks that were assessed. A summary of the assessments for each stock (both the Status of Australian Fish Stocks and IUCN Red List) are given in Appendices E-G, and individual species accounts are available in the Species Compendium (Appendix H).

Table 1. State of Australian Fish Stocks categories used in the Australian Shark and Ray Report Card (from www.fish.gov.au).

Stock status	Description	Potential implications for management of the stock
Sustainable	Biomass (or proxy) is at a level sufficient to ensure that, on average, future levels of recruitment are adequate (recruitment is not impaired) and for which fishing mortality (or proxy) is adequately controlled to avoid the stock becoming recruitment impaired (overfishing is not occurring).	Appropriate management is in place.
Depleting	Biomass (or proxy) is not yet depleted and recruitment is not yet impaired, but fishing mortality (or proxy) is too high (overfishing is occurring) and moving the stock in the direction of becoming recruitment impaired.	Management is needed to reduce fishing mortality and ensure that the biomass does not become depleted.
Recovering	Biomass (or proxy) is depleted and recruitment is impaired, but management measures are in place to promote stock recovery, and recovery is occurring.	Appropriate management is in place, and there is evidence that the biomass is recovering.
Depleted	Biomass (or proxy) has been reduced through catch and/or non-fishing effects, such that recruitment is impaired. Current management is not adequate to recover the stock, or adequate management measures have been put in place but have not yet resulted in measurable improvements.	Management is needed to recover this stock; if adequate management measures are already in place, more time may be required for them to take effect.
Undefined	Not enough information exists to determine stock status.	Data required to assess stock status are needed.
Negligible	Catches are so low as to be considered negligible and inadequate information exists to determine stock status.	Assessment will not be conducted unless catches and information increase.

The status of Australia's sharks and rays

Overall the stocks of Australia's sharks, rays and chimaeras are relatively healthy (Table 2, Figure 1), with 230 stocks (68%) assessed as Sustainable. A further 48 (14%) were assessed as Negligible, meaning they rarely, if ever, interact with Australian fisheries and so there are no concerns about their status. In most cases, species assessed as Negligible are those that occur in deeper waters where fishing rarely occurs (e.g. Blue Skate), are too small to be captured (e.g. Pygmy Shark) or rarely occur in Australian waters (e.g. Basking Shark). Eighteen species (5%) were assessed as Undefined stocks, meaning there was insufficient information to determine the status of the stock. Some Undefined stocks require urgent attention to better assess their status, including two species of river sharks (Northern River Shark, Speartooth Shark) that are currently listed as Threatened on the EPBC Act, and Colclough's Shark which has been affected by fishing but requires more information to understand the magnitude. Of the remaining Undefined stocks, there was no information to suggest any are under immediate threat from human pressures, including fishing. Further investigation is needed to better understand the status of these mainly deepwater species.

Table 2. Number of stocks assessed in each of the Status of Australian Fish Stocks categories by group and total.

Status	Sharks	Rays	Chimaeras	Total
Sustainable	119	98	13	230
Recovering	8	2	1	11
Depleting	7	8		15
Depleted	11	8		19
Undefined stock	9	9		18
Negligible	39	9		48
Total	**193**	**134**	**14**	**341**

While most Australian species are in a healthy state, 45 stocks (13%) have been affected by fishing and other threats. Of these 19 (6%) are assessed as Depleted, meaning their populations are likely to be below levels that will enable sustainable take. The overfishing of some Depleted species is mostly the result of fishing pressure outside of Australian waters on highly migratory species (e.g. Oceanic Whitetip Shark, Giant Manta Ray). Depleted species are those on which management needs to be focused to rebuild populations. Of the 19 species, all but five have specific management measures in place, either through fisheries management, being protected by national threatened or migratory species listings (i.e. matters of national environmental significance under the EPBC Act) or have rebuilding plans as required by being listed as Conservation Dependent under the EPBC Act (Appendix B). All five species assessed as Depleted that lack specific management are currently being assessed for listing as Threatened under the EPBC Act, or have been previously assessed. Thus, there is a clear focus on efforts to address the declines of species that have been overfished. The success of management efforts to recover overfished species is shown by the 11 stocks (3%) listed as Recovering, meaning that in the past they were considered Depleted, but that populations are now increasing and are above the level at which a stock is considered Depleted. These are mostly species where fisheries management measures have been specifically implemented to improve status (e.g. Dusky Shark (west coast) and Sandbar Shark (west coast)), or marine park zoning has been changed enabling populations to increase (e.g. Grey Reef Shark). Continued management efforts are required to ensure these recoveries continue. Fifteen stocks (4%) were assessed as Depleting, meaning their level is below that which would enable sustainable take, but have not yet reached levels that would see

them assessed as Depleted. However, further management is required to address these declines. Many of these Depleting species currently lack specific management, often being bycatch of fisheries targeting other species. There are often general management measures in place, including bycatch management plans, in these fisheries, but additional specific measures should be considered. In some cases (e.g. several species of stingaree) the data demonstrating declines is now quite old, and more recent data will help better understand the status of these species and the management measures required.

Status by group

With the completion of assessments for all species of shark, rays and chimaeras it is now possible to compare status summaries between groups (Figure 1). The chimaeras are the group in healthiest condition, with only one species assessed as Recovering and the remainder being Sustainable. Sharks and rays have similar proportion of species in the Depleted/Depleting/Recovering groups, at about 13%; sharks have a substantially greater proportion of species assessed as Negligible (20% vs 7%), but fewer species assessed as Sustainable (62% vs 73%). Sharks had greater proportions of species assessed as Recovering (4%) than rays (1%), and fewer species Depleting (3%) than rays (6%). These results suggest that management for ray species has lagged behind that of shark, and that greater focus is needed on ray management. In assessing the ray species, it was noted that there are no rays that are target species in commercial fisheries in Australian water, but they are commonly taken as bycatch in a wide range of fisheries. This suggests that management action to reduce bycatch, through action such as bycatch exclusion devices (Campbell et al. 2020), bycatch limits (e.g. those used in the tuna and billfish longline and northern prawn fisheries), and handling and release practices may all provide positive outcomes.

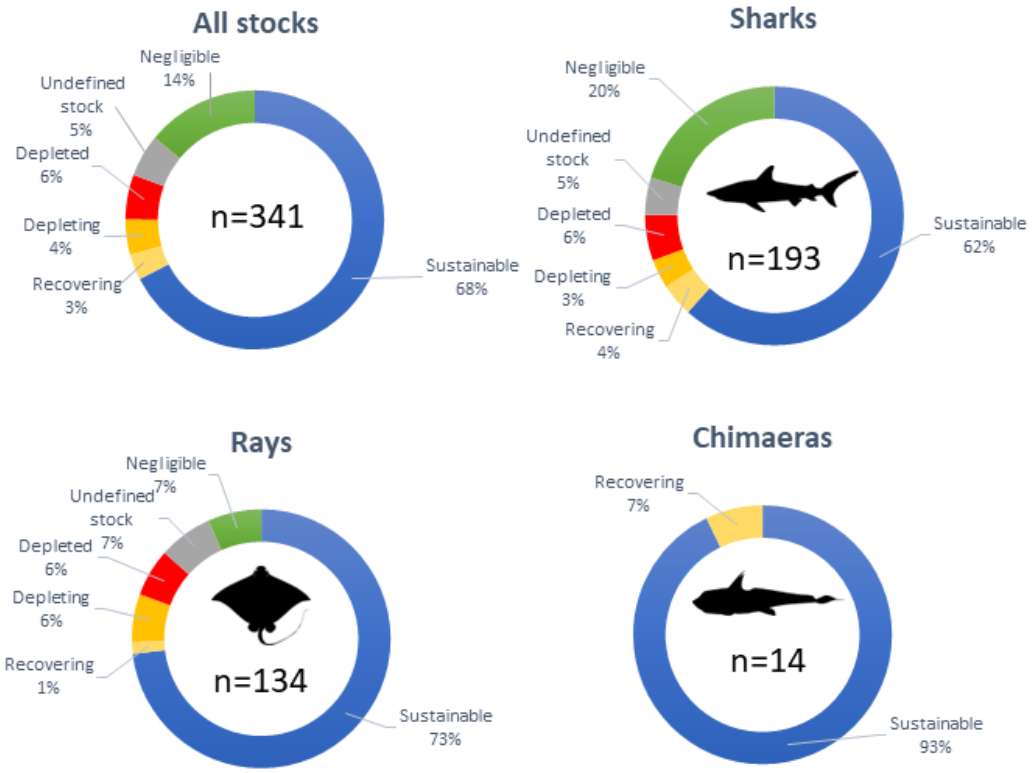

Figure 1. Proportion of stocks by status category for all species, sharks, rays and chimaeras.

Species listed on international environmental conventions

Over the past two decades, there has been an increasing trend of International Environmental Agreements incorporating shark and ray species in a bid to address global conservation concerns. The Convention on Migratory Species (CMS) aims to improve conservation outcomes for species that migrate by promoting coordinated action between signatories (Appendix II listing) or protection by signatories (Appendix I listing). The first shark species was added to the CMS Appendices in 1999 (Whale Shark). At the time of writing there were 30 species that occur in Australian waters listed on the CMS Appendices (Appendix C). Australia has reservations against 10 of the CMS listings on the basis that the status in Australia is better than in other part of the world, and that the EPBC Act requires that species listed on Appendix I or II are fully protected. In addition to the main CMS agreement, there is a subsidiary Sharks Memorandum of Understanding (Sharks MoU) that has a different group of signatories and is a non-binding agreement that promotes shark and ray conservation. Twenty nine species that occur in Australian waters are currently listed on the Sharks MoU. The second international agreement is the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which aims to conserve wild populations of listed species by regulating (Appendix II listing) or banning (Appendix I listing) international trade. At the time of writing there were 59 species that occur in Australian waters listed on the CITES Appendices, with all but the sawfish species listed on Appendix II (Appendix D).

Global versus Australian status

It is possible to compare the status of species that occur more broadly than Australian waters by comparing the Australian Red List status to the global Red List status (Figure 2; Appendix E-G). The proportion of species listed in a threatened category (Vulnerable, Endangered or Critically Endangered) in Australia was less than half that for species that occur in Australian waters across their global extent. Of the 331 species assessed, 107 had a better Australian status than global status, and no species had a worse status in Australian than it did globally. Three Australia endemic species had Red List status mismatches, but all were the result of new global assessments being completed after the Action Plan for Australian Sharks and Rays where the most recent national Red List assessments were reported. These results suggest that Australian management of sharks and rays is on average better than the global average. This result is consistent with research that has identified Australia as a global lifeboat for a number of species and groups (Morgan et al. 2011). The high number and proportion of stocks assessed as Sustainable in Australian waters is also consistent with the observation that Australia is one of the few nations that has demonstrated sustainable shark catches on the basis of strong management measures (Simpfendorfer and Dulvy 2017).

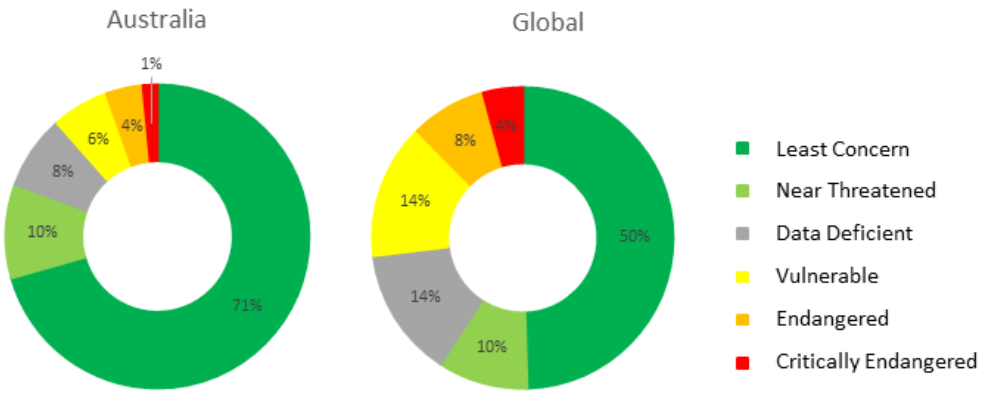

Figure 2. Comparison between Australian Red List status and global Red List status for those shark, ray and chimaera species that occur in Australian waters.

Differences between the 2019 Shark Report Card and the Shark and Ray Report Card

Comparing the outcomes of the Shark Report Card produced in 2019 (Simpfendorfer et al. 2019) with the Shark and Ray Report Card (this report) reveals that 115 of 193 stocks retained the same status, while 78 changed status (Appendix E). Many of these changes were for technical reasons, such as the addition of the Negligible category (37 stocks), non-inclusion in the Shark Report Card (5 species, mostly newly identified species), and separation of a species into multiple stocks (1). New information becoming available to improve assessments was the second most common reason for a difference in status (23 stocks). Greater alignment with regional status was achieved for highly migratory species by incorporating information from regional assessment (4 stocks); and alignment with new Status of Australian Fish Stock assessments changed the status of six stocks.

Australia's capacity to research, monitor, assess and manage sharks

While the results of this assessment demonstrate that Australia has done a good job managing its sharks and rays, it is important that these efforts are maintained. There is a long history of research, monitoring and assessment of sharks and rays in Australia. This has provided a sound base for the management of stocks and is one of the reasons that so few species are Depleted compared to global levels, and nearly all of those have some form of management in place to reverse declines. Ongoing monitoring and research are critical to maintaining the healthy state of Australia's sharks and rays. Without the knowledge of when action is required, managers are unable to act.

Australia's long history of shark research, dates back to the work of Gilbert Whitley (taxonomy), Alan Olsen (fisheries biology), Terry Walker (fisheries biology), John Stevens (fisheries biology, taxonomy), Peter Last (taxonomy) and others. Initially research capacity was focused at CSIRO and state and Territory fisheries agencies. However, as resources for some agencies have declined, and alternative sources of funding have become available, there has been a shift towards research capacity also being located at universities. This trend is best illustrated by the exponential increase in PhD, MPhil and MSc research on Australia's sharks and rays since the 1990s (Figure 3). This changing research landscape has broadened the scope of research. Up until about 2000, most research was focused on the species targeted in Australian fisheries (e.g. Gummy, School, Dusky, Whiskery and Australian Blacktip sharks). Subsequently, research has focused across a wide array of species, many of them not important commercially or important only as bycatch, and important in terms of the broader marine ecosystem and biodiversity. It is this broadening of research that has helped facilitate the production of this Report Card and other similar outputs. This broad base of research has positioned Australia well to continue to be able to address concerns about the status of its shark stocks into the future.

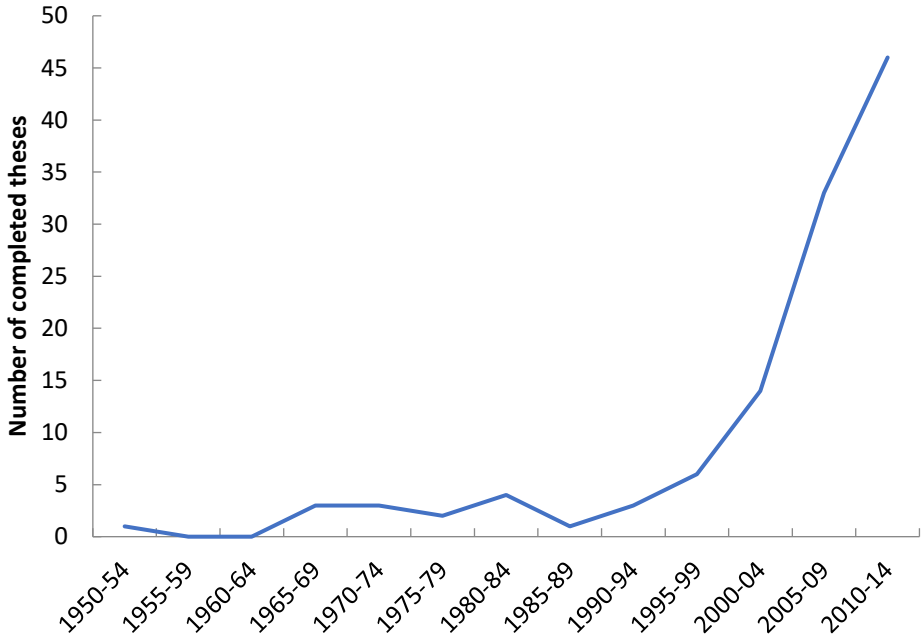

Figure 3. The number of PhD and MSc theses on sharks and rays completed at Australian universities in five year periods from 1950 to 2014.

The monitoring of Australia's shark stocks occurs in a wide variety of ways. For some target species, there are specific monitoring programs that provide data for stocks assessments. This includes many of the species targeted by fisheries, or those that are subject to rebuilding plans under the Commonwealth Harvest Strategy. However, most monitoring occurs via ongoing or one-off fishery observer programs or the collection of catch and effort data by fisheries agencies. Fishery observer programs are essential for ongoing monitoring of species caught incidentally in fisheries and formed the basis of many of the assessments that underpinned this Report Card. Despite the importance of ongoing monitoring for understanding the status of Australia's sharks and rays, the availability, coverage and focus of observer programs varies dramatically among Australian jurisdictions. Ongoing support for monitoring programs that provide data on the status of Australia's sharks and rays will be important for ensuring that the healthy nature of most stocks identified in this Report Card can be maintained. Without such programs, the ability to detect stocks that have become Depleted is more difficult and opportunities to recover stocks are lost.

The assessment of the state of Australia's shark and ray stocks is fundamental to maintaining them in a healthy state. Most species are assessed infrequently, using the IUCN Red List Categories and Criteria. This was first done in 2003 when a selection of Australian species was assessed, and again as part of this Report Card process. These assessments, however, are a measure of extinction risk and cannot be used to set sustainable fishing limits. A much smaller subset of species is subject to quantitative stock assessments that generate measures of stock status and levels of sustainable catch. Assessments of these stocks occur regularly and many are reported in the Status of Australia Fish Stocks reports (see www.fish.gov.au). In addition to full stock assessments, many sharks and rays caught in Australian fisheries have been assessed as part of ecological risk assessments (ERA). These ERAs identify those species that may be at risk from a specific fishery and need to have this risk mitigated via an appropriate mechanism. The ongoing assessment using all of these approaches play an important role in ensuring that Australia's sharks and rays are managed to ensure the vast majority remain in a healthy state and those that are not are recovered.

The culmination of research, monitoring and assessment is the implementation of management. The results of this Report Card demonstrate that Australia's approach to managing its shark and ray stocks has to date been very good. There are few species that are considered Depleted and most of those are subject to species-specific management action. Given the broad ranges and movements of many shark and ray species this management often requires the cooperation of multiple jurisdictions. The primary responsibility for management of fisheries falls to state, Territory and Commonwealth fisheries agencies. However, the Department of Climate Change, Energy, the Environment and Water also plays an important role through the EPBC Act and Wildlife Trade Operation certification processes that ensures fisheries management meets Australia's Ecologically Sustainable Development guidelines. There is also some coordination of the management of sharks and rays through Australia's National Plan of Action for Sharks (Shark Plan) that is currently in its second iteration (http://www.agriculture.gov.au/fisheries/environment/sharks). This is part of the United Nations Food and Agriculture Organisation's International Plan of Action for Sharks which aims to ensure the conservation and management of sharks and rays and their long-term sustainable use (http://www.fao.org/ipoa-sharks/en/). The results of this Report Card should contribute to all of these management processes to enable the best possible management of Australia's sharks and rays.

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Appendix A. Equivalency table between Status of Australian Fish categories and IUCN Red List status as used in the Shark and Ray Report Card.

<table>
<tr><th>IUCN Red List category</th><th>Aligns to SAFS category</th><th>Rationale</th><th>Comments</th></tr>
<tr><td>Extinct</td><td>Not Applicable</td><td>An Extinct species cannot be fished and thus cannot be included in a SAFS report. Thus, there is no corresponding SAFS category.</td><td>There are no sharks^ in this category (globally)</td></tr>
<tr><td>Extinct in the Wild</td><td>Not Applicable</td><td>A species that is Extinct in the Wild cannot be fished and thus cannot be included in a SAFS report. Thus, there is no corresponding SAFS category.</td><td>There are no sharks in this category (globally)</td></tr>
<tr><td>Critically Endangered (CR)</td><td>Depleted</td><td rowspan="4">The VU, EN, and CR categories describe scenarios where significant (>30% to >90%) population reductions have occurred over the last ten years or three generations, may occur in the future or occur over a time period encompassing both the past and the future*. This scenario aligns with Depleted in the SAFS assessment framework which indicates scenarios where recruitment levels are significantly reduced and current management is not adequate to recover the stock#.

However, a VU or EN species may also align with Recovering where management has halted and is reversing previous declines; and also with Depleting where stocks are not yet depleted but overfishing is occurring and moving stocks towards becoming depleted#.

A shark listed as VU, EN or CR may not be subject to targeted fishing pressure. However, VU, EN and CR species may still be incidentally taken as bycatch, and fishing pressure is the causative factor in the VU, EN and CR assessment for almost all sharks. Consequently, Depleted is an appropriate term that could be applied to all three IUCN categories. The exception to this are some species assessed as VU where stocks have been depleted but management measures are now in place to promote stock recovery, and recovery is occurring# (Recovering).</td><td rowspan="4">Using IUCN assessment Criteria A1, A2, A3 and A4 which assess population trends; Criteria B that assess restricted ranges and includes continuing decline in range and/or mature individuals; and Criteria C which assess declines in mature individuals.

Where fishing mortality on these species has demonstrably ceased or decreased, the Report Card Species Assessment Summary will highlight that while stocks are still in a reduced state, overfishing was historical and is no longer occurring.

Population/stock recovery depends on management intervention.</td></tr>
<tr><td>Endangered (EN)</td><td>Depleted</td></tr>
<tr><td rowspan="3">Vulnerable (VU)</td><td>Depleting</td></tr>
<tr><td>Recovering</td></tr>
<tr><td>Sustainable</td></tr>
</table>

Near Threatened (NT)	**Sustainable**	NT indicates that population reduction has occurred over the last ten years or three generations, or may occur in the future, to levels approaching the >30% population reduction threshold (VU category). However, population reductions have not yet, or are not predicted to, reach levels that are likely to threaten the species with extinction. Fishing may also reduce a stock to depleted but *stable* state where further reductions toward extinction is unlikely due to management. This scenario aligns with the SAFS category for sustainable fishing (Sustainable) where a depleted but stable population is being held at Maximum Sustainable Yield; OR categories where fishing pressure is *moving the stock in the direction of becoming recruitment overfished#* (Depleting).	The Report Card *Species Assessment Summary* will specify if the species is considered to be Sustainable, Recovering or Depleting. In Transitional stocks (Recovering or Depleting), new management intervention may be needed to halt and reverse a decline, or existing management needs to be maintained to continue population/stock recovery to target levels.
Least Concern (LC)	**Sustainable**	LC indicates that the species is not at risk of extinction. This category aligns with the SAFS *Sustainable* category which describes scenarios where stock levels are sufficient to ensure adequate levels of future recruitment and where existing management is sufficient to maintain adequate recruitment levels.	Existing management continued to maintain current population/stock levels.
	Negligible	Species can be assessed as least Concern if there is little information on their status, but where it is possible to demonstrate a lack of threats. In the case where a species is assessed as LC (and possibly NT) but where it is known to very rarely interact with Australian fisheries it can be assessed as Negligible	
Data Deficient (DD)	**Undefined Stock**	Both are categories that indicate there is insufficient information to assess the status of the population/stock against the assessment criteria.	Data required to assess populations/stocks.
Data Deficient (DD)	**Negligible**	Both are categories that indicate there is insufficient information to assess the status of the population/stock against the assessment criteria. This category aligns with the SAFS *Negligible* category where in addition, catches of the stock are so low as to be considered negligible.	Data required to assess populations/stocks when catches increase.
Not Evaluated (NE)	**No corresponding category**	The SAFS is a fisheries assessment, so a fished species that is not assessed is not included in the SAFS report. Thus, there is no corresponding SAFS category.	

Appendix B. Australian shark, ray and chimaera stocks with evidence of population declines (Depleted, Depleting, Recovering) and the type of management arrangements in place (if any). Fishery rules – species-specific rules in place in main fisheries; Protected species – protected under Commonwealth/state/Territory legislation; Rebuilding plan – species with a rebuilding plan under the Commonwealth Harvest Strategy Policy or Conservation Dependent (Environment Protection Biodiversity Conservation Act 1999 (EPBC) listing).

Scientific Name	Common Name	Current Australian management
Depleted		
Sharks		
Alopias pelagicus	Pelagic Thresher	Intl. fisheries rules
Carcharhinus longimanus	Oceanic Whitetip Shark	Intl. fisheries rules
Carcharias taurus (East Coast)	Grey Nurse Shark	Protected species
Centrophorus harrissoni	Harrisson's Dogfish	Rebuilding plan
Centrophorus uyato	Southern Dogfish	Rebuilding plan
Cephaloscyllium albipinnum	Whitefin Swellshark	None specific^
Galeorhinus galeus	School Shark	Rebuilding plan
Rhincodon typus	Whale Shark	Protected species (threatened)
Sphyrna lewini	Scalloped Hammerhead	Rebuilding plan^
Sphyrna mokarran	Great Hammerhead	Fishery rules
Squalus chloroculus	Greeneye Spurdog	None specific^
Rays		
Dentiraja confusa	Australian Longnose Skate	None specific^
Dipturus canutus	Grey Skate	None specific^
Mobula birostris	Giant Manta Ray	Protected species (migratory)
Pristis clavata	Dwarf Sawfish	Protected species (threatened)
Pristis pristis	Largetooth Sawfish	Protected species (threatened)
Pristis zijsron	Green Sawfish	Protected species (threatened)
Urolophus orarius	Coastal Stingaree	None specific*
Zearaja maugeana	Maugean Skate	Protected species (threatened)
Depleting		
Sharks		
Alopias superciliosus	Bigeye Thresher	Intl. fisheries rules
Carcharhinus falciformis	Silky Shark	Intl. fisheries rules
Cephaloscyllium variegatum	Saddled Swellshark	None specific
Eusphyra blochii	Winghead Shark	Fishery rules
Galeocerdo cuvier (East Coast)	Tiger Shark	Fishery rules
Isurus oxyrinchus	Shortfin Mako	Intl. fisheries rules
Squatina albipunctata	Eastern Angelshark	None specific^
Rays		
Anoxypristis cuspidata	Narrow Sawfish	Protected species (migratory)*
Dentiraja endeavouri	Endeavour Skate	None specific
Dipturus gudgeri	Bight Skate	None specific
Hemitrygon fluviorum	Estuary Stingray	None specific
Myliobatis hamlyni	Purple Eagle Ray	None specific
Urolophus bucculentus	Sandyback Stingaree	None specific
Urolophus sufflavus	Yellowback Stingaree	None specific

Urolophus viridis	Greenback Stingaree	None specific
Recovering		
Sharks		
Carcharhinus obscurus (Western stock)	Dusky Shark	Fishery rules
Carcharhinus plumbeus (West Coast)	Sandbar Shark	Fishery rules
Carcharodon carcharias	White Shark	Protected species (threatened)
Deania calcea	Brier Shark	Fishery rules
Deania quadrispinosa	Longsnout Dogfish	Fishery rules
Odontaspis ferox	Smalltooth Sandtiger Shark	Protected species (NSW)
Squalus grahami	Eastern Longnose Spurdog	Fishery rules
Squalus montalbani	Philippine Spurdog	Fishery rules
Rays		
Dentiraja australis	Sydney Skate	None specific
Spiniraja whitleyi	Melbourne Skate	None specific
Chimaeran		
Chimaera ogilbyi	Ogilby's Chimaera	None specific

^ at the time of writing these species were on the Department of Climate Change, Energy, the Environment and Water's Finalised Priority Assessment List, meaning that they are currently being assessed for listing under the EPBC Act for threatened status.

* these species have previously been assessed by Department of Climate Change, Energy, the Environment and Water for listing as Threatened and determined to not be eligible.

Appendix C. Shark and ray species that occur in Australian waters listed on the Convention on Trade in Migratory Species of Wild Animals appendices and Shark Memorandum of Understanding.

Common name	Scientific name	Status	Appendix I	Appendix II	Sharks MoU
Thresher sharks	**Alopidae**				
Pelagic thresher	*Alopias pelagicus*	Depleted		2014*	2016
Bigeye thresher	*Alopias superciliosus*	Depleting		2014*	2016
Common thresher	*Alopias vulpinus*	Sustainable		2014*	2016
Mackerel sharks					
White shark	*Carcharodon carcharias*	Recovering	2002	2002	2010
Shortfin mako	*Isurus oxyrinchus*	Depleting		2008^	2010
Longfin mako	*Isurus paucus*	Undefined		2008	2010
Porbeagle	*Lamna nasus*	Sustainable		2008	2010
Requiem sharks					
Silky shark	*Carcharhinus falciformis*	Depleting		2014	2016
Oceanic whitetip shark	*Carcharhinus longimanus*	Depleted	2020		2018
Dusky shark	*Carcharhinus obscurus*	Recovering		2017*	2018
Blue shark	*Prionace glauca*	Sustainable		2017*	
Hammerhead sharks					
Scalloped hammerhead	*Sphyrna lewini*	Depleted		2014*	2016
Great hammerhead	*Sphyrna mokarran*	Depleted		2014*	2016
Smooth hammerhead	*Sphyrna zygaena*	Sustainable		2020*	2018
Other sharks					
School shark	*Galeorhinus galeus*	Depleted		2020*	
Spiny dogfish	*Squalus acanthias*	Sustainable		2008	2010
Whale shark	*Rhincodon typus*	Depleted	2017	1999	2010
Basking shark	*Cetorhinus maximus*	Negligible	2005	2005	2010

Manta and devil rays					
Reef manta	*Mobula alfredi*	Sustainable	2014	2014	2016
Oceanic manta	*Mobula birostris*	Depleted	2011	2011	2016
Pygmy devil ray	*Mobula eregoodoo*	Sustainable	2014	2014	2016
Shortfin devil ray	*Mobula kuhlii*	Sustainable	2014	2014	2016
Giant devil ray	*Mobula mobular*	Sustainable	2014	2014	2016
Chilean devil ray	*Mobula tarapacana*	Sustainable	2014	2014	2016
Bentfin devil ray	*Mobula thurstoni*	Sustainable	2014	2014	2016
Sawfishes					
Narrow sawfish	*Anoxypristis cuspidata*	Depleting	2014	2014	2016
Dwarf sawfish	*Pristis clavata*	Depleted	2014	2014	2016
Largetooth sawfish	*Pristis pristis*	Depleted	2014	2014	2016
Green sawfish	*Pristis zijsron*	Depleted	2014	2014	2016
Wedgefishes					
White-spotted wedgefish	*Rhynchobatus australiae*	Sustainable		2017*	2018

*Australia has a reservation against listing

^Specific Australian legislation dealing with the take of this species

Appendix D. Shark and ray species that occur in Australian waters listed on the Convention on International Trade in Endangered Species appendices.

Common name	Scientific name	Status	Appendix I	Appendix II
Basking shark				
Basking shark	*Cetorhinus maximus*	Negligible		2003
Whale shark				
Whale shark	*Rhincodon typus*	Depleted		2003
Mackerel sharks				
White shark	*Carcharodon carcharias*	Recovering		2005
Shortfin mako	*Isurus oxyrinchus*	Depleting		2020
Longfin mako	*Isurus paucus*	Undefined		2020
Porbeagle	*Lamna nasus*	Sustainable		2014
Thresher sharks				
Pelagic thresher shark	*Alopias pelagicus*	Depleted		2017
Bigeye thresher shark	*Alopias superciliosus*	Depleting		2017
Common thresher shark	*Alopias vulpinus*	Sustainable		2017
Requiem sharks				
Silvertip Shark	*Carcharhinus albimarginatus*	Sustainable		2023
Bignose Shark	*Carcharhinus altimus*	Negligible		2023
Graceful Shark	*Carcharhinus amblyrhynchoides*	Sustainable		2023
Grey Reef Shark	*Carcharhinus amblyrhynchos*	Sustainable		2023
Pigeye Shark	*Carcharhinus amboinensis*	Sustainable		2023
Bronze Whaler	*Carcharhinus brachyurus*	Undefined		2023
Spinner Shark	*Carcharhinus brevipinna*	Sustainable		2023
Nervous Shark	*Carcharhinus cautus*	Sustainable		2023
Australian Blackspot Shark	*Carcharhinus coatesi*	Sustainable		2023

Silky Shark	*Carcharhinus falciformis*	Depleting		2017
Creek Whaler	*Carcharhinus fitzroyensis*	Sustainable		2023
Galapagos Shark	*Carcharhinus galapogensis*	Sustainable		2023
Bull Shark	*Carcharhinus leucas*	Sustainable		2023
Common Blacktip Shark	*Carcharhinus limbatus*	Sustainable		2023
Oceanic Whitetip Shark	*Carcharhinus longimanus*	Depleted		2014
Hardnose Shark	*Carcharhinus macloti*	Sustainable		2023
Blacktip Reef Shark	*Carcharhinus melanopterus*	Sustainable		2023
Dusky Shark	*Carcharhinus obscurus*	Recovering		2023
Sandbar Shark	*Carcharhinus plumbeus*	Recovering		2023
Spot-tail Shark	*Carcharhinus sorrah*	Sustainable		2023
Australian Blacktip Shark	*Carcharhinus tilstoni*	Sustainable		2023
Northern River Shark	*Glyphis garricki*	Undefined		2023
Speartooth Shark	*Glyphis glyphis*	Undefined		2023
Sliteye Shark	*Loxodon macrorhinus*	Sustainable		2023
Sharptooth Lemon shark	*Negaprion acutidens*	Sustainable		2023
Blue Shark	*Prionace glauca*	Sustainable		2023
Milk Shark	*Rhizoprionodon acutus*	Sustainable		2023
Grey Sharpnose Shark	*Rhizoprionodon oligolinx*	Undefined		2023
Australian Sharpnose Shark	*Rhizoprionodon taylori*	Sustainable		2023
Whitetip Reef Shark	*Triaenodon obesus*	Sustainable		2023
Hammerhead sharks				
Winghead shark	*Eusphyra blochii*	Depleting		2023
Scalloped hammerhead	*Sphyrna lewini*	Depleted		2014
Great hammerhead	*Sphyrna mokarran*	Depleted		2014
Smooth hammerhead	*Sphyrna zygaena*	Sustainable		2014

Manta and devil rays				
Reef manta	*Mobula alfredi*	Sustainable		2014
Oceanic manta	*Mobula birostris*	Depleted		2014
Pygmy devil ray	*Mobula eregoodoo*	Sustainable		2017
Shortfin devil ray	*Mobula kuhlii*	Sustainable		2017
Giant devil ray	*Mobula mobular*	Sustainable		2017
Chilean devil ray	*Mobula tarapacana*	Sustainable		2017
Bentfin devil ray	*Mobula thurstoni*	Sustainable		2017
Sawfishes				
Narrow sawfish	*Anoxypristis cuspidata*	Depleting	2007	
Dwarf sawfish	*Pristis clavata*	Depleted	2007	
Largeotooth sawfish	*Pristis pristis*	Depleted	2007	
Green sawfish	*Pristis zijsron*	Depleted	2007	
Giant guitarfish				
Giant guitarfish	*Glaucostegus typus*	Sustainable		2020
Wedgefishes				
Shark ray	*Rhina anclystoma*	Sustainable		
White-spotted wedgefish	*Rhynchobatus australiae*	Sustainable		2020
Eyebrow wedgefish	*Rhynchobatus palpebratus*	Sustainable		2020
Guitarfish				
Goldeneye shovelnose ray	*Rhinobatos sainsburyi*	Sustainable		2023

Appendix E. Summary of status for all Australian sharks, including Report Card status (SAFS; 2023 and 2019)), national Red List (Shark Report Card) and global Red List.

Order	Family	Scientific Name	Common Name	2023 Report Card Status	2021 Shark Action Plan	2023 Global Red List	2019 SAFS Status
Carcharhiniformes	Atelomycteridae	*Atelomycterus macleayi*	Marbled Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus albimarginatus*	Silvertip Shark	Sustainable	LC	VU	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus altimus*	Bignose Shark	Negligible	LC	NT	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus amblyrhynchoides*	Graceful Shark	Sustainable	LC	VU	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus amblyrhynchos*	Grey Reef Shark	Sustainable	NT	EN	Recovering
Carcharhiniformes	Carcharhinidae	*Carcharhinus amboinensis*	Pigeye Shark	Sustainable	LC	VU	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus brachyurus*	Bronze Whaler	Undefined	LC	VU	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus brevipinna*	Spinner Shark	Sustainable	LC	VU	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus cautus*	Nervous Shark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus coatesi*	Australian Blackspot Shark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus falciformis*	Silky Shark	Depleting	VU	VU	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus fitzroyensis*	Creek Whaler	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus galapagensis*	Galapagos Shark	Sustainable	LC	LC	Sustainable

Carcharhiniformes	Carcharhinidae	*Carcharhinus leucas*	Bull Shark	Sustainable	LC	VU	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus limbatus* (Eastern stock)	Common Blacktip Shark	Sustainable	LC	VU	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus limbatus* (Gulf of Carpentaria stock)	Common Blacktip Shark	Undefined	LC	VU	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus limbatus* (Northern stock)	Common Blacktip Shark	Sustainable	LC	VU	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus limbatus* (Western stock)	Common Blacktip Shark	Sustainable	LC	VU	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus longimanus*	Oceanic Whitetip Shark	Depleted	CR	CR	Depleted
Carcharhiniformes	Carcharhinidae	*Carcharhinus macloti*	Hardnose Shark	Sustainable	LC	NT	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus melanopterus*	Blacktip Reef Shark	Sustainable	LC	VU	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus obscurus* (Eastern stock)	Dusky Shark	Sustainable	NT	EN	Recovering
Carcharhiniformes	Carcharhinidae	*Carcharhinus obscurus* (Western stock)	Dusky Shark	Recovering	NT	EN	Recovering
Carcharhiniformes	Carcharhinidae	*Carcharhinus plumbeus* (East Coast)	Sandbar Shark	Sustainable	NT	EN	Recovering
Carcharhiniformes	Carcharhinidae	*Carcharhinus plumbeus* (West Coast)	Sandbar Shark	Recovering	NT	EN	Recovering
Carcharhiniformes	Carcharhinidae	*Carcharhinus sorrah*	Spot-tail Shark	Sustainable	LC	NT	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus tilstoni* (Eastern stock)	Australian Blacktip Shark	Sustainable	LC	LC	Sustainable

Carcharhiniformes	Carcharhinidae	*Carcharhinus tilstoni* (Gulf of Carpentaria stock)	Australian Blacktip Shark	Undefined	LC	LC	Sustainable
Carcharhiniformes	Carcharhinidae	*Carcharhinus tilstoni* (North and West stock)	Australian Blacktip Shark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Carcharhinidae	*Glyphis garricki*	Northern River Shark	Undefined	VU	VU	Depleted
Carcharhiniformes	Carcharhinidae	*Glyphis glyphis* (	Speartooth Shark	Undefined	VU	VU	Depleted
Carcharhiniformes	Carcharhinidae	*Loxodon macrorhinus*	Sliteye Shark	Sustainable	LC	NT	Sustainable
Carcharhiniformes	Carcharhinidae	*Negaprion acutidens*	Sharptooth Lemon Shark	Sustainable	LC	NT	Sustainable
Carcharhiniformes	Carcharhinidae	*Prionace glauca*	Blue Shark	Sustainable	NT	NT	Sustainable
Carcharhiniformes	Carcharhinidae	*Rhizoprionodon acutus*	Milk Shark	Sustainable	LC	VU	Sustainable
Carcharhiniformes	Carcharhinidae	*Rhizoprionodon oligolinx*	Grey Sharpnose Shark	Negligible	DD	NT	n/a
Carcharhiniformes	Carcharhinidae	*Rhizoprionodon taylori*	Australian Sharpnose Shark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Carcharhinidae	*Triaenodon obesus*	Whitetip Reef Shark	Sustainable	NT	VU	Recovering
Carcharhiniformes	Galeocerdidae	*Galeocerdo cuvier* (East Coast)	Tiger Shark	Depleting	NT	NT	Depleting
Carcharhiniformes	Galeocerdidae	*Galeocerdo cuvier* (West Coast)	Tiger Shark	Sustainable	NT	NT	Depleting
Carcharhiniformes	Hemigaleidae	*Hemigaleus australiensis*	Australian Weasel Shark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Hemigaleidae	*Hemipristis elongata*	Fossil Shark	Sustainable	LC	VU	Sustainable
Carcharhiniformes	Pentanchidae	*Apristurus albisoma*	White-bodied Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Pentanchidae	*Apristurus ampliceps*	Roughskin Catshark	Sustainable	LC	LC	Sustainable

Carcharhiniformes	Pentanchidae	*Apristurus australis* Sato,	Pinocchio Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Pentanchidae	*Apristurus bucephalus*	Bighead Catshark	Sustainable	LC	DD	Undefined
Carcharhiniformes	Pentanchidae	*Apristurus longicephalus*	Smoothbelly Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Pentanchidae	*Apristurus melanoasper*	Fleshynose Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Pentanchidae	*Apristurus pinguis*	Bulldog Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Pentanchidae	*Apristurus platyrhynchus*	Bigfin Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Pentanchidae	*Apristurus sinensis*	Freckled Catshark	Sustainable	LC	DD	Undefined
Carcharhiniformes	Pentanchidae	*Asymbolus analis*	Grey Spotted Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Pentanchidae	*Asymbolus funebris*	Blotched Catshark	Negligible	DD	DD	Undefined
Carcharhiniformes	Pentanchidae	*Asymbolus occiduus*	Western Spotted Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Pentanchidae	*Asymbolus pallidus*	Pale Spotted Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Pentanchidae	*Asymbolus parvus*	Dwarf Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Pentanchidae	*Asymbolus rubiginosus*	Orange Spotted Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Pentanchidae	*Asymbolus submaculatus*	Variegated Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Pentanchidae	*Asymbolus vincenti*	Gulf Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Pentanchidae	*Bythaelurus incanus*	Dusky Catshark	Negligible	DD	DD	Undefined
Carcharhiniformes	Pentanchidae	*Figaro boardmani*	Sawtail Shark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Pentanchidae	*Figaro striatus* Gledhill,	Northern Sawtail Shark	Sustainable	LC	DD	Undefined

Carcharhiniformes	Pentanchidae	*Galeus gracilis*	Slender Sawtail Shark	Negligible	DD	DD	Undefined
Carcharhiniformes	Pentanchidae	*Halaelurus sellus*	Speckled Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Pentanchidae	*Parmaturus bigus*	Short-tail Catshark	Negligible	DD	DD	Undefined
Carcharhiniformes	Pseudotriakidae	*Pseudotriakis microdon*	False Catshark	Negligible	DD	LC	Sustainable
Carcharhiniformes	Scyliorhinidae	*Atelomycterus fasciatus*	Banded Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Scyliorhinidae	*Atelomycterus marnkalha*	Eastern Banded Catshark	Sustainable	LC	DD	Undefined
Carcharhiniformes	Scyliorhinidae	*Aulohalaelurus labiosus*	Blackspotted Catshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Scyliorhinidae	*Cephaloscyllium albipinnum*	Whitefin Swellshark	Depleted	CR	CR	Depleted
Carcharhiniformes	Scyliorhinidae	*Cephaloscyllium cooki*	Cook's Swellshark	Negligible	DD	DD	Undefined
Carcharhiniformes	Scyliorhinidae	*Cephaloscyllium hiscosellum*	Reticulate Swellshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Scyliorhinidae	*Cephaloscyllium laticeps*	Draughtboard Shark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Scyliorhinidae	*Cephaloscyllium signourum*	Flagtail Swellshark	Negligible	LC	DD	Undefined
Carcharhiniformes	Scyliorhinidae	*Cephaloscyllium speccum*	Speckled Swellshark	Negligible	LC	DD	Undefined
Carcharhiniformes	Scyliorhinidae	*Cephaloscyllium variegatum*	Saddled Swellshark	Depleting	NT	NT	Depleting
Carcharhiniformes	Scyliorhinidae	*Cephaloscyllium zebrum*	Narrowbar Swellshark	Negligible	DD	DD	Undefined
Carcharhiniformes	Sphyrnidae	*Eusphyra blochii*	Winghead Shark	Depleting	VU	EN	Sustainable
Carcharhiniformes	Sphyrnidae	*Sphyrna lewini*	Scalloped Hammerhead	Depleted	EN	CR	Depleted
Carcharhiniformes	Sphyrnidae	*Sphyrna mokarran*	Great Hammerhead	Depleted	EN	CR	Depleted

Carcharhiniformes	Sphyrnidae	*Sphyrna zygaena*	Smooth Hammerhead	Sustainable	NT	VU	Sustainable
Carcharhiniformes	Triakidae	*Furgaleus macki*	Whiskery Shark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Triakidae	*Galeorhinus galeus*	School Shark	Depleted	EN	CR	Recovering
Carcharhiniformes	Triakidae	*Hemitriakis abdita*	Darksnout Houndshark	Negligible	DD	DD	Undefined
Carcharhiniformes	Triakidae	*Hemitriakis falcata*	Sicklefin Houndshark	Negligible	LC	LC	Sustainable
Carcharhiniformes	Triakidae	*Hypogaleus hyugaensis*	Pencil Shark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Triakidae	*Iago garricki*	Longnose Houndshark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Triakidae	*Mustelus antarcticus* (Southern stock)	Gummy Shark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Triakidae	*Mustelus antarcticus* (Eastern stock)	Gummy Shark	Undefined	LC	LC	n/a
Carcharhiniformes	Triakidae	*Mustelus ravidus*	Grey Gummy Shark	Sustainable	LC	LC	Sustainable
Carcharhiniformes	Triakidae	*Mustelus stevensi*	Western Spotted Gummy Shark	Sustainable	LC	LC	Sustainable
Echinorhiniformes	Echinorhinidae	*Echinorhinus brucus*	Bramble Shark	Negligible	DD	EN	Undefined
Echinorhiniformes	Echinorhinidae	*Echinorhinus cookei*	Prickly Shark	Negligible	DD	DD	Sustainable
Heterodontiformes	Heterodontidae	*Heterodontus galeatus*	Crested Hornshark	Sustainable	LC	LC	Sustainable
Heterodontiformes	Heterodontidae	*Heterodontus portusjacksoni*	Port Jackson Shark	Sustainable	LC	LC	Sustainable
Heterodontiformes	Heterodontidae	*Heterodontus zebra*	Zebra Hornshark	Negligible	DD	LC	Sustainable
Hexanchiformes	Chlamydoselachidae	*Chlamydoselachus anguineus*	Frill Shark	Negligible	LC	LC	Sustainable

Hexanchiformes	Hexanchidae	*Heptranchias perlo*	Sharpnose Sevengill Shark	Sustainable	LC	NT	Sustainable
Hexanchiformes	Hexanchidae	*Hexanchus griseus*	Bluntnose Sixgill Shark	Sustainable	LC	NT	Sustainable
Hexanchiformes	Hexanchidae	*Hexanchus nakamurai*	Bigeye Sixgill Shark	Negligible	LC	NT	Undefined
Hexanchiformes	Hexanchidae	*Notorynchus cepedianus*	Broadnose Sevengill Shark	Sustainable	LC	VU	Sustainable
Lamniformes	Alopiidae	*Alopias pelagicus*	Pelagic Thresher	Depleted	EN	EN	Sustainable
Lamniformes	Alopiidae	*Alopias superciliosus*	Bigeye Thresher	Depleting	VU	VU	Sustainable
Lamniformes	Alopiidae	*Alopias vulpinus*	Common Thresher	Sustainable	NT	VU	Sustainable
Lamniformes	Carchariidae	*Carcharias taurus* (East Coast)	Grey Nurse Shark	Depleted	VU	CR	Depleted
Lamniformes	Carchariidae	*Carcharias taurus* (West Coast)	Grey Nurse Shark	Sustainable	VU	CR	Sustainable
Lamniformes	Cetorhinidae	*Cetorhinus maximus*	Basking Shark	Negligible	NT	EN	Undefined
Lamniformes	Lamnidae	*Carcharodon carcharias*	White Shark	Recovering	VU	VU	Recovering
Lamniformes	Lamnidae	*Isurus oxyrinchus*	Shortfin Mako	Depleting	VU	EN	Depleting
Lamniformes	Lamnidae	*Isurus paucus*	Longfin Mako	Undefined	VU	EN	Undefined
Lamniformes	Lamnidae	*Lamna nasus*	Porbeagle	Sustainable	LC	VU	Sustainable
Lamniformes	Megachasmidae	*Megachasma pelagios*	Megamouth Shark	Negligible	DD	LC	Sustainable
Lamniformes	Mitsukurinidae	*Mitsukurina owstoni*	Goblin Shark	Negligible	LC	LC	Sustainable
Lamniformes	Odontaspididae	*Odontaspis ferox*	Smalltooth Sandtiger Shark	Recovering	NT	VU	Depleted

Lamniformes	Pseudocarchariidae	*Pseudocarcharias kamoharai*	Crocodile Shark	Sustainable	LC	LC	Sustainable
Orectolobiformes	Brachaeluridae	*Brachaelurus colcloughi*	Colclough's Shark	Undefined	VU	VU	Depleted
Orectolobiformes	Brachaeluridae	*Brachaelurus waddi*	Blind Shark	Sustainable	LC	LC	Sustainable
Orectolobiformes	Ginglymostomatidae	*Nebrius ferrugineus*	Tawny Shark	Sustainable	LC	VU	Sustainable
Orectolobiformes	Hemiscylliidae	*Chiloscyllium punctatum*	Brownbanded Bamboo Shark	Sustainable	LC	NT	Sustainable
Orectolobiformes	Hemiscylliidae	*Hemiscyllium hallstromi*	Papuan Epaulette Shark	Negligible	LC	VU	n/a
Orectolobiformes	Hemiscylliidae	*Hemiscyllium ocellatum*	Epaulette Shark	Sustainable	LC	LC	Sustainable
Orectolobiformes	Hemiscylliidae	*Hemiscyllium trispeculare*	Speckled Carpetshark	Sustainable	LC	LC	Sustainable
Orectolobiformes	Orectolobidae	*Eucrossorhinus dasypogon*	Tasselled Wobbegong	Sustainable	LC	LC	Sustainable
Orectolobiformes	Orectolobidae	*Orectolobus floridus*	Floral Banded Wobbegong	Sustainable	LC	LC	Sustainable
Orectolobiformes	Orectolobidae	*Orectolobus halei*	Gulf Wobbegong	Sustainable	LC	LC	Sustainable
Orectolobiformes	Orectolobidae	*Orectolobus hutchinsi*	Western Wobbegong	Sustainable	LC	LC	Sustainable
Orectolobiformes	Orectolobidae	*Orectolobus maculatus*	Spotted Wobbegong	Sustainable	LC	LC	Sustainable
Orectolobiformes	Orectolobidae	*Orectolobus ornatus*	Ornate Wobbegong	Sustainable	LC	LC	Sustainable
Orectolobiformes	Orectolobidae	*Orectolobus parvimaculatus*	Dwarf Spotted Wobbegong	Sustainable	LC	LC	Sustainable
Orectolobiformes	Orectolobidae	*Orectolobus reticulatus*	Network Wobbegong	Negligible	DD	DD	Undefined
Orectolobiformes	Orectolobidae	*Orectolobus wardi*	Northern Wobbegong	Negligible	LC	LC	Sustainable

Orectolobiformes	Orectolobidae	*Sutorectus tentaculatus*	Cobbler Wobbegong	Sustainable	LC	LC	Sustainable
Orectolobiformes	Parascylliidae	*Parascyllium collare*	Collared Carpetshark	Sustainable	LC	LC	Sustainable
Orectolobiformes	Parascylliidae	*Parascyllium elongatum*	Elongate Carpetshark	Negligible	DD	DD	Undefined
Orectolobiformes	Parascylliidae	*Parascyllium ferrugineum*	Rusty Carpetshark	Sustainable	LC	LC	Sustainable
Orectolobiformes	Parascylliidae	*Parascyllium sparsimaculatum*	Ginger Carpetshark	Negligible	DD	DD	Undefined
Orectolobiformes	Parascylliidae	*Parascyllium variolatum*	Varied Carpetshark	Sustainable	LC	LC	Sustainable
Orectolobiformes	Rhincodontidae	*Rhincodon typus*	Whale Shark	Depleted	EN	EN	Depleted
Orectolobiformes	Stegostomidae	*Stegostoma tigrinum*	Zebra Shark	Sustainable	LC	EN	Sustainable
Pristiophoriformes	Pristiophoridae	*Pristiophorus cirratus*	Common Sawshark	Sustainable	LC	LC	Sustainable
Pristiophoriformes	Pristiophoridae	*Pristiophorus delicatus*	Tropical Sawshark	Sustainable	LC	LC	Sustainable
Pristiophoriformes	Pristiophoridae	*Pristiophorus nudipinnis*	Southern Sawshark	Sustainable	LC	LC	Sustainable
Squaliformes	Centrophoridae	*Centrophorus*	Gulper Shark	Sustainable	LC	EN	Depleted
Squaliformes	Centrophoridae	*Centrophorus harrissoni*	Harrisson's Dogfish	Depleted	EN	EN	Depleted
Squaliformes	Centrophoridae	*Centrophorus moluccensis*	Endeavour Dogfish	Sustainable	LC	VU	Sustainable
Squaliformes	Centrophoridae	*Centrophorus squamosus*	Leafscale Gulper Shark	Sustainable	LC	EN	Undefined
Squaliformes	Centrophoridae	*Centrophorus westraliensis*	Western Gulper Shark	Sustainable	LC	DD	Undefined
Squaliformes	Centrophoridae	*Centrophorus zeehaani*	Southern Dogfish	Depleted	EN		n/a
Squaliformes	Centrophoridae	*Deania calcea*	Brier Shark	Recovering	NT	NT	Sustainable
Squaliformes	Centrophoridae	*Deania quadrispinosa*	Longsnout Dogfish	Recovering	NT	VU	Recovering

Squaliformes	Dalatiidae	*Dalatias licha*	Black Shark	Sustainable	NT	VU	Sustainable
Squaliformes	Dalatiidae	*Euprotomicrus bispinatus*	Pygmy Shark	Negligible	LC	LC	Sustainable
Squaliformes	Dalatiidae	*Isistius brasiliensis*	Smalltooth Cookiecutter Shark	Negligible	LC	LC	Sustainable
Squaliformes	Dalatiidae	*Isistius plutodus*	Largetooth Cookie-cutter Shark	Negligible	LC	LC	Sustainable
Squaliformes	Dalatiidae	*Squaliolus aliae*	Smalleye Pygmy Shark	Negligible	LC	LC	Sustainable
Squaliformes	Etmopteridae	*Centroscyllium kamoharai*	Bareskin Dogfish	Sustainable	LC	LC	Undefined
Squaliformes	Etmopteridae	*Etmopterus granulosus*	Southern Lanternshark	Sustainable	LC	LC	Sustainable
Squaliformes	Etmopteridae	*Etmopterus bigelowi*	Blurred Smooth Lanternshark	Sustainable	LC	LC	Sustainable
Squaliformes	Etmopteridae	*Etmopterus brachyurus*	Short-tail Lanternshark	Sustainable	LC	DD	Undefined
Squaliformes	Etmopteridae	*Etmopterus dianthus*	Pink Lanternshark	Negligible	LC	LC	Sustainable
Squaliformes	Etmopteridae	*Etmopterus dislineatus*	Lined Lanternshark	Negligible	LC	LC	Sustainable
Squaliformes	Etmopteridae	*Etmopterus evansi*	Blackmouth Lanternshark	Negligible	LC	LC	Sustainable
Squaliformes	Etmopteridae	*Etmopterus fusus*	Pygmy Lanternshark	Negligible	LC	LC	Sustainable
Squaliformes	Etmopteridae	*Etmopterus lucifer*	Blackbelly Lanternshark	Sustainable	LC	LC	Sustainable
Squaliformes	Etmopteridae	*Etmopterus molleri*	Moller’s Lanternshark	Sustainable	LC	DD	Undefined
Squaliformes	Etmopteridae	*Etmopterus pusillus*	Smooth Lanternshark	Sustainable	LC	LC	Sustainable
Squaliformes	Etmopteridae	*Etmopterus unicolor*	Bristled Lanternshark	Sustainable	LC	DD	Undefined

Squaliformes	Etmopteridae	*Etmopterus viator*	Traveller Lanternshark	Sustainable	n/a	LC	n/a
Squaliformes	Oxynotidae	*Oxynotus bruniensis*	Prickly Dogfish	Sustainable	NT	NT	Undefined
Squaliformes	Somniosidae	*Centroscymnus coelolepis*	Portuguese Dogfish	Sustainable	LC	NT	Sustainable
Squaliformes	Somniosidae	*Centroscymnus owstonii*	Owston's Dogfish	Sustainable	NT	VU	Sustainable
Squaliformes	Somniosidae	*Centroselachus crepidater*	Golden Dogfish	Sustainable	LC	NT	Sustainable
Squaliformes	Somniosidae	*Scymnodon macracanthus*	Largespine Velvet Dogfish	Sustainable	NT	VU	Sustainable
Squaliformes	Somniosidae	*Scymnodalatias albicauda*	Whitetail Dogfish	Negligible	DD	DD	Undefined
Squaliformes	Somniosidae	*Scymnodalatias sherwoodi*	Sherwood's Dogfish	Negligible	DD	DD	Undefined
Squaliformes	Somniosidae	*Somniosus antarcticus*	Southern Sleeper Shark	Sustainable	LC	LC	Undefined
Squaliformes	Somniosidae	*Zameus squamulosus*	Velvet Dogfish	Sustainable	LC	LC	Undefined
Squaliformes	Squalidae	*Cirrhigaleus australis*	Southern Mandarin Shark	Undefined	DD	DD	Undefined
Squaliformes	Squalidae	*Squalus acanthias*	Whitespotted Spurdog	Sustainable	LC	VU	Sustainable
Squaliformes	Squalidae	*Squalus albifrons*	Eastern Highfin Spurdog	Sustainable	LC	LC	Undefined
Squaliformes	Squalidae	*Squalus altipinnis*	Western Highfin Spurdog	Negligible	LC	DD	Undefined
Squaliformes	Squalidae	*Squalus chloroculus*	Greeneye Spurdog	Depleted	EN	EN	Recovering
Squaliformes	Squalidae	*Squalus crassispinus*	Fatspine Spurdog	Negligible	LC	LC	Undefined
Squaliformes	Squalidae	*Squalus edmundsi*	Edmunds' Spurdog	Sustainable	LC	NT	Sustainable

Squaliformes	Squalidae	*Squalus grahami*	Eastern Longnose Spurdog	Recovering	NT	NT	Recovering
Squaliformes	Squalidae	*Squalus megalops*	Piked Spurdog	Sustainable	LC	LC	Sustainable
Squaliformes	Squalidae	*Squalus montalbani*	Philippine Spurdog	Recovering	NT	VU	Recovering
Squaliformes	Squalidae	*Squalus nasutus*	Western Longnose Spurdog	Sustainable	LC	NT	Undefined
Squaliformes	Squalidae	*Squalus notocaudatus*	Bartail Spurdog	Negligible	LC	LC	Undefined
Squatiniformes	Squatinidae	*Squatina albipunctata*	Eastern Angelshark	Depleting	VU	VU	Depleting
Squatiniformes	Squatinidae	*Squatina australis*	Australian Angelshark	Sustainable	LC	LC	Sustainable
Squatiniformes	Squatinidae	*Squatina pseudocellata*	Western Angelshark	Sustainable	LC	LC	Sustainable
Squatiniformes	Squatinidae	*Squatina tergocellata*	Ornate Angelshark	Sustainable	LC	LC	Sustainable

Appendix F. Summary of status for all Australian rays, including Report Card status (SAFS; 2023), national Red List (Shark Report Card) and global Red List.

Order	Family	Scientific Name	Common Name	2023 Report Card Status	2021 Shark Action Plan	2023 Global Red List
Myliobatiformes	Aetobatidae	*Aetobatus ocellatus*	Spotted Eagle Ray	Sustainable	LC	VU
Myliobatiformes	Dasyatidae	*Bathytoshia brevicaudata*	Smooth Stingray	Sustainable	LC	LC
Myliobatiformes	Dasyatidae	*Bathytoshia lata*	Brown Stingray	Sustainable	LC	VU
Myliobatiformes	Dasyatidae	*Hemitrygon fluviorum*	Estuary Stingray	Depleting	VU	NT
Myliobatiformes	Dasyatidae	*Hemitrygon parvonigra*	Dwarf Black Stingray	Undefined	DD	DD
Myliobatiformes	Dasyatidae	*Himantura australis*	Australian Whipray	Sustainable	LC	LC
Myliobatiformes	Dasyatidae	*Himantura leoparda*	Leopard Whipray	Sustainable	LC	VU
Myliobatiformes	Dasyatidae	*Maculabatis astra*	Blackspotted Whipray	Sustainable	LC	LC
Myliobatiformes	Dasyatidae	*Maculabatis toshi*	Brown Whipray	Sustainable	LC	LC
Myliobatiformes	Dasyatidae	*Megatrygon microps*	Smalleye Stingray	Undefined	DD	DD
Myliobatiformes	Dasyatidae	*Neotrygon annotata*	Plain Maskray	Sustainable	NT	NT
Myliobatiformes	Dasyatidae	*Neotrygon australiae*	Australian Bluespotted Maskray	Sustainable	LC	NT
Myliobatiformes	Dasyatidae	*Neotrygon leylandi*	Painted Maskray	Sustainable	LC	LC
Myliobatiformes	Dasyatidae	*Neotrygon ningalooensis*	Ningaloo Maskray	Sustainable	LC	DD
Myliobatiformes	Dasyatidae	*Neotrygon picta*	Speckled Maskray	Sustainable	LC	LC

Myliobatiformes	Dasyatidae	*Neotrygon trigonoides*	Coral Sea Maskray	Sustainable	LC	LC
Myliobatiformes	Dasyatidae	*Pastinachus ater*	Broad Cowtail Ray	Sustainable	LC	VU
Myliobatiformes	Dasyatidae	*Pateobatis fai*	Pink Whipray	Sustainable	LC	VU
Myliobatiformes	Dasyatidae	*Pateobatis hortlei*	Hortle’s Whipray	Undefined	DD	NT
Myliobatiformes	Dasyatidae	*Pateobatis jenkinsii*	Jenkin's Whipray	Sustainable	LC	VU
Myliobatiformes	Dasyatidae	*Pteroplatytrygon violacea*	Pelagic Stingray	Sustainable	LC	LC
Myliobatiformes	Dasyatidae	*Taeniura lymma*	Bluespotted Fantail Ray	Sustainable	LC	LC
Myliobatiformes	Dasyatidae	*Taeniurops meyeni*	Blotched Fantail Ray	Sustainable	LC	VU
Myliobatiformes	Dasyatidae	*Urogymnus acanthobothrium*	Mumburarr Whipray	Undefined	DD	DD
Myliobatiformes	Dasyatidae	*Urogymnus asperrimus*	Porcupine Ray	Sustainable	LC	VU
Myliobatiformes	Dasyatidae	*Urogymnus dalyensis*	Freshwater Whipray	Sustainable	LC	LC
Myliobatiformes	Dasyatidae	*Urogymnus granulatus*	Mangrove Whipray	Sustainable	LC	VU
Myliobatiformes	Gymnuridae	*Gymnura australis*	Australian Butterfly Ray	Sustainable	LC	LC
Myliobatiformes	Hexatrgonidae	*Hexatrygon bickelli*	Sixgill Stingray	Sustainable	LC	DD
Myliobatiformes	Mobulidae	*Mobula alfredi*	Reef Manta Ray	Sustainable	LC	VU
Myliobatiformes	Mobulidae	*Mobula birostris*	Giant Manta Ray	Depleted	EN	EN
Myliobatiformes	Mobulidae	*Mobula eregoodoo*	Long-horned Pygmy Devilray	Sustainable	LC	EN
Myliobatiformes	Mobulidae	*Mobula kuhlii*	Kuhl’s Devilray	Sustainable	LC	EN

Myliobatiformes	Mobulidae	*Mobula mobular*	Giant Devilray	Sustainable	NT	EN
Myliobatiformes	Mobulidae	*Mobula tarapacana*	Chilean Devilray	Sustainable	NT	EN
Myliobatiformes	Mobulidae	*Mobula thurstoni*	Bentfin Devilray	Sustainable	NT	EN
Myliobatiformes	Myliobatidae	*Aetomylaeus caeruleofasciatus*	Bluebanded Eagle Ray	Sustainable	LC	LC
Myliobatiformes	Myliobatidae	*Aetomylaeus vespertilio*	Ornate Eagle Ray	Sustainable	NT	EN
Myliobatiformes	Myliobatidae	*Myliobatis hamlyni*	Purple Eagle Ray	Depleting	VU	NT
Myliobatiformes	Myliobatidae	*Myliobatis tenuicaudatus*	Southern Eagle Ray	Sustainable	LC	LC
Myliobatiformes	Plesiobatidae	*Plesiobatis daviesi*	Giant Stingaree	Sustainable	LC	LC
Myliobatiformes	Rhinopteridae	*Rhinoptera neglecta*	Australian Cownose Ray	Sustainable	LC	DD
Myliobatiformes	Urolophidae	*Trygonoptera galba*	Yellow Shovelnose Stingaree	Sustainable	LC	LC
Myliobatiformes	Urolophidae	*Trygonoptera imitata*	Eastern Shovelnose Stingaree	Sustainable	LC	LC
Myliobatiformes	Urolophidae	*Trygonoptera mucosa*	Western Shovelnose Stingaree	Sustainable	LC	LC
Myliobatiformes	Urolophidae	*Trygonoptera ovalis*	Striped Stingaree	Sustainable	LC	LC
Myliobatiformes	Urolophidae	*Trygonoptera personata*	Masked Stingaree	Sustainable	LC	LC
Myliobatiformes	Urolophidae	*Trygonoptera testacea*	Common Stingaree	Sustainable	NT	NT
Myliobatiformes	Urolophidae	*Urolophus bucculentus*	Sandyback Stingaree	Depleting	VU	VU
Myliobatiformes	Urolophidae	*Urolophus circularis*	Circular Stingaree	Sustainable	LC	LC
Myliobatiformes	Urolophidae	*Urolophus cruciatus*	Banded Stingaree	Sustainable	LC	LC

Myliobatiformes	Urolophidae	*Urolophus expansus*	Wide Stingaree	Sustainable	LC	LC
Myliobatiformes	Urolophidae	*Urolophus flavomosaicus*	Patchwork Stingaree	Sustainable	LC	LC
Myliobatiformes	Urolophidae	*Urolophus gigas*	Spotted Stingaree	Sustainable	LC	LC
Myliobatiformes	Urolophidae	*Urolophus kapalensis*	Kapala Stingaree	Sustainable	NT	NT
Myliobatiformes	Urolophidae	*Urolophus lobatus*	Lobed Stingaree	Sustainable	LC	LC
Myliobatiformes	Urolophidae	*Urolophus mitosis*	Mitotic Stingaree	Sustainable	LC	LC
Myliobatiformes	Urolophidae	*Urolophus orarius*	Coastal Stingaree	Depleted	EN	EN
Myliobatiformes	Urolophidae	*Urolophus paucimaculatus*	Sparsely-spotted Stingaree	Sustainable	LC	LC
Myliobatiformes	Urolophidae	*Urolophus piperatus*	Coral Sea Stingaree	Sustainable	LC	LC
Myliobatiformes	Urolophidae	*Urolophus sufflavus*	Yellowback Stingaree	Depleting	VU	VU
Myliobatiformes	Urolophidae	*Urolophus viridis*	Greenback Stingaree	Depleting	VU	VU
Myliobatiformes	Urolophidae	*Urolophus westraliensis*	Brown Stingaree	Sustainable	LC	LC
Rajiformes	Anacanthobatidae	*Sinobatis bulbicauda*	West Australian Legskate	Sustainable	LC	LC
Rajiformes	Anacanthobatidae	*Sinobatis caerulea*	Indigo Legskate	Sustainable	LC	DD
Rajiformes	Anacanthobatidae	*Sinobatis filicauda*	East Australian Legskate	Negligible	LC	DD
Rajiformes	Arhynchobatidae	*Bathyraja eatonii*	Eaton’s Skate	Sustainable	LC	LC
Rajiformes	Arhynchobatidae	*Bathyraja irrasa*	Kerguelen Skate	Undefined	LC	VU
Rajiformes	Arhynchobatidae	*Bathyraja ishiharai*	Abyssal Skate	Negligible	LC	DD
Rajiformes	Arhynchobatidae	*Bathyraja maccaini*	McCain’s Skate	Undefined	DD	LC

Rajiformes	Arhynchobatidae	*Bathyraja murrayi*	Murray's Skate	Sustainable	LC	LC
Rajiformes	Arhynchobatidae	*Bathyraja richardsoni*	Richardson's Skate	Negligible	LC	LC
Rajiformes	Arhynchobatidae	*Insentiraja laxipella*	Eastern Looseskin Skate	Sustainable	LC	DD
Rajiformes	Arhynchobatidae	*Insentiraja subtilispinosa*	Western Looseskin Skate	Sustainable	LC	LC
Rajiformes	Arhynchobatidae	*Irolita waitii*	Southern Round Skate	Sustainable	LC	LC
Rajiformes	Arhynchobatidae	*Irolita westraliensis*	Western Round Skate	Sustainable	LC	DD
Rajiformes	Arhynchobatidae	*Notoraja azurea*	Blue Skate	Negligible	LC	LC
Rajiformes	Arhynchobatidae	*Notoraja hirticauda*	Ghost Skate	Sustainable	LC	DD
Rajiformes	Arhynchobatidae	*Notoraja ochroderma*	Pale Skate	Negligible	LC	DD
Rajiformes	Arhynchobatidae	*Notoraja sticta*	Blotched Skate	Negligible	LC	LC
Rajiformes	Arhynchobatidae	*Pavoraja alleni*	Allen's Skate	Sustainable	LC	LC
Rajiformes	Arhynchobatidae	*Pavoraja arenaria*	Sandy Skate	Undefined	DD	DD
Rajiformes	Arhynchobatidae	*Pavoraja mosaica*	Mosaic Skate	Sustainable	LC	LC
Rajiformes	Arhynchobatidae	*Pavoraja nitida*	Peacock Skate	Sustainable	LC	LC
Rajiformes	Arhynchobatidae	*Pavoraja pseudonitida*	False Peacock Skate	Sustainable	LC	LC
Rajiformes	Arhynchobatidae	*Pavoraja umbrosa*	Dusky Skate	Sustainable	LC	LC
Rajiformes	Rajidae	*Amblyraja georgiana*	Antarctic Starry Skate	Undefined	Not included	DD
Rajiformes	Rajidae	*Amblyraja hyperborea*	Boreal Skate	Sustainable	LC	LC

Rajiformes	Rajidae	*Amblyraja taaf*	Whiteleg Skate	Sustainable	Not included	DD
Rajiformes	Rajidae	*Dentiraja australis*	Sydney Skate	Recovering	VU	NT
Rajiformes	Rajidae	*Dentiraja cerva*	Whitespotted Skate	Sustainable	NT	NT
Rajiformes	Rajidae	*Dentiraja confusa*	Australian Longnose Skate	Depleted	CR	CR
Rajiformes	Rajidae	*Dentiraja endeavouri*	Endeavour Skate	Depleting	NT	NT
Rajiformes	Rajidae	*Dentiraja falloarga*	False Argus Skate	Sustainable	LC	DD
Rajiformes	Rajidae	*Dentiraja flindersi*	Pygmy Thornback Skate	Undefined	DD	DD
Rajiformes	Rajidae	*Dentiraja healdi*	Heald's Skate	Sustainable	LC	LC
Rajiformes	Rajidae	*Dentiraja lemprieri*	Australian Thornback Skate	Sustainable	LC	LC
Rajiformes	Rajidae	*Dentiraja oculus*	Australian Ocellate Skate	Sustainable	LC	LC
Rajiformes	Rajidae	*Dentiraja polyommata*	Argus Skate	Sustainable	LC	LC
Rajiformes	Rajidae	*Dipturus acrobelus*	Australian Deepwater Skate	Sustainable	LC	LC
Rajiformes	Rajidae	*Dipturus apricus*	Pale Tropical Skate	Sustainable	LC	LC
Rajiformes	Rajidae	*Dipturus canutus*	Grey Skate	Depleted	EN	EN
Rajiformes	Rajidae	*Dipturus grahamorum*	Graham's Skate	Sustainable	LC	LC
Rajiformes	Rajidae	*Dipturus gudgeri*	Bight Skate	Depleting	NT	NT
Rajiformes	Rajidae	*Dipturus melanospilus*	Blacktip Skate	Sustainable	LC	DD
Rajiformes	Rajidae	*Dipturus queenslandicus*	Queensland Deepwater Skate	Negligible	LC	DD

Rajiformes	Rajidae	*Dipturus wengi*	Weng's Skate	Sustainable	LC	LC
Rajiformes	Rajidae	*Leucoraja pristispina*	Sawback Skate	Sustainable	LC	LC
Rajiformes	Rajidae	*Okamejei arafurensis*	Arafura Skate	Sustainable	LC	LC
Rajiformes	Rajidae	*Okamejei leptoura*	Australian Thintail Skate	Sustainable	LC	LC
Rajiformes	Rajidae	*Rajella challengeri*	Challenger Skate	Negligible	LC	LC
Rajiformes	Rajidae	*Spiniraja whitleyi*	Melbourne Skate	Recovering	VU	VU
Rajiformes	Rajidae	*Zearaja maugeana*	Maugean Skate	Depleted	EN	EN
Rhinopristiformes	Glaucostegidae	*Glaucostegus typus*	Giant Guitarfish	Sustainable	LC	CR
Rhinopristiformes	Pristidae	*Anoxypristis cuspidata*	Narrow Sawfish	Depleting	VU	CR
Rhinopristiformes	Pristidae	*Pristis clavata*	Dwarf Sawfish	Depleted	EN	CR
Rhinopristiformes	Pristidae	*Pristis pristis*	Largetooth Sawfish	Depleted	CR	CR
Rhinopristiformes	Pristidae	*Pristis zijsron*	Green Sawfish	Depleted	CR	CR
Rhinopristiformes	Rhinidae	*Rhina ancylostomus*	Shark Ray	Sustainable	NT	CR
Rhinopristiformes	Rhinidae	*Rhynchobatus australiae*	Bottlenose Wedgefish	Sustainable	NT	CR
Rhinopristiformes	Rhinidae	*Rhynchobatus palpebratus*	Eyebrow Wedgefish	Sustainable	NT	NT
Rhinopristiformes	Rhinobatidae	*Rhinobatos sainsburyi*	Goldeneye Shovelnose Ray	Sustainable	LC	LC
Rhinopristiformes	Trygonorrhinidae	*Aptychotrema rostrata*	Eastern Shovelnose Ray	Sustainable	LC	LC
Rhinopristiformes	Trygonorrhinidae	*Aptychotrema timorensis*	Spotted Shovelnose Ray	Negligible	VU	VU
Rhinopristiformes	Trygonorrhinidae	*Aptychotrema vincentiana*	Western Shovelnose Ray	Sustainable	LC	LC

Rhinopristiformes	Trygonorrhinidae	*Trygonorrhina dumerilii*	Southern Fiddler Ray	Sustainable	LC	LC
Rhinopristiformes	Trygonorrhinidae	*Trygonorrhina fasciata*	Eastern Fiddler Ray	Sustainable	LC	LC
Torpediniformes	Hypnidae	*Hypnos monopterygius*	Coffin Ray	Sustainable	LC	LC
Torpediniformes	Narcinidae	*Narcinops lasti*	Western Numbfish	Sustainable	LC	LC
Torpediniformes	Narcinidae	*Narcinops nelsoni*	Eastern Numbfish	Sustainable	LC	LC
Torpediniformes	Narcinidae	*Narcinops ornata*	Ornate Numbfish	Sustainable	LC	LC
Torpediniformes	Narcinidae	*Narcinops tasmaniensis*	Tasmanian Numbfish	Sustainable	LC	LC
Torpediniformes	Narcinidae	*Narcinops westraliensis*	Banded Numbfish	Sustainable	LC	LC
Torpediniformes	Torpedinidae	*Tetronarce nobiliana*	Great Torpedo	Sustainable	LC	LC

Appendix G. Summary of status for all Australian chimaeras, including Report Card status (SAFS; 2023), national Red List (Shark Report Card) and global Red List.

Order	Family	Scientific Name	Common Name	2023 Report Card Status	2021 Shark Action Plan	2023 Global Red List
Chimaeriformes	Callorhinchidae	*Callorhinchus milii*	Elephant Fish	Sustainable	LC	LC
Chimaeriformes	Chimaeridae	*Chimaera argiloba*	Whitefin Chimaera	Sustainable	LC	LC
Chimaeriformes	Chimaeridae	*Chimaera fulva*	Southern Chimaera	Sustainable	LC	LC
Chimaeriformes	Chimaeridae	*Chimaera lignaria*	Giant Chimaera	Sustainable	LC	LC
Chimaeriformes	Chimaeridae	*Chimaera macrospina*	Longspine Chimaera	Sustainable	LC	LC
Chimaeriformes	Chimaeridae	*Chimaera obscura*	Shortspine Chimaera	Sustainable	LC	LC
Chimaeriformes	Chimaeridae	*Chimaera ogilbyi*	Ogilby's Chimaera	Recovering	NT	NT
Chimaeriformes	Chimaeridae	*Hydrolagus homonycteris*	Black Ghostshark	Sustainable	LC	LC
Chimaeriformes	Chimaeridae	*Hydrolagus marmoratus*	Marbled Ghostshark	Sustainable	LC	LC
Chimaeriformes	Chimaeridae	*Hydrolagus trolli*	Abyssal Ghostshark	Sustainable	LC	LC
Chimaeriformes	Rhinochimaeridae	*Harriotta haeckeli*	Smallspine Spookfish	Sustainable	LC	LC
Chimaeriformes	Rhinochimaeridae	*Harriotta raleighana*	Bigspine Spookfish	Sustainable	LC	LC
Chimaeriformes	Rhinochimaeridae	*Rhinochimaera africana*	Paddlenose Spookfish	Sustainable	LC	DD
Chimaeriformes	Rhinochimaeridae	*Rhinochimaera pacifica*	Pacific Spookfish	Sustainable	LC	LC

FRDC FINAL REPORT CHECKLIST

The final report checklist can now be filled in when submitting your final report deliverable in FishNet.