

Technical information supporting the 2023 Proportion of fish stocks sustainable environmental trend and condition report card

Department for Environment and Water
August, 2023

DEW Technical note 2023/41



**Government
of South Australia**

Department for
Environment and Water

Department for Environment and Water
Government of South Australia
August 2023

81-95 Waymouth St, ADELAIDE SA 5000
Telephone +61 (8) 8463 6946
Facsimile +61 (8) 8463 6999
ABN 36702093234

www.environment.sa.gov.au

Disclaimer

The Department for Environment and Water and its employees do not warrant or make any representation regarding the use, or results of the use, of the information contained herein as regards to its correctness, accuracy, reliability, currency or otherwise. The Department for Environment and Water and its employees expressly disclaims all liability or responsibility to any person using the information or advice. Information contained in this document is correct at the time of writing.



With the exception of the Piping Shrike emblem, other material or devices protected by Aboriginal rights or a trademark, and subject to review by the Government of South Australia at all times, the content of this document is licensed under the Creative Commons Attribution 4.0 Licence. All other rights are reserved.

© Crown in right of the State of South Australia, through the Department for Environment and Water 2023

Preferred way to cite this publication

Department for Environment and Water (2023). *Technical information supporting the 2023 Proportion of fish stocks sustainable environmental trend and condition report card*, DEW Technical report 2023/41, Government of South Australia, Department for Environment and Water, Adelaide.

Download this document at <https://data.environment.sa.gov.au>

Acknowledgement of Country

We acknowledge and respect the Traditional Custodians whose ancestral lands we live and work upon and we pay our respects to their Elders past and present. We acknowledge and respect their deep spiritual connection and the relationship that Aboriginal and Torres Strait Islanders people have to Country. We also pay our respects to the cultural authority of Aboriginal and Torres Strait Islander people and their nations in South Australia, as well as those across Australia.

Acknowledgements

This document was prepared by Jordan Lear (Department of Primary Industries and Regions (PIRSA)). Simon Bryars (DEW) provided technical review of this report. Brady Stead (DEW) provided mapping support. Improvements were made to this report and associated report card based on reviews by Craig Meakin (DEW), Amy Ide (DEW) and Annabel Jones (PIRSA).

Contents

Acknowledgement of Country	ii
Acknowledgements	ii
Summary	v
1 Introduction	1
1.1 Environmental trend and condition reporting in SA	1
1.2 Purpose and benefits of SA's trend and condition report cards	1
1.3 Fisheries in South Australia	2
2 Methods	3
2.1 Indicators	3
2.2 Data sources, collection and analysis	3
2.3 Methods to assign trend, condition and reliability	3
2.3.1 Trend	5
2.3.2 Condition	5
2.3.3 Reliability	7
2.4 Data transparency	8
3 Results	9
3.1 Trend and condition	9
3.2 Reliability	12
3.2.1 Notes on reliability	12
4 Discussion	13
4.1 Trend	13
4.2 Condition	13
4.3 Further management	14
5 Appendices	15
A. Managing environmental knowledge chart for Proportion of fish stocks sustainable	15
B. Stock summaries	16
6 References	18

List of tables

Table 2.1.	Information source and year of latest assessment for individual species	4
Table 2.2.	Definition of condition classes used	6
Table 2.3.	Condition assessment	7
Table 2.4.	Guides for applying information currency	7
Table 2.5.	Guides for applying information applicability	7
Table 2.6.	Guides for applying spatial representation of information (sampling design)	8
Table 3.1.	2022 summary of South Australia's fisheries stock status based on latest available stock status reports	10
Table 3.2.	Summary of stock classifications in 2012 and 2022	10
Table 3.3.	Fish species and stocks that are currently in a different category in 2022 compared to 2012	11
Table 3.4.	Condition assessment	11
Table 3.5.	Information reliability scores for fish stocks	12

Summary

The 2023 release of South Australia's environmental trend and condition report cards summarises our understanding of the current condition of the South Australian environment, and how it is changing over time.

This document describes the indicators, information sources, analysis methods and results used to develop this report and the associated 2023 Proportion of fish stocks sustainable report card. The reliability of information sources used in the report card is also described.

The Proportion of fish stocks sustainable report card sits within the report card Biodiversity theme and Coastal and marine sub-theme. Report cards are published by the Department for Environment and Water and can be accessed at www.environment.sa.gov.au.

1 Introduction

1.1 Environmental trend and condition reporting in SA

The Minister for Climate, Environment and Water under the *Landscape South Australia Act 2019* is required to 'monitor, evaluate and audit the state and condition of the State's natural resources, coasts and seas; and to report on the state and condition of the State's natural resources, coasts and seas' (9(1(a-b))). Environmental trend and condition report cards are produced as the primary means for the Minister to undertake this reporting. Trend and condition report cards are also a key input into the State of the Environment Report for South Australia, which must be prepared under the *Environment Protection Act 1993*. This Act states that the State of the Environment Report must:

- include an assessment of the condition of the major environmental resources of South Australia (112(3(a))), and
- include a specific assessment of the state of the River Murray, especially taking into account the Objectives for a Healthy River Murray under the *River Murray Act 2003* (112(3(ab))), and
- identify significant trends in environmental quality based on an analysis of indicators of environmental quality (112(3(b))).

1.2 Purpose and benefits of SA's trend and condition report cards

South Australia's environmental trend and condition report cards focus on the state's priority environmental assets and the pressures that impact on these assets. The report cards present information on trend, condition, and information reliability in a succinct visual summary.

The full suite of report cards captures patterns in trend and condition, generally at a state scale, and gives insight to changes in a particular asset over time. They also highlight gaps in our knowledge on priority assets that prevent us from assessing trend and condition and might impede our ability to make evidence-based decisions.

Although both trend and condition are considered important, the report cards give particular emphasis to trend. Trend shows how the environment has responded to past drivers, decisions, and actions, and is what we seek to influence through future decisions and actions.

The benefits of trend and condition report cards include to:

- provide insight into our environment by tracking its change over time
- interpret complex information in a simple and accessible format
- provide a transparent and open evidence base for decision-making
- provide consistent messages on the trend and condition of the environment in South Australia
- highlight critical knowledge gaps in our understanding of South Australia's environment
- support alignment of environmental reporting, ensuring we 'do once, use many times'.

Environmental trend and condition report cards are designed to align with and inform state of the environment reporting at both the South Australian and national level. The format, design and accessibility of the report cards has been reviewed and improved with each release.

1.3 Fisheries in South Australia

Fishing forms an important part of South Australia's economy providing around 3,874 jobs directly and to regional South Australia and contributing over 46,000 tonnes of seafood, valued at \$444.6 million Gross State Production (2020–21, BDO EconSearch 2022). In addition, fishing is important to Aboriginal traditional nations, and as a recreational activity for around 356,708 – or one in four – South Australians (Beckman et. al 2023).

Managing fisheries is complex and inherently difficult. Productivity of a fishery is limited by biological production, which is influenced by natural and human induced changes in the environment as well as social and economic priorities/pressures. Therefore maintaining sustainable stocks requires adequate, adaptive and active management of fishing activity.

The Department of Primary Industries and Regions (PIRSA) manages South Australia's fisheries through the administration of the *Fisheries Management Act 2007* in partnership with key stakeholder groups. PIRSA does this through subordinate legislation, the development of fishery management plans and a range of formal policies including the South Australian Fisheries Harvest Strategy Policy. The primary objective under the *Fisheries Management Act 2007* is to protect, manage, use and develop the aquatic resources of the state on behalf of the community in a manner that is consistent with ecologically sustainable development.

The South Australian Research and Development Institute (SARDI) – PIRSA's research division and the South Australian Government's principal primary industries research institute – conducts regular stock assessments of key fish stocks and allocates a stock status classification based on the following categories and definitions (Pidcocke et al. 2021):

Sustainable stock – 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).

Depleting stock – 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.

Depleted stock – 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.

Recovering stock – Biomass (or proxy) is depleted and recruitment is impaired. Current management measures are in place to promote stock recovery, and recovery is occurring.

Undefined stock – Not enough information exists to determine stock status.

In South Australia, most fish stock statuses are regularly updated, in many cases annually. This report uses the most recent stock status available at the time of assessing this report card.

This report outlines the methods used to generate the content of the 2023 Proportion of fish stocks sustainable environmental trend and condition report card and provides a snapshot in time related to the proportion of fish stocks classified as sustainable based on the most recent assessment for each of the assessed fish stocks.

2 Methods

2.1 Indicators

The indicators used for the proportion of fish stocks sustainable report card are:

1. Percentage of fish stocks with a stock status classification of 'sustainable'
2. Number of fish stocks with a stock status classification of 'depleted'.

2.2 Data sources, collection and analysis

Data relating to trends in fish stock classification (see definitions in Section 1.3) are taken from assessments published by PIRSA/SARDI and the Fisheries Research and Development Corporation (FRDC) (see information sources in Table 2.1).

Data relating to commercial fisheries' catch and value are taken from published summary reports prepared by EconSearch Pty Ltd for PIRSA (BDO EconSearch 2022). Data relating to recreational fisheries are taken from the survey undertaken in 2021–2022 (Beckman et al. 2023)

2.3 Methods to assign trend, condition and reliability

Individual stock statuses are taken directly from the most recently published reports but may contain information that is of varying ages. For example, the most recent assessment of the scalefish sectors was published in 2021 for the 2019 year. Other species have reports that present more recent data. This report card aims to use the most up to date information possible to provide a snapshot of known fishery stock statuses as reported in the published stock assessment reports. The stocks and their assessment years are provided in Table 2.1.

Table 2.1. Information source and year of latest assessment for individual species

Species	Source	Year of latest assessment
Western Australian salmon	Drew et al. 2021	2019
Australian sardine	Grammer and Ivey 2022	2022
Black bream	Earl et al. 2022 Drew et al. 2021	Coorong 2020–21 State 2019
Blacklip abalone	Burnell et al. 2021 Burnell et al. 2022 Stobart and Mayfield 2021	Central Zone 2019 Southern Zone 2021–22 Western Zone 2019–20
Blue swimmer crab	Beckman et al. 2022 Drew et al. 2021	2020–21 West Coast 2019
Southern garfish	Drew et al. 2021	2019
Giant crab	McLeay 2022	2020–21
Pipi (Goolwa cockle)	Earl et al. 2022	2020–21
Greenlip abalone	Burnell et al. 2021 Burnell et al. 2022 Stobart and Mayfield 2021	Central Zone 2019 Southern Zone 2021–22 Western Zone 2019–20
King George whiting	Drew et al. 2021	2019
Mulloway	Earl et al. 2022 Drew et al. 2021	Coorong 2020–21 State 2019
Western king prawn	Noell 2022 Noell and Hooper 2021 McLeay and Hooper 2021	West Coast 2021 Spencer Gulf 2019–20 Gulf St Vincent 2020–21
Southern rock lobster	Linnane et al. 2022 Linnane et al. 2022	Northern Zone 2020–21 Southern Zone 2020–21
Snapper	Drew et al. 2022	2022
Southern calamari	Drew et al. 2021	2019
Yelloweye mullet	Drew et al. 2021 Earl et al. 2022	State 2019 Coorong 2020–21
Vongole (mud cockle)	Ferguson et al. 2022	2021/22
Snook	Drew et al. 2021	2019
Greenback flounder	Earl et al. 2022	Coorong 2020–21
Yellowfin whiting	Drew et al. 2021	2019
Australian herring	Drew et al. 2021	2019
Sand crab	Drew et al. 2021	2019
Ocean jacket	Drew et al. 2021	2019
Bluethroat wrasse	Drew et al. 2021	2019
Silver trevally	Drew et al. 2021	2019
Leatherjackets	Drew et al. 2021	2019
Rays and skates	Drew et al. 2021	2019
Cuttlefish	Drew et al. 2021	2019
Turbo (wavy periwinkle)	PIRSA 2018	2018

2.3.1 Trend

The trend allocation for this card is not a true trend over time, but instead is a snapshot of two points in time (2012 (PIRSA 2015a) and 2022). The delineation of some fish stocks and the terminology used for stock status classification have changed since 2006. Methods of classification have been relatively consistent since 2012 although some terminology has changed (for example, 'overfished' and 'environmentally limited' classifications are now combined and reported together as 'depleted'). However as reporting progresses over time, more stocks are allocated stock statuses, and a better picture of the state of South Australia's fisheries is acquired. Therefore it is not appropriate to make direct comparisons between years as the addition of new stock assessments will impact the percentages of stocks allocated to classification levels.

This report card uses the indicator for trend as "the proportion (percentage) of fish stocks classified as sustainable" and the "number of fish stocks classified as depleted". These two classifications should remain consistent throughout time. However, there are limitations to this approach. Variation in the number of stocks assessed between reporting years will impact the overall percentage of sustainable stocks until consistent stock assessments are made from one reporting period to the next. For example, if 8 out of 10 (80%) stocks are sustainable, and three more species that weren't previously assessed are added to the list in the following year with a sustainable category, then the percentage of stocks sustainable will increase to 85%. This increase from 80% to 85% does not represent a true improvement in the stock status of monitored species. Therefore, the trend does not give a complete indication as to the overall status of South Australia's fisheries. Nonetheless, it was still deemed appropriate to assign a trend classification for fish stocks by comparing the percentage of stocks that were sustainable across a 10-year period between 2012 and 2022. For further analysis of the status of fisheries, the trend should be read in conjunction with the information used to calculate condition (Section 2.3.2).

2.3.2 Condition

For this report card, the condition was assigned based on the trend indicator (percentage of fish stocks classified as 'sustainable'), in conjunction with changes in stock status to meet the condition definitions presented in Table 2.2. This involved assessing the movement of stocks that have changed classification (e.g. changed from sustainable to depleting, depleted to recovering, depleting to depleted, recovering to sustainable) in combination with a comparison of stock status classifications for stocks between two points in time (2012 and 2022). The combination of these two factors determines the condition classification based on the parameters set out in Table 2.3.

Table 2.2. Definition of condition classes used

Condition	Description	Threshold
Very good	The natural resource is in a state that meets all environmental, economic and social expectations, based on this indicator. Thus, desirable function can be expected for all processes/services expected of this resource, now and into the future, even during times of stress (e.g. prolonged drought)	See Table 2.3
Good	The natural resource is in a state that meets most environmental, economic and social expectations, based on this indicator. Thus, desirable function can be expected for only some processes/services expected of this resource, now and into the future, even during times of stress (e.g. prolonged drought)	See Table 2.3
Fair	The natural resource is in a state that does not meet some environmental, economic and social expectations, based on this indicator. Thus, desirable function cannot be expected from many processes/services expected of this resource, now and into the future, particularly during times of stress (e.g. prolonged drought)	See Table 2.3
Poor	The natural resource is in a state that does not meet most environmental, economic and social expectations, based on this indicator. Thus, desirable function cannot be expected from most processes/services expected of this resource, now and into the future, particularly during times of stress (e.g. prolonged drought)	See Table 2.3
Unknown	Data are not available to determine the state of this natural resource, based on this indicator	
Not applicable	This indicator of the natural resource does not lend itself to being classified into one of the above condition classes	

Table 2.3. Condition assessment

Between 2 comparison points (i.e. 2012 & 2022 - excluding stocks that were sustainable in 2012 and 2022) the:		
Percentage of stocks sustainable	Number of stocks returning to sustainable \geq Number of stocks moving to a worse category	Number of stocks moving to a worse category $>$ Number of stocks returning to sustainable
>95-100	Very good	Very good
>90-95	Very good	Good
>85-90	Good	Good
>80-85	Good	Good
>75-80	Good	Good
>70-75	Good	Fair
>65-70	Fair	Fair
>60-65	Fair	Poor
>55-60	Poor	Poor
>50-55	Poor	Poor
≤ 50	Poor	Poor

2.3.3 Reliability

Information is scored for reliability based on the minimum of subjective scores (1 [worst] to 5 [best]) given for information currency, applicability, level of spatial representation and accuracy. Definitions guiding the application of these scores are provided in Table 2.4 for currency, Table 2.5 for applicability and Table 2.6 for spatial representation. Accuracy information was not applicable for this report.

Table 2.4. Guides for applying information currency

Currency score	Criteria
1	Most recent information > 10 years old
2	Most recent information up to 10 years old
3	Most recent information up to 7 years old
4	Most recent information up to 5 years old
5	Most recent information up to 3 years old

Table 2.5. Guides for applying information applicability

Applicability score	Criteria
1	Data are based on expert opinion of the measure
2	All data based on indirect indicators of the measure
3	Most data based on indirect indicators of the measure
4	Most data based on direct indicators of the measure
5	All data based on direct indicators of the measure

Table 2.6. Guides for applying spatial representation of information (sampling design)

Spatial score	Criteria
1	From an area that represents less than 5% the spatial distribution of the asset within the region/state or spatial representation unknown
2	From an area that represents less than 25% the spatial distribution of the asset within the region/state
3	From an area that represents less than half the spatial distribution of the asset within the region/state
4	From across the whole region/state (or whole distribution of asset within the region/state) using a sampling design that is not stratified
5	From across the whole region/state (or whole distribution of asset within the region/state) using a stratified sampling design

2.4 Data transparency

Data transparency for this report card is represented in Appendix A.

3 Results

3.1 Trend and condition

As described in Section 2.3.2, the assessment of this report compares two points in time and is not a true trend as the number of stocks with a classification has increased, therefore not allowing direct comparison. For the 2022 report, 48 stocks from 26 species have been assessed to calculate trend and condition (Table 3.1). Based on the most current stock assessments available, 38 stocks are sustainable, six are depleted, two are recovering, and two are depleting (Table 3.2).

The number of sustainable stocks has increased from 19 in 2012, to 38 for the 2022 report card assessment with 22 more stocks having a stock status in 2022 compared with 2012 (Table 3.2). The proportion of sustainable stocks is now recorded at 79%. As the percentage of fish stocks classified as sustainable increased slightly from 75% in 2012 to 79% in 2022, and given the caveats detailed earlier, the trend in status of sustainable stocks across SA was given a conservative classification rating of 'stable' from 2012 to 2022. The condition was allocated a rating of 'good' based on the assessment that 79% of stocks are sustainable, and a higher number of stocks moved to a worse category than the number of stocks which returned to sustainable. There are seven stocks that are in a different category in 2022 compared to 2012 (Table 3.3). One stock has remained depleted since being classified as depleted in 2012, and 16 stocks were classified as sustainable in both 2012 and 2022 (Appendix B).

Table 3.1. 2022 summary of South Australia's fisheries stock status based on latest available stock status reports

Sustainable		Depleting
Western Australian salmon (SA)	Yelloweye mullet (Lakes and Coorong, SA)	Greenlip abalone (Central Zone)
Australian sardine (SA)	Vongole - mud cockle (West Coast, Coffin Bay)	Western king prawn (West Coast)
Black bream (SA)	Snook (SA)	Depleted
Blue swimmer crab (Gulf St. Vincent, Spencer Gulf, West coast)	Yellowfin whiting (Northern Gulf St Vincent, Northern Spencer Gulf)	Black bream (Lakes and Coorong)
Southern garfish (Southern Spencer Gulf, Southern Gulf St Vincent, West Coast, South East)	Australian herring (Western-Southern Australia)	Southern garfish (Northern Gulf St. Vincent)
Pipi - Goolwa cockle (Lakes and Coorong)	Sand crab (SA)	Vongole - mud cockle (Port River)
King George whiting (Gulf St Vincent/Kangaroo Island, Spencer Gulf, West Coast)	Giant crab (SA)	Snapper (Gulf St Vincent, Spencer Gulf/West Coast)
Mulloway (Lakes and Coorong, SA)	Ocean jacket (SA)	Greenback flounder (Lakes and Coorong)
Western king prawn (Spencer Gulf, Gulf St. Vincent)	Bluethroat wrasse (SA)	Recovering
Southern rock lobster (Southern Zone, Northern Zone)	Silver trevally (SA)	Southern garfish (Northern Spencer Gulf)
Snapper (Western Victoria)	Cuttlefish (SA)	Blacklip abalone (Central Zone)
Southern calamari (SA)	Blacklip abalone (Southern Zone, Western Zone)	
	Greenlip abalone (Western Zone)	

Table 3.2. Summary of stock classifications in 2012 and 2022

	2012		2022	
	Number	Percentage	Number	Percentage
Total with classification	26	-	48	-
Sustainable	19	76	38	79
Depleting	2	8	2	4
Recovering	1	4	2	4
Depleted*	3	12	6	12
Undefined	4	-	9	-
Negligible	-	-	4	-

*Includes previous categories of 'Overfished' and 'Environmentally limited'

Table 3.3. Fish species and stocks that are currently in a different category in 2022 compared to 2012

Species	Zone	FRDC 2012 fishery assessment	2022 report card assessment
Blacklip abalone	Central Zone	Sustainable	Recovering
Southern garfish	Northern Spencer Gulf	Depleting	Recovering
Southern garfish	Northern Gulf St Vincent	Depleting	Depleted
Greenlip abalone	Central Zone	Sustainable	Depleting
Western king prawn	West Coast	Recovering	Depleting
Snapper	Gulf St Vincent	Sustainable	Depleted
Snapper	Spencer Gulf/ West Coast	Depleting	Depleted

Table 3.4. Condition assessment

Between 2 comparison points (i.e. 2012 & 2022 - excluding stocks that have remained sustainable throughout this period) the:		
Percentage of stocks sustainable	Number of stocks returning to sustainable \geq Number of stocks moving to a worse category	Number of stocks moving to a worse category $>$ Number of stocks returning to sustainable
>95-100	Very good	Very good
>90-95	Very good	Good
>85-90	Good	Good
>80-85	Good	Good
>75-80	Good	Good
>70-75	Good	Fair
>65-70	Fair	Fair
>60-65	Fair	Poor
>55-60	Poor	Poor
>50-55	Poor	Poor

3.2 Reliability

The overall reliability score for this report card is 4 out of 5, based on Table 3.5.

Table 3.5. Information reliability scores for fish stocks

Indicator	Applicability	Currency	Spatial	Accuracy	Reliability
Status of fish stocks	5	5	4	N/A	4

3.2.1 Notes on reliability

The report card has been given a reliability score of 4 out of 5. This is based on an applicability score of 5 as all data is based on direct indicators of the measure, a currency score of 5 as the reports used are all based on data from within the last three years, and a spatial score of 4 as data is from the whole region/state, but is not stratified. Accuracy information was not applicable for this report.

4 Discussion

4.1 Trend

There is increasing interest in the state of fish stocks, the sustainability of fisheries and the marine environment, from fishers, seafood consumers, policy makers and the broader community (Stewardson et al. 2018). Fish stocks are impacted by fishing pressure, environmental degradation, environmental variations, population growth, coastal development and changing global climate patterns. These pressures impact fish abundance, distribution and recruitment, and can cause changes to production capacity (PIRSA 2015).

Globally there is a declining trend in fish stocks (Costello et al. 2016, Pauly & Zellar 2017); however, at a national level Australia's fisheries generally perform well due to robust fisheries management arrangements embedded in legislation which aim to ensure fish stocks are maintained at sustainable levels. Of the Australian catch reported in the Status of Australian fish stocks reports 2020 (FRDC 2022), approximately 90% is from sustainable stocks, 3% is from depleting stocks, 5% is from recovering stocks, 1% is from overfished stocks, 1% is from undefined stocks and 0.01% is from stocks classed as negligible.

The South Australian Government is committed to providing a transparent and consistent reference for stakeholder groups and the wider community on the trends in stock status for all major fisheries in South Australian waters. This has increased the number of stocks assessed consistent with the national reporting framework from 25 in 2012 to 48 in 2022 (61 including negligible and undefined stocks). Between 2012 and 2022 the number of fish stocks classified as sustainable has increased from 19 to 38, while the proportion has remained stable (about 75–80%). The number of stocks classified as depleted (6) has increased since 2012, however the proportion of stocks depleted has remained stable at 12% (Table 3.2). One stock remains depleted since 2012 (Table 6.1). The trend in the proportion of fish stocks sustainable is therefore considered to be 'stable'.

4.2 Condition

There were 28 species and 48 stocks (61 stocks minus 9 undefined and 4 negligible stocks (Appendix B)) used to assess the condition of South Australia's fisheries.

In 2022, most stocks were classified as sustainable (38 stocks or 79%) with 2 stocks depleting (Table 3.2, 3.3). Two stocks were classified as recovering, and six as depleted (Appendix B).

To address stocks in the depleting or depleted categories, a number of management arrangements have been put in place for the commercial and recreational sectors, including spatial and temporal restrictions and reviewed catch limits to aid recovery.

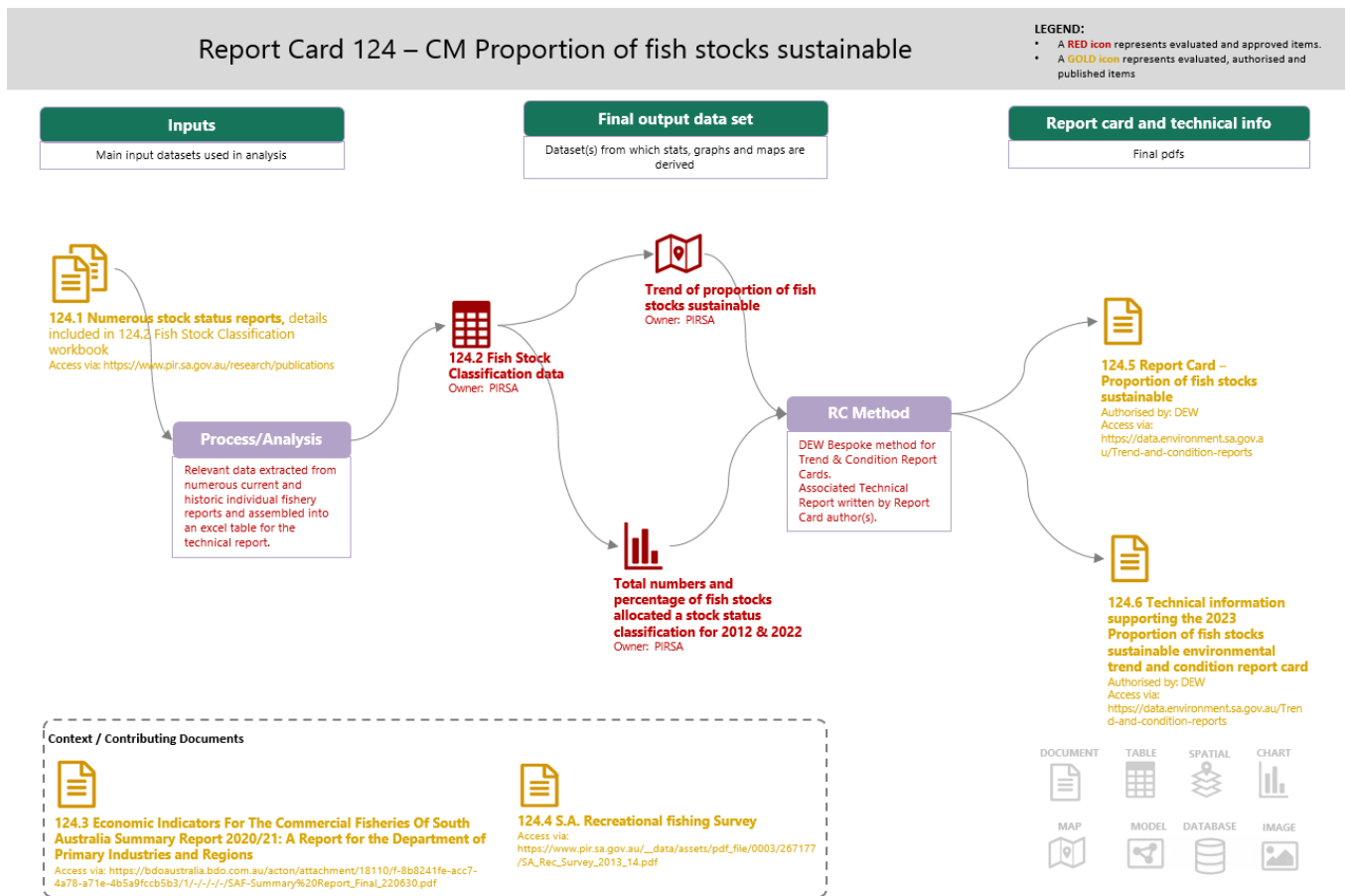
Management actions have proved successful in the past, for example: the Northern Spencer Gulf southern garfish stock transitioned from depleting to recovering; Northern Zone rock lobster returned to sustainable after a number of years at depleting; and King George whiting in Spencer Gulf and Gulf St Vincent returned to sustainable and have remained at this classification since 2018 (Drew et al. 2021) (Appendix B).

4.3 Further management

The eight stocks classified as depleting or depleted are being managed to promote their recovery. For example, to improve garfish stocks, gear restrictions and a minimum size limit increase have been implemented for commercial fishing, and recreational bag and boat limits were reduced. The Western Zone Abalone Fishery licence holders have voluntarily cut their greenlip and blacklip abalone harvest since 2015 and total allowable catch was reduced, while a closure was implemented for the Central Zone Blacklip Abalone Fishery in 2022. A snapper closure was implemented in the West Coast, Spencer Gulf and Gulf St Vincent in November 2019 and a total allowable catch for all snapper fishing has been implemented in the South East. There is currently a complete ban on the take of vongole (mud cockle), and other bivalves, in the Port River.

5 Appendices

A. Managing environmental knowledge chart for Proportion of fish stocks sustainable



B. Stock summaries

Stock assessment summaries for 2012 and 2022

Species	Stock	Stock status 2012	Stock status 2022
WA salmon	Western Australia/SA	Sustainable	Sustainable
Australian sardine	SA	Sustainable	Sustainable
Balmain bugs	SA		Negligible
Bastard trumpeter	SA		Negligible
Black bream	Lakes and Coorong Fishery		Depleted
Black bream	SA Marine Scalefish Fishery		Sustainable
Blacklip abalone	SA Central Zone Fishery	Sustainable	Recovering
Blacklip abalone	SA Southern Zone Fishery	Sustainable	Sustainable
Blacklip abalone	SA Western Zone Fishery	Sustainable	Sustainable
Blue swimmer crab	Gulf St Vincent	Sustainable	Sustainable
Blue swimmer crab	Spencer Gulf	Sustainable	Sustainable
Blue swimmer crab	West Coast	Undefined	Sustainable
Bluethroat wrasse	South Australia		Sustainable
Brownlip abalone	SA Western Zone Fishery		Undefined
Giant crab	SA	Sustainable	Sustainable
Greenlip abalone	SA Central Zone Fishery	Sustainable	Depleting
Greenlip abalone	SA Southern Zone Fishery	Sustainable	Undefined
Greenlip abalone	SA Western Zone Fishery	Sustainable	Sustainable
Hapuku	SA		Negligible
King George whiting	Gulf St Vincent	Sustainable	Sustainable
King George whiting	Spencer Gulf	Sustainable	Sustainable
King George whiting	West Coast - Eyre Peninsula	Sustainable	Sustainable
Mulloway	Lakes and Coorong Fishery		Sustainable
Mulloway	Marine Scalefish Fishery		Sustainable
Ocean jacket	SA		Sustainable
Pale octopus	SA		Negligible
Pipi	SA		Sustainable
Roe's abalone	SA Western Zone Fishery		Undefined
Silver trevally	SA		Sustainable
Snapper	Gulf St Vincent	Sustainable	Depleted
Snapper	Spencer Gulf/West Coast	Depleting/Undefined	Depleted
Snapper	Western Victoria	Undefined	Sustainable
Snook	SA		Sustainable
Southern calamari	SA	Undefined	Sustainable
Southern garfish	Northern Gulf St Vincent	Depleting	Depleted
Southern garfish	Northern Spencer Gulf	Depleting	Recovering
Southern garfish	SA West Coast		Sustainable
Southern garfish	South-East		Sustainable
Southern garfish	Southern Gulf St Vincent	Sustainable	Sustainable
Southern garfish	Southern Spencer Gulf	Sustainable	Sustainable

Species	Stock	Stock status 2012	Stock status 2022
Southern rock lobster	Northern Zone	SA-Sustainable	Sustainable
Southern rock lobster	Southern Zone	SA-Sustainable	Sustainable
Southern sand flathead	SA		Undefined
Vongole	Coffin Bay Cockle		Sustainable
Vongole	Port River Cockle	Depleted	Depleted
Vongole	West Coast Cockle		Undefined
Turbo (wavy periwinkle)	SA	Undefined	Undefined
Western king prawn	Gulf St Vincent Prawn Fishery	Sustainable	Sustainable
Western king prawn	Spencer Gulf Prawn Fishery	Sustainable	Sustainable
Western king prawn	West Coast Prawn Fishery	Recovering	Depleting
Yelloweye mullet	Lakes and Coorong Fishery		Sustainable
Yelloweye mullet	Marine Scalefish Fishery		Sustainable
Yellowfin whiting	Gulf St Vincent		Sustainable
Yellowfin whiting	Spencer Gulf		Sustainable
Australian herring	SA		Sustainable
Sand crabs	SA		Sustainable
Whaler shark	SA		Undefined
Leather jackets	SA		Undefined
Rays and skates	SA		Undefined
Cuttlefish	SA		Sustainable
Greenback flounder	SA		Depleted

6 References

- BDO EconSearch. (2022). Economic indicators for the commercial fisheries of South Australia, Summary report 2020/21. A report for the Department of Primary Industries and Regions, [https://bdoaustralia.bdo.com.au/acton/attachment/18110/f-8b8241fe-acc7-4a78-a71e-4b5a9fccb5b3/1/-/-/-/-/SAF-Summary%20Report Final 220630.pdf](https://bdoaustralia.bdo.com.au/acton/attachment/18110/f-8b8241fe-acc7-4a78-a71e-4b5a9fccb5b3/1/-/-/-/-/SAF-Summary%20Report%20Final%20220630.pdf) (accessed 21 March 2023).
- Beckmann, C. L. and Hooper, G. E. (2022). Blue Crab (*Portunus armatus*) Fishery 2020/21. Fishery Assessment Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2007/000729-18. SARDI Research Report Series No. 1136. 52pp.
- Beckman, C. L., Durante, L. M., Graba-Landry, A., Stark, K. E. and Tracey, S. R. (2023). Survey of recreational fishing in South Australia in 2021–22. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2022/000385-1. SARDI Research Report Series No. 1161. 195 pp.
- Burnell, O., Mayfield, S. and Bailleul, F. (2021). Status of the Central Zone Greenlip (*Haliotis laevis*) and Blacklip Abalone (*H. rubra*) Fisheries in 2020. Status Report for PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2021/000378-1. SARDI Research Report Series No. 1115. 35pp.
- Burnell, O., Mayfield, S. and Hogg, A. (2022). Status of the Southern Zone Abalone (*Haliotis rubra* and *H. laevis*) Fishery in 2021/22. Report for PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2014/000359-5. SARDI Research Report Series No. 1138. 29pp.
- Costello C., Ovando, D., Clavelle, T. and Leland, A. (2016). Global fishery prospects under contrasting management regimes. *Proc Natl Acad Sci USA* 113 (18), 5125–5129. <https://doi.org/10.1073/pnas.1520420113>
- Drew, M. J., Fowler, A. J., McGarvey, R., Feenstra, J., Bailleul, F., Matthews, D., Matthews, J. M., Earl, J., Rogers, T. A., Rogers, P. J., Tsolos, A. and Smart, J. J. (2021). Assessment of the South Australian Marine Scalefish Fishery in 2019. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2017/000427-4. SARDI Research Report Series No. 1109. 254pp.
- Drew, M. J., Rogers, T. A., McGarvey, R., Feenstra, J., Matthews, D., Matthews, J., Earl, J., Smart, J., Noell, C. and Fowler, A. J. (2022). Snapper (*Chrysophrys auratus*) Stock Assessment Report 2022. Report to PIRSA Fisheries and Aquaculture (PDF 11.0 MB). South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2007/000523-7. SARDI Research Report Series No. 1155. 178pp.
- Earl, J., Rogers, T. A. and Bailleul, F. (2022). Assessment of the South Australian Lakes and Coorong Fishery in 2020/21. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2020/000208-3. SARDI Research Report Series No. 1128. 78pp.
- Ferguson, G., Heldt, K., Stobart, B. and Mayfield, S. (2022). Harvestable biomass in the South Australian Vongole Fishery (*Katelysia* spp.). Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2014/000191-3. SARDI Research Report Series No. 1127. 37pp.
- FRDC (2022). Status of Australian fish stocks for 2020 reports. Fisheries Research and Development Corporation, Canberra. <https://www.fish.gov.au/reports/key-results> (accessed 16 November 2022).

- Grammer, G. L. and Ivey, A. R. (2022). Spawning biomass of Sardine, *Sardinops sagax*, in waters off South Australia in 2022. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2007/000566-12. SARDI Research Report Series No. 1152. 27 pp.
- Linnane, A., McGarvey, R., Feenstra, J. and Grasko, D. (2022). Northern Zone Rock Lobster (*Jasus edwardsii*) Fishery 2020/21. Fishery Assessment Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2007/000320-16. SARDI Research Report Series No. 1142. 66pp.
- Linnane, A., McGarvey, R., Feenstra, J. and Hawthorne, P. (2022). Southern Zone Rock Lobster (*Jasus edwardsii*) Fishery 2020/21. Fishery Assessment Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2007/000276-16. SARDI Research Report Series No. 1141. 67pp.
- McLeay, L. (2022). Stock Status Report for the South Australian Giant Crab (*Pseudocarcinus gigas*) Fishery in 2020/21. Fishery Status Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2011/000332-11. SARDI Research Report Series No. 1123. 20pp.
- McLeay, L. J. and Hooper, G. E. (2021). Gulf St Vincent Prawn *Penaeus (Melicertus) latisulcatus* Fishery 2020/21. Fishery Assessment Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2007/000782-11. SARDI Research Report Series No. 1114. 45pp.
- Noell, C. J. and Hooper, G. E. (2021). Spencer Gulf Prawn *Penaeus (Melicertus) latisulcatus* Fishery. Fishery Assessment Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2007/000770-11. SARDI Research Report Series No. 1097. 57pp.
- Noell, C. J. (2022). Stock Status Report for the West Coast Prawn (*Penaeus (Melicertus) latisulcatus*) Fishery in 2021. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2007/000772-13. SARDI Research Report Series No. 1143. 22pp.
- Pauly, D. and Zellar, D. (2017). Comments of FAO's State of World Fisheries and Aquaculture (SOFIA 2016). Marine Policy. Vol 77, 176-181.
- Piddocke, T., Ashby, C., Hartman, K., Hesp, A., Hone, P., Klemke, J., Mayfield, S., Roelofs, A., Saunders, T., Stewart, J., Stewart, Wise, B. and Woodhams, J. (eds) 2021, Status of Australian fish stocks reports 2020, Fisheries Research and Development Corporation, Canberra.
- PIRSA (2015). South Australian fisheries harvest strategy policy, Reference A2540337. PIRSA Fisheries and Aquaculture, Adelaide.
[www.pir.sa.gov.au/ data/assets/pdf file/0020/267230/Harvest_strategy_policy DECEMBER 2015.pdf](http://www.pir.sa.gov.au/data/assets/pdf_file/0020/267230/Harvest_strategy_policy_DECEMBER_2015.pdf) (accessed 21 March 2023).
- PIRSA (2018). Ecological Assessment of South Australian Commercial Miscellaneous Fishing Activities: Reassessment Report Incorporating Harvest of Sea Urchin, Specimen Shell and Turbo. Primary Industries and Resources South Australia (Fisheries and Aquaculture) Adelaide, 11p.
- Stewardson, C., Andrews, J., Ashby, C., Haddon, M., Harmann, K., Hone, P., Harvat, P., Klemke, J., Mayfield, S., Roelofs, A., Sainsbury, K., Saunders, T., Stewart, J., Nocil, S. and Wise, B. (eds) (2018). Status of Australian fish stocks reports 2018, Fisheries Research and Development Corporation, Canberra.
- Stobart, B. and Mayfield, S. (2021). Western Zone Blacklip Abalone (*Haliotis rubra*) and Greenlip Abalone (*H. laevigata*) Fisheries in 2020/21. Report to PIRSA Fisheries and Aquaculture. South Australian Research and

Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2017/000331-5 SARDI Research Report Series No. 1119. 72pp.



**Government
of South Australia**

Department for
Environment and Water