Application for assessment of the South Australian Abalone fisheries for approval under the *Environment Protection and Biodiversity Conservation Act 1999*

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Introduction

This submission meets the requirements for the assessment of the South Australian Abalone Fisheries (SAAF), which include the Western Zone Abalone Fishery (WZAF), the Central Zone Abalone Fishery (CZAF) and the Southern Zone Abalone Fishery (SZAF) under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

This submission has been produced to enable the Department of Climate Change, Energy, the Environment and Water (DCCEEW) to assess the WZAF, CZAF and SZAF management arrangements against the *Guidelines for the Ecologically Sustainable Management of Fisheries – 2nd Edition* and the requirements set out in relevant sections of the EPBC Act.

The fishery

Description of the fishery

The South Australian Government has management jurisdiction for abalone from the low water mark out to three nautical miles. It also has jurisdiction from three nautical miles out to the edge of the Australian Fishing Zone (200 nautical miles) under an Offshore Constitutional Settlement (OCS) agreement between the South Australian and Commonwealth governments.

The commercial SAAF is managed in three separate fishery management zones: the Southern Zone, Central Zone and Western Zone. The Southern Zone includes coastal waters from the South Australia/Victoria border to the mouth of the Murray River with the exception of the Coorong and waters inside (Figure 1). The Central Zone consists of coastal waters of South Australia between the Murray Mouth and meridian 136°30'E, while the Western Zone consists of all coastal waters of South Australia between the Western Australia border and meridian 136°30'E (Figure 1).



A comparison of management arrangements between the three zones of the fishery is provided in Table 1.

In addition to the commercial fishery there is also a recreational fishery. The recreational fishery is predominately managed through Minimum Legal Length (MLL) and a daily bag limit of five abalone and a daily boat limit of ten per day. A size limit of 130 mm applies for all abalone except for Greenlip Abalone in the Western Zone where the minimum legal size limit is 145 mm.

Management tool	Southern Zone	Central Zone	Western Zone		
Limited entry – number of licences	6	6	22		
TACC (tonnes; shell weight)	Greenlip: 1.5 t Blacklip: 132 t	Greenlip: 44.892 t Blacklip: 0 t	Greenlip: 166.9 t Blacklip: 152.6 t		
Quota season	1 September to 31 August	1 January to 31 December	1 January to 31 December		
Minimum legal limit (shell length, SL)	130 mm Greenlip 100 - 125 mm Blacklip (size limits set in each Spatial Assessment Units)	130 mm Greenlip 130 mm Blacklip	145 mm Greenlip 130 mm Blacklip		
Minimum meat weight	n/a	113 g	113 g or 140 g for Greenlip in WZAF		
Minimum quota unit holding (units)	Greenlip 5 Blacklip 100	Blacklip 25 Greenlip 25	Greenlip 27.5 Blacklip 25		
Catch and effort data	Daily log	gbook, submitted mo	nthly		
Catch and disposal records	Daily reco	rds, submitted upon	anding		
Landing times	Any t	ime during the. seaso	on		
Landing locations	Aı	nywhere in the zone			
Vessel Monitoring System (VMS)	Only app	olied in the Southern	Zone		

Table 1: Summary of management measures for the commercial sector of SAAF in 2024

Fishing methods and gear

Commercial abalone divers harvest legal-sized abalone from the substrate by hand using an abalone iron. All abalone must be measured immediately after being detached from the seabed. Divers mostly operate from large trailered boats. Divers use surface supplied air from the boat and may use motorised cages to mitigate physical interactions with White Sharks (*Carcharodon carcharias*). Some divers circulate warm water through their wetsuits to help them to operate in cold water for extended periods of time. Catches of abalone are raised to the surface in air-lifted mesh bags. Another person operates the boat and usually actively follows the diver and cage, recovers the bags, and in the Western Zone and Central Zone may remove the abalone meat from the shell (shucking). Where the market is live or whole, animals are not shucked from the shell. After landing, the catch is transported to the consigned processors and prepared for markets. Abalone products are usually sold as live, frozen, dried, parboiled, retort pouched and canned products.

Target and byproduct species

All species of abalone of the Genus *Haliotis* (Family Haliotidae) may be taken by fishers under clause 3(4) of the *Fisheries Management (Abalone Fisheries) Regulations 2017*, however, Blacklip Abalone (*H. Rubra*) and Greenlip Abalone (*H. laevigata*) are the target species.

Other species of abalone including *H. roei* and *H. scalaris* may be taken, however, they are seldom landed. There is no bycatch in the SAAF due to highly selective fishing method of harvesting individual shells by hand.

Value of the fishery

Over the 20-year period, 2002/03 to 2021/22, the real value of catch in the SAAF fell by 68%. This trend was due to a decrease in real price (43%) and reduction in catch (50%) over the same period. In 2021/22, the value of catch was \$18.3 million the lowest value over the 20-year period in real and nominal terms.

The SAAF was affected by the COVID-19 pandemic as countries closed their borders and entered into lockdowns. The impact of the COVID-19 pandemic was most significant in 2019/20 and then eased in 2020/21 despite other on-going challenges. In November 2020, trade disputes between China and Australia also created difficulties for abalone fishers' market access in China with licence holders indicating the impact was mainly attributable to a 40 to 50 per cent decline in price for Blacklip Abalone, while Greenlip Abalone prices remained stable

Further information on the value of the fishery can be found in the BDO Econsearch report titled "Economic and Social Indicators for the South Australian Abalone Fishery 2021/22" at <u>https://www.bdo.com.au/en-au/insights/advisory/economics/south-australian-commercial-fisheries-and-aquaculture-reports</u>.

Management regime

Description of the management regime

The main output control used to manage the South Australian Commercial Abalone Fishery is the implementation of Total Allowable Commercial Catches (TACCs) for Blacklip Abalone and Greenlip Abalone in each management zone. A harvest strategy included in the <u>Management Plan for the South Australian</u> <u>Commercial Abalone Fishery (2021)</u> provides guidance on setting TACCs.

The SZAF is also spatially managed at the level of Spatial Assessment Areas (SAUs) with SAU-specific MML determined under regulation. Each SAU also has a 'catch cap' applied for Blacklip Abalone as the predominate target species in that zone, to ensure effort is spread across the entire zone and harvest at the SAU level is at sustainable levels. Catch caps are monitored and managed by industry.

The catch for Blacklip and Greenlip by individual licence holders is decremented from their individual quota unit entitlements endorsed on their licence for each class of abalone. Quota units may be permanently or temporarily transferable between licence holders within each zone.

The fishery has undergone a range of management changes since 1971 with the key amendments listed below (Table 2).

Table 2: A chronology of important management changes in the South Australian commercial Abalone Fishery since its inception in1964 from Shepherd and Rodda (2001).

Year	Management change
1964	Fishing commenced in the Southern Zone Abalone Fishery.

1971	Licences made non-transferable and MLL of 130 mm SL were imposed on all abalone species for both commercial and recreational sectors.
1976	5 additional licences issued, making a total of 35.
1978	Sub-zones and fishing blocks were replaced by map numbers and codes.
1980	Licences became transferable.
1984	Western Zone Abalone Fishery divided into Regions A and B, and MLL of Greenlip Abalone increased to 145 mm SL. MLL for Blacklip Abalone was decreased to 120 mm SL in the Southern Zone Abalone Fishery.
1985	Quotas introduced into the Western Zone Abalone Fishery.
1988	Quotas introduced into the Southern Zone Abalone Fishery and Blacklip Abalone MLL increased to a shell length of 125 mm.
1989	Quotas introduced into the Central Zone Abalone Fishery.
1991	Combined TACC for Greenlip and Blacklip Abalone introduced into Region B of the Western Zone Abalone Fishery.
1993	Owner-operator regulation was abolished.
1994	Four fishdown areas defined in the Southern Zone Abalone Fishery, where abalone between 110 and 125 mm SL could be taken.
1997	1st Management Plan for the South Australian Abalone Fishery.
2003	Separate TACCs for fishdown (known as Area S) and non-fishdown areas into Southern Zone Abalone Fishery.
2004	2nd Management Plan for the South Australian Abalone Fishery.
2014	3rd Management Plan for the South Australian Abalone Fishery
2014	Amalgamation of Region A and B in the Western Zone Abalone Fishery.
2014	Finer scale management introduced in the Southern Zone Abalone Fishery.
2015	Introduction of Marine Parks and the subsequent removal of 1 licence from the Western Zone Abalone Fishery
2017	Introduction of weighing catch within 2-hours of landing in the Southern Zone Abalone Fishery.
2021	New Management Plan for South Australian Abalone Fisheries, including Harvest Strategy, implemented in 2021.
2024	On 23 February 2024, Abalone Viral Ganglioneuritis (AVG) was confirmed in wild abalone in waters south off Port MacDonnell in the south east of South Australia.

Consultation processes

There are three separate peak bodies representing the individual abalone fisheries in South Australia:

- Industry Association of South Australia (AIASA) Inc in the WZAF;
- The Central Zone Abalone Industry (CZAI) in the CZAF; and
- The Southern Zone Abalone Management (SZAM The Abalone) Inc in the SZAF.

These peak bodies represent all licence holders and are consulted on management issues in each of the respective fisheries. In seeking advice on the setting of TACCs, the Department of Primary Industries and Regions (PIRSA) convenes a meeting of licence holders for each of the three fisheries annually to ensure all licence holders are provided the opportunity to provide input on the setting of TACCs and other management arrangements, if applicable.

The last meetings of each of the separate peak bodies representing the individual abalone fisheries in South Australia and the matter they met in relation to are:

- AIASA 16 August 2024 meeting to discuss TACC setting for 2024/25 and general business;
- CZAI 31 July 2024 survey and performance measures to assess the status of the Blacklip Abalone stock ; and
- SZAM The Abalone 3 September 2024 AVG.

Performance against objectives, performance indicators and performance measures

Performance Objectives

Formal management plans for the SAAF must set out management objectives and strategies to achieve these objectives as a requirement of section 43(1) of the *Fisheries Management Act 2007* (the Act). The objectives described in the SAAF Management Plan relate to the following goals:

- 1. Ensure the abalone resource is sustainably harvested.
- 2. Allocate access to abalone resources to achieve optimum utilisation and equitable distribution of the resource to the benefit of the community.
- 3. Minimise impacts on the ecosystem.
- 4. Cost effective and participative management of the fishery.

The formal management plan for the SAAF describes performance indicators and reference points against these objectives.

The primary objectives and reference levels related to ensuring Greenlip and Blacklip Abalone stocks are harvested within sustainable limits are described in the harvest strategy included in the Management Plan. A further objective relates to ensuring adequate data and information are collected to support the harvest strategy and inform management decisions. The harvest strategy supports meeting the management plan objectives through the monitoring and annual assessment of performance indicators against the reference points to determine overall zone stock status for each of the three fishing zones. The introduction of other secondary fishery information through harvest rules refines the level of catch to be recommended as the annual TACC.

Goal 2 aims to optimise the use of the fishery in an equitable way, within the sustainability constraints of the fishery. Optimising the use of the fishery is addressed in the objectives and strategies in terms of maximising stable economic returns from the commercial fishery and maintaining equitable access to the resource for the non-commercial sectors.

Objectives under Goal 3 relate to minimising fishery impacts on by-catch species and the ecosystem, avoiding lethal interactions with threatened, endangered and protected species (TEPS), minimising external impacts on stocks associated with broader environmental health (e.g., desalination plant and aquaculture) and managing diseases and exotic pests to minimise impacts on abalone stocks.

Goal 4 relates to encouraging co-management of the fishery, planning of management activities and cost recovery processes. The key objectives of this goal are to ensure that stakeholders and government fisheries administration share responsibility and participate in management decision-making processes, and to ensure the arrangements are complied with. The cost effectiveness of management arrangements also needs to be taken into account in the development process as the costs of management are recovered from fishers in accordance with the Government's cost recovery policy.

Performance Indicator

Catch-per-unit-effort (CPUE) (units of kg. hour-1)

CPUE is a primary indicator for abundance in abalone fisheries from information derived from all fishers on all fisher days with broad representation of the fished grounds which is used to estimate the CPUE. Units of effort are also recorded independently and along with catch levels are available over an extended timeseries allowing a good understanding of changes (i.e., trends) in CPUE over time. The ability to evaluate abundance over a SAU comprising different levels of productivity is a key strength of the CPUE indicator.

Legal density

A fishery-independent estimate of the density of abalone that have reached the MLL for each class of abalone in each zone provides another measure of abundance/biomass that is independent of the fishery

and not influenced by the factors effecting CPUE. The estimate of legal density is undertaken by SARDI scientists using a methodology that is objective, standardised and unbiased.

Economic indicators

A range of economic information is collected and monitored annually against economic objectives in the management plan. Reports of economic performance in the SAAF are available at:

bdoaustralia.bdo.com.au/acton/attachment/18110/f-86ab3797-3381-42a1-86cd-14950993b778/1/-/-/-//Abalone_Final_230630.pdf?_ga=2.63480815.1147427274.1723176075-

<u>1940662065.1700700721&_gl=1*1vv9m79*_gcl_au*MjEwNDAzMTQzOS4xNzlwNDlyMjg5*_ga*MTk0MDY</u> 2MjA2NS4xNzAwNzAwNzIx*_ga_7HH1130XC0*MTcyMzE3ODY5OS4xNC4wLjE3MjMxNzg2OTkuNjAuMC4w

Interactions with TEPS

Commercial fishers are required to report interactions with TEPS in Wildlife Interaction logbooks. Reports of these interactions in each fishery are published on the PIRSA website at

https://www.pir.sa.gov.au/ data/assets/pdf file/0005/467699/Protected_species_interaction_reported_i n_SA_managed_fisheries_2022-23.pdf

Controlling the level of harvest

All three abalone fisheries are managed by TACCs for Blacklip and Greenlip Abalone in each zone. Allocation of the TACC to individual licence holders is implemented through Blacklip and Greenlip quota units being held as entitlements on individual licences and an annual determination of a quota unit value (i.e., kg of meat weight per unit) for both abalone species. The MLL for all Abalone species limits the commercial harvest of Abalone other than Blacklip and Greenlip as the other species rarely grow to the MLL.

The decision rules in the Harvest Strategy guide the setting of the TACCs prior to the commencement of each season.

Further management arrangements that control the level of catch with a key focus on ensuring ecologically sustainable stocks include:

- Limited entry restricting the total number of commercial licences in each fishing zone
- MLLs and minimum meat weight for shucked abalone.

Harvest strategy

The harvest strategy applies to all three abalone fisheries: SZAF, CZAF and the WZAF and is included in the Management Plan for the South Australian Commercial Abalone Fishery (2021)

A review of the previous harvest strategy was undertaken in 2015 with the aim of simplifying the harvest strategy, addressing discrepancies in stock status between the weight of evidence approach and application of the harvest strategy, and the broad nature of the decision rules. During the review period, a report of the previous harvest strategy was undertaken by Smith (2016).

The harvest strategy provides a structured framework for decision making that takes into account the complex spatial structure of both stock and fishing mortality and ensures the Ecologically Sustainable Development (ESD) object of the Act is adhered to.

The revised abalone harvest strategy integrates fishery-dependent and -independent performance indicators (PIs), and additional secondary fishery and environmental information (e.g., weather). Within the harvest strategy are target and limit reference points based on acceptable levels of risk to the fished component of the abalone stock. The harvest strategy applies to Blacklip and Greenlip Abalone in all three fishing zones and is used annually to inform TACC decisions for each zone.

The harvest strategy decision-making framework comprises of three main phases; monitoring, assessment and harvest decision rules in the following ten steps:

Monitoring phase

- 1. Identify spatial assessment units (SAUs);
- 2. Undertake monitoring program to collect information on performance indicators (PIs) for each SAU (SARDI and industry contribute information) and relevant secondary fishery information;
- 3. Hold a workshop to share relevant fishery information for the previous fishing season to inform the harvest decision rules.

Stock Assessment phase

4. Using CPUE, score the performance of the fishery in each SAU based on limit reference points and target reference points (Figure 3);

- 5. Using legal density, score the performance of the fishery in each SAU based on limit reference points and target reference points (Figure 4);
- 6. Combine the two PI scores for an overall SAU performance score;
- 7. Aggregate the scores of each SAU to provide an overall zonal score that translates to stock status. Stock status is based on trigger reference points for biomass (or proxy, i.e. zone score) and fishing mortality (or proxy, i.e. trend in zone score).

Harvest decision rules phase

- 8. Use the zonal score as the measure of overall fishery performance to determine the zonal catch;
- 9. Consider relevant secondary information and, where appropriate, adjust the catch-contribution from each SAU up or down by a maximum of 10%, then sum to a recommended catch;
- 10. Formally recommend TACC to the Minister (or delegate).



Figure 2: Schematic diagram of scoring CPUE in the Abalone Harvest Strategy. A score of five (5) which equals the target reference point is comprised of the middle 40% of CPUE range from the reference period and produces a 'flat' stable section where a range of CPUE will result in a score of 5 (PIRSA, 2021)

The harvest decision rule at Point 8 are applied to target zonal catch that reflects a catch level considered to be biologically sustainable over the long-term and aims to ensure stocks are not classified as depleted for more than 9-years in every 10-years.

The target zonal catches for each species in each fishery are as follows;

- Southern Zone Abalone Fishery Blacklip
- Central Zone Abalone Fishery Greenlip
- Central Zone Abalone Fishery Blacklip
- Western Zone Abalone Fishery Greenlip
- Western Zone Abalone Fishery Blacklip
- 132,000 kg whole weight 46,040 kg meat-weight 9,000 kg meat-weight
- 78,000 kg meat-weight
- 77,000 kg meat-weight



Figure 3: A schematic diagram of scoring legal density. A score of five which equals the target reference point is comprised of the middle 40% of legal density from the reference period.



Figure 4: Schematic representation of the conversion from zonal score to a zonal catch. The zonal score is a representative only. The final TACC recommended from the harvest strategy is a determined after application of the secondary information through the decision rules.

Discussion and operation are undertaken in conjunction with industry and commences through an information workshop to bring together fishery-dependent and -independent data from SARDI stock assessments, and secondary information including diver assessments, market considerations, proportion large, % Grade 1 Greenlip Abalone, fisher behavior, etc. that may impact catch-rate (e.g., percentage of the catch sold live) and environmental parameters. The role of the discussions with industry prior to setting the TACCs is to gain a shared understanding of issues and events that have affected the fishery for the season

of assessment. Information shared supports the harvest decision rules and final recommendation of the TACC from the harvest strategy.

To ensure that there is a high likelihood of the SAAF remaining sustainable, protected from overexploitation and not endangered, the harvest strategy is set up to ensure there is a high probability of stock recovery from depletion to levels above a limit reference point, within specified timeframes. A primary aim of the harvest strategy is to ensure this occurs through assessing the uncertainty of the data used to assess performance and establishing appropriate limit, trigger and target reference points to direct harvest decision rules.

The merits of each performance indicator used in the harvest strategy is provided under their respective headings above and the reference points reflect the need for a high likelihood that the stock at the zone level remains sustainable, or is classified as sustainable nine years in every ten. The operational objectives provide the criteria for a sustainable stock and directly link the performance indicators and the reference points.

Recovery strategies for overfished stocks

The recovery strategy for the SAAF is outlined in the harvest strategy which uses decision rules to maintain the stock status classification as sustainable. If the fishery is classified as depleting or recovering, the TACC in the respective zone is restricted to bring the stock back to a sustainable level. If the zone score is 1.0 or below, or the stock was classified as depleted, this would trigger temporal closure(s) of the fishery zone(s) for a particular species or SAUs to mitigate the risk. A reduction in zonal catch is applied when a zone score is below 5 reflecting a lower level of stock performance (Figure 10) and recommends TACCs set at zero when the zone score is 1 or below.

While the Management Plan does not specify the procedures for reopening a fishery it does state *catch levels developed for post-closure situations should be extremely precautionary and may incorporate fishery- independent and fishery-dependent surveys, and structured fishing to provide for the development and testing of alternative strategies and monitoring of stock recovery.*

Enforcement of the management arrangements

Enforcement of management arrangements is undertaken by PIRSA Fisheries and Aquaculture. The compliance program has dual objectives: 1) to maximise voluntary compliance with fisheries rules; and 2) to create effective deterrence to breaching fisheries rules. These objectives are consistent with the 'National Fisheries Compliance Policy'.

Voluntary compliance is maximised through ensuring that fishers are aware of the rules that apply to their fishing activities, understand the rules and the purpose of those rules, and operate in a culture of compliance. Effective deterrence is created through the presence of Fisheries Officers and awareness of compliance operations, as well as through detection and prosecution of illegal activity. Compliance regimes include, but are not limited to, Fisheries Patrol Vessels, and monitoring catch logs, unload logs, line monitoring, start and finish times, gear use and fishing nights used. Further information about the compliance program for each of the SAAF can be found in published cost recovery implementation statements at Services to industry - PIRSA.

Mitigating impacts on the wider ecosystem

The Act requires ecological impacts to be identified and assessed in developing formal management plans as follows:

- Current known impacts of the fishery on the ecosystem
- Potential impacts of the fishery on the ecosystem
- Ecological factors that could have an impact on the performance of the fishery.

The ecological impacts associated with the fishery have been identified and assessed through the process of conducting an ESD risk assessment for the fishery. The *National ESD Reporting Framework for Australian Fisheries* (Fletcher *et al.* 2002) was used to conduct the risk assessment. In accordance with the ESD object in the Act, this approach is aimed at identifying and prioritising important ecological factors effecting the management of the fishery.

Risks and important issues in the fishery were identified in consultation with stakeholders and were prioritised using risk ratings from negligible to extreme. Specific management strategies to minimise risks identified as moderate, high or extreme have been developed and are provided in Table 3 of the 2021 Management Plan.

The report titled, 'Ecologically Sustainable Development (ESD) Risk Assessment for the South Australian Abalone Fishery' (PIRSA 2021) provides further detailed information about the fishery and outcomes of the ESD risk assessment. The report can be found at

https://pir.sa.gov.au/__data/assets/pdf_file/0008/173996/abalone-esd-risk-assessment-2021.pdf.

The risk to trophic impacts related to removal of abalone was considered LOW given catch levels under harvest strategy decision rules. Habitat disturbance and impacts on TEPS, and interactions with other non-retained species was ranked as Negligible given the selective (hand collection) nature of this fishery.

National policies, plans and strategies

Management plans and harvest strategies were developed consistent with the National Policy on Fisheries Bycatch and the South Australian Harvest Strategy, within the following links:

- National Policy on Fisheries Bycatch <u>https://www.agriculture.gov.au/agriculture-</u> land/fisheries/environment/bycatch/nat_by_policy_1999
- South Australian Harvest Strategy https://pir.sa.gov.au/__data/assets/pdf_file/0020/267230/Harvest_strategy_policy_DECEMBER_2 015.pdf

Changes since the previous assessment

Abalone Viral Ganglioneuritis (AVG)

On 23 February 2024, Abalone Viral Ganglioneuritis (AVG) was confirmed in wild abalone in waters south of Port MacDonnell in the south east of South Australia. AVG is known to occur elsewhere in Australia, including Victoria and Tasmania, however, this was the first detection in South Australia. A fishery closure around the outbreak site was implemented to give the greatest chance of preventing further spread by human activities while delimiting surveillance was undertaken. Eradication of AVG is not feasible in an open marine environment.

On 27 March 2024, a notice under the *Livestock Act 1997* was issued providing longer term arrangements for movement of fishing equipment outside of the Southern Zone and storage of live abalone by Fish Processors sourced from the Southern Zone to mitigate the risk of spread of AVG to other fishing zones. In

addition, a fishery closure under the Act was implemented at Port MacDonnell to support abalone stock recovery with this closure extended in May 2024 west of the initial closure area.

PIRSA, in collaboration with industry, will continue to monitor AVG and apply appropriate management arrangements to prevent further spread of the disease.

In consultation with industry, an AVG Biosecurity <u>Code of Practice for South Australia</u> was developed. The Code provides industry standards for dive operations, decontamination, regional movement of fishing equipment, as well as protocols for observing and reporting suspect abalone. Further information about AVG closures and the Code of Practice are available at: <u>Abalone viral ganglioneuritis - PIRSA</u>.

Abalone herpes virus (*Haliotid herpesvirus-1*), the disease that causes AVG, is a notifiable disease under the *Livestock Act 1997*. The virus is specific to abalone and affects the abalone nervous system, causing weakness and eventually death. AVG has the potential to severely impact local abalone stocks and reef ecosystems, with up to 90% mortality reported in some instances.

2021 Management Plan

A new <u>Management Plan for the South Australia Commercial Abalone Fishery</u> (2021) came into effect September 2021 and applies for a period of 10 years. A review of this Plan must be undertaken as soon as practicable after its fifth anniversary or may be undertaken at any time as approved by the Minister under the Act.

The principal change in the new management plan is a harvest strategy applying the performance indicators CPUE and legal density. For further information on the new harvest strategy see the sections "Performance Indicator" and "Harvest Strategy".

Electronic logbooks

All three SAAF have transitioned to mandatory electronic Catch Disposal Records (CDRs). These were implemented for the respective fisheries in:

- May 2023 for the CZAF
- July 2023 for the WZAF
- September 2023 for the SZAF.

PIRSA is in the process of implementing mandatory electronic Catch and Effort Logbook reporting for all three fishing zones in the SAAF.

Monitoring and data collection

Data collection, data validation and data monitoring programs

CPUE (units of kg. hour) is a primary performance indicator for all three SAAF. Catch and effort data are recorded by commercial fishers in the catch and effort logbooks and provided monthly. These data are then used by SARDI to determine CPUE for each of the three SAAF. The CPUE reported by SARDI is then applied to the harvest strategy decision rules for each zone to determine TACCs for the respective abalone species.

Catch and effort records provided by licence holders are submitted monthly and are validated with unload records provided at the time of offload of catch to fish processors at ports. Compliance activities may include inspections during unloading and at markets to monitor and validate catch records.

Assessment of abalone stocks is undertaken biannually or annually and reported regularly by SARDI. Reports are available at <u>Publications and reports - PIRSA</u>.

A fishery-independent estimate of the density of abalone that have reached the MLL for each class of abalone in each zone provides another measure of abundance/biomass that is independent of the fishery and not influenced by the factors effecting commercial CPUE. The estimate of legal density is undertaken

by SARDI scientists at important SAUs in each fishing zone using a methodology that is objective, standardised and unbiased. This assessment provides independent measures of relative abundance and trends in the number of individuals recruited into the fishery and can be interpreted without the confounding factors that complicate the interpretation of fishery-dependent information. Not all SAUs in each fishing zone are surveyed. In the SZAF, fishery independent surveys are undertaken biennially at five SAUs. In the CZAF, two SAUs are surveyed biennially and in the WZAF independent surveys are conducted alternating years between Blacklip and Greenlip survey sites with five SAUs surveyed for Blacklip and three for Greenlip.

Due to the diving targeted nature of the SAAF there is no bycatch and there is currently no requirement to record discarded bycatch in logbooks. While there are no interactions with TEPS in the SAAF there are observations and sightings of White Sharks by divers and these are recorded in the logbooks and reported on by SARDI.

For future information on data collected in the SAAF refer to the Management Plan for the South Australian Commercial Abalone Fisheries (2021) at <u>https://pir.sa.gov.au/__data/assets/pdf_file/0004/12982/abalone-management-plan.pdf</u>.

A summary of commercial catch and effort (diving hours) and estimated recreational catch is provided in Appendix 1.

Stock Assessments

Key target and byproduct species

PIRSA has adopted the National Fishery Status Reporting Framework to determine the status of all South Australian fish stocks (Stewardson *et al* 2018). Stock assessments, using rules in the harvest strategy, are provided for each target species in each zone by SARDI annually or biennially. The most recent stock status classifications for the respective zones of the SAAF are provided in the tables below.

Southern Zone Abalone Fishery

The most recent SARDI Stock Assessment "<u>Assessment of the Southern Zone Abalone (Haliotis rubra and H.</u> <u>laevigata</u>) Fishery in 2022/23" provides an assessment of stock status for Blacklip Abalone and Greenlip Abalone in the Southern Zone of the SAAF for the 2022/23 fishing season. Blacklip stock status is determined using the harvest strategy from the Abalone Management Plan (PIRSA 2021). The Harvest Strategy is not applied to Greenlip in the Southern Zone (PIRSA 2021).

Application of the YTD data to the harvest strategy defined the stock status for Blacklip in the SZAF in 2022 as '**sustainable**'. This is consistent with the status classifications since 2016. Greenlip catches in the SZAF remained at the lowest levels recorded since the mid-1980s consistent with the current low TACC of 1.8 t. Greenlip is considered a bycatch species in the SZAF, and there are insufficient data available to estimate either biomass or fishing mortality. The stock status for this species is classified as '**undefined**' (Table 3).

Table 3: Southern Zone blacklip and greenlip statistics from 2013 to 2022; total allowable commercial catch (TACC); total commercial catch (TCC); catch-per-unit-effort (CPUE); stock status (complete season) and stock status (year-to-date). *Since 2019 blacklip stock status has been determined using the Harvest Strategy (PIRSA 2021). Prior to this stock status was determined using the weight-of-evidence from the National Fishery Status Reporting Framework. ^The Harvest Strategy is not applied to greenlip, instead stock status classifications are determined using the National Fishery Status Reporting Framework.

Season No. licences		TACC (t)	TCC (t)	CPUE (kg.hr ⁻¹)	Stock Status (Complete season)	Stock Status (YTD)	
2013/14	6	151.5	125.7	95.9	Depleting		
2014/15	6	151.5	134.6	93.5	Depleting		
2015/16	6	126.0	122.6	98.2	Depleting		
2016/17	6	126.0	125.9	98.3	Sustainable		
2017/18	6	126.0	126.3	107.9	Sustainable		
2018/19	6	132.0	131.5	109.8	Sustainable		
2019/20	6	132.0	117.8	104.4	Sustainable*		
2020/21	6	132.0	132.3	103.4	Sustainable*		
2021/22	6	132.0	132.2	117.0	Sustainable*	Sustainable#,*	
2022/23	6	132.0	115.2 [#]	116.8 [#]	TBA in next report	Sustainable ^{#,}	

Greenlip	enlip											
Season	Season No. licences		TCC (t)	CPUE (kg.hr ⁻¹)	Stock Status^							
2013/14	6	7.2	3.6	na	Undefined							
2014/15	6	7.2	4.4	na	Undefined							
2015/16	6	6.0	3.8	na	Undefined							
2016/17	6	3.6	3.2	na	Undefined							
2017/18	6	3.6	3.1	na	Undefined							
2018/19	6	1.8	1.9	na	Undefined							
2019/20	6	1.8	1.9	na	Undefined							
2020/21	6	1.8	1.4	na	Undefined							
2021/22	6	1.8	1.6	na	Undefined							
2022/23	6	1.8	1.6 [#]	na	Undefined							

Central Zone Abalone Fishery

The <u>Status of the Central Zone Abalone Fishery 2022</u> provides the most recent assessment of stock status for Greenlip Abalone (*Haliotis laevigata*) in the CZAF. The stock status was determined using the harvest strategy from the Abalone Management Plan (PIRSA 2021). There is no updated assessment for Blacklip Abalone (*Haliotis rubra*) because the fishery is classified as **'depleted'** and was closed to commercial fishing in 2022 with a TACC of zero.

Application of the harvest strategy to Greenlip data in 2022 resulted in the stock status for Greenlip in 2022 being classified as **'sustainable'** (Table 4).

Table 4: Key statistics for the Central fishery from 2013 to 2022, including TACC, total commercial catch (TCC), catch per unit effort (CPUE), and stock status from the weight of evidence using the national fishery status reporting framework (NFSRF) or Harvest Strategy. Tmw = tonnes meat weight, kg.hr⁻¹ = kilograms per hour. *Indicates years when stock status was determined using the weight of evidence approach from the NFSRF (Piddocke et al. 2021).

Greenlip						
Season	TACC (t)	TCC (t)	CPUE (kg.hr ⁻¹)	Zone Score	Zone Trend Score	Stock Status
2013	47.7	47.9	23.5	5.8	5.0	Depleting*
2014	47.7	47.5	24.3	6.8	6.0	Depleting*
2015	46.0	45.7	23.4	6.3	5.5	Depleting*
2016	46.0	46.0	23.7	6.1	5.0	Depleting*
2017	46.0	46.1	22.8	5.3	4.1	Sustainable*
2018	46.0	45.7	22.2	5.0	4.3	Sustainable*
2019	46.0	46.0	20.9	4.4	4.0	Depleting
2020	46.0	28.1	19.8	4.4	4.5	Depleting
2021	46.0	24.9	19.2	4.4	4.9	Depleting
2022	36.1	23.3	20.2	4.5	5.0	Sustainable
Blacklip						
2013	8.1	8.4	24.0	3.9	5.0	Depleting*
2014	8.1	7.5	23.7	3.9	5.0	Depleting*
2015	6.4	6.4	24.6	4.4	5.0	Depleting*
2016	6.4	6.2	20.9	1.5	2.7	Depleting*
2017	6.4	5.8	18.3	0.6	0.1	Depleted*
2018	0.0	0.0	NA			Depleted*
2019	6.4	1.0	NA			Depleted*
2020	6.4	1.2	18.9			Depleted*
2021	1.2	1.2	NA			Depleted*
2022	0.0	0.0	NA			Depleted*

Western Zone Abalone Fishery

The most recent SARDI Stock Assessment is the "<u>Western Zone Blacklip Abalone (*H. rubra*) and Greenlip Abalone (*Haliotis laevigata*) Fisheries in 2022/23". The assessment includes application of the harvest strategy included in the Management Plan for the SAAF (PIRSA 2021) to determine stock status. Application of the harvest strategy resulted in the stock status for Blacklip in the WZAF in 2023 being defined as **'sustainable'**. The 2023 stock status of 'sustainable' follows a long-term decline in harvestable biomass from 2006 to 2019 and continues to reflect evidence that the decline abated from 2019 onwards. The change to 'sustainable' in 2019 was due to a modest improvement in stock abundance evidenced primarily by small increases in CPUE for the Western Zone and some SAUs between 2019 and 2020, and increasing estimates of legal density at three fishery-independent survey sites. These changes continued in 2021 and 2022 suggesting that the the long-term decline in harvestable biomass since 2006 likely abated and that stock recovery may have started. Evidence that the improvement continued between 2022 and 2023</u>

included increases in WZAF CPUE continuing between 2022 and 2023, CPUE increasing or stabilising at several SAUs.

Application of the harvest strategy resulted in the stock status for Greenlip in the WZAF in 2023 being defined as **'sustainable'**. The Greenlip status for 2023 as **'sustainable'** (Table 5) follows a long-term decline in harvestable biomass from 2005 to 2014 and continues to reflect evidence that the decline has likely abated. The large improvement in 2023 is due to the largest inter-annual increase in CPUE for the Western Zone that is apparent at multiple SAUs and suggests a large increase in biomass between 2022 and 2023. However, such large interannual changes in biomass are unexpected for long-lived, slow growing species such as abalone, with the contribution of recent changes in fishing practices on CPUE being poorly understood.

						-		
Calendar Year	No licences	TACC (tmw)	VCL (tmw)	TCC (tmw)	Financial Year	HS Stock Status		
BLACKLIP				_				
2019	22	58.6	53	51.08	2018/2019	Depleting		
2020	22	43.0	NA	40.39	2019/2020	Sustainable		
2021	22	47.3	44.3	45.19	2020/2021	Sustainable		
2022	22	43.5	NA	44.04	2021/2022	Sustainable		
2023	22				2022/2023	Sustainable		
GREENLIP				-	-	-		
2019	22	73.01	66.4	66.05	2018/2019	Depleting		
2020	22	51.0	NA	49.05	2019/2020	Depleting		
2021	22	48.9	NA	51.02	2020/2021	Sustainable		
2022	22	44.1	NA	46.72	2021/2022	Sustainable		
2023	22				2022/2023	Sustainable		

Table 5: Key summarised Western Zone blacklip and greenlip statistics: **Calendar Year** - number of licences (No. licences); total allowable commercial catch (TACC); voluntary catch limit (VCL) and total commercial catch (TCC); stock status from the harvest strategy (HS). tmw = tonnes meat weight

Distribution and spatial structure of key stocks

The biology of Blacklip and Greenlip abalone throughout South Australia is well documented in previous scientific and assessment reports (see Stobart *et al.* 2014, 2015; Burnell *et al.* 2016). Briefly, the distribution of Blacklip and Greenlip abalone overlaps throughout southern Australia but they have different overall ranges and habitat preferences. Blacklip range from Coffs Harbour (New South Wales) to Rottnest Island (Western Australia), while Greenlip range from Flinders Island (Tasmania) to Cape Naturaliste (Western Australia) (Edgar 2008). Typically, these two species occupy different habitats, with Blacklip mostly inhabiting crevices and caves or the bottom of steep rock faces of topographically complex rocky reefs (1 to 30 m depth), whilst Greenlip tend to inhabit the edge of reefs and boulders near sand or seagrass (5 to >50 m depth).

Blacklip have a broad-scale population structure (Brown 1991), although significant genetic differentiation can occur between sites less than 15 km apart (Shepherd and Brown 1993; Temby *et al.* 2007; Miller *et al.* 2009), suggesting limited dispersal among 'metapopulations' (Fleming 1997; Miller *et al.* 2009). In contrast, dispersal of Greenlip appears to be more widespread, which is reflected in population genetics where metapopulations occur at the distances of up to 135 km (Miller *et al.* 2014). The relatively limited dispersal of abalone, particularly Blacklip, has implications for the recovery of depleted stocks from localised depletion, and contrasts with many other marine organisms, that have greater capacity for dispersal.

Estimates of total removals

Estimates of total removals are outlined in Appendix 1, which includes commercial and recreational catch.

Indicator byproduct species

There are no indicator byproduct species identified within the SAAF as there is no byproduct. commercial catch is exclusively target species of Blacklip and Greenlip, for which TACCs are set. Under a ministerial exemption, a limited amount of fishing of Roei Abalone was allowed in the WZAF in 2014 which provided a TACC of 11 tonnes whole weight. PIRSA catch reports indicate that less than 200 kg meat weight of Roe's Abalone was harvested in 2021 and limited harvest in 2020. No further exemptions have been issued since December 2022 due to low interest by licence holders.

Bycatch

Bycatch composition

There is no bycatch in the fishery as the fishing method is highly selective and targeted due to the hand-collection method utilised in this fishery

Risk assessment on the effects of fishing on bycatch

The risk assessment for non-retained bycatch, and non-target species has been assessed in the Abalone Fishery ESD Risk Assessment was ranked as Negligible given the selective (hand collection) nature of this fishery

Bycatch mitigation measures

Table 3 of the Management Plan for the South Australian Commercial Abalone Fisheries (2021) identifies the need for new divers to be adequately trained to ensure they only take abalone and do not incidentally take or disturb other species and to adhere to industry codes of conduct.

Indicator bycatch species

Not applicable

Management actions

Not applicable

Protected species and threatened ecological communities

Fishery impacts on protected species and communities

All commercial fisheries in South Australia are required to report wildlife interactions with TEPS. An annual Advice Note recording interactions with TEPS is provided by SARDI. The <u>2022/23 SARDI Advice Note</u> records two sightings of White Shark in the SAAF. Noting in all cases these sharks were uninjured or harmed. <u>The ESD risk assessment undertaken for the SASF</u> ranked the risk of fishery impacts on protected species and ecological communities as Negligible.

Mitigating risks to protected species and communities

Table 3 of the Management Plan for the South Australian Commercial Abalone Fisheries (2021) states the measures to mitigate interactions with TEPS and communities including, training new divers to ensure they only take abalone and to not incidentally take or disturb other species and to adhere to industry codes of conduct.

CITES-listed species

There are no CITES list species harvested in the SAAF.

Ecosystem

Ecosystem management actions

A formal management plan for the SAAF sets out management objectives to protecting and conserving ecosystems and benthic habitats. The management plan also describes performance indicators and reference points against the objectives described for this objective.

In addition, the ESD risk assessment for the SAAF can be found at https://www.pir.sa.gov.au/ data/assets/pdf_file/0008/173996/abalone-esd-risk-assessment-2021.pdf

Risks and important issues in the fishery are identified in this report and prioritised using risk ratings from negligible to extreme. The risk of trophic impacts related to removal of abalone was considered Low given catch levels under harvest strategy decision rules. The risk to the ecosystem from habitat disturbance, impacts on TEPS, and impacts on non-retained species were assessed and ranked as Negligible given the selective (hand collection) nature of this fishery.

There are no current decision rules that specifically trigger management actions related to ecosystem management. However, such information would be considered in regard to management actions required, if appropriate.

Marine bioregional plans

All three abalone fisheries predominately operate in SA state waters and therefore are not considered to operate in any marine bioregional area.

Research

Information on the most relevant research can be found in the most recent SARDI reports at <u>Publications</u> and <u>reports - PIRSA</u>. The most recent SARDI research reports for each of the three fisheries are:

- <u>Status of the Central Zone Abalone Fisheries in 2022</u>
- Assessment of the Southern Zone Abalone (Haliotis rubra and H. laevigata) Fishery in 2022-23
- Western Zone Blacklip Abalone (*H. rubra*) and Greenlip Abalone (*Haliotis laevigata*) Fisheries in 2022–23

In addition to the core monitoring and assessment reports the following report on Greenlip Abalone restocking has been prepared by SARDI:

• <u>Accelerating Greenlip Abalone stock recovery in South Australia using release of hatchery-reared</u> juveniles. Phase 1 - genetic risk assessment and preliminary cost-benefit analysis.

Progress against current Conditions

There are no current conditions under either Part 13 protected species accreditation or Part 13A export approval.

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Appended Data Tables

Appendix 1 – Total Catch and effort Target Species

Southern Zone Abalone Fishery – Catches Blacklip Abalone Fishery 2018-19 to 2022-23 in tonnes (whole weight)

Season	Admella	Beachport	Blackfellows Caves	Cape Jaffa	Carpenters Rocks	East Port Macdonnell	Gerloffs Bay	Middle Point	Nene Valley	Nora Creina	Number 2 Rocks	Port Macdonnell	Rivoli Bay	South End	Unassigned SZ	Total
2018/19	5.2	5.0	2.3	2.5	8.1	0.0	8.3	26.7	2.9	8.2	31.0	15.8	10.0	5.6	0.0	131.5
2019/20	4.5	5.1	2.6	2.5	9.2	0.0	9.6	27.6	2.1	5.3	25.4	10.3	7.2	6.4	0.0	117.8
2020/21	4.3	7.3	2.1	2.3	11.3	0.0	6.1	26.8	2.4	6.3	31.0	14.5	9.8	8.2	0.0	132.3
2021/22	8.8	8.0	1.9	4.1	11.1	0.0	2.8	27.8	3.8	5.4	29.0	10.9	9.1	9.4	0.0	132.2
2022/23	8.7	7.3	1.6	0.6	5.0	0.0	3.5	23.2	0.0	7.9	30.8	12.8	9.3	4.5	0.0	115.2

Southern Zone Abalone Fishery – Greenlip Abalone Fishery 2018-19 to 2022-23 in tonnes (whole weight)

Season	Admella	Beachport	Blackfellows Caves	Cape Jaffa	Carpenters Rocks	East Port Macdonnell	Gerloffs Bay	Middle Point	Nene Valley	Nora Creina	Number 2 Rocks	Port Macdonnell	Rivoli Bay	South End	Unassigned SZ	Total
2018/19	0.1	0.0	0.2	0.1	0.2	0.0	0.5	0.0	0.1	0.4	0.0	0.2	0.2	0.0	0.0	1.9
2019/20	0.1	0.0	0.1	0.2	0.2	0.0	0.4	0.1	0.0	0.6	0.0	0.0	0.1	0.0	0.0	1.9
2020/21	0.1	0.1	0.0	0.1	0.2	0.0	0.3	0.0	0.0	0.6	0.0	0.1	0.1	0.0	0.0	1.4
2021/22	0.1	0.0	0.0	0.7	0.1	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	1.6
2022/23	0.2	0.0	0.1	0.0	0.1	0.0	0.5	0.0	0.0	0.4	0.0	0.0	0.3	0.0	0.0	1.6

Central Zone Abalone Fishery – Greenlip Abalone Fishery 2018 to 2022 in tonnes (meat weight)

Year	Cape Elizabeth	East YP	Fleurieu	North Kl	South Kl	South YP	Tiparra Reef	Unassigned CZ	West KI	West YP	Western SG
2018		16.98			19.07		24.61		17.15	22.31	
2019		16.87			23.88		24.01		20.42	18.43	
2020		18.21			22.50		19.96		20.83	19.91	
2021		23.68			19.52		21.09		16.73	19.03	
2022		19.60			20.88				21.77	20.02	

Row Labels	Anxious_Bay	Avoid_Bay	Baird_Bay	Cape_Bauer	Cape_Catastrophe	Coffin_Bay	DEntrecasteaux_Reef	Drummond_North	Drummond_South	Elliston_Cliffs	Fishery_Bay	Flinders_Island	Franklin_lslands	Greenly_Island	Hotspot	Memory_Cove	NE_Thistle	Neptune_Islands	North_Nuyts_Archipelago	Pearson_Island	Point_Avoid	Point_Westall	Reef_Head	Searcy_Bay	Sheringa	Sir_Joseph_Banks	South_Nuyts_Archipelago	SW_Thistle	Taylors_Island	The_Gap	Unassigned_WZ_RG_A	Unassigned_WZ_RG_B	Venus_Bay	Ward_Island	Waterloo_Bay	Wedge_Island	Western Zone
2018	5.7	5.8	4.5	0.7	1.3	0.1	0.6	1.3	2.1	0.7	1.3	5.1	1.5	0.0	4.9	0.6	0.4	0.2	1.8	0.0	7.3	3.5	2.9	1.8	0.3	0.0	0.8	1.4	2.1	4.4	0.0	0.0	0.8	3.7	0.6	0.9	69.1
2019	4.1	4.4	2.3	1.0	2.0	0.4	0.0	1.1	1.3	0.2	1.9	2.8	0.4	0.0	3.4	2.0	0.5	0.0	0.7	0.0	6.1	2.8	2.6	1.6	0.7	0.2	0.3	2.1	1.9	4.2	0.0	0.0	0.7	3.2	0.3	1.0	55.9
2020	3.2	7.0	1.5	0.2	1.0	0.3	0.0	0.7	2.3	0.0	1.9	3.1	0.0	0.0	2.0	2.1	0.2	0.1	0.0	0.0	4.6	2.6	2.8	0.8	0.4	0.0	0.0	1.8	1.8	5.6	0.0	0.0	0.3	2.5	0.3	0.9	49.9
2021	3.1	9.0	1.8	0.0	1.1	0.2	0.1	1.0	1.4	0.3	1.0	2.3	0.1	0.2	2.8	1.0	0.3	0.1	0.1	0.0	3.9	2.7	1.8	1.5	0.5	0.0	1.4	0.8	1.6	4.6	0.0	0.0	0.2	2.1	0.2	0.1	47.4
2022	1.5	5.1	3.0	0.1	1.1	0.6	0.2	1.3	2.2	0.2	0.9	2.3	0.1	0.0	2.8	0.6	0.4	0.4	0.4	0.0	3.8	1.5	2.0	1.0	0.4	0.3	0.7	0.5	2.8	1.8	0.0	0.0	0.4	1.8	0.3	0.4	41.2
2023	3.2	5.9	2.7	0.3	0.5	0.1	0.4	1.1	2.3	0.1	1.5	4.1	0.4	0.0	2.3	0.5	0.3	0.0	0.2	0.0	3.2	2.6	1.8	1.4	0.6	0.0	0.7	1.0	1.3	2.4	0.0	0.0	0.1	2.4	0.0	0.2	43.4
West	ern Z	Zone	Aba	alone	e Fisl	nery	– B	lackli	ip At	balor	ne ca	tch	(fina	ncial	yea	r) (t	ons	Mea	t We	eight) fro	m tł	ne W	/este	rn Z	one	SAU	s and	d HS	рос	led	data	limi	ted :	SAUs	; (or	dered

Western Zone Abalone Fishery – Greenlip Abalone catch (financial year) (tons Meat Weight) from the Western Zone SAUs and HS pooled data limited SAUs (ordered alphabetically)

alphabetically)

Financial Year	Anxious Bay	Avoid Bay	Baird Bay	Cape Bauer	Cape Catastrophe	Coffin Bay	DEntrecasteaux Reef	Drummond North	Drummond South	Elliston Cliffs	Fishery Bay	Flinders Island	Franklin Islands	Greenly Island	Hotspot	Memory Cove	NE Thistle	Neptune Islands	North Nuyts	Pearson Island	Point Avoid	Point Westall	Reef Head	Searcy Bay	Sheringa	Sir Joseph Banks	South Nuyts	SW Thistle	Taylors Island	The Gap	Unassigned WZ RG A	Unassigned WZ RG B	Venus Bay	Ward Island	Waterloo Bay	Wedge Island	Western Zone
2019	2.0	4.1	0.1	1.2	0.3	0.3	1.1	4.1	8.0	1.7	0.4	1.1	0.6	0.0	1.8	0.0	0.0	0.0	1.6	0.0	2.3	7.5	4.6	5.0	5.4	0.0	0.1	0.2	0.0	0.3	0.0	0.0	0.3	1.8	0.2	0.0	56.0
2020	2.0	3.7	0.0	1.2	0.3	0.2	0.2	4.9	4.4	1.1	0.4	0.4	0.4	0.0	0.7	0.1	0.0	0.0	0.5	0.0	2.8	4.9	3.6	3.1	5.9	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.2	1.1	0.1	0.0	42.7
2021	1.6	4.0	0.0	0.8	0.3	0.3	0.0	4.3	6.4	0.6	0.5	1.0	0.0	0.0	0.8	0.2	0.0	0.0	0.0	0.0	4.0	4.9	3.4	2.5	4.3	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.8	0.2	0.0	41.2
2022	1.5	2.6	0.0	0.7	0.4	0.1	0.1	5.4	6.2	0.9	0.7	0.2	0.0	0.0	0.9	0.0	0.0	0.0	0.1	0.0	3.0	6.8	2.5	3.6	8.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.9	1.0	0.2	0.0	45.9
2023	0.6	2.0	0.2	0.6	0.2	0.2	0.0	6.1	9.5	0.9	0.2	0.8	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	2.7	4.9	2.4	3.5	5.6	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.6	1.1	0.4	0.0	42.8
2024	1.9	0.9	0.0	0.5	0.1	0.1	0.0	7.6	9.5	1.0	0.2	0.7	0.0	0.0	0.5	0.0	0.0	0.0	0.1	0.0	1.5	5.9	2.6	3.6	8.4	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.2	1.2	0.0	0.0	47.0

Year	Zone	Total Hours	Year	Zone	Total Hours	Year	Zone	Total Hours
2019	Western Zone	5889	2019	Southern Zone	1154	2019	Central Zone	2292
2020	Western Zone	4276	2020	Southern Zone	1103	2020	Central Zone	1500
2021	Western Zone	4691	2021	Southern Zone	1515	2021	Central Zone	1350
2022	Western Zone	4291	2022	Southern Zone	1096	2022	Central Zone	1149
2023	Western Zone	3694	2023	Southern Zone	1198	2023	Central Zone	1172

Total commercial hours of effort (diving) for Abalone in three fishing zones between 2019-2023

Estimated Recreational Catch of Abalone - from recreational fishing survey estimating annual harvest (retained, by number), average weight (kg) and estimated harvest weight (t) by species for recreational fishers in SA from March 2021 to February 2022.

	Harvest (No)	Average weight (kg) catch	Harvest (t)	SE
Abalone, Blacklip	3,296	0.39	1.30	1.12
Abalone, Greenlip	3,795	0.47	1.64	0.84

Appendix 2 – Discarded Catch

Not applicable as there are no by-catch due to the targeted nature of this fishery.

Appendix 3 – TEPS interactions

Interactions with Great White Shark in the Abalone Fishery from 2018-2023. Notes ^a: no released white sharks were recorded as injured. No other interactions with TEPS have been recorded in the time period for the SAAF

					Interact	tion	Stat	us	Fate if caught			
Fin. year	Fishery	Group	Common name	No.	Caught entangled encircled	Seen	Alive ^a	Dead	Released	Retained ^b		
2018/19	Abalone	FISH	GREAT WHITE SHARK	7		7	7					
2019/20	Abalone	FISH	GREAT WHITE SHARK	2		2	2					
2020/21	Abalone	FISH	GREAT WHITE SHARK	1		1	1					
2022/23	Abalone	FISH	GREAT WHITE SHARK	2		2	2					