BENCHMARKING SARDI'S FISHERIES RESEARCH MONITORING, ASSESSMENT AND HARVEST STRATEGIES

Ian Knuckey and Tony Smith

November 2025

fishwell

Executive Summary

In line with the terms of reference provided by the South Australian Cost-Recovery Implementation Committee (CRIC), this report evaluates the fisheries monitoring, assessment and ecological research activities in South Australia, and the extent to which they are appropriate, risk based, cost-effective, efficient, transparent, and aligned with best practice. The review sought input from SARDI scientists and has involved wide consultation with, and input from, the commercial fishing industry in South Australia. It covered all South Australian commercial fisheries for which SARDI provides monitoring and assessment: Abalone (Southern, Central and Western Zones), Blue Crab, Lakes and Coorong (finfish and pipi sectors), Marine Scalefish, Prawn (Gulf St. Vincent, Spencer Gulf, West Coast), Rock Lobster (Northern and Southern Zones), Sardine, Giant Crab, Vongole and Charter Boat. This breadth ensured that findings reflected both the common issues across fisheries and the unique challenges faced by individual small, medium and large fishing sectors.

The review also includes an evaluation of the research activities undertaken by the government research agency SARDI (particularly focusing on monitoring and stock assessment) and consideration of the performance of applicable harvest strategies, including status of stocks, for all South Australian commercial fisheries. Key findings from this review are listed below. This is followed by a more extended summary of findings, plus key recommendations and fishery-specific suggestions.

Main findings

- The status of individual fisheries in South Australia is generally well informed. The main source of information is catch and effort statistics collected from mandatory logbooks completed by fishers in each fishery. Most fisheries have a long time series of such information. Recent transfer from paper to electronic reporting is improving efficiency (and potentially effectiveness) of information applied in fishery assessments. However, electronic coverage needs expansion to all fisheries addressing necessary improvements in spatial and temporal resolution which is poor for some fisheries (e.g. Abalone, Marine Scale, Lakes and Coorong finfish). Opportunities to extend electronic reporting to quantification of bycatch and discards, interactions with ETPs, should also be adopted as this information has been noted as insufficient in ecological risk assessments.
- Climate change is significantly influencing fishery productivity and the distribution and abundance of target species for fisheries around Australia, including South Australian fisheries. This is increasing the uncertainty of stock assessments and fishery harvest strategies and requires greater science resources to address. Electronic monitoring of environmental data e.g. sea surface/bottom temperature and salinity on fishing vessels should also be expanded given the strong influence of environmental variables on fishery dynamics (e.g. Prawns, Marine Scalefish). Notwithstanding the utility of environmental data in fisheries assessment, facilitation of expanded environmental data collection for marine and coastal ecosystems should be funded and promoted by government. This is

all the more important given extant threats to marine ecosystem health exemplified by the current harmful algal bloom and potential marine heatwaves.

- Information on the status of South Australian fisheries is generally comprehensive and includes annual status/stock assessment reports complemented with regular ecological risk assessments. Even so, there are many data-limited fisheries including most species in the Marine Scale fishery, Lakes and Coorong finfish and specifically Giant Crab. Some fisheries, notably Snapper, Southern Garfish, Black Bream, West Coast Prawns, Giant Crab and Central Zone Abalone (blacklip) are depleted. Quantitative (model-based) assessments are not used as frequently in South Australia as they are in other jurisdictions. This, in part, reflects the widespread use of fishery-independent surveys.
- Alternative assessments of fish stocks, including methods widely deployed for data-poor fisheries e.g. surplus production models can improve rigour and reduce risk (of fishery decline) by improved information on stock status. Current models (e.g. the 'est' models used for some Marine Scale fisheries) do not estimate depletion which limits their utility in assessment. Migration of existing quantitative assessments to more integrated methods with forward projection capability (such as Stock Synthesis) is consistent with best practice in fisheries stock assessment. Some fisheries, such as Rock Lobster, do not need annual model-based assessments. In any case, the annual stock assessments for Rock Lobster do not inform the harvest strategy. Accordingly, assessments could be undertaken less frequently (for example New Zealand undertakes quantitative assessments every five years). This would reduce cost without compromising risk to the stock.
- Notwithstanding the strength of extensive data sets on (commercial) fishery catch and effort statistics, many South Australian fisheries display hyperstability in catch rates driven largely by fisher behaviour and targeting practices which can maintain catch rates as stocks decline. This undermines a fundamental assumption in fishery stock assessment that catch rates are proportional to stock abundance. Furthermore, many harvest strategies applicable to South Australian fisheries (e.g. Rock Lobster) rely mainly on catch rates as performance indicators (to set annual catch limits). There is therefore a need to further evaluate the causes and implications of hyperstability to improve assessments, inform risk, and better define appropriate reference points and harvest control rules in harvest strategies.
- Fishery independent surveys are widely used in South Australian fishery assessments and this is to be commended particularly for prawn fisheries, which rank among the world's best managed. Spencer Gulf prawns and Lakes and Coorong pipis present outstanding examples of co-management based on industry participation in monitoring. However, such surveys are expensive and some, including those applied in Abalone, Marine Scale, and Sardine fisheries, are not well regarded by Industry and would benefit from a revised approach including methodology and frequency linked to a risk assessment (of stock status). Not all fisheries require annual fishery independent surveys. Reducing the frequency of fishery independent surveys (e.g. for Sardines, Vongole) can reduce cost without necessarily compromising stock risk. Furthermore, applying novel technologies

(e.g. genetic applications, ROVs, electronic video monitoring in combination with AI video recognition) may provide more cost-effective approaches or alternatives to surveys or observer monitoring without compromising risk.

- The performance of harvest strategies in some fisheries is poor with stocks in a depleted state (e.g. Central Zone Abalone) or for Western Zone Abalone where recommendations from the harvest strategy are consistently too optimistic. The form of the harvest control rules applicable in some harvest strategies (e.g. Blue Crab, Gulf St Vincent Prawn, Spencer Gulf Prawn and Giant Crab) require revision as exploitation rates increase as stocks decline. The complex multi-species, multi-gear Marine Scalefish fishery has undergone major reform and now has a new, but unevaluated, harvest strategy. Evaluation of the effectiveness of current harvest strategies applied to South Australian fisheries should be undertaken with management strategy evaluation (MSE), an accepted process which can also assist in evaluating the effectiveness of current management in driving stocks to target levels (e.g. which support maximum economic yield). MSE can also assist in evaluating the cost effectiveness of current monitoring and assessment processes.
- Recreational fishers take a large share of the catch of some species particularly in the Marine Scale, Lakes and Coorong, and Blue Crab fisheries yet data on recreational harvests are collected infrequently and at poor spatial resolution. This is a key limitation to current assessments of these fisheries which can reduce the effectiveness of harvest strategies for fisheries where recreational catches are significant. Regular validated recreational surveys using enforceable electronic technology (e.g. recreational fishing apps as used in other jurisdictions) should provide key inputs to assessments and link to harvest strategies for individual fisheries. Such surveys should be funded by government given the public good applicable to recreational fisheries.
- Annual evaluation of economic (and to a lesser extent) social performance of individual fisheries is an outstanding strength of South Australia. Although not universally well regarded by Industry, the annual assessments of South Australian fisheries are comprehensive and inform a cost benefit analysis of the provision of science services. Market trends, particularly for those fisheries dependent on export, reveal increasing threats to the financial viability of some fisheries (e.g. Abalone and Prawns) from large-scale aquaculture production overseas. This has a negative impact on gross value of production (GVP) and more particularly net economic returns (NER) and capacity to pay for science services. Research and monitoring costs as a proportion of GVP are variable across fisheries and in some cases (e.g. Gulf St Vincent Prawns) look to be unsustainably high. The consequences of reducing costs of research and monitoring, such as by reducing the frequency or intensity of fishery independent surveys, can be evaluated through a Risk Cost Catch analysis (e.g. using MSE) but may require trade-offs involving lower levels of harvest.
- Benchmarking of science services against similar services provided in other jurisdictions yielded variable results. Some services such as those currently provided for Rock Lobster and Sardines are provided at much less cost elsewhere, whereas those provided for

Abalone and Prawns are comparable or less expensive. Service costs for the multi-species, multi-gear and multi-sector fisheries such as the Marine Scalefish Fishery and the Lakes and Coorong Fishery are high, but this is not inconsistent with similar fisheries in other jurisdictions. In any case, costs allocated for science services are relatively transparent (through annual cost recovery implementation statements) when compared with those in other jurisdictions. Even so, for added transparency, improvements can be made in presenting cost allocation (e.g. by FTE) against each of the specific science services e.g. stock assessment, fishery-independent surveys, ecological risk assessment, and for involvement in externally funded research programs (e.g. through FRDC).

- There is value in SARDI maintaining core skills in fishery monitoring, stock assessment and ecological risk assessment, for continuity and consistency of science programs, maintenance of key fishery science skills, corporate knowledge, and to support the critical (and generally very good) relationships between SARDI scientists and industry. Competitive tendering for core monitoring and assessment services may or may not reduce costs of science services, but such a process introduces additional costs in administration and may erode local science capability and established SARDI/Industry relationships. Furthermore, if such services are outsourced it may undermine the long-term consistency and quality of data and assessment methods. However, exclusive provision of all science services by SARDI promotes a perception of poor value for money by industry. Mixed provider model approaches to cost recovery (e.g. by enabling a process for external providers to bid for some science services) should be explored, particularly where capability or capacity in SARDI is limited, or research is outside core monitoring and assessment functions.
- A structured program for periodic external review of science services applied to South Australian fisheries will be mutually beneficial to SARDI and to Industry (concerned about rigour and cost-effectiveness of individual programs). Augmenting the existing MAC process in South Australia with independent scientists is one way of providing external evaluation of current science services. Periodic review of stock assessments of individual fisheries (e.g. as applied in Commonwealth fisheries) is another.
- Consultation with industry (through peak bodies), and surveys of fishers revealed varying levels of acceptance of the current cost recovery process for science services. Acceptance ranged from dissatisfaction to strong approval. Dissatisfaction arose from a perceived lack of transparency, lack of confidence in assessments (including fishery-independent surveys), mismatch of the spatial scale of monitoring and fishery operation, and poor industry consultation. Strong approval arose from constructive relationships between SARDI scientists and industry, extensive data sets from regular monitoring, regular economic evaluation of individual fisheries, and application of harvest strategies. Our review confirmed that SARDI scientists are generally well regarded and that this regard is reinforced with a good track record of publication of fishery assessments in peer-reviewed journals.

General summary

The fisheries resources of South Australia are required under the *Fisheries Management* Act 2007 (the Act) to be managed according to principles of ecologically sustainable development (ESD). ESD integrates social, economic and environmental objectives in ensuring that living marine resources are managed conservatively for the benefit of the South Australian community. Furthermore, the Act recognises (Section 7 (3)) that sustainability, accountability and value for money are essential to maintaining viable fisheries and thriving coastal communities. In recognition of these obligations, and following recommendations from the Independent Cost-recovery Review Panel, the South Australian Government established the CRIC to oversee implementation of a system that ensures fisheries science, monitoring and research activities in South Australia are appropriate, risk-based, effective, transparent, and aligned with best practice.

A central recommendation of the Review Panel was that the science services (including monitoring, research, and fishery assessment) provided under cost-recovery should be benchmarked. Benchmarking was seen as critical to determining whether existing programs deliver efficient and cost-effective outcomes, whether they align with risk profiles of individual fisheries, and whether the costs borne by industry represent value for money. Concerns had been raised by licence holders from many South Australian fisheries about steadily increasing fees, limited transparency in the derivation of recovered costs, and the absence of competition in the provision of research services. In this context, PIRSA commissioned a comprehensive benchmarking exercise to review the costs, scope, efficiency and outcomes of the fisheries science services delivered by the South Australian Research and Development Institute (SARDI).

The aim of the benchmarking exercise was not to question the technical expertise or capability of SARDI scientists, but to examine the broader system of service delivery – its transparency, efficiency, alignment with legislative obligations and Australian cost-recovery guidelines, and consistency with best practice in Australia and internationally. The review was designed to answer several key questions:

- Are current monitoring and stock assessment programs cost-effective and risk-based?
- Do they deliver information that is fit for purpose and aligned with management and harvest strategy needs?
- Are the costs transparent to licence holders, and comparable with those of other jurisdictions and providers?
- Do existing arrangements encourage efficiency, innovation and responsiveness, or does the large reliance on a single science provider undermine these aspirations? ?

The benchmarking drew on multiple lines of evidence. A literature and cost review was undertaken of Service Level Agreements (SLAs), Cost-recovery Implementation Statements (CRIS), stock assessment reports, ecological risk assessments, BDO / EconSearch economic assessments, and other relevant documentation. Industry perspectives were captured through an extensive survey of stakeholders (commercial fishers/licence holders) and structured interviews with peak bodies, PIRSA and SARDI staff. Comparative analyses were undertaken of monitoring, assessment and research undertaken for similar commercial fisheries in other Australian jurisdictions and in New Zealand by other providers. Finally, a risk–cost–catch (RCC) framework was applied to assess the proportionality of investment across fisheries, the adequacy of programs and extant risks to fish stocks.

Monitoring

Logbook programs remain the backbone of fisheries data collection and are generally considered by industry to provide reliable information on target species. However, recurring concerns were raised about their design and application. Industry stakeholders emphasised that logbook data and broader environmental and external data are not readily available to licence holders or associations, limiting their use in day-to-day management or industry-led monitoring. Many considered the spatial and temporal resolution too coarse, with current grids or reporting periods obscuring finer-scale patterns in effort and catch. The grouping of byproduct (non-target species that are caught and retained) and bycatch (species that are caught and discarded) into broad categories was frequently described as unhelpful for both scientific and accreditation purposes. Reporting of endangered, threatened and protected (ETP) species was often seen as compliance-driven, with little evidence of how the information was used. A common theme was that although logbook data have value, their effectiveness could be greatly enhanced through finer-scale metrics (e.g. gear-hours, GPS positions), real-time access for industry, harnessing electronic/digital technology, and clearer feedback loops on how the information is used in assessments and management decisions.

South Australia has already adopted electronic reporting to replace paper logbooks in many fisheries. However, there is a need to further expand coverage of electronic reporting to capture greater efficiencies in data recording and processing. Given the capacity of digital technology, together with issues of poor temporal and spatial resolution of catch and effort data, there is an opportunity to improve the utility of catch and effort data in reporting, assessments and the accesses and use by industry. Such technology and reporting could also be expanded to cover bycatch, discards, and ETP interactions which remain problematic for many South Australian fisheries. Remote, vessel-based camera technology linked to machine learning artificial intelligence (AI) has capacity to replace human observers for accurate recording of these ancillary data at lower cost. Similarly, extension and application of app-based data-recording technology should be applied to the recreational fishing sector which have substantial catch shares of some South Australian fisheries (e.g. Marine Scale, Lakes and Coorong, Blue Crab). Mandatory and enforceable data recording for recreational fishers should address current deficiencies in spatial/temporal measures of catch, improve the reliability of harvest strategies, and allow reduced risks to stocks targeted by this sector.

Although stakeholder views were mixed depending on the fishery, the widespread implementation and use of fishery independent surveys (FIS) to underpin research and management across South Australia's fisheries is exemplary. The data derived from the long-term survey series (e.g. puerulus monitoring, prawn recruitment and biomass surveys, sardine surveys) were acknowledged as valuable in most fisheries and often essential for underpinning assessments and harvest strategies. Nevertheless, the high cost of FIS relative to fishery value was a major concern. Participants in several fisheries questioned whether annual surveys were always necessary, particularly where stock status is stable, suggesting that biennial or risk-based cycles as deployed in other jurisdictions (e.g. for sardines) might be more appropriate. Some raised the possibility of shared or combined surveys across fisheries to achieve efficiencies. Others pointed to the potential for industry-led surveys or alternative methods (e.g. electronic monitoring, industry vessel or dive loggers, egg production surveys) to replace or complement expensive fishery independent programs. Overall, although stakeholders recognised the scientific value of FIS, they questioned whether the balance between rigour, frequency and cost was appropriate.

Notwithstanding industry concerns, FIS are a notable strength of South Australian fisheries research. However, compared with fishery-dependent data collection programs, FIS are expensive. Nonetheless, cost efficiencies can be captured through review of existing programs and improved design (spatial coverage, statistical power, frequency of conduct) guided by the harvest strategy and risk profile of the fishery. Novel technologies (e.g. dive loggers, ROVs, electronic monitoring and AI applications) can also assist in reducing costs, improving precision, and reducing risks. Altering the frequency, design or approach to FIS will require a detailed review for each fishery where changes are proposed. This review should include analysis of options and identification of the trade-offs involved in potentially reducing or improving certainty in the indices of abundance used as performance indicators in harvest strategies for particular fisheries. Trade-offs should be identified in risk cost catch analyses and formal incorporation into harvest strategies.

Environmental data, including oceanographic and habitat monitoring, were seen as poorly integrated in fishery assessments. Several stakeholders noted that environmental drivers are increasingly important to fishery dynamics but remain under-utilised in assessment models. This is increasingly important given the influence of climate change on the distribution, abundance and dynamics of fish stocks. Respondents also emphasised opportunities to harness fisher-generated data and to use independent custodians or analysts to collate fine-scale data while protecting commercial sensitivities. Collectively, there was a strong demand for a broader, more balanced suite of data that captures biological, economic, social and environmental drivers of fishery outcomes.

Existing programs such as the IMOS sponsored Fishing Vessels as Ships of Opportunity Program (FishSOOP) provide further opportunities for cost-effective collection of environmental data. Under the FishSOOP program, fishing vessels are equipped with remote data collection equipment to record, in particular, subsurface water column and bottom sea temperature at depth information. This harnesses the capacity of the South Australian fishing fleet to expand data collection capacity at a time when there is increasing concern about climate change impacts and extraordinary environmental events such as harmful algal blooms. Incorporation of environmental drivers in formal fishery stock assessments and harvest strategies is rare and can be problematic. However, environmental variables inform the harvest strategy for the Western rock lobster fishery providing a template for potential application to some South Australian fisheries.

Feedback from stakeholders indicated that data collection is overly concentrated on biological monitoring, with insufficient attention to economic, social and environmental dimensions. Economic data were valued, particularly the long-term BDO/EconSearch series, but some industry stakeholders noted that not all fishing-related operating costs were captured in annual economic assessments. Others note that economic assessment concentrated on owner operators rather than corporate stakeholders in some fisheries such as Rock Lobster and Abalone. The comprehensive socio-economic data collected each year for individual fisheries should be explicitly integrated into annual status reports reflecting performance metrics such as net economic return. Industry concerns over the representativeness of such data should be addressed in the context of legislative objectives of maximising benefit to the South Australian community.

Across all monitoring programs, this review acknowledges that commercial logbook data has been consistently collected and, while adequate in the past, monitoring across South Australian fisheries would benefit from a more modern, efficient and risk-based design. The immediate priority is to extend electronic logbooks to every fishery. Full e-log coverage provides the platform for improving the spatial and temporal resolution of catch and effort information, including accurate start–finish times and, where feasible, latitude–longitude positions for each operation. These upgrades would markedly strengthen the reliability of the data underpinning assessments, harvest strategies and compliance.

Fishery-independent surveys remain an important strength of the science program but are also one of its most significant costs. A structured review of survey frequency, design and delivery is warranted, noting that any reduction in effort may increase risk and may require complementary adjustments in harvest strategies. Emerging technologies—including ROVs, vessel-mounted sensors and AI-assisted image processing—should be evaluated and costed as potential ways to maintain or enhance data quality while improving efficiency.

Environmental monitoring also needs to be broadened. Fine-scale biophysical data from freshwater and marine systems should be strengthened through greater participation in SOOP and better use of commercial vessels as monitoring platforms. At the same time, a government-funded recreational fishing monitoring program is required to ensure that total fishing pressure on key species is consistently measured at the appropriate spatial scale.

The socio-economic data already collected each year provide valuable information on the performance and resilience of each fishery. These indicators should be explicitly incorporated into annual status reporting so that management decisions are informed by a more complete picture of biological condition, environmental drivers and economic outcomes.

Stock Assessment

Surveys of industry stakeholders revealed variable confidence in stock assessments, depending on the fishery. Many respondents questioned whether assessments adequately reflect on-water realities, particularly for short-lived species (e.g. calamari) or where models do not account for environmental changes, fisher behaviour, or market dynamics. Concerns were raised about transparency of stock assessments, both in terms of which data and models are selected and how outputs are communicated to industry. Stakeholders often felt excluded from meaningful input into the process, with priorities and methods seen as determined by SARDI and PIRSA and then presented to industry as non-negotiable. Fishery assessments were also criticised for being overly complex in some cases, yet not timely enough in others, reducing their utility for adaptive management. Suggestions for improvement included clearer explanations of methods and assumptions, greater incorporation of environmental variables in assessments, and exploration of simplified or indicator-based approaches for lower-risk fisheries.

The widespread availability of FIS data across South Australian fisheries allows an analysis of the incidence of hyperstability in CPUE. This review identified hyperstability in CPUE for all stocks and for all fishing methods where sufficient fishery data were available to make a comparison: i.e. Abalone (all zones), Blue Crab, Prawns (all zones), Pipi and Rock Lobster (Southern Zone). FIS data are also available for Sardines and Vongole but have not yet been compared to CPUE. For other fisheries, where no FIS data were available, there is no direct evidence of hyperstability in catch rates, but assessments should consider it as a plausible scenario. These fisheries included Marine Scale, Giant Crab, Rock Lobster (Northern Zone) and Lakes and Coorong (finfish). The implications of finding widespread evidence for hyperstability in CPUE for stock assessments, reference point identification, and harvest strategies has yet to be undertaken but should be a high priority.

Quantitative (model-based) stock assessments are not used as frequently in South Australia as they are in other jurisdictions. This reflects in part the widespread application of FIS and incorporation of derived abundance indices (e.g. density estimates for Lakes and Coorong (pipis), Vongole, and Abalone; DEPM estimates of spawning biomass for Sardines; FIS catch rates for Prawns, and Blue Crabs) as performance indicators in harvest strategies. However, for fisheries where FIS are not used (e.g. Rock Lobster Northern Zone), or data are of poor quality (e.g. Marine Scale, Lakes and Coorong (finfish), Giant Crab), model-based assessments are useful. Current "Est" models apply to some South Australian fisheries (e.g. snapper, King George whiting, southern garfish, sardine) but these lack key features of contemporary quantitative models. The planned migration to Stock Synthesis (SS) models (widely used in quantitative fisheries assessment) can address current issues applicable to South Australian fisheries assessment including hyperstability in CPUE, and forward projections of stock status under various assumptions of recruitment and catch levels (including HCRs). Furthermore, SS models can be used to formally test harvest strategies for individual fisheries using management strategy evaluation (MSE), implying that the wider adoption of SS for stock assessments would have additional benefits. MSE has not been widely used for South Australian fisheries and will be important to assess the potential for recovery of currently depleted or depleting stocks (e.g. southern garfish, blacklip abalone, snapper, black bream, giant crab, west coast prawns) together with the ability to more formally evaluate the costs and benefits of alternative options for components of monitoring strategies such as FIS.

Overall, the review finds that strengthening stock assessment is central to improving harvest strategies across South Australian fisheries. Several practical enhancements are recommended. First, assessments should explicitly account for hyperstability in CPUE, particularly in fisheries where technological improvements or fisher behaviour can mask underlying stock declines. Environmental information also needs to be incorporated more effectively so assessments reflect changes in marine conditions that influence productivity and stock dynamics.

Assessment methods should be modernised. The planned transition toward integrated modelling frameworks such as Stock Synthesis is strongly supported, but there is also value in expanding the use of simpler surplus-production models to provide quantitative assessments for a greater number of fisheries. In parallel, South Australia should consider adopting emerging techniques such as close-kin mark–recapture (CKMR), which offer new opportunities for estimating abundance and mortality in data-poor or high-value fisheries.

To deliver these improvements, local quantitative capacity needs to be strengthened. Building skills in advanced modelling, simulation, and diagnostics would reduce reliance on external providers and support more timely, transparent assessments. Finally, routine external scrutiny—through peer review, independent panels or periodic audit—would help ensure that assessment methods remain contemporary, robust and aligned with best practice.

Harvest Strategies

Harvest strategies are recognised as an important advance in formalising decision-making, but stakeholders expressed concerns about their clarity, responsiveness and balance. In several fisheries, decision rules were seen as complex or poorly explained, with limited understanding among licence holders of the specific triggers that would result in changes to effort, quotas or closures. Some questioned whether rules were sufficiently responsive to stock status, while others felt they were too rigid and failed to account for social and economic factors. A recurring theme was that trade-offs among sustainability, economic viability and social outcomes were not always transparent, with industry perceiving that, under ESD objectives, biological sustainability was prioritised above economic or community viability. Industry input into the development and review of harvest strategies was also seen as limited, reducing confidence in their legitimacy. This is somewhat surprising given that most harvest strategies are developed by working groups with active industry participation. Overall, although harvest strategies are valued as a framework, stakeholders called for clearer rules, greater responsiveness to multiple objectives, and more genuine co-management in their design and application.

Although harvest strategies are fundamental to risk-based fisheries management and have been adopted for all commercial fisheries in South Australia, our review found there are clear areas for improvement:

- Review indicators and reference points including implications of hyperstability in CPUE.
- Evaluate harvest control rules where harvest strategies for individual fisheries (e.g. Blue Crab, Lakes and Coorong (pipis)) involve increasing exploitation rates as stock levels decline. In these examples, while catch declines as stock levels decline, the decline is not sufficient to prevent catch as a proportion of biomass (i.e. exploitation rate) increasing.
- Consideration of exceptional circumstances including responses to environmental events and shifting baselines (e.g. productivity).
- Potential for incorporation of environmental data.
- Clear processes for fishery monitoring during closures and associated reopening rules.
- Increased use of MSE to evaluate trade-offs in risk cost catch (RCC) analyses.

Improving the quantitative modelling capacity in SARDI will help improve the basis for MSE and RCC evaluation. This will allow formal consideration of the costs and benefits of various forms of fishery monitoring, including FIS, and the frequency and form of quantitative stock assessment for individual fisheries. This, combined with improved integration of BDO economic data (available for most fisheries), will allow a more formal and quantitative approach to evaluating and justifying the key monitoring, assessment and general research costs recovered from fishery licence holders.

Relationships

Industry widely acknowledged that South Australia benefits from the availability of experienced local scientists and long datasets. In most fisheries, stakeholders acknowledged a good working relationship with SARDI scientists. However, several consistent concerns were raised:

- Transparency of costs: Licence holders and industry associations often reported difficulty in understanding how SARDI's costs were derived, how overheads and on-costs were allocated, and how efficiencies were tested. This lack of clarity limited confidence that costs were justified.
- Overprovision: Some fisheries are clearly "over-provided" with monitoring and science compared with what may be reasonably needed to meet the requirements of a harvest strategy and compared with services provided to similar fisheries in other jurisdictions.
- Fishery independent surveys: Issues raised by some fishers about the spatial extent, suitability and representativeness of surveys in relation to fisher behaviour where particular areas are targeted to maintain desired catch rates e.g. in Abalone fisheries.
- Value relative to fishery scale. Participants in smaller or lower-value fisheries perceived that costs of research were disproportionately high relative to the value of the fishery, particularly where assessment frequency or survey intensity in the smaller fisheries mirrored those for larger fisheries.
- Monopoly provision: The mandated status of SARDI as the sole provider of stock assessment and monitoring was perceived to limit incentives for efficiency (i.e.

allocation of resources to reflect the true cost of services) or responsiveness to industry priorities. This was described as “anti-competitive” by some stakeholders.

- Dominance of biological research: Stakeholders considered that most of research investment was concentrated on biological monitoring and stock assessment, with insufficient attention given to economic, social, market, or innovation-focused research.
- Opportunities for innovation: There was broad recognition that technologies such as electronic logbooks, electronic monitoring, automated data processing, fisher-led surveys and collaborative data custodianship could reduce costs, improve timeliness and efficiency, and increase shared ownership of science.

The review found that trust in SARDI’s science capability can be improved by:

- More clearly specifying in annual CRIS the cost of the various elements of the monitoring, assessment and research programs including the FTE contributions of individual scientists allocated to those elements.
- Identification and costing of research tasks that directly address industry issues and concerns.
- Developing a structured program for periodic external review of research inputs and costs to the fishery management process.
- Considering the costs and benefits of a MAC process for those fisheries that lack one, in particular the benefits of having an independent Chair and scientist.

Science expenditure

This review confirms that South Australia incurs relatively greater costs for fisheries science services for some fisheries, compared with other jurisdictions with different cost-recovery models (e.g. GVP based). Although this investment has ensured robust biological datasets, it has not always translated into improved fishery profitability, reduced risk to stocks, or increased industry confidence. Comparative analyses highlighted that other jurisdictions e.g. Victoria, Commonwealth, New Zealand, often employ mixed models of research delivery, drawing on private, university and government providers, supported by strong governance to ensure quality and independence. Such models can encourage competition, create incentives for efficiency, and broaden the scope of research beyond biology alone. However, outsourcing models applicable to fisheries research can come at the cost of eroding both local science capability and valuable informal relationships established between local scientists and industry. Those jurisdictions that employ competitive tendering or outsourcing of fisheries research services often encounter considerable additional costs associated with the administration of the process. Furthermore, the pool of capable alternative research providers is relatively small and, in some cases, such providers may present programs more expensive than government-provided research. However, outsourcing of science services has resulted in reduced costs for assessment and monitoring of some fisheries e.g. Rock Lobster in Victoria and New Zealand and, notwithstanding some of the disadvantages above, should be considered for some South Australian fisheries. In particular, this should be considered where capability or capacity in SARDI is limited, or research is outside core monitoring and assessment functions.

Applying the RCC framework revealed in some cases mismatches between the level of science expenditure and the relative risks faced by different fisheries. For some smaller fisheries, the costs of assessments appeared high relative to GVP e.g. Prawns Gulf St. Vincent, Abalone Central Zone. However, the economic performance of these fisheries is largely related to external market conditions. For Gulf St Vincent prawns, reducing science services (particularly FIS) risks stock sustainability. For Abalone Central Zone, stocks of blacklip abalone are already depleted and the effectiveness of both FIS and the harvest strategy is of concern. Application of RCC for fisheries where current economic performance is poor (e.g. Rock Lobster Northern Zone and Prawns Spencer Gulf, in addition to those above), in concert with MSE, could assist in targeting cost effective assessment and management strategies.

Benchmarking of those South Australian fisheries, for which similar research programs exist elsewhere, revealed the cost of research and assessment of Rock Lobster and Sardines to be high, of Abalone to be broadly comparable and lower for Prawns. Collectively, there is evidence presented in this review which shows that some South Australian fisheries have recovered costs that are excessively high whereas others are within reasonable bounds. Given this, and consistent with policies of cost efficiency and effectiveness, consideration should be given to:

- Enhancing transparency in cost-recovery by providing clearer breakdowns of cost categories, overheads and staff time within CRIS documentation.
- Exploring competitive tendering or partial outsourcing of services to alternative providers, including private consultancies and universities, where appropriate.
- Embedding innovation and technology integration, including electronic monitoring/reporting, fisher-led surveys, and automated analysis.
- Reviewing the frequency and design of monitoring and stock assessments to ensure proportionality to risk and value.
- Consistent with Australian cost-recovery guidelines, strengthening co-management processes to give industry a stronger role in setting research priorities and evaluating performance.

This review confirms that while South Australia benefits from highly capable scientists and long-term datasets, there are material concerns about the transparency, cost-effectiveness, efficiencies, and competitiveness of the current cost-recovery model. Industry's confidence has been eroded by rising licence fees, limited visibility of cost drivers, and the absence of alternative providers. At the same time, there are strong opportunities to modernise science delivery, improve efficiency, and strengthen alignment with both industry needs and legislative obligations.

Implementing these findings and recommendations will be critical. Greater transparency, risk-based investment, and openness to innovation and competition will ensure that South

Australian fisheries science continues to underpin sustainability, while being delivered in a manner that is efficient, accountable, and provides demonstrable value for money.

Recommendations

Fishery-specific suggestions

Acronyms

AFMA	Australian Fisheries Management Authority
AI	Artificial intelligence
CDR	Catch disposal record
CPUE	Catch per unit effort
CRIC	Cost-recovery Implementation Committee
CRIS	Cost-recovery implementation statement
CSIRO	Commonwealth scientific and industrial research organisation
DEPM	Daily egg production method
ERA	Ecological risk assessment
ERM	Ecological risk management
ETP	Endangered, threatened and protected species
FIMS	Fishery-independent monitoring surveys
FIS	Fishery-independent survey
FMA	Fishery management area
FRDC	Fisheries research and development corporation
FTE	Full time equivalent (employee)
GVP	Gross value of production
HAB	Harmful algal bloom
HCR	Harvest control rule
IMOS	Integrated marine observing system
ITQ	Individual transferrable quota
KGW	King George whiting
LRP	Limit reference point
MAC	Management advisory committee
MEY	Maximum economic yield
MFA	Marine fishing area
MLS	Minimum legal size
MSC	Marine Stewardship Council
MSE	Management strategy evaluation
MSF	Marine scalefish fishery
MSS	Mean size sampling
MSY	Maximum sustainable yield
NIWA	National Institute of Water and Atmospheric Research (NZ)
OCS	Offshore constitutional settlement
PI	Performance indicator
PIRSA	Department of Primary Industries and Regions, South Australia
PRI	Pre-recruit index

PSI	Puerulus settlement index
RBC	Recommended biological catch
RCC	Risk Cost Catch (analysis)
RLIC	Rock Lobster Industry Council (New Zealand)
RP	Reference point
SAFS	Status of Australian Fish Stocks
SARDI	South Australian Research and Development Institute
SAU	Spatial assessment unit
SLA	Service level agreement
SOOP	Ships of Opportunity Program
SpB	Spawning biomass
SS	Stock synthesis (model)
TACC	Total allowable commercial catch
TACE	Total allowable commercial effort
TRP	Target reference point
VCL	Voluntary catch limit
VFA	Victorian Fisheries Authority

Introduction

Commercial fisheries in South Australia are subject to the state government's cost-recovery policy which requires that annual licence fees be set based on activities required to manage individual fisheries. This process is managed by the Department of Primary Industries and Regions (PIRSA) through its Division of Fisheries and Aquaculture. The underlying principle of the Government's policy is that costs recovered by licenced fishers are those that could be avoided if that fishery was not in place. Particular avoidable costs considered here are the science services necessary to support the application of management plans for individual fisheries. These costs are established each year and follow a consultative process with Industry associations (representing individual fisheries) to finalise work programs needed to assess the status of individual fisheries.

PIRSA's policy requires a review of cost-recovery arrangements every five years (or as directed by the Minister). Under the current policy, PIRSA Fisheries and Aquaculture contracts out research and assessment services. SARDI Aquatic Sciences is currently the only provider of research and assessment services applicable to South Australian commercial fisheries. Annual evaluation of the economic performance of individual fisheries in South Australia has been undertaken over many years by BDO Econsearch.

Monopoly service provision has been highlighted as potentially detrimental to service delivery (Deloitte 2009). Previous reviews of cost-recovery noted a lack of transparency in attributable costs thereby making it difficult to compare costs with other providers (Deloitte 2009, Deloitte Access Economics 2015, Productivity Commission 2016). The cost of research services attributable to fisheries also has a public good component e.g. for recreational fisheries (Deloitte 2009) or ecological assessment (Productivity Commission 2016) similar to public benefit derived from other scientific endeavours (Productivity Commission 2007). A report on Australian marine fisheries by the Productivity Commission noted that cost-recovery should cover only efficient costs (Productivity Commission 2016). In the present context, efficient costs are those that reflect science services and resources necessary to deliver desired monitoring or assessment outcomes (e.g. as required under harvest strategies applied to individual fisheries). The same report found that South Australia had efficient and cost-effective fisheries management. However, in response to a general review of cost-recovery of fisheries management across Australia (Productivity Commission 2016) and recommendations arising from a review of PIRSA cost-recovery processes (Deloitte Access Economics 2015), a further review was commissioned by PIRSA in 2018 (KPMG 2018). The KPMG review recommended expanding longer term cost-recovery arrangements with individual fisheries (four years) to reduce administrative burdens (and associated costs). Industry consultation informing the review noted that annual negotiations over cost of research services are highly prescribed with minimal opportunities to reduce costs.

Despite the reviews of the cost-recovery process summarised above it was noted "Irrespective of the findings of independent reviews and recent improvements in the cost-recovery process, there remains significant and increasing challenges with the current process" (McCallum *et al.* 2023). This finding prompted the establishment of an independent review panel in 2022. The findings of this panel (McCallum *et al.* 2023) found strong support from PIRSA and from the commercial fishing sector for the concept of the current South Australian cost-recovery policy. However, in relation to research and assessment costs, there were several concerns expressed by the fishing industry. These concerns included a lack of contestability perceived to maintain relatively high costs (including overheads) for relatively unsophisticated annual assessments of South Australian fisheries. A frequently expressed view on costs attributable to SARDI's research and assessment services is "there is poor value for money" (McCallum *et al.* 2023).

Heilbron (2023) noted that several previous reviews of cost-recovery for South Australian fisheries had focussed mainly on incremental changes to the status quo rather than concentrating on the underlying economic rationale and practical implications of the current system. Heilbron (2023) echoed disaffection from industry in relation to a lack of cost transparency noting that the current cost-recovery process followed by PIRSA/SARDI is expensive and requires considerable resources to administer. Heilbron (2023) recommended a simple GVP process whereby costs of research and assessment are extracted (together with other avoidable costs) through a percentage of GVP. This is the model applicable to fisheries research and assessment in Western Australia and is designed to provide greater certainty and stability of funds for the government and for the industry association (WAFIC) (Neville 2015). However, the independent cost-recovery review panel found no support for a GVP-based cost-recovery model for South Australia (McCallum *et al.* 2023). The panel were concerned that such a model could introduce potential inequities (e.g. some fisheries subsidising services in others) and lacked the transparency of an activity-based cost-recovery model such as presently applies in South Australia. Instead, McCallum *et al.* (2023) recommended a revise and reset process given general support for the current cost-recovery framework but continued concerns over transparency and efficiency.

In response to this latest review, a Cost-recovery Implementation Committee (CRIC) was formed to implement the recommendations of the independent cost-recovery review panel. One such recommendation was science benchmarking to ensure that research/assessment and associated costs are transparent, risk-based and aligned with best practice. This follows concerns noted above including: a lack of transparency; value for money; and cost effectiveness.

Thus, this current review seeks to evaluate the appropriateness and cost-effectiveness of science services across commercial fisheries as a whole and at the individual fishery level. The objectives of this review are to:

1. Evaluate the current science frameworks and cost structures within the fisheries sectors to determine if these are appropriate, risk-based and effective.
2. Ensure science costs are transparent and aligned with best practice.
3. Identify further efficiencies in current activities and future opportunities for modernisation, particularly through innovation and new approaches to stock assessment and monitoring.

4. Ensure compliance with legislation including that SARDI service provision aligns with the requirements of the *Fisheries Management* Act 2007 where the aquatic resources of the State are to be managed in an efficient and cost-effective manner.

Here we evaluate and compare resources and recovered costs currently dedicated to research and assessment of individual fisheries in South Australia.

Methods

Literature review

Key literature including management plans/harvest strategies, ecological risk assessments, fishery status reports/stock assessments, and economic reports for individual South Australian fisheries were reviewed in the context of extant monitoring/assessment and research programs. Where available, strategic assessments of South Australian fisheries, as required under Part 13 A of the *Environment Protection and Biodiversity Conservation* Act (EPBC Act) were reviewed to identify ongoing research needs. Similarly, equivalent programs in other Australian jurisdictions and in other countries were evaluated to benchmark current science frameworks and cost structures for South Australian fisheries.

In particular, the annual cost recovery implementation statements (CRIS) for each fishery provide details of costs recovered from licence holders including costs of monitoring, research and assessment.

Stakeholder surveys

An online survey was sent to individual fishery stakeholders to gauge responses to a number of issues (Appendix 2).

Stakeholder interviews

In addition to online surveys, interviews were held with stakeholders including executive officers of fishery associations, licence holders, fishers, and fishery managers. Results from the survey and key findings of interviews were consolidated as stakeholder feedback for individual fisheries. Overarching themes identified from stakeholder consultation were also recorded in the context of the objectives of this review.

Stock Risk

Each fishery was scored against four components contributing to stock risk:

- Monitoring;
- Stock Assessment;
- Harvest Strategy;
- Stock Status.

Each component is scored on a range of 1 to 5, where 1 is low risk and 5 is high risk. Consistent criteria are used to score these components for each fishery. The four component risk scores are then averaged to obtain a composite Stock Risk Score. Individual component scores of 1 or 2 (low or low-medium risk) are considered "good".

Elements considered in scoring Monitoring Risk include:

- Uncertainties about catch (e.g. recreational catch);
- Catch sampling (size, age, sex);
- Fishery-independent surveys (FIS) (frequency, spatial coverage, length of time series)

Elements considered in scoring Stock Assessment Risk include:

- Methods of assessment;
- Frequency of assessment;
- Key uncertainties in the assessment.

Elements considered in scoring Harvest Strategy Risk include:

- Robustness of primary indicators and reference points;
- Form of the harvest control rule (HCR);
- Harvest strategy performance (is it working well?)

Elements considered in scoring Stock Status Risk include:

- Stock status relative to the target reference point (TRP) and limit reference point (LRP).
- Trends in stock status.

For fisheries with multiple stocks or target species, risk scores were averaged across principal stocks or species.

Individual scoring reports for each fishery provided in Appendix 1 outline the elements considered and the justification for the scores. The fishery risk scores have not taken into account any recent impacts or longer-term consequences of the ongoing harmful algal bloom impacting South Australian coastal waters.

ERA Risk

Ecological risk assessments (ERA) for individual fisheries were based on published reports including regular assessments conducted by PIRSA/SARDI and strategic assessments as required under conditions applicable to Part 13A of the *Environment Protection and Biodiversity Conservation* Act 1999. These assessments evaluate the ecological impact of commercial fisheries on bycatch/byproduct species, ETPs, and the ecosystem more generally (Fletcher *et al.* 2002). Risk is assessed based on consequence to the above components and likelihood of impact (Fletcher 2005). Based on this, a five-point scoring system was applied (Table 1). The scoring system derives from published ecological risk and Part 13 A (EPBC Act) assessments for individual fisheries. Thus, ERA risks presented in Table 1 reflect those identified in these assessments. Where no data exist (e.g. for Prawns West Coast), a moderate risk is assumed. Note that risks to target species are not included in this ERA as they are covered under stock risks.

As noted, the Stock Risk Score is the average of the four elements listed above. The Fishery Risk Score is the average of these four elements plus the ERA risk score.

Table 1. ERA Scoring system applied to South Australian fisheries for the purpose of this report. Risk assessment and justification are taken from published ERAs and from Part 13 A assessments under EPBC Act provisions.

Score	Risk	Justification
1	Negligible	No likely or consequential effects of fishing on bycatch/byproduct species, ETPs, trophic structure or habitat.
2	Low	Minor disturbance or unlikely impact given current management measures. No additional management measures required.
3	Moderate	No ERA undertaken for the fishery. Moderate risk assessed for bycatch/byproduct species, ETPs, habitat structure, or ecosystem function in published ERAs or Part 13 A assessments under the EPBC Act.
4	High	Unacceptable likely and consequential impact on bycatch/byproduct species, mortality of ETPs, alteration of trophic structure, loss or damage to habitat. Immediate mitigation measures required.
5	Major	Catastrophic impact on bycatch/byproduct, ETPs, trophic structure or habitat causing long term impact including potential extinction of species, permanent loss of habitat, major disruption to food chain. Cessation of fishing required.

Fishery summaries

Fifteen fisheries comprising 29 stocks (or sub-stocks) were considered in the review. Details of the information gleaned for each fishery from the literature review, online surveys and face-to-face meetings are provided in Appendix 1 but a brief summary of each fishery is provided below. In addition to these fishery-specific data and information, Table 2 presents information for individual fisheries and component stocks taken from South Australian statistics and the status of Australian fish stocks (SAFS) report (Roelofs *et al*. 2024).

Risk scores include stock risk (monitoring, stock assessment, harvest strategy, stock status), ecological risk (Table 1) and overall fishery risk (i.e. stock risk and ecological risk). These risks are detailed in Appendix 1 for each fishery and further summarised below.

*Table 2. Summary information for South Australian fisheries. Data are 2023/24 for Abalone WZ, Prawns GSV and 2022/23 for all others. *meat weight. Status is from SAFS report (Roelofs et al. 2024)*

Fishery	Licences	TACC (t) or TACE	Catch (t)	Status
Abalone Central Zone	6	36* (greenlip)	67.8	Sustainable
		0 (blacklip)	0	Depleted
Abalone Southern Zone	6	132 (blacklip)	140.2	Sustainable
Abalone Western Zone	22	50.9* (blacklip) 55.6* (greenlip)	47.0* 43.4*	Sustainable
Rock Lobster Northern Zone	62	306	253	Sustainable
Rock Lobster Southern Zone	180	1,330	1,327	Sustainable
Prawns Spencer Gulf	39		1,578	Sustainable
Prawns Gulf St Vincent	10	390 nights	112	Sustainable
Prawns West Coast	3		43	Depleting
Marine Scalefish	211			
King George whiting		353	192	Sustainable
Southern garfish (WC, GSV and SE stocks)		188	64	Sustainable
Southern garfish (SG stock)		107	74	Recovering
Southern calamari		380	295	Sustainable
Snapper (WC, SG, and GSV stocks)		0	0	Depleted
Snapper SE		36	29	Sustainable
Yellowfin whiting		n/a	97	Sustainable
Blue Crab		n/a	29	Sustainable
WA Salmon		n/a	362	Sustainable
Australian herring		n/a	93	Sustainable
Snook		n/a	37	Sustainable
Sand crab		n/a	51	Sustainable
Yelloweye mullet		n/a	7	Sustainable
Ocean jacket		n/a	522	Sustainable
Blue crab	10	703	597	Sustainable
Giant crab	2	22	14	Depleting
Lakes and Coorong (finfish)	30	n/a	1,404	Sustainable
Black bream	As above	n/a		Depleted
Lakes and Coorong (pipi)	19	450	442	Sustainable
Sardine	14	50,000	47,000	Sustainable
Vongole		56.8		Sustainable

Abalone - Western Zone

The Western Zone Abalone Fishery targets blacklip (*Haliotis rubra*) and greenlip (*H. laevigata*) abalone through dive and hand collection methods. It is commercially dominated, with 22 licences holding 99.7% of allocations and only small recreational and Aboriginal shares. Stocks are assessed at the scale of spatial assessment units (SAUs) to account for the patchy distribution of abalone, though finer-scale dynamics remain important. In 2023–24, catches were 50.8 t of blacklip and 55.6 t of greenlip, with both species classified as Sustainable under SAFS (2024).

The fishery generates around $10 million gross value of production (GVP) and contributes to a state-wide net economic return of $5 million, although declining stock trends and export competition have reduced profitability. Licence fees equate to 11.9% of GVP, with $573,000 annually directed to science and monitoring, including $174,000 for FIS diver surveys.

Monitoring programs include logbook data, biennial fishery independent surveys (FIS), and some industry-led diver assessments. The fishery is data-rich by abalone standards, though FIS spatial coverage is limited and some FIS sites have been discontinued. Catch per unit effort (CPUE) is known to be hyper-stable, raising risks in interpretation. Assessments, undertaken annually, integrate FIS and CPUE trends at the SAU level and are relatively robust, but uncertainties remain due to scale mismatches, changes in fishing behaviour, and lack of recruitment forecasting. Industry-collected diver data are not yet fully incorporated into the assessment process.

The harvest strategy translates zonal scores into total allowable commercial catches (TACCs) using detailed decision rules, supplemented by secondary indicators. Although greenlip stocks have improved to within target ranges, blacklip remains well below target. A key concern is that harvest strategy target catch levels appear to be set too high in the harvest control rules (HCRs), with industry frequently recommending lower TACCs than those generated by the HCR. Despite this, voluntary stewardship by licence holders, including quota undercuts and closures, has helped stabilise stocks.

Overall, it is data rich and has a long history of structured assessments, but challenges persist around the limited utility of CPUE, high costs of FIS, discontinuity of survey sites, and a harvest strategy that sets unsustainably high target reference point (TRP) catch levels. Blacklip abalone remains below target, underscoring the need for more precautionary reference points. Ecological risks are negligible given the hand collection method, but efficiency and cost-effectiveness of research and monitoring remain pressing concerns. The project determined a fishery Stock Risk score of 2.25, an ecological risk assessment (ERA) Risk score of 1, and a total Fishery Risk score of 2.0.

Fishery Suggestion 1 – Abalone WZ.
Review FIS including spatial coverage and frequency. Make better use of dive logger technology to evaluate fine scale catch and effort trends in all zones.

Fishery Suggestion 2 – Abalone WZ.
Develop recruit forecasting for both Abalone species in all zones through targeted surveys of juvenile habitat to assess the relative proportion of post-settlement abalone.

Fishery Suggestion 3 – Abalone WZ.
Revise the harvest strategy applied to the Western zone following MSE to provide more realistic and precautionary reference points.

Abalone – Central Zone

The Central Zone targets greenlip and blacklip abalone via dive/hand collection, managed at SAU scale to reflect fine, patchy reef dynamics. Six commercial licences operate alongside very small recreational and Aboriginal shares. Recent catch was ~68 t greenlip and 0 t blacklip (effectively closed since 2018). Status of Australian Fish Stocks (SAFS) show greenlip: Sustainable; blacklip: Depleted. Economically, the zone produces about $4 million GVP (with export competition pushing prices down), against a state-wide net economic return (NER) around $5 million (~28% of GVP). Cost-recovery allocates ~$146k to science/monitoring in the central zone, with licence fees ~11.9% of GVP; Cost recovery implementation statement (CRIS) notes that harvest strategy development, environmental studies and biosecurity are outside cost-recovery.

Monitoring is mixed: greenlip is data-rich by abalone standards (long FIS time series: timed swims, leadline transects; CPUE; and GPS/depth logger datasets since 2013, though logger coverage has declined since 2020). Blacklip is data-poor (no FIS; only limited permit-based information), constraining recovery assessment. CPUE for both species is strongly hyperstable, emphasising the value of independent FIS and fine-scale effort indicators. Annual assessments (latest Burnell 2023) aggregate SAU-level CPUE/FIS to zone scores and incorporate logger indicators for greenlip; uncertainties remain around hyperstability, mixed-species effort units, and the absence of contemporary blacklip data.

The harvest strategy converts zone scores to target catches (e.g., Zone Score 5 implies ~78 t greenlip, ~9 t blacklip), with ±10% adjustments from secondary indicators. In practice, industry has repeatedly recommended total allowable catches (TACs) well below HCR outputs, and MSE testing for Central Zone greenlip indicates the strategy may be insufficiently precautionary. greenlip sits above LRP but below TRP and trending slightly down; blacklip remains depleted. ERA findings remain negligible given hand collection, and export approval extends to 2035.

The fishery has a Stock Risk score of 3.25, an ERA Risk score of 1, and a total Fishery Risk score of 2.8. CZ has strong greenlip datasets but lacks a fit-for-purpose blacklip recovery dataset; CPUE hyperstability and reduced logger coverage undermine trend inference; and the current HCR appears to set TRP-aligned catches too high relative to on-ground signals, driving reliance on voluntary cuts.

Fishery Suggestion 4 – Abalone CZ.
Undertake targeted surveys of blacklip Abalone in the Central Zone to evaluate recovery; revise the harvest strategy to include explicit criteria for reopening after fishery closure.

Abalone - Southern Zone

The Southern Zone Abalone Fishery primarily targets blacklip (*Haliotis rubra*) through dive and hand collection methods, with minor incidental greenlip catches. Six commercial licences operate under statewide allocations, with recreational and Aboriginal shares together accounting for less than 1%. In 2023–24 the catch was 140 t (blacklip only). SAFS status is Sustainable for blacklip, whereas greenlip is currently undefined. The fishery produced $3.5 million GVP, contributing to a statewide NER of around $5 million (28% of GVP). Licence fees equate to 11.9% of GVP, with $183,500 annually directed to science and monitoring.

Monitoring combines commercial shell sampling, length-frequency data from FIS at four blacklip and one greenlip site, and GPS/depth logger data collected since 2010. Blacklip monitoring is comprehensive, with biennial FIS providing consistent information, though coverage for greenlip is sparse. Assessments are annual, with zone scores derived from CPUE and FIS indicators and supplemented with secondary measures. Uncertainties include hyperstability in CPUE, limited FIS site coverage, and no adjustment for changes in effort effectiveness.

The harvest strategy follows the same decision-rule structure as other abalone zones, translating SAU-level indices into zone scores and TACCs, with ±10% adjustments possible. For a Zone Score of 5, the indicative blacklip catch is 132 t. Prior to the abalone viral ganglioneuritis (AVG) outbreak detected in 2024, blacklip stocks were well above the TRP and trending upwards, whereas greenlip remained undefined. Although assessments indicated strong blacklip performance, hyperstability in CPUE remains a concern, and further integration of dive logger data could strengthen robustness.

It is effectively a single-species fishery, with blacklip well above TRP and showing positive trends prior to the AVG closure in March 2025. The FIS program is comprehensive and dive loggers provide additional value, but hyperstability in CPUE remains an unresolved issue. Ecological risks are negligible given the hand collection method. The further sustainability concern is the disease threat rather than fishing pressure, but refinement of the harvest strategy is still needed to properly account for CPUE limitations. The project determined the fishery has a Stock Risk score of 1.5, an ERA Risk score of 1, and a total Fishery Risk score of 1.4.

Fishery Suggestion 5 – Abalone SZ.
Review the harvest strategy applicable to all zones to consider the implications of hyperstability in CPUE. Cross compare data for CPUE, CPUA and FIS for Greenlip in the Central Zone and Blacklip in the Southern Zone to evaluate hyperstability in CPUE and the extent to which it is diminished by calculating CPUA from diver logger data.

Blue Crab

The South Australian Blue Crab Fishery targets *Portunus armatus* and operates through nine pot licences and one marine scale licence, alongside a significant recreational allocation and a nominal Aboriginal allocation. Management recognises two zones—Spencer Gulf and Gulf St Vincent—with evidence of some genetic connectivity. In 2023–24 the total allowable commercial catch was 458 t in Spencer Gulf (with 385 t landed) and 245 t in Gulf St Vincent (212 t landed). The fishery is classified as Sustainable under SAFS (2024).

Economically, the fishery generates around $10 million GVP and $3 million NER. Cost-recovery arrangements allocate $184,000 annually to science and monitoring (around 3.2% of GVP), with expenditure focused on fishery-independent surveys and stock assessments, but excluding harvest strategy development and environmental studies.

Monitoring is anchored by annual fishery-independent surveys for legal-sized and pre-recruit crabs, complemented by logbooks. Industry regards the surveys as central, repeatable, and reliable, though uncertainty remains around recreational harvests due to infrequent and non-spatially resolved surveys. Assessments are empirical and indicator-based, relying primarily on FIS trends rather than CPUE, which is not standardised and shows hyperstability. Industry finds assessments transparent and consistent with observations, though environmental influences are not consistently incorporated.

The harvest strategy is based on decision tables using FIS indices, with clear rules and effective exceptional-circumstance provisions (e.g., algal bloom responses). Concerns by the reviewers remain that harvest fractions increase as stock declines, potentially creating risk at low abundance. Industry stakeholders highlighted the need for more frequent biological validations and pragmatic approaches to exploratory research, particularly to test southern range expansion.

Monitoring in the Blue Crab Fishery is extensive, with annual FIS and logbook data forming a strong foundation. Weaknesses remain in the uncertain recreational catch and limited validation of biological parameters. Stock assessments are comprehensive and well-structured but could be strengthened by developing simple quantitative models to complement indicator approaches. Although the harvest strategy is performing well, its structure warrants review to ensure that the increasing harvest fraction at lower stock levels does not create management risk. Ecological risks are generally low due to the selective pot fishery, though more detailed assessments of byproduct impacts and discards will be required to meet *Environment Protection and Biodiversity Conservation* Act (EPBC) conditions. Efficiency challenges stem from the high cost and inflexibility of exploratory research, which has slowed responses to range shifts and boundary questions.

Fishery Suggestion 6 – Blue Crab.
Obtain spatially-resolved estimates of recreational catches of Blue Crabs to aid assessment.

Fishery Suggestion 7 – Blue Crab.
Evaluate the effectiveness of the HCR applied in the Blue Crab harvest strategy particularly in relation to the harvest fraction.

Giant Crab

The South Australian Giant Crab Fishery targets *Pseudocarcinus gigas* with baited pots. Recreational and Aboriginal catch is negligible, and the fishery is managed under offshore constitutional settlement (OCS) arrangements with two zones aligned with the Northern and Southern Rock Lobster zones. Giant crabs are thought to form a single biological stock across southern Australia. Management includes limited entry, pot restrictions, closed seasons, size limits (150 mm carapace length), and a prohibition on taking berried females. Two dedicated licences operate alongside rock lobster licence holders who may retain up to five crabs per trip. In 2023–24, total catch was ~14 t against a TACC of 22 t, which has since been reduced to 9.3 t. The fishery is classified as Depleting under SAFS (2024).

Economic information is limited, with GVP and NER not reported but known to be low. Cost-recovery allocates around $16,900 annually to science and monitoring, though no fishery-independent surveys are undertaken.

Monitoring is based on commercial sampling of size, sex, pre-recruits, and spawning females, with no FIS to corroborate CPUE trends. Assessments rely on standardised CPUE (adjusted for month, licence, marine fishing area (MFA), depth), but hyperstability is likely and not explicitly accounted for. Annual assessments highlight sharp CPUE declines in the Northern Zone and more stable but still below-trigger trends in the Southern Zone. The harvest strategy links TACCs to CPUE bands, with harvest rates only marginally reduced near the LRP. TACCs have been consistently under-caught, and recent steep declines have prompted TACC reductions greater than those suggested by the harvest control rules.

The fishery has relatively few ecological concerns, with low bycatch and minor interactions with endangered, threatened and protected species (ETPs), although better bycatch recording is required under EPBC export conditions. Overall, there is limited information on economic performance, monitoring is sparse, and reliance on CPUE introduces significant risk given the likelihood of hyperstability. The project determined the fishery has a Stock Risk score of 3.5, an ERA Risk score of 2, and a total Fishery Risk score of 2.8.

Fishery Suggestion 8 – Giant Crab.
Address issue of hyperstability in CPUE potentially with FIS of Giant Crabs in both zones. Develop informative quantitative models to improve assessment and provide a more precautionary and functional harvest strategy.

Lakes and Coorong (finfish)

The Lakes and Coorong Fishery targets multiple estuarine and nearshore species—primarily golden perch (*Macquaria ambigua*), mulloway (*Argyrosomus japonicus*), and yelloweye mullet (*Aldrichetta forsteri*)—using gillnets. The fishery operates across freshwater, estuarine, and coastal habitats, encompassing Lake Alexandrina, Lake Albert, the Coorong lagoons, and adjacent coastal waters. It is a multi-species, multi-gear, multi-zone system that also supports small recreational and Aboriginal components. In 2023–24, catches were approximately 52 t of golden perch, 29 t of mulloway, and 236 t of yelloweye mullet, within a total fishery catch of 1,404 t (including pipis). The fishery's primary species are classified as Sustainable, while black bream remains Depleted under a recovery plan.

The fishery generates around $13.3 million GVP (including $8 million from pipis) and $6.4 million NER. Cost recovery allocates about $234,800 annually to science and monitoring (5.5% of GVP), including $13,500 in industry payments for sampling. Economic returns are strongly influenced by pipi prices, while finfish margins have declined in recent years.

Monitoring includes market and onboard sampling for length and age structure of key species, with a small fishery-independent survey (FIS) program focused on black bream. Recreational catch data remain infrequent and uncertain. Assessments rely on long CPUE time series (since 1984) and some age data, but targeting complexity, mixed effort units, and unstandardised CPUE limit interpretability. Weight-of-evidence assessments are undertaken annually, and recent CPUE increases have coincided with strong freshwater inflows from the 2022–23 flood.

The harvest strategy is unusual, combining environmental and biological indicators. Primary indicators are environmental variables defining habitat availability for each net sector, while secondary indicators are unstandardised CPUE for target species. This structure improves ecological integration but weakens responsiveness to biological signals. Input controls through Total Annual Commercial Effort (TACE) govern the number of nets but not deployment frequency, reducing management precision. Environmental variability, seal interactions, and uncertain recreational catch data add complexity and risk. The project determined the fishery has a Stock Risk score of 2.75, an ERA Risk score of 3, and a total Fishery Risk score of 2.9.

> *Fishery Suggestion 9 – Lakes and Coorong.*
> *Improve quantification of bycatch, discarding, and recreational harvest. strengthen the responsiveness of the harvest strategy. Ensure effort controls are effective in addressing species-specific sustainability risks.*

> *Fishery Suggestion 10 – Lakes and Coorong.*
> *Standardise CPUE to take into account differences in targeting, gear, and fishing power to improve monitoring and assessment of target species in the Lakes and Coorong (finfish) fishery.*

Fishery Suggestion 11 – Lakes and Coorong.
Revise the harvest strategy for the Lakes and Coorong (finfish) fishery to include more precautionary and representative HCRs for target species, including the amount and frequency of deployment of particular gear equivalent to TACE controls.

Lakes and Coorong (pipi)

The South Australian Pipi (*Latona deltoides*) fishery operates predominantly along a 20–40 km section of the Younghusband Peninsula and contributes roughly 60% of the total GVP of the broader Lakes and Coorong Fishery. Commercial fishers hold 73% of the allocation, recreational 26%, and Aboriginal fishers 1%, with limited bait access provided to Rock Lobster licence holders. Nineteen Lakes and Coorong licences and two Marine Scalefish licences are endorsed to harvest pipis. The 2023–24 landed catch was 442 t against a TACC of 450 t. The fishery is classified as Sustainable under SAFS (2024).

The fishery generates around $8 million GVP (out of $13.3 million total for the Lakes and Coorong Fishery) and contributes to a combined NER of $6.4 million. Licence fees equate to 5.5% of GVP, with $239,200 allocated annually to science and monitoring, including $29,250 in industry payments for surveys. No CRIS funding is directed toward harmful algal bloom response or biosecurity work.

Monitoring is extensive and includes three annual fishery-independent surveys that cover the entire commercial range. Data collection focuses on size frequency, relative biomass, and pre-recruit indices. Stock assessment is based solely on the long FIS time series (since 2007) and is regarded as robust, with pre-recruit indicators used to adjust TACs within the harvest strategy. Industry supports the framework, citing its responsiveness during the Coorong die-off event, although debates around TAC levels persist due to differing commercial models. The harvest strategy uses FIS-derived biomass bands to set TACCs and incorporates an economic safeguard that reduces TACs if forecast margins fall below 2.5%. The only concern identified is that harvest fractions increase slightly as biomass declines—a trade-off designed to maintain catch stability.

This is a well-managed and data-rich fishery, with robust stock monitoring, clear harvest rules, and minimal ecological impact. It remains MSC certified and has a strong record of compliance and inter-sectoral cooperation. The main challenges relate to managing harmful algal bloom events and improving knowledge of recreational harvest on northern beaches. The project determined the fishery has a Stock Risk score of 1.25, an ERA Risk score of 1, and a total Fishery Risk score of 1.2.

Fishery Suggestion 12 – Lakes and Coorong.
Maintain the current harvest strategy (pipi) and FIS framework but improve monitoring of recreational harvest and harmful algal bloom risks, ensuring contingency responses remain proportionate and cost-effective.

Marine Scalefish

South Australia's Marine Scalefish Fishery (MSF) is the state's most complex commercial fishery: multi-species, multi-gear and multi-zone (West Coast; Spencer Gulf; Gulf St Vincent & Kangaroo Island; South East), with catches shared with recreational and Aboriginal sectors (nominal 1% Aboriginal allocation and species-specific commercial/recreational shares). More than 30 gear types are used (≈60% line, ≈30% nets). There are 211 licences (100 were surrendered in 2021). Total catch is ≈2,142 t; the four Tier-1 species provide ~60% of weight and ~70% of value (King George whiting 192 t, southern calamari 295 t, southern garfish 138 t, snapper 29 t). SAFS status varies by stock: snapper is Depleted (except South East = Sustainable); southern garfish is Sustainable overall but Spencer Gulf is Recovering; southern calamari is Sustainable; most Tier-2/3 species are Sustainable/Undefined.

GVP is ≈$22.4 m and NER ≈$2.0 m (NER/GVP ≈9%). Licence fees equate to ≈11.5% of GVP. Science and monitoring under CRIS totals ≈$810,699 (harvest strategy development, environmental studies and biosecurity sit outside cost-recovery). Benchmarking is difficult given the fishery's breadth.

Monitoring is uneven: limited market-based age/length sampling for a few species; no fishery-wide FIS. DEPM has been used for snapper during closures (historically for King George whiting), but many species rely on fishery-dependent CPUE. Recreational removals are substantial for several stocks yet remain infrequently estimated and not spatially resolved; charter data are better resolved. Overall monitoring risk is elevated because key uncertainties (rec catches, CPUE standardisation, environmental effects) are unresolved.

Assessments are mixed. Most stocks are assessed by weight-of-evidence using trends in CPUE and sparse age structure; "Est" model applications exist for King George whiting, snapper and garfish but don't estimate depletion. The plan is to transition Tier-1 species to Stock Synthesis on ~3-year cycles, and an FRDC project is developing methods for calamari. Core uncertainties include: likely hyperstability in CPUE, highly skewed southern garfish sex structure, limited age/length sampling, no FIS for most species, and very uncertain recreational catches.

The previous harvest strategy was complex and weakly linked to stock status. The new (2025) harvest strategy is a substantial step-up: output controls/ITQs for Tier-1 stocks; clearer assessment categories and buffers; a "hockey-stick" HCR for biomass-assessed stocks; multi-year RBCs; defined rebuilding pathways; and a separate implementation plan (allowing within-plan adjustment). MSE is planned. However, performance will still hinge on CPUE, and full implementation is pending and exceptional-circumstances provisions must better recognise environmental shocks (e.g., algal blooms).

Current classifications are mixed and sometimes counter-signalled by quantitative work. Notably, the latest southern garfish assessment indicates biomass <B20 for decades with truncated age structures, questioning "recovering" designations. More broadly, environmental forcing (rainfall, inflows, temperature/salinity, wind) is widely believed to drive availability for King George whiting, calamari and others, yet is not systematically embedded in assessments

or HCRs. ERA is moderate overall: infrequent ETP interactions, but habitat effects from netting and limited bycatch/discard monitoring keep risk from falling further.

In summary, the Marine Scalefish fishery has undergone major reform and now has a far clearer harvest strategy framework. Nevertheless, assessment credibility and management precision are constrained by reliance on CPUE, uncertain recreational removals, limited fishery-independent indices, and insufficient environmental integration. The project determined the fishery has a Stock Risk score of 3.25, an ERA Risk score of 3, and a total Fishery Risk score of 3.2.

Fishery Suggestion 13 – Marine Scalefish Fishery.
Generally, implement Stock Synthesis for Tier-1 species (King George whiting, snapper, garfish) and retire the legacy "Est" models once SS is stable.

Fishery Suggestion 14 – Marine Scalefish Fishery.
Resolve uncertainties in the assessment of MSF species including: addressing hyperstability in CPUE, improved age and length sampling, and accurate/spatially resolved recreational catch data.

Fishery Suggestion 15 – Marine Scalefish Fishery.
Generally, tighten CPUE standardisation and effort units used in assessments: move to more operational metrics (e.g., km-net-hours/hook-hours), incorporate gear/soak/crew effects, and explicitly test for hyperstability; publish diagnostics with each assessment.

Fishery Suggestion 16 – Marine Scalefish Fishery.
Establish a standing recreational/charter boat data program with mandatory e-reporting (or app-based logbooks) to deliver annual, spatially resolved removals for Tier-1 stocks

Fishery Suggestion 17 – Marine Scalefish Fishery.
Align cost-sharing of monitoring and assessment with recreational harvest shares for all species – not just some key species.

Fishery Suggestion 18 – Marine Scalefish Fishery.
Re-design snapper monitoring and assessment: commission an independent review of DEPM suitability for demersal snapper given its key influence as a performance indicator in the harvest strategy; trial alternative indices (acoustics, structured pre-recruit or fisher-assisted surveys) and adopt regional assessments where warranted.

Fishery Suggestion 19 – Marine Scalefish Fishery.
Review the status of southern garfish given that the Spencer Gulf stock has been below the LRP for at least two decades. Re-specify southern garfish rebuilding using SS outputs and realistic reference points; align survey design and timing with fishery reality; address sex-ratio and age-structure risks explicitly.

Fishery Suggestion 20 – Marine Scalefish Fishery.
Review the approach to the assessment of southern calamari and how annual TACs are determined.

Fishery Suggestion 21 – Marine Scalefish Fishery.
Consider embedding environmental covariates (rainfall/inflows, wind, temperature/salinity, turbidity/moon) in assessments/HCR diagnostics for King George whiting, southern calamari, southern garfish and key Tier-2 species where feasible.

Fishery Suggestion 22 – Marine Scalefish Fishery.
Strengthen exceptional-circumstances provisions so environmentally driven CPUE collapses (e.g., algal blooms) trigger tailored responses rather than stock-decline remedies.

Prawns - West Coast

The West Coast Prawn Fishery targets western king prawn (*Penaeus (Melicertus) latisulcatus*) using bottom trawls and allows limited retention of octopus, scallops, and arrow squid. Three licences operate mainly in Venus Bay (≈72% of total catch) with occasional effort in Coffin Bay, Ceduna, and Corvisart Bay. The stock is managed as a separate unit from Spencer Gulf and Gulf St Vincent, though shared biological connections are likely. Management is primarily input-based—limited entry, spatial and temporal closures, and effort limits expressed as fleet nights fished—supplemented by environmental triggers linked to ENSO conditions. The fishery is classified as Depleting under SAFS (2024).

Economic information is sparse, with GVP and NER unreported. Cost recovery allocates approximately $34,000 annually to science and monitoring, covering catch sampling, FIS, and assessments, but excluding harvest strategy development and biosecurity.

Monitoring is long-standing, with annual SARDI observer surveys in March and June since 1990, providing extensive data on catch rates, grade weights, and size distributions. There is no recreational component. Assessments (Heldt 2024) are based on a composite CPUE index combining commercial and FIS data from Venus Bay. Although the time series is robust, CPUE appears hyper-stable and environmentally sensitive, particularly to ENSO variation. Abundance has declined steadily since 2015, with the CPUE index now below the LRP. The harvest strategy, revised in 2022, uses the CPUE index, bucket counts, and ENSO classification to set effort levels and spatial limits. While it maintains some fishing even below the LRP—reasonable in a strongly environmentally driven fishery—further testing and simplification are warranted.

This is a small, environmentally sensitive fishery with limited data and high interannual variability. The stock is currently below its LRP but appears to fluctuate largely with climate cycles. An ecological risk assessment has not been completed, though DCCEEW recommends one if effort increases. The project determined the fishery has a Stock Risk score of 2.5, an ERA Risk score of 3, and a total Fishery Risk score of 2.7.

Fishery Suggestion 23 – Prawns (WC).
Improve understanding of the relationship between ENSO and prawn abundance, and investigate potential hyperstability in CPUE,

Fishery Suggestion 24 – Prawns (WC).
The harvest strategy for west coast prawns requires review and simplification given the uncertainty in the relationship between prawn abundance and environmental fluctuation (ENSO). HCRs which allow fishing when the stock is below the LRP require review given the current status of the fishery as depleting.

Prawns - Gulf St Vincent

The Gulf of St Vincent Prawn Fishery targets western king prawn (*Penaeus (Melicertus) latisulcatus*) using bottom trawl gear. It is a small, commercially exclusive fishery with ten licences operating under limited entry and tight spatial and seasonal controls, including prohibitions on trawling in depths <10 m. The stock is considered biologically connected to the Spencer Gulf and West Coast prawn fisheries but is managed independently under a separate harvest strategy (PIRSA 2022c). The most recent catch was 112 t. The fishery is classified as Sustainable under SAFS (2024).

The fishery generates approximately $3 million GVP but has a negative NER of –$2.5 million, reflecting significant financial stress from low prices and rising costs. Licence fees represent 19% of GVP, with $326,900 allocated annually to science and monitoring, including $130,000 in industry payments for surveys. Benchmarking shows comparable monitoring costs to other prawn fisheries but higher costs relative to its economic scale.

Monitoring is strong, with fishery-independent surveys conducted since 2004 and three surveys currently undertaken annually (November, March, April/May). These provide robust pre-recruit and recruit indices, complemented by commercial catch sampling for size and grade. Assessments (McLeay and Hooper 2024) use standardised CPUE and FIS data as dual indicators. Although the assessment process is thorough, CPUE shows evidence of hyperstability, and there is no established stock–recruitment relationship. Recent declines in both FIS and CPUE indices, particularly since 2016, suggest possible reductions in productivity.

The harvest strategy is decision-table based, setting an annual Total Allowable Commercial Effort (TACE) in nights, weighted equally by FIS and CPUE indices. The strategy has been MSE-tested using a bioeconomic model (Noell et al. 2015), but concerns remain about whether hyperstability was adequately captured and whether the current TACE ceiling is too high. Although the fishery remains above its trigger points, both indices have declined while effort allowances have increased, weakening responsiveness. This trend has only just changed during 2025 with all abundance indices increasing markedly. Stakeholders have called for simplified, better-documented models, improved transparency, and closer integration of fisher knowledge.

The fishery remains sustainable with robust data collection and low ecological impact, though profitability is poor and efficiency concerns persist. There is moderate ecological risk to benthic habitats from trawling, but bycatch and ETP interactions are low. The project determined the fishery has a Stock Risk score of 1.75, an ERA Risk score of 3, and a total Fishery Risk score of 2.4.

Fishery Suggestion 25 – Prawns (GOSV). *Reassess the use/balance of CPUE in the harvest strategy given evidence of hyperstability.*

Fishery Suggestion 26 – Prawns (GOSV). *In the context of Risk, Cost, Catch, examine ways to reduce costs given current licence fees for GSV Prawns at nearly 20% of GVP and with a negative NER. Research costs/GVP are the highest of all South Australian fisheries.*

Fishery Suggestion 27 – Prawns (GOSV). *Transition the bespoke bio-economic model to Stock Synthesis or a more generic modelling framework.*

Fishery Suggestion 28 – Prawns (GOSV). *Improve the assessment and harvest strategy applicable to Gulf St Vincent prawns by incorporating HCRs better aligned to TACE and improved use of FIS data in the assessment.*

Prawns - Spencer Gulf

The Spencer Gulf Prawn Fishery also targets western king prawn by bottom trawl and retains small quantities of southern calamari and Balmain bugs. It is a fully commercial fishery with 39 licences operating under well-established co-management that applies fine-scale spatial rules across 100+ spatial blocks, seasonal/area closures, and a 10 m depth prohibition. Although prawns are part of a broader shared stock complex, Spencer Gulf is managed independently under its own harvest strategy (PIRSA 2020a). In the most recent season the catch was about 1,578 t. SAFS classifies the fishery as Sustainable.

Economically, GVP is about $26.5 million, but NER is negative (−$5.7 million), reflecting low prices and rising costs (estimated catching cost ~$16.4/kg vs price ~$16.8/kg). Cost recovery allocates ~$709,500 to science/monitoring (≈4% of GVP), including ~$211,000 in industry payments for surveys; harvest strategy development and biosecurity are out of scope for CRIS.

Monitoring is exceptionally strong: three fishery-independent surveys (FIS) each year since 2004 provide long time-series indices for adults and pre-recruits, supported by bucket counts/grade data from both FIS and commercial landings. These surveys, complemented by detailed electronic logbooks, produce reliable indices for stock assessment and real-time management. The fishery has negligible recreational catch.

Assessments (Heldt and Hooper 2023) rely primarily on FIS indices averaged across surveys, with within-season real-time reporting to inform adaptive decisions. The approach is statistically simple but robust given the depth of survey data; key assumptions are that FIS CPUE tracks biomass and that hyperstability risks in commercial CPUE are avoided by emphasising FIS.

The harvest strategy is complex but effective, with separate pre- and post-Christmas rules and extensive real-time adjustments based on survey triggers and spatial performance. Long-term indicators fluctuate around or above targets, although a very slight downward trend has been observed and stakeholders seek tighter integration of environmental covariates and faster access to e-logbook data for association use. Ecological risks are generally low to moderate: MSC certification, spatial constraints, bycatch-reduction gear, and a stable benthic footprint mitigate impacts, though improvements are still needed in ETP recording and habitat risk reduction. The project determined the fishery has a Stock Risk score of 1.0, an ERA Risk score of 2, and a total Fishery Risk score of 1.6.

Fishery Suggestion 29 – Prawns (SG).
Given the currently poor economics of the fishery and low (if any) profits of many operators, options to restructure the fishery and/or improve fishing efficiency should be explored.

Fishery Suggestion 30 – Prawns (SG).
Improve timely industry access to e-logbook/fleet data to strengthen real-time co-management.

Fishery Suggestion 31 – Prawns (SG).
The relationship of environmental factors and prawn recruitment and productivity could be better explored using vessel sensors to collect relevant data for potential consideration in annual assessments.

Rock Lobster - Northern Zone

The Northern Zone Rock Lobster Fishery targets southern rock lobster (*Jasus edwardsii*) using baited pots across state and Commonwealth waters extending from the Murray mouth to the Western Australian border. Sixty-two licences operate under ITQ management with size limits, gear restrictions, limited entry, and a prohibition on taking berried females. The fishery is managed separately from the Southern Zone but is part of a broader shared stock across

South Australia, Victoria, and Tasmania. The most recent catch was 253 t against a TACC of 306 t. The fishery is classified as Sustainable under SAFS (2024).

The fishery generates about $14.2 million GVP but currently has a negative NER of –$1.1 million. Licence fees equate to 11.5% of GVP, with $300,900 allocated annually to science and monitoring. Annual research and assessment for both zones are supported by around 4.2 FTEs. Harvest strategy development and biosecurity are not included in cost recovery. Comparable assessments in Victoria and New Zealand are delivered at lower cost.

Monitoring includes commercial and observer pot sampling, voluntary length-frequency data, and annual puerulus settlement monitoring since 1996, which provides a long-term pre-recruit index (PRI) and puerulus settlement index (PSI). There is no dedicated fishery-independent pot survey for the Northern Zone. Recreational catch represents about 3.5% of total removals. Monitoring data are considered comprehensive but lack fine-scale spatial resolution.

Stock assessment (Linnane *et al.* 2024a) uses two quantitative models—LenMod (size-structured) and qR (catch-at-number and weight)—applied to CPUE data and, for LenMod, to PRI and length-frequency data. Both models provide consistent trends showing increasing CPUE and egg production. However, key uncertainties remain, including possible hyperstability in CPUE, unexamined shifts in productivity, and limited data for the Outer Region, where CPUE has not recovered despite recent TACC reductions.

The harvest strategy uses CPUE as the primary indicator within decision tables for both regions, with PRI data applied through meta-rules. It was MSE tested and is achieving expected recovery outcomes in CPUE and egg production, although future reviews should reconsider productivity shifts, the potential for hyperstability, and whether separate harvest rules are still warranted for the Outer Region.

The Northern Zone fishery forms part of a broader southern Australian stock that exhibits regional variation in productivity and biological performance. The fishery remains sustainable, with increasing biomass and egg production. However, efficiency concerns persist due to high research costs, limited access to real-time data, and lack of spatial resolution. Environmental and economic datasets require integration to better understand productivity shifts. The project determined the fishery has a Stock Risk score of 1.5, an ERA Risk score of 1, and a total Fishery Risk score of 1.4.

Fishery Suggestion 32 – Rock Lobster NZ. *Consider if the PRI/PSI could be incorporated more directly into the harvest control rule.*

Fishery Suggestion 33 – Rock Lobster NZ.
Given the importance of CPUE data in influencing harvest strategy outcomes, the need for annual quantitative assessments is considerably reduced. Consideration should be given to less frequent annual assessments consistent with other jurisdictions managing southern rock lobster.

Fishery Suggestion 34 – Rock Lobster NZ.
The harvest strategy applicable to Northern Zone Rock Lobster should be revised to consider changes in productivity, hyperstability of CPUE and regional differences (e.g. the Outer Region).

Rock Lobster - Southern Zone

The Southern Zone Rock Lobster Fishery targets southern rock lobster using baited pots across state and Commonwealth waters extending from the Murray River to the Victorian border. The zone is divided into seven Marine Fishing Areas, with most fishing concentrated in four. The fishery operates under ITQ management with size limits, gear restrictions, seasonal closures, and a prohibition on taking berried females. One hundred and eighty licences are active, landing 1,327 t against a TACC of 1,330 t. The fishery is classified as Sustainable under SAFS (2024).

The fishery generates approximately $70.5 million GVP and a positive NER of $8 million. Licence fees equate to 4.9% of GVP, with $1.05 million allocated to science and monitoring (including a $200,000 FRDC levy). Benchmarking suggests similar assessments in Victoria and New Zealand are delivered at lower cost. Harvest strategy development, environmental studies, and biosecurity remain outside cost recovery.

Monitoring includes commercial and observer pot sampling, voluntary length-frequency data, and annual fishery-independent monitoring surveys (FIMS) conducted each August and January since 2006. These surveys provide long-term independent indices of stock condition, complemented by a puerulus settlement index (PSI) monitored since 1991. Logbook and observer data are comprehensive and reliable, while recreational catch is minor at about 3.5%.

Stock assessment (Linnane *et al.* 2024b) applies two quantitative models—LenMod (size-structured) and qR (catch-at-number and weight)—fitted to CPUE data. LenMod also incorporates pre-recruit indices and length data. CPUE and egg production have increased steadily, consistent with model projections. However, CPUE is known to be hyper-stable and not fully accounted for in the assessment, and a downward productivity shift identified in 2015 has not been revisited.

The harvest strategy uses CPUE as the primary indicator within a decision table linking TACC to CPUE bands, supported by a meta-rule incorporating pre-recruit indices (PRI). The strategy was MSE tested and is achieving expected recovery in CPUE and egg production. Future revisions should account for hyperstability in CPUE and reconsider reference points to ensure precautionary management.

The Southern Zone Rock Lobster Fishery is South Australia's most valuable and among its best managed. Long-term biological datasets and annual FIMS underpin strong confidence in sustainability, supported by the Clean Green industry code that minimises ecological impacts. Similar to the Northern Zone, changes in productivity and hyperstability in CPUE should be reassessed to ensure the models and harvest rules remain contemporary. The project determined the fishery has a Stock Risk score of 1.25, an ERA Risk score of 1, and a total Fishery Risk score of 1.2.

Fishery Suggestion 35 – Rock Lobster SZ. *Review the harvest strategy to address hyperstability in CPUE and consider potential shifts in productivity.*

Fishery Suggestion 36 – Rock Lobster SZ. *There is a need to specify the primary monitoring and assessment tasks as they apply to the CRIS applicable to the Northern Zone and the Southern Zone Rock Lobster fisheries.*

Fishery Suggestion 37 – Rock Lobster SZ . *Staff are currently aggregated at 4.2 FTEs across both northern and southern zones. This level of staffing appears to be high, particularly in the northern zone, when compared with similar monitoring/assessment of Rock Lobster in other jurisdictions.*

Sardine

The South Australian Sardine fishery targets Australian sardine (*Sardinops sagax*) with purse seine (anchovy permitted) and operates across three zones—Spencer Gulf, Gulf St Vincent, and Outside (offshore)—with effort extending into Commonwealth waters under OCS arrangements. Fourteen licences landed ~47,000 t against a 50,000 t TACC. Sardines off SA/western Victoria comprise a single biological stock, managed separately from the other southern stocks. The fishery is classified as Sustainable under SAFS (2024).

GVP is ~$31 million and NER ~$8.6 million (NER/GVP ~27.8%). Licence fees are ~4.1% of GVP. CRIS science/monitoring totals ~$1.05 million: DEPM survey & spawning biomass report (~$573,900), stock assessment & catch sampling (~$296,982), and dolphin-interaction/code-of-practice evaluation (~$59,716). Harvest strategy development and biosecurity are outside cost recovery. Comparable DEPM programs elsewhere have reportedly been delivered at lower cost.

Monitoring is comprehensive: independent observers cover ~20% of sets (length, weight, age, sex, gonad stage), annual DEPM surveys have run since 1995, and dolphin interactions are independently validated. Recreational catch is negligible.

Stock assessment (Grammer *et al*. 2024) is robust and does not use CPUE. It integrates DEPM-derived spawning biomass (SpB) in the SardEst model to estimate SpB, recruitment, harvest fraction, total biomass and relative depletion. Key uncertainties relate to otolith ageing (partly addressed via age–otolith-weight relationships) and environmental forcing.

The tiered harvest strategy links exploitation rates to SpB (DEPM) and survey frequency, with a higher TRP (200,000 t), spatial caps by zone and mean-size-based limits in the gulfs, and meta-rules for operational safeguards. Performance has been strong: SpB has been maintained well above the TRP for the past decade despite fluctuating abundance. Industry feedback highlights high costs, reporting lags, and a desire for greater use of fishery-dependent sampling and complementary methods (e.g., acoustics), plus clearer, more flexible rules for monitoring frequency. Interactions with short-beaked common dolphins remain the primary ERA concern; mitigation under the code of practice has reduced interactions, but under-reporting concerns persist in some quarters. The project determined the fishery has a Stock Risk score of 1.0, an ERA Risk score of 3, and a total Fishery Risk score of 1.4.

Fishery Suggestion 38 – Sardine.
Explore expanding accredited industry sampling and potential for alternative (e.g. acoustic) biomass estimates.

Fishery Suggestion 39 – Sardine.
Maintain the DEPM-anchored harvest strategy that targets SpB above TRP, but improve cost-effectiveness and responsiveness by linking survey intensity to harvest fraction/SpB (rather than fixed quota tiers).

Fishery Suggestion 40 – Sardine.
Conduct a MSE (similar to the Commonwealth) to evaluate the need for annual DEPM assessments given the relatively high costs compared with similar Commonwealth assessments of small pelagic fisheries.

Fishery Suggestion 41 – Sardine.
Strengthen dolphin-interaction monitoring through electronic monitoring. This could assist in evaluating the effectiveness of the code-of-practice and potentially streamline observer coverage on a risk-based approach.

Vongole

The South Australian Vongole fishery targets three clam species — *Katelysia scalarina* (greys), *K. rhytiphora* (yellows), and *K. peroni* (whites) — using hand rakes across two management zones: Coffin Bay and the West Coast (which includes Streaky, Smoky, and Venus Bays). A third area, the Port River zone, has been closed since 2011. The fishery operates under limited entry, with TACCs and minimum size limits as primary controls. Total allowable catches are

40.8 t in Coffin Bay and 16 t in the West Coast zone. The fishery is classified as Sustainable in both zones under SAFS (2024).

Economic information is limited, with GVP and NER unavailable. Science and monitoring costs under cost recovery total approximately $40,000, representing a small share of total fishery value. Payments to industry for surveys are $5,700 and fieldwork costs $6,500. Benchmarking data are unavailable, but expenditure is relatively modest compared with other South Australian fisheries.

Monitoring is primarily through fishery-independent surveys (FIS) conducted since 2009, which collect species-specific biomass and size-structure data. Surveys occur biennially in Coffin Bay and every three years in the West Coast zone. Although early FIS designs varied, methods have since been standardised following an external review (Foster 2022). Commercial catches are recorded in logbooks but not sampled directly, and recreational harvest is negligible.

Stock assessments (Ferguson *et al.* 2022) rely on FIS estimates of fishable biomass for each zone. These assessments are conducted biennially or triennially, depending on zone, with species composition reported separately. Key uncertainties include natural recruitment variability and the basis for reference points, which are empirical but not clearly documented.

The recently implemented harvest strategy (PIRSA 2024d) links TACCs to estimated harvestable biomass using conservative harvest fractions: 7.5% above the trigger reference point, 3% below it, and zero below the limit reference point. Meta-rules apply for bay-specific management within the West Coast zone, and penalties apply if surveys are delayed. The harvest strategy is considered appropriately precautionary given the small scale of the fishery and variable recruitment dynamics.

The Vongole fishery is a small, low-impact, hand-harvest operation with limited economic data but a strong monitoring framework and conservative harvest controls. The fishery remains sustainable, though subject to natural fluctuations in recruitment. No recent ERA is available, but ecological risks are presumed low, similar to other hand-harvested bivalve fisheries. The project determined the fishery has a Stock Risk score of 1.5, an ERA Risk score of 1, and a total Fishery Risk score of 1.3.

Fishery Suggestion 42 – Vongole. *Undertake a formal ecological risk assessment to confirm low risk from hand-harvest operations.*

Fishery Suggestion 43 – Vongole. *The basis for reference points (FIS) need clarification in the current harvest strategy for Vongole. Consider and trial simple fishery-dependent indicators (e.g., discard/juvenile rates, rake-hours) via e-logs to complement FIS between survey years.*

Fishery Suggestion 44 – Vongole.
Consider the potential for more industry involvement in expanding the spatial extent of the FIS.

Fishery Suggestion 45 – Vongole.
Improve spatial effort resolution in logbook catch and effort data (GPS/app) to map fine-scale pressure/productivity without adding undue burden.

Fishery Suggestion 46 – Vongole.
Review survey frequency/costs (e.g., Coffin Bay 2→3-yearly when risk is low) and report cost breakdowns to strengthen confidence in CRIS charges.

Charter Boat

The South Australian Charter Boat Fishery is a commercial extension of the recreational fishery, primarily targeting snapper, King George whiting, bight redfish and a range of other key recreational fish species depending on location. Unlike other commercial fisheries, it does not have dedicated stock assessments or harvest strategies of its own; these are encompassed within the Marine Scalefish Fishery and Lakes and Coorong Fishery (Finfish) management and research frameworks.

Charter operations use hook-and-line methods across five regions—West Coast, Spencer Gulf/Coffin Bay, Gulf St Vincent/Kangaroo Island, Victor Harbor/South East, and offshore waters. Eighty-four licences are issued, with 49 currently active. The combined annual GVP is approximately $3.4 million. The fishery is managed under limited entry with size, bag, and trip limits, spatial closures, and output controls, including a TAC for snapper. The latest management plan (PIRSA 2022f) provides the overarching regulatory framework, while biological reference points for the main target species are adopted from the Marine Scalefish harvest strategy.

Science and monitoring costs total $105,888, with $43,000 allocated to data collection and $24,000 to economic assessment. Compliance costs are reported separately. Catch and effort data are collected from active licence holders and integrated with broader Marine Scalefish datasets. Status of the primary target species is assessed under the Marine Scalefish program, with an annual catch and effort report and a full research assessment every three years (Dennis *et al*. 2024).

Snapper stocks are currently classified as depleted, with the fishery closed to all snapper take. King George whiting, bight redfish, and other target species are assessed as sustainable. The harvest strategy applied to these species is newly implemented and based primarily on CPUE performance indicators within their respective fisheries. No separate reference points apply to the Charter Boat sector.

The most recent ERA (PIRSA 2018) identified moderate risk to target species and discards, but negligible risk to habitats or the broader ecosystem. As the fishery shares stocks with larger commercial and recreational sectors, its management effectiveness depends on integration with those overarching frameworks rather than independent performance measures. The project determined the fishery has a Stock Risk score of 3.0, an ERA Risk score of 2, and a total Fishery Risk score of 2.5.

Fishery Suggestion 47 – Charter Boat. *Maintain alignment with the Marine Scalefish and Lakes and Coorong harvest strategies to ensure consistent reference points and performance indicators.*

Fishery Suggestion 48 – Charter Boat. *Deploy GPS-enabled electronic logbooks (standard fields for retained/released catch, effort, and optional environmental notes) and return near-real-time summaries to operators.*

Fishery Suggestion 49 – Charter Boat. *Continue to strengthen integration of catch and effort reporting across sectors.*

Fishery Suggestion 50 – Charter Boat. *Create a cooperative monitoring stream using charter vessels (observer days, structured fisher-assisted sampling for sizes/discards) with simple protocols.*

Fishery Suggestion 51 – Charter Boat. *Introduce a safe-reporting framework for rare ETP interactions (clear definitions, non-punitive guidance, and feedback on how reports are used).*

The Fishery Science Process

Monitoring – Logbooks

Stakeholder Feedback

Across all fisheries, logbook data remain the central foundation of monitoring the status of target species. However, there is frustration that data are not available in a timely manner even for fisheries with electronic reporting (e.g. Spencer Gulf Prawns, Northern Zone Rock Lobster). Spatial and temporal effort metrics are often too coarse and unrepresentative of fishery dynamics. Standardisation of CPUE data is required for those fisheries with many different gear types and targeting practices (e.g. Marine Scalefish and Lakes and Coorong finfish). Byproduct and bycatch reporting are aggregated in ways that limit their management value. Similarly, ETP reporting is regarded as compliance-driven with little feedback on its use in decision-making. External evaluation of South Australian fisheries (e.g. by the Commonwealth in relation to Part 13A requirements of the EPBC Act) calls for improved reporting of bycatch and discards noting that no fisheries in South Australia monitor indicator species. There is a common need for logbook systems that deliver real-time, high-resolution, spatially and temporally relevant, and accessible outputs that serve operational and management needs as well as compliance.

Review Findings

Opportunities to harness electronic/digital technology and improve reporting are being developed. Abalone operators in both the Central and Southern Zones are trialling diver loggers and Deckhand application systems that generate fine-scale, independently verifiable data. Spencer Gulf Prawn fishers have promoted development of a “data commons” dashboard to return logbook data directly to associations. In the Northern Zone Rock Lobster fishery, proposals to adopt AI-driven systems to interpret large logbook datasets are being developed.

Although logbooks will remain an important fishery monitoring tool, it is important that they are supplemented with fishery independent data as discussed below.

Recommendation 1. Expand the coverage of electronic logbooks to include every fishery.

Recommendation 2. Facilitated by the introduction of electronic logbooks, introduce finer spatial and temporal resolution of catch and effort data. Time-of-day and duration of each fishing operation should be recorded to a spatial resolution of latitude and longitude where possible.

Monitoring - Fishery Independent Surveys

Stakeholder Feedback

Attitudes by commercial operators toward fishery independent surveys (FIS) diverge sharply across South Australian fisheries. In some sectors, such as the Blue Crab and Spencer Gulf Prawn fisheries, surveys are regarded as the backbone of management, valued for their repeatability and central role in harvest strategy decision rules. These programs have built confidence among industry participants, with fishers citing examples such as the algal bloom event in Gulf St Vincent where survey outcomes validated industry observations and reinforced trust in the FIS framework.

In contrast, for some other fisheries, operators consider FIS as costly, unsafe, or misaligned with operational reality. In the Abalone fishery zones, fishers argued that transect surveys add risk (e.g. shark attack) without generating value commensurate with their cost, and that they do not adequately capture the patchy, reef-based nature of the resource. In the Marine Scalefish fishery, the snapper daily egg production method (DEPM) was strongly criticised as scientifically questionable and prohibitively expensive, particularly given its abandonment in other jurisdictions. For the West Coast Prawn fishery, juvenile recruitment surveys were considered an unnecessary burden during lean seasons when recruitment signals were already evident from fishing operations. For the Southern Rock Lobster fishery, where CPUE is the dominant input to the harvest strategy, opinions were divided among those who regarded FIS as non-essential and others who wanted structured programs to address gaps in assessment created by declining vessel numbers.

Industry acceptance of FIS is influenced by them being demonstrably efficient, representative, and being relevant to management needs and the spatial dynamics of the resource (particularly for abalone).

Review Findings

Fishery Independent Surveys (FISs) are one of the key strengths of South Australian fishery monitoring and science. Of the 15 fisheries examined in this review (excluding the Charter Boat fishery), all but four have a FIS and most now have lengthy time series of such monitoring. Of the four fisheries without an FIS program – the Marine Scale Fishery, Lakes and Coorong (finfish), Northern Zone Rock Lobster and Giant Crab – the first two are multispecies fisheries and now have a FIS program in place for individual stocks that are subject to stock-specific recovery plans (snapper for the Marine Scale fishery and black bream for Lakes and Coorong). Although the Northern Zone Rock Lobster fishery does not have a FIS targeting legal-sized animals, it does have long-term monitoring of puerulus settlement used to predict recruitment.

Generally, the availability of FIS data strengthens the robustness of stock assessments and provides key indicators that are used in fishery-specific harvest strategies. Although FISs are often a costly component of the science program and are subject to cost-recovery, in most instances they appear to be well supported by the commercial fishing industry, regarded as the backbone of management, valued for their repeatability and central role in harvest strategy decision rules. FIS for Abalone are not well supported as noted above. DEPM surveys for sardines are generally considered to be robust but are expensive with the need for annual FIS questionable given the generally conservative harvest strategy applicable to the fishery. A lower frequency DEPM linked to stock risk as used in other jurisdictions (e.g. the Commonwealth small pelagic fishery) may present a lower cost and risk averse option for the Sardine fishery.

Altering the frequency, design or approach to FIS will require a detailed review for each fishery where changes are proposed. This review should include analysis of options and identification of the trade-offs involved in potentially reducing or improving certainty in the indices of abundance used as performance indicators in harvest strategies for particular fisheries. Trade-offs should be identified in risk cost catch analyses with formal incorporation into harvest strategies.

Recommendation 3. Fishery Independent Surveys are a notable strength of South Australian fishery science but are also expensive. Cost efficiencies can be considered, including the frequency, design and approach of fishery independent surveys, noting that some changes may increase risks and therefore require changes in harvest strategies to maintain acceptable levels of risk. New technologies for fishery independent sampling such as use of ROVs or application of AI should be considered and costed.

Recommendation 4. Conduct fishery-specific reviews of FIS design and frequency considering the trade-offs involved in potentially reducing or improving certainty in the indices of abundance used as performance indicators in harvest strategies for particular fisheries. Trade-offs should be identified in risk cost catch analyses and formally incorporated into harvest strategies.

Monitoring – Biophysical Environment

Stakeholder Feedback

A common frustration expressed by participants in South Australian commercial fisheries is the limited integration of environmental drivers into assessments. Fishers noted the critical influence of temperature, salinity, rainfall, freshwater inflows, and upwellings on stock availability and recruitment. The harvest strategy for West Coast Prawns and Lakes and Coorong (finfish) do include environmental drivers (respectively ENSO status and Murray River flow). However, these drivers are poorly linked to primary performance indicators (catch rates) and require a more explicit understanding of how they influence stock status or productivity. More generally, fishers noted that CPUE trends often reflect environmental anomalies rather than true stock decline, yet current models rarely incorporate these drivers. In particular, Marine Scalefish fishery operators noted the algal bloom event as evidence that assessments and harvest strategies do not take external environmental drivers into account.

Review Findings

Although integration of environmental parameters in formal fishery stock assessments and harvest strategy application is comparatively rare in world fisheries (but see Britten *et al.* 2016, Haltuch *et al.* 2019, Kapur *et al.* 2021, Pepin *et al.* 2020, Gross *et al.* 2022) there are examples of their application in Australian fisheries. In Western Australia, the harvest control rules for the Western Rock Lobster fishery include ENSO related Southern Oscillation index, local ocean currents, rainfall, sea level height and sea surface temperature (de Lestang *et al.* 2012). For southern rock lobster (including South Australian fisheries), there has already been a change in productivity associated with a changing environment (Linnane *et al.* 2019). Thus, environmental assessment linked to fisheries assessment is increasingly important and re-evaluation of harvest strategies will be required.

The impact of climate change on marine fisheries in Australia is well documented, ongoing (Pecl *et al.* 2014, 2017) and increasingly incorporated into annual assessments (e.g. AFMA's Climate and Ecosystem status report for key fisheries)[1]. Understanding climate change impacts on fisheries requires the collection of robust environmental data. With the link to

[1] climatereport-sessf-nov23.pdf

nutrient levels and water temperature, the actual and potential impacts of the recent (and current) harmful algal bloom have only heightened these concerns and the call for improved fine-scale spatial and temporal bio-physical monitoring of all aquatic (freshwater, estuarine and marine) environments. Such environmental monitoring will benefit all South Australians and should be publicly funded. The current integrated marine observing system (IMOS) Ships of Opportunity Program (SOOP) program[2] provides an example of where commercial fishing vessels can provide a valuable platform for collection of temperature-depth data across broad spatial and temporal scales.

Integration and expansion of industry capacity to collect environmental data (particularly sub-surface salinity and temperature) presents a cost-effective means of expanding ocean monitoring. Financial incentives for South Australian fishers to participate in the Fishing Vessels as Ships of Opportunity Program[3] (FishSOOP) may yield mutually beneficial outcomes given the need to improve understanding of climate change impacts on coastal/marine ecosystems, and specifically in the Gulf of St Vincent and Spencer Gulf.

Recommendation 5. Promote fine-scale biophysical monitoring of the freshwater and marine environments including increased participation in FishSOOP and harnessing the data collection capacity of commercial fishing vessels.

Monitoring - Recreational Catch and Effort

Stakeholder Feedback

Marine Scalefish and Lakes and Coorong fishers highlighted that recreational harvest is poorly measured, despite its large share of total removals for species such as snapper, whiting, southern calamari and bream. The absence of robust and timely recreational data undermines the credibility of assessments and is perceived as inequitable when commercial fishers are expected to carry most of the cost of monitoring and assessment.

Review Findings

With the exception of Charter Boat fishing, there is a fundamental lack of reliable, ongoing data on the total harvest and catch composition of recreational fishing in South Australia. Recreational catch surveys are infrequent, imprecise, and lack the detailed spatial and temporal coverage required for use in stock assessments. For example, recreational data are not currently spatially resolved to management areas.

There is a strong argument that government should fund recreational data collection programs in proportion to harvest share based on clear and explicit information on allocation and catches.

[2] https://www.unsw.edu.au/research/oceanography/fishsoop
[3] Note that author Ian Knuckey is a co-investigator on the FishSOOP program

Recommendation 6. Design and implement an ongoing recreational fishing monitoring program to collect catch and effort information on key recreational species at appropriate spatial scales. This program should be funded by government.

Monitoring - Fishery economics

Stakeholder feedback

In general, the annual economic reports presented for most South Australian fisheries are well regarded. However, some stakeholders commented that the assessments do not represent the actual economic status of their fisheries and sometimes miss vital information on inputs and market dynamics.

Review Findings

Although not strictly part of the monitoring, assessment and research program, economic surveys are cost-recovered from licence holders of individual fisheries. The economic (and to a lesser extent social) data are comprehensive. In this regard, South Australia does a better job of monitoring economic performance of commercial fisheries than any other jurisdiction in Australia. However, this information appears to be under-utilised in fishery assessment and management.

Recommendation 7. The comprehensive socio-economic data collected each year for individual fisheries should be explicitly integrated into annual status reports reflecting additional performance metrics in management plans.

Stock Assessment

Stakeholder Feedback

Industry confidence in stock assessment processes varies from strong to extremely low depending on the fishery. For the Blue Crab fishery, participants described assessments as transparent, reliable, and closely aligned with reality. Similarly, Spencer Gulf Prawn fishers also found assessments broadly useful, although they noted delays and weak integration of environmental data.

In contrast, Abalone and Marine Scalefish fishery operators repeatedly criticised assessments as duplicative, opaque, and inconsistent with on-water observations. Snapper assessments were singled out as lacking credibility, with the continued reliance on the DEPM regarded as outdated and scientifically unsound. Calamari and southern garfish assessments were described as poorly designed and prohibitively expensive, with little management value delivered relative to cost. In the Northern Zone Rock Lobster fishery, annual assessments were regarded as repetitive, adding little beyond what raw CPUE trends already indicated mid-season.

The consistent response across fisheries is a need for more transparent and accountable assessment processes. Industry has asked for pre-assessment technical meetings to agree on inputs, assumptions, and methods before analyses begin, so that disputes do not arise after results are finalised. There is also strong interest in shifting from full annual assessments to multi-year cycles supplemented by annual indicators. This would reduce cost without compromising risk. For short-lived species such as calamari, fishers want new, species-specific methods that incorporate environmental drivers. Independent peer review and benchmarking against other jurisdictions were frequently suggested as ways to restore confidence in fisheries assessments.

Review Findings

Fishery modelling and quantitative stock assessment

Fishery modelling and quantitative stock assessment is both a strength and a weakness of the research and assessment program. Quantitative stock assessments are undertaken for several fisheries and species – rock lobster in both management zones, sardines, and several primary species in the Marine Scalefish fishery – notably snapper, King George whiting and southern garfish. All of these models were developed and implemented by Dr Rick McGarvey who has recently retired. Although they have been useful and used for some stock assessments, most of these models have no forward projection capability and are of limited use in informing sustainable harvest levels or for management strategy evaluation (MSE). The exception is the LenMod model for Rock Lobster which is a model broadly applied to Southern rock lobster stocks shared among South Australia, Victoria and Tasmania (Linnane *et al*. 2024c).

The Sub-program Leader for the stock assessment group is developing a program to transfer many of these quantitative assessment models to Stock Synthesis (SS). This is a welcome move and will assist in making better use of the models to inform harvest strategies. Similarly, SS has the capacity for incorporating MSE given forward projection capacity for modelling of future catches under various management approaches. However, the number of staff with quantitative modelling skills at SARDI is limited and demand for this work greatly exceeds current capacity.

More use of simple stock assessment models

The quantitative stock assessment models used in South Australia are all of the "integrated assessment" form, with the partial exception of the qR model for the Rock Lobster fisheries. Consideration should be given to more use of surplus production models (e.g. Martell and Froese 2013) which could, for example, be applied to fisheries with FIS and catch data. Assessment software such as JABBA, or the Commonwealth Dynamic Tier 4 method, might be suitable for this purpose and provide improved projection capability for a wider range of stocks.

External review

There appears to be no organised program of external peer review for the fishery science in general or the stock assessments in particular. Ad hoc reviews are undertaken for particular fisheries, sometimes when a stock collapses (e.g. snapper) and sometimes following a request from industry (in some cases paid for by industry). Some external peer review of stock assessments comes though the SAFS process but this is very limited, and some when scientific findings are published in the peer-reviewed literature. A few fisheries have MACs and research sub committees (RSCs) with independent scientists as members, and this provides some independent scrutiny of the science. It is acknowledged that external peer review can be costly, and the benefits need to be weighed against the costs.

External review can also be facilitated by cross jurisdictional collaboration, where scientists studying the same species get together periodically to discuss methods and results. Examples include the Rock Lobster and Abalone fishery meetings and congresses. Communities of practice, where they exist, can facilitate sharing of methods and some peer review.

Innovation

Much of the scientific input into fishery management involves the fairly routine application of existing methods and approaches over long time periods. However, scientists also need to be responsive to novel science and methods that might provide new information or provide existing information more cost-effectively. This review has revealed some examples of new and innovative science but also scope for new approaches and methods. A recent example of an innovative approach was the survey of catch rates in a closed area for rock lobster fishing, with the ability to contrast this with catch rates from fished areas. This resulted not only in a scientific publication, but also in providing greater confidence about a key uncertainty in the Rock Lobster fishery assessment. Greater use of monitoring across spatial contrasts in levels of exploitation could be made for other fisheries in South Australia.

Hyper stability in CPUE

Examples were also found in this review where better use could be made of existing data. A notable example is the analysis of hyperstability in CPUE. Although this is well recognised in abalone fisheries, examination of CPUE versus FIS abundance revealed widespread evidence of hyperstability across all the fisheries and species examined – prawns in three trawl fisheries, rock lobster and blue crabs in pot fisheries, pipi and vongole in hand rake fisheries and abalone in three hand collection fisheries. Although not formally evaluated, hyperstability in CPUE for the purse seine Sardine fishery is also highly likely. The implications of this finding, which if previously recognised had not been generally remarked on, are potentially profound. Much more can be made of this information, including causes and implications of hyperstability, to improve stock assessments, inform risk, better define reference points, and improve HCRs and decision tables where both FIS and CPUE are used.

Recommendation 8. South Australian stock assessments, fundamental to effective harvest strategies should be improved by:

a) taking explicit account of hyperstability in CPUE;

b) making better use of environmental data to account for changes in the marine environment;

c) adopting modern methods for integrated assessments such as Stock Synthesis (as planned);

d) making better use of "simple" surplus production models to increase the number of fisheries with quantitative assessments;

e) considering the adoption of novel assessment techniques such as close kin mark recapture (CKMR);

f) increasing the local capacity to undertake quantitative assessments; and

g) increasing the extent of external scrutiny and review of stock assessments.

Harvest Strategy

Stakeholder Feedback

Harvest strategies are generally accepted by industry as useful approaches to fishery management particularly with transparent decision rules. However, across most fisheries, harvest strategies are criticised as inflexible and insufficiently adaptive. In Blue Crab and Spencer Gulf Prawn fisheries, FIS-based harvest strategies were praised as legitimate and self-correcting. However, for Abalone, Marine Scalefish, and Lakes and Coorong (finfish) fisheries, decision rules were described as either too slow to respond to real changes or too rigid to accommodate environmental shocks. Fishers also noted that harvest strategies frequently fail to balance sustainability with economic and social objectives.

Many fishers highlighted that their own voluntary stewardship actions, such as quota reductions, closures or other precautionary measures, were not recognised within formal harvest strategy frameworks. For the Abalone fisheries, voluntary reductions far exceeded those triggered by the harvest strategy, yet were not formally incorporated into decision-making. For the Marine Scalefish fishery, fishers were particularly concerned that exceptional-circumstances provisions were too weak to account for events such as algal blooms that distort CPUE without reflecting stock decline.

To address these gaps, industry has proposed strengthening exceptional-circumstances provisions, embedding fisher knowledge systematically into harvest settings, and creating multilateral frameworks where adjustments require agreement among PIRSA, SARDI, industry, and independent scientists. Across fisheries there is also a call for harvest strategies to explicitly recognise and credit voluntary stewardship actions, thereby embedding industry's co-management role in sustainability within the formal decision framework.

Review Findings

Application of Risk Cost Catch

South Australia has adopted the national guidelines for development of harvest strategies (Sloan *et al.* 2014) including risk and how it should be managed. However, this review has found quite variable and inconsistent application of risk cost catch (RCC) in harvest strategies across fisheries. This is of particular relevance to the development of individual harvest strategies. An explicit RCC framework appears in only some harvest strategies – notably the new Marine Scalefish fishery strategy, and also the Sardine fishery and some of the Prawn fisheries – where buffers are applied depending on the sophistication of the assessment and/or the frequency of surveys/assessments. Application of RCC is more difficult where less quantitative assessment methods apply, e.g. weight of evidence. However, such application remains possible although generally not implemented.

Harvest strategy performance

Although not necessarily a reflection on the science, harvest strategy performance (whether the fishery is meeting its targets) is variable across South Australian fisheries. Some are clearly performing well, e.g. Sardines, Rock Lobster (both Zones). Others are not (e.g. Western Zone Abalone where recommendations from the harvest strategy are consistently too optimistic. Further analysis of harvest strategy performance for individual fisheries is considered under the Stock Risk analyses (Appendix 1).

Catch levels in HCRs and decision tables

Almost all the harvest strategies implemented in South Australia use HCRs or decision tables based on empirical performance indicators. This is acceptable but puts increased pressure on 1) correctly identifying reference points for the indicators used, and 2) correctly estimating appropriate catch levels at different levels of indicators. The latter can be problematic in the absence of a stock assessment model, so a careful review of the basis for the catch levels adopted in each case would be useful, together with any buffers required to meet appropriate levels of risk. Detailed analysis of the form of the HCRs identified several examples (Blue Crab in both Gulf St Vincent and Spencer Gulf Prawns, and Giant Crab) where harvest rates increase as stocks decline.

Recommendation 9. Improve harvest strategy review and implementation through:

a) review and consideration of the indicators and reference levels used, including the implications of hyperstability in CPUE;

b) the form of the harvest control rules where harvest strategies for some fisheries involve increasing exploitation (harvest) rates as stock levels decline;

c) consideration of exceptional circumstances, including responses to environmental events, shifting baselines, and clear processes for fishery monitoring and associated reopening rules during closures; and

d) increased use of more formal approaches to MSE (management strategy evaluation) involving risk cost catch analyses and including consideration of the cost effectiveness of monitoring and assessment.

Industry relationship with SARDI and PIRSA

Although individual SARDI scientists are widely respected by industry members, relationships with SARDI and PIRSA as institutions were described as strained in a number of fisheries. Blue Crab and Spencer Gulf Prawn fishers reported constructive, collaborative engagement with scientists, with survey and harvest processes running smoothly. However, for other fisheries, industry perceptions were more negative. Abalone fishers described SARDI as selective in data use and slow to act on industry proposals. Marine Scalefish fishers described consultation as tokenistic and assessments as agenda-driven. Rock Lobster fishers pointed to delays in implementing agreed harvest strategy improvements and a lack of transparency around model choices.

Industry frequently expressed frustration at cost allocations, reporting delays, and the exclusion of fisher knowledge. Many participants argued that genuine co-management has been undermined by a process where industry is treated as a client rather than as an equal partner. In response, proposals for independent mediation or chairing of technical processes, joint documentation of decisions, and structured pathways for fisher knowledge to be formally incorporated into fishery assessments, have been made. More broadly, there is strong interest in competitive tendering or mixed delivery models to ensure efficiency, accountability, and trust in the provision of science services.

Conclusion from Stakeholder Consultation

Across South Australia’s commercial fisheries, a consistent set of themes has emerged from stakeholder consultation. There is a strong commitment to science and independent monitoring, but deep concerns about cost, efficiency, transparency, and the credibility of current arrangements. Industry is calling for a reset of relationships and systems: one that embraces modernised electronic reporting and digital technologies, incorporates environmental and recreational data, applies fit-for-purpose assessment methods, and embeds fisher stewardship and knowledge within harvest strategies. Although the emphasis differs by fishery, the overall direction is clear. Stakeholders seek collaborative, accountable, and efficient science and management models that reflect on-water realities and deliver genuine value for money.

Alongside these cross-cutting issues, several secondary themes stand out. Voluntary stewardship actions in Abalone, Rock Lobster and Prawn fisheries demonstrate industry's proactive sustainability practices but remain unrecognised in formal frameworks. In the Marine Scalefish fishery, the misapplication of long-lived species models to short-lived stocks such as calamari has been especially damaging to credibility. Concerns about equity in cost-recovery have been voiced most strongly in the Marine Scalefish fishery, where licence fees are viewed as disproportionately high relative to other fisheries. Unique environmental shocks, such as algal blooms in the Blue Crab fishery and brevetoxin closures in the Lakes and Coorong (pipi) fishery, reinforce the need for robust exceptional-circumstances provisions in annual assessments and application of harvest strategies. There are also notable examples of innovation, including industry-funded DNA studies in the Blue Crab fishery and proposals for AI-driven data platforms in Abalone and Rock Lobster fisheries. Issues of data ownership, particularly in the Northern Zone Rock Lobster fishery and in several of the Abalone Zones, highlight tensions over access to industry-generated information. Finally, smaller fisheries such as West Coast Prawn stressed the importance of proportionality, urging that science frameworks be scaled to match economic capacity and avoid overwhelming costs.

Cost-recovery

The Australian Cost-recovery Policy

Principles applicable to cost-recovery[4] have been adopted by governments including South Australia (PIRSA 2024e), Victoria (Fisheries Victoria 2016) and the Commonwealth (AFMA 2025a) in recovering costs associated with the management of commercial fisheries. They guide this review. The three key principles of the cost recovery policy are: 1) Efficiency and Effectiveness; 2) Transparency and Accountability; and 3) Stakeholder Engagement. A brief definition of these principles is provided below.

Efficiency and Effectiveness

Efficiency and effectiveness in government involve making the proper use of available resources (people, money and other supplies) to achieve government policy outcomes. With respect to fisheries, this should optimise resource allocation by providing price signals for service provision that reflect the true costs of fisheries assessment and monitoring. The complexity of establishing fees should be balanced against administrative costs, ensuring that the expense of collecting and managing licence fees remains proportional to the revenue generated from licence fees.

Transparency and Accountability

Government agencies must maintain openness regarding their approach to commercial fishing licence fee setting, including comprehensive documentation of cost methodologies

[4] Australian Government Cost Recovery Policy | Department of Finance

and making relevant information accessible to industry stakeholders. This involves regular public reporting on the performance and outcomes of fisheries cost-recovery arrangements. Clear roles and responsibilities should be established for industry representatives, government agencies, and other stakeholders throughout the licence fee determination process. Agencies should publish detailed descriptions of their costing models to enable licence holders, industry associations, and other interested parties to review and understand how licence fees are calculated.

Stakeholder Engagement

This recognises the critical importance of consulting with commercial fishing industry stakeholders, throughout the cost-recovery process to ensure well-developed and effectively implemented licence fee arrangements. This includes comprehensive initial consultation during fee structure development as well as ongoing engagement to address changing fisheries conditions, industry needs, and management requirements.

The PIRSA Cost-recovery Process

PIRSA applies an activity-based costing approach to the recovery of costs associated with, *inter alia*, scientific monitoring and stock assessment of South Australia's commercial fisheries (PIRSA 2022e). Each year, PIRSA consults with Industry associations representing individual fisheries in relation to proposed programs and costs of work required. Following stakeholder consultation PIRSA Fisheries and Aquaculture prepare Cost-recovery Implementation Statements (CRIS) for each fishery which details deliverables and itemised costs applicable to fisheries management.

In contrast to previous concerns that cost-recovery attribution lacked transparency (McCallum *et al.* 2023), the CRIS are detailed and, in most cases, specify particular activities, deliverables against time lines, and full-time equivalent staff (FTEs) by staff designation. Furthermore, annual reports summarise delivery against cost-recovery agreements (assessment and research) for each fishery. These reports are comprehensive and publicly available.

The PIRSA cost-recovery process includes an annual schedule of meetings among government (PIRSA and SARDI) and fishery stakeholders through Industry associations (PIRSA 2022e). This schedule includes: a review of long-term objectives for each fishery and identification of priority needs; development of research programs (including requisite resources); discussion of proposed research programs with Industry associations; meetings with Industry associations to finalise research programs and associated resources/costs; and incorporation of proposed research/monitoring costs into licence fees.

A focus in the current review is on services required to assess the status of individual fisheries particularly performance indicators specified in harvest strategies under management plans. Most South Australian fisheries have established harvest strategies with performance indicators used to compare the status of fisheries against prescribed reference points (Sloan *et al.* 2014).

For stock assessment and monitoring, SARDI Aquatic Sciences is the preferred research provider and responsible for the delivery of assessment and research services at individual fishery (project) level. For economic and social evaluation of individual fisheries, research services are provided by BDO Econ Search under contract to PIRSA. Information including catch and effort data, value of production, and wildlife interaction data (e.g. endangered, threatened and protected (ETP) species) is managed by Fisheries Information Services of PIRSA Fisheries and Aquaculture. Data collection, collation, processing and quality control are provided as services necessary to monitor the status of individual fisheries. These services are costed pro-rata per FTE as required to meet information needs for each fishery.

Key deliverables of assessment and monitoring are specified for each fishery under service level agreements (SLAs) between PIRSA and SARDI. Other research-related activities exclusive of SLAs and for which costs are recovered from industry through licence fees include monitoring of ETP species (through logbooks), and collection of a levy as a contribution to the Fisheries Research and Development Corporation (FRDC). This levy is calculated as 0.25% of each fishery's gross value of production (GVP) over a three-year rolling average. FRDC leverages this contribution to fund relevant research programs addressing priorities for individual fisheries. Against this, SARDI also contributes to assessment and research services providing specific equipment, accounting for capital depreciation, infrastructure and research facilities. This in-kind contribution is currently about 15% of total assessment and research costs (exclusive of economic/social, Information Services, other, and FRDC levy) for each fishery.

For some fisheries e.g. Rock Lobster, Marine Scalefish there is a public good component e.g. for recreational fisheries, and PIRSA contributes funds accordingly to research (e.g. 4.5 - 10% of total assessment and monitoring costs). Collectively, net research-related costs specific to individual fisheries are then aggregated together with management, compliance and support services and recovered through annual licence fees (PIRSA 2022e).

SARDI Fishery research programs and costs

Stakeholder Feedback

A universal theme across all fisheries is that research costs are considered excessive, opaque, and disproportionate to the economic base of the sectors. Industry cited examples of assessments costing hundreds of thousands of dollars, often with little explanation of how funds were allocated across fieldwork, analysis, and reporting. In the Marine Scalefish fishery, garfish assessments were reported to cost nearly $900,000 when size and age work was included. Rock Lobster fishers estimated their annual science costs to be three times the level of comparable assessments in other jurisdictions. Abalone operators recounted survey quotes of $140,000 that were later reduced without justification.

Suspicion is widespread that commercial fisheries are subsidising other SARDI projects, such as FRDC studies or government-initiated disease work, and that full-time equivalent allocations do not reflect actual staff effort. Many reported a sense that assessment reports were duplicative, with "cut-and-paste" repetition adding cost without generating new value.

Industry responses have consistently focused on benchmarking SARDI costs against those of other jurisdictions and alternative providers, and on exploring consultancy- or industry-commissioned projects under SARDI oversight. Many called for more modern and efficient service models that adopt technologies such as electronic monitoring, Deckhand (app) systems, or diver loggers to reduce reliance on expensive traditional surveys. There is also strong support for independent accounting of costs, including transparent breakdowns of FTEs, overheads, and in-kind contributions, so that licence holders can clearly see value for money.

Review Findings

A precursor to evaluating cost recovery for research is to consider its efficiency and effectiveness. In the context of this review, and following Australian cost recovery policy, effectiveness is judged by the extent to which it supports the needs of fishery management. In this case, the needs are those involved in management of the target resources and stocks in each fishery, as these are the areas that are primarily subject to cost-recovery. This means in turn that the main focus for considering efficiency and effectiveness of the research is the basis that it provides for implementation of robust and effective harvest strategies for each managed fishery.

This review considered the research contribution to the three main elements of a harvest strategy: monitoring, assessment, and the form of the harvest control rules (HCRs). Of these three elements, SARDI has primary responsibility for the first two, whereas PIRSA has responsibility for the overall structure and operation of the harvest strategies, including the HCRs. However, SARDI also plays a major role in developing, testing and implementing harvest strategies (e.g. by providing the performance indicators used in the HCRs and testing HCR performance).

The three main programs underpinning monitoring are logbooks, catch sampling and fishery independent surveys (FIS). PIRSA are responsible for implementing the logbook program which is cost-recovered pro-rata by the FTEs needed and through Information Services. SARDI takes primary responsibility for catch sampling and FIS. SARDI also collect other data informing assessments, such as environmental data, but costs of this are not generally recovered through licence fees.

Assessing the status of individual fish stocks is the sole responsibility of SARDI. This involves analysis of data to determine stock status and the provision of (mostly annual) stock assessment or stock status reports. Across fisheries, stock assessments use a variety of approaches including weight of evidence, trends in indicators, and use of more formal quantitative models to assess stock status relative to reference points specified in harvest strategies.

Harvest strategies have been implemented for all South Australian managed fisheries. The harvest strategy for the Charter Boat fishery links to the management plan/harvest strategy for the recreational fishery (PIRSA 2022f). This provides a structured framework for decision making consistent with the principles of ESD.

The form of the HCRs applicable to harvest strategies is largely empirical, with a defined relationship between performance indicators (such as CPUE or FIS) and management controls such as TACCs or total allowable commercial effort (TACEs) (catch or effort controls). Most harvest strategies are complemented by additional management controls such as minimum size limits and input controls such as spatial and temporal closures, and gear restrictions. Very few harvest strategies for South Australian fisheries have been formally tested using methods such as Management Strategy Evaluation (MSE), but several have been more informally tested using methods such as retrospective analysis.

Non-recovered costs

SARDI identified that much of their work is not cost-recovered under the CRIS framework. Costs not covered include harvest strategy development, climate change impacts and preparedness, harmful algal blooms (HABs), biosecurity responses, impacts of marine protected areas (MPAs), and Advice Notes not scoped in the service level agreement (SLA). For many of these activities, there is no additional funding provided by PIRSA Fisheries and Aquaculture.

Details of costs in CRIS statements

With regard to transparency and accountability, it is sometimes difficult to break down individual as well as overall costs of elements of the science program. For example, FIS costs might include charter costs, observer costs, laboratory costs and data analysis costs. The CRIS statements and SLAs don't present this level of discrimination, particularly for the Rock Lobster fisheries. This has implications for assessing the cost implications of varying the frequency or coverage of FIS.

Cost price squeeze and cost vs depletion

Research programs that have been affordable in the past may become increasingly unaffordable over time. The BDO economic reports can be examined in more detail to understand the cost price squeeze i.e. increasing costs versus economic returns from fishing. Declining GVP given increasing price competition from aquaculture production is a feature of Abalone and Prawn fisheries. This affects affordability of services including research and assessment. A more pernicious feature is that research costs can actually be lower when the stock is in a healthy state (e.g. less frequent surveys or stock assessment reports needed) and increase as stocks decline towards a limit reference point (LRP) or an ERA reveals additional monitoring requirements e.g. for ETPs, bycatch, discards. As stocks decline, increased research costs run up against decreased revenue and profits, so that there can be a double squeeze. Sometimes when stocks collapse, the State will step in and subsidise the costs of management and research (e.g. snapper) but the State does not offer any subsidies ahead of that tipping point.

Current costs and resources applied to each fishery

The current research costs (2024/25) applicable to South Australian fisheries are presented in Table 3. These costs include: stock assessment and monitoring, economic assessment, Information Services (for provision of fishery dependent logbook data), other research (e.g.

monitoring of ETPs), and a FRDC levy. Applicable costs recovered from stock assessment and monitoring (including salaries of research staff and operating costs) range from $14K p.a. (Giant Crab fishery) to $926K for Southern Zone Rock lobster. Cost/FTE for staff engaged in stock assessment and monitoring ranges from $113K p.a. to $174 K p.a. reflecting the seniority of individual staff members engaged on each fishery. By comparison, an FTE for provision of Information Services is currently about $101 K p.a. Notably, data were not available for specific research and monitoring costs for Southern Zone Rock Lobster in 2024/25. Rather, a combined total of 4.2 FTEs applies with nominal apportionment of stock assessment and monitoring costs 22% Northern Zone and 78% Southern Zone (Table 3). Similarly, other research costs including economic assessment, Information Services, other research (ETPs) and the FRDC levy are shown as 2023/24 data (Table 3).

Evaluation of costs

SARDI research costs as applied to fisheries assessment and monitoring and as recovered through licence fees can be evaluated in several ways:

- Program specification: Is the work for which costs are recovered necessary to assess the annual status of each fishery through specified performance indicators?
- Program inputs: Are the resources applied (scientist salaries) reasonable?
- Program overheads: Are the overhead costs applied reasonable and consistent with other research agencies?
- Affordability: What is the cost of research and assessment recovered from each fishery relative to the gross value of production (GVP)?
- Benchmarking: What are the comparative costs of undertaking research and assessment compared with similar work done in other jurisdictions?

Comparative evaluation is presented below.

Table 3. SARDI full time equivalent (FTE) research staff and costs levied from licence fees applicable to individual fisheries. Data are 2024/25.

Fishery	Stock Assessment and Monitoring	FTEs	Cost/FTE	Economic Assessment	Information Services	Other	FRDC	Total cost-recovered
Abalone (WZ)	514,485	2.05	161,383	14,471	17,259	895	26,259	573,369
Abalone (CZ)	128,659	0.55	140,622	3,798	3,923	233	9,681	146,294
Abalone (SZ)	165,598	0.70	124,339	3,798	3,923	233	9,978	183,530
Rock lobster	1,099,690	4.20	141,644					
NZ specific	292,284			11,390	28,504	2,607	32,689	300,932
SZ specific	681,996 FIMS 125,410			*24,962	*64,219	*5,537	*200,537	1,102,661
Prawns (SG)	567,910	1.54	134,140	18,806	45,240	1,517	76,029	709,502
Prawns (WC)	34,031	0.14	129,871	874	5,492	117	3,077	43,591
Prawns (GSV)	296,023	0.65	160,845	10,633	13,075	389	6,764	326,884
Blue Crab	157,906	0.82	136,037	8,197	17,782	350	0	184,235
Marine scalefish	529,239	3.19	135,252	29,920	193,510	8,676	49,354	810,699
Sardines	870,881	3.13	134,543	17,525	35,564	**59,716	70,173	1,053,859
Lakes and Coorong (pipi)	200,725	0.72	139,303	9,529	14,121	0	14,858	239,233
Lakes and Coorong (finfish)	192,438	0.73	142,105	10,178	20,397	1,401	10,358	234,772
Vongole	19,370	0.24	112,542	10,584	7,322	0	2,786	40,062
Giant crab	14,266	0.05	173,840	0	2,615	0	0	16,881
Charter boat	35,622	0.15	146,660	24,083	43,148	3,035	0	105,888
TOTAL	**4,878,661**	**18.16**		**198,748**	**516,094**	**84,706**	**512,543**	**6,190,752**

*23/24 data

** dolphin interaction program

Table 4. Research input to harvest strategy evaluation by fishery.

Fishery	Primary PI	Source of information	Secondary PI	Source of Information	Additional Research	Activity	Output
Abalone (WZ)	CPUE	Logbook	Density	FIS (biennial for each species)	Length frequency	FIS	Annual stock status report (greenlip/blacklip), biennial assessment for each species.
Abalone (CZ)	CPUE	Logbook (greenlip)	Density (greenlip	FIS greenlip (biennial)	Length frequency	Commercial catch sampling	Annual stock status report
Abalone (SZ)	CPUE	Logbook (blacklip)	Density (blacklip)	FIS (biennial)	Density greenlip	FIS	Annual stock status report
Rock lobster (NZ)	CPUE	Logbook	Pre-recruit abundance	Logbook	Length frequency Sex ratio Bycatch Puerulus relative abundance Stock Assessment	Catch sampling Observers on board commercial vessels Puerulus monitoring QR and LenMod modelling	Annual Stock Assessment report
Rock lobster (SZ)	CPUE	Logbook	Pre-recruit abundance	Logbook	Length frequency Sex ratio Bycatch Puerulus relative abundance Stock Assessment	Catch sampling Observers on board commercial vessels Puerulus monitoring (monthly) QR and LenMod modelling FIMS: Transects (29) (10 pots/transect)	Annual Stock Assessment report
Prawns (SG)	CPUE adults	FIS	CPUE recruits	FIS	Spatial distribution.	Bucket counts FIS	Biennial stock assessment report

					Size composition Bycatch Trawl footprint	Spatial analysis	
Prawns (WC)	CPUE	Logbook	CPUE	FIS	Size composition Length frequency	Bucket counts FIS	Stock assessment report
Prawns (GSV)	CPUE	FIS	CPUE	Logbook	Spatial distribution Size composition Length frequency Sex ratio	Bucket counts FIS	Assessment report
Blue Crab	CPUE	FIS	CPUE (pot)	Logbook	Spatial distribution. Size composition. Length frequency (male and female)	FIS	Assessment report
Snapper	Biomass, spawning biomass	Integrated stock assessment (catch, CPUE, length at age). FIS (DEPM). Logbook, catch sampling.			Egg production, size composition, age structure.	Market sampling	Stock assessment report

KG whiting Southern Garfish	Biomass	Integrated stock assessment (catch, CPUE, length at age). Sex ratio, Logbook, catch sampling.			Egg production, size composition, age structure.	Market sampling	Stock assessment report
Southern Calamari	Catch, jig effort, jig CPUE, haul net effort, haul net CPUE	Logbook					Stock summary report
Tier 2 Scalefish	Catch, CPUE Catch MSY	Logbook Fishbase and time series of catch to estimate *r* and *k*					Stock summary report
Tier 3 Scalefish	Catch, Effort, CPUE	Logbook					Stock summary report
Sardines	Spawning biomass	FIS (DEPM)			Catch at size/age Reproductive state Dolphin interaction	Catch sampling/observers Observers	Stock assessment report (biennial) Annual report.

					Ecological assessment (ecological indicators)		
Lakes and Coorong (pipi)	Biomass	FIS	Pre-recruit abundance	FIS	Bycatch	FIS	Stock status report.
Lakes and Coorong (net)	% habitat available	Modelled salinity at 1 km increments Annual estuarine water level	CPUE Relative abundance	Logbook FIS (black bream, greenback flounder)	Age/length frequency	Market sampling	Stock assessment (golden perch) Fishery assessment report
Vongole	Harvestable biomass (three species)	FIS (transects)	Pre-recruit abundance	FIS	Length frequency	FIS	Stock status report (west coast)
Giant Crab	CPUE (legal size crabs)	Logbook	Catch, mean weight, pre-recruit abundance, sex ratio	Commercial catch sampling			Status report
Charter Boat	Catch by key species (snapper and King George whiting)	Logbook	Status of key species	Assessment reports	Release numbers of sub-legal fish. ETP interactions. Socio economic status	Logbook External assessment (BDO Econsearch)	Data summary report

Program specification

Priority research needs for South Australian fisheries assessment relate to annual provision of performance indicators applicable to harvest strategies to allow the setting of recommended biological catches (RBCs) and total allowable commercial catch/effort (TACCs/TACEs) for each fishery (Table 4). Harvest strategies are designed to avoid the risk of overfishing through monitoring of performance indicators against specified reference points. Decision rules guide management action based on the relative level of performance indicators (Sloan *et al.* 2014). Inputs to fishery assessments are mainly based on fishery-dependent commercial logbook returns administered by SARDI Information Services with applicable costs recovered (Table 3). Commendably, FIS data are also used in assessing the status of many fisheries including Abalone, Southern Zone Rock Lobster, Prawn, Blue Crab and Vongole fisheries together with pipi, snapper, black bream, greenback flounder within Marine Scale and Lakes and Coorong (finfish) fisheries (Table 4). Program specifications for individual South Australian fisheries are provided below. Additional details for each fishery are provided in Appendix 1.

The primary performance indicators for Abalone fisheries are spatially disaggregated CPUE from fishery dependent logbook data (Table 4). Secondary performance indicators are based on fishery-independent surveys (FIS) which provide relative abundance estimates and size composition data. FIS are undertaken biennially in each of three zones. Compared with logbook data (provided by Information Services) FIS are resource (and cost) intensive requiring a dive team and a research vessel (Chick *et al.* 2012).

For the Rock Lobster fisheries, primary and secondary performance indicators used for annual assessment against specified reference points are fishery-dependent logbook data (Table 4) i.e. CPUE of legal size and pre-recruit lobsters (nos/potlift). Additional research includes a fishery independent monitoring survey (FIMS) in the Southern Zone, puerulus monitoring for use in recruitment forecasting (Linnane *et al.* 2024a) and length-based stock assessment modelling (Linnane *et al.* 2023, 2024 a,b,c) (Table 4).

Although fisheries for rock lobster (*Jasus edwardsii*) are managed as separate fisheries across southern Australia (including two fisheries in South Australia) they form part of a single stock (Linnane *et al.* 2024c) which may also include the New Zealand fishery (Ovenden 1992). However, in practical terms, regional differences in population biology are apparent (Morgan *et al.* 2013). Spatial divisions apply (e.g. Southern and Northern zones for the South Australian Rock Lobster fishery) because of regional differences in growth, catchability, recruitment, ecological interactions. However, spatial boundaries are political rather than ecological (Punt 2024). Thus, biological parameters important in stock assessment such as natural mortality (*M*) can and are derived from collective research efforts (Linnane *et al.* 2024c).

At a stock level, southern rock lobster is assessed against egg production with a limit of 20% of unfished level applicable (Linnane *et al.* 2024c) but this LRP is not applied at the Zonal level in South Australia, where at the moment it constitutes a stock rebuilding target. A putative regime shift in productivity of southern rock lobster has been identified (Linnane *et al.* 2019) and this has influenced the management of Rock Lobster fisheries in each jurisdiction (e.g. changes to reference points in the Tasmanian rock lobster harvest strategy). Thus, fishing mortality is assessed annually for each fishery in each jurisdiction (Linnane *et al.* 2024c). Even so, the primary input for evaluating stock status of South Australian rock lobster is fishery-dependent logbook data (Table 4) although annual stock assessment reports for each zone are provided.

Assessment of Prawn fisheries is mainly through FIS with industry vessels employed to conduct surveys (1 to 3 annually) to evaluate recruitment (size composition) and relative spatial abundance for the Spencer Gulf, Gulf St. Vincent and West Coast fisheries. Stock assessments are conducted biennially but annual status reports present primary and secondary performance indicators to evaluate against reference points in the harvest strategy (Heldt and Hooper 2023, McLeay and Hooper 2024). Similarly, the Blue Crab fishery is assessed against CPUE data provided from FIS. These FIS involve industry vessels deploying research pots to derive relative abundance and size composition (Beckmann and Hanamseth 2024) (Table 4).

The Marine Scalefish fishery has undergone recent and major reforms including the establishment of regional zones of management: Spencer Gulf, Gulf St Vincent/King Island, the West Coast and the South East (PIRSA 2025). This has influenced the research and assessment program in this multi-species, multi-gear fishery (Dennis *et al.* 2024). A tiered management framework was also introduced to reflect the data richness of individual species. Tier 1 fisheries are managed with TACCs with applicable individual transferrable quotas (ITQs). With the exception of southern calamari (assessed against fishery-dependent CPUE data), Tier 1 fisheries (including snapper, King George whiting and southern garfish) are managed on a basis of biomass estimated from dynamic integrated stock assessment models (Table 4). The main inputs to these models are fishery-dependent commercial logbook data (particularly CPUE) but also length at age derived from catch sampling programs (Dennis *et al.* 2024). Assessment of snapper is also informed by fishery-independent daily egg production models (DEPM) to estimate spawning biomass (Drew *et al.* 2022). Tier 2 fisheries are managed according to fishery-dependent indicators including catch, effort and CPUE. Some Tier 2 stocks (e.g. yellowfin whiting) are assessed with a catch MSY approach (Dennis *et al.* 2024). This uses a Schaefer surplus production model to estimate maximum sustainable yield (MSY) based on prior specification for species productivity including maximum rate of population increase (r) and carrying capacity (k) (Martell and Froese 2013).

The Lakes and Coorong pipi fishery is assessed using FIS surveys which determine relative abundance and size (weight) (Sarakinis and Earl 2024). Similarly, FIS surveys are used to evaluate the status of the Vongole fishery (Ferguson *et al.* 2022) (Table 4). In addition to biological performance indicators summarised in Table 4, the Lakes and Coorong finfish fishery uses environmental performance indicators as primary input to the harvest strategy (Sarakinis and Earl 2024).

Similarly, the relatively small Vongole fishery is assessed using FIS surveys (Ferguson *et al.* 2024) augmented with fishery dependent catch data. Fishery-independent surveys provide relative abundance and size composition of the three species harvested within zones/management areas (Table 4). Fishery-dependent data do not discriminate the three species comprising the fishery. Rather, the commercial catch data are used to evaluate spatial trends in catch over time (Ferguson *et al.* 2024).

The relatively small Giant Crab fishery is assessed using fishery dependent logbook data complemented with commercial catch sampling to assess size composition and pre-recruit abundance (McLeay 2024) (Table 4).

The Sardine fishery uses annual estimates of spawning biomass derived from a fishery-independent daily egg production model (DEPM) (PIRSA 2023b). Biennial stock assessments integrate FIS and fishery dependent data using the SardEst model (Grammer *et al.* 2024).

The Charter Boat fishery uses catch data by key species (snapper and King George whiting) derived from mandatory logbook reporting. Annual data summary reports are provided which summarise commercial logbook data and which provide spatial and temporal trends in client numbers and catches (including retained and released catch) (Hanamseth 2024, Table 4). This fishery is responsive to a management plan and a harvest strategy (PIRSA 2022f). However, as the fishery is a commercial platform for recreational fishing it does not directly align to monitoring and assessment that is applied to the commercial fisheries evaluated here. Rather, the fishery is responsive to spatial and temporal variation of key species that are managed as part of the Marine Scalefish fishery.

Notably, integrated stock assessment modelling is used for performance indicator evaluation against reference points in harvest strategies only for snapper, southern garfish and King George whiting. Stock assessments of rock lobster are undertaken, and these contribute to collective understanding of the dynamics of shared southern stocks (Linnane *et al.* 2024c), but they are not used in annual TACC setting.

Program inputs

Annual CRIS specify program inputs including staff resources used in fishery assessment and monitoring (Table 3). The annual costs of an FTE vary from $124K (Abalone Southern Zone) to $174K (Giant Crab). This variation reflects the seniority of staff input with the Giant Crab fishery using the services of a Principal Scientist (0.05 FTE) vs mainly lower classified scientists (Research Services Officer and Research Officers) for Abalone. These FTE rates include oncosts such as superannuation. The FTE rates shown in Table 3 are comparable with other state-based research agencies and generally less than those of CSIRO (that are between $150K and $270K). These latter data are based on mid to senior level research scientist classification.

For the Rock Lobster fisheries, it is difficult to evaluate staff costs as they are aggregated across both zones (4.2 FTE including a principal scientist (1.15), research scientist (0.05), and research officers (3.0))[5]. Furthermore, detailed costings for the Rock Lobster Southern Zone fishery were only available from CRIS for 2023/24 (i.e. economic assessment, Information

[5] From CRIS (Northern Zone) 1 July 2024 to 30 June 2025)

Services, other (ETPs) and the FRDC levy). Notably, there was an unusually high FRDC levy for the Rock Lobster Southern Zone fishery in 2023/24 (~$200,000). The core scope of work applicable to both zones includes: annual stock assessment including a report on performance indicators applicable to the harvest strategies for each zone, puerulus monitoring, and a fishery independent monitoring survey (FIMS) (Southern Zone only).

Apart from these specific research and assessment tasks, SARDI is also contracted to deliver mid and end of season presentations to research sub-committee, management advisory committee (MAC) and port meetings across the state. Other work specified in the service level agreement (SLA) with PIRSA includes developing project proposals to create research opportunities in regard to aspects of the Rock Lobster fishery and/or biology of strategic interest, including projects that extend beyond South Australia. In this regard, development of research proposals (either specific to South Australia or through collaboration with other jurisdictions) particularly for FRDC (given the annual levy component of licence fees) is important. This work for SARDI is external to the SLA with PIRSA. Of the costs applicable to research and assessment (as detailed in the CRIS), PIRSA contributes 4.5% to SARDI against a public good component (recreational fishing). Thus, costs recovered from licence holders are ~$300K for the Northern Zone and ~ $1.1[6] million for the Southern Zone.

Provision of Information Services to the various fisheries is costed at ~$101K per FTE. For complex fisheries such as Marine Scalefish which target a large number of species distributed across the state, the annual cost of Information Services is relatively high ($193K) reflecting 370 days or 1.85 FTE input. Notably, there is a 0.05 FTE decrease for 2024/25 reflecting improved fisher reporting.

SARDI overheads

SARDI Aquatic Sciences charges an overhead for service delivery for each fishery. These are indirect costs that cannot be directly attributed to a specific business activity, product or service, and are included as assessment and research services. These overhead costs vary between 47% and 72% of salary costs (Table 5). Precise overhead to salary ratios in Australian research organisations are not generally available but indicative overheads applied to fisheries research staff at CSIRO are 75% of salaries. More generally, a web search reveals typical overheads as proportion of salaries to be:

- Universities 25-50%
- Government research laboratories 30-60%
- Private research providers 40-80%
- Commercial research and development 50-100%

Thus, SARDI overheads applied in cost-recovery for fisheries research and assessment are within a typical range and may be considered as moderate when compared with other research agencies.

---

[6] This figure is an estimate as additional costs including a large FRDC levy of ~ $200K were from 2023/24 figures.

Affordability

Licence fees can be a significant contributor to the costs of commercial fishing with fees greater than 10% of GVP applicable to Abalone, Charter Boat, Gulf St Vincent Prawn, Northern Zone Rock Lobster and Marine Scalefish fisheries (BDO 2024). Based on current costs in relation to GVP the affordability of research and assessment is of concern for Abalone, Marine Scalefish, Sardines, Charter Boat (all > 3.5%) and, particularly, Gulf St Vincent Prawns (10.9%). As noted above (Cost/Price squeeze) affordability may be expected to further decline as research and assessment costs for individual fisheries continue to increase and GVP for many fisheries particularly Prawns and Abalone continue to decrease (BDO 2024).

In comparison, licence fees applied to abalone in Victoria are based on a royalty of 7.2% of GVP (Fisheries Victoria 2016) and in Western Australia for all commercial fisheries (5.75% of GVP) (Neville 2015). However, for these fisheries, the costs of all fishery management services including research and assessment, compliance, information services, directorate are deducted from this. Furthermore, the Western Australian licence fee also includes a levy of 0.5% GVP for the industry association WAFIC and 0.25% GVP for FRDC.

Table 5. SARDI Research and Assessment overhead costs.

	overhead as a proportion of salaries (%)
Abalone WZ	50
Abalone CZ	60
Abalone SZ	66
Rock Lobster NZ	56
Rock Lobster SZ	56
Prawns SG	61
Prawns WC	63
Prawns GSV	51
Blue Crab	60
Marine Scalefish	59
Sardines	48
Pipi	58
Lakes and Coorong	57
Vongole	72
Giant Crab	47
Charter Boat	56

Table 6. Comparative research costs for South Australian fisheries.

Fishery	Research and Assessment costs (2024/25)	GVP (2022/23) ($millions)	Research costs as % GVP
Abalone (WZ)	$573,369	10	5.7
Abalone (CZ)	$146,294	4	3.7
Abalone (SZ)	$183,530	3.5	5.2
Rock Lobster (NZ)	$300,932	13	2.1
Rock Lobster (SZ)	$1,102,664	70.5	1.6
Prawns (SG)	$709,502	26.5	2.8
Prawns (GSV)	$326,884	3	10.9
Prawns (WC)	$34,031	na	na
Blue Crab	$184,235	10	1.8
Marine Scalefish	$810,699	22	3.7
Sardines	$1,053859	29	3.6
Lakes and Coorong	$234,772	13	1.8
Charter Boat	$105,888	3	3.5

Table 7. Jurisdictional comparison of research dedicated to rock lobster.

	South Australia	Tasmania	Victoria	Western Australia	New Zealand
Cost-recovery process	Cost of research and monitoring fully recovered	No formal cost-recovery process.	Cost or research and monitoring fully recovered	5.75% of GVP for each fishery to cover all fishery management services.	Cost of research and monitoring fully recovered.
Management zones	2	5	2		9
Frequency of stock assessment	Annual report on biological indicators	Annual	Annual		
Performance Indicator (HS)	CPUE legal and pre-recuits	Biomass, egg production	Egg production, then CPUE	Spawning stock biomass	Spawning stock biomass
Additional research	Temperature loggers		observer program		
FIS	Transects (Southern Zone only) Puerulus monitoring		On board observer surveys Fixed site surveys (pre-recruit abundance) Puerulus monitoring (Apollo Bay)		

Table 8. Jurisdictional comparison of research dedicated to Abalone.

	South Australia	Tasmania	Victoria	Western Australia	New Zealand
Cost-recovery process	Cost of research and monitoring fully recovered	No formal cost-recovery process.	Cost or research and monitoring fully recovered	5.75% of GVP for each fishery to cover all fishery management services.	Cost of research and monitoring fully recovered.
Management zones	3	5	3	8	10
Frequency of stock assessment	Annual report on biological indicators	Annual	Annual		
Performance Indicator (HS)	CPUE, FIS legal sized density	CPUE		Standardised CPUE (three species)	Spawning stock biomass
Additional research	Dive loggers			Yield and egg per recruit, stock enhancement	
FIS	Line and radial transects in some spatial assessment units (two species)	Timed swims	Fixed site Radial transects	Fixed site transects	Timed swims

Benchmarking

Previous benchmarking conducted some time ago revealed that SARDI research costs were mid-range at around 200% of base salary costs (Ruello and Associates 1998, Price Waterhouse Coopers 1999). This was noted by the independent cost-recovery panel (McCallum *et al.* 2023). PIRSA is unique among Australian jurisdictions in publishing detailed annual costings as part of CRIS (salaries, overheads, operating costs) including those applied in service level agreements for fisheries research and assessment. Similar detailed costs are generally unavailable elsewhere. However, comparable costs for fisheries research can be inferred through jurisdictions that apply a competitive tendering process to procure research and assessment services (e.g. Victoria and New Zealand). This allows a comparative overview of costs benchmarked against other jurisdictions with similar fisheries. Similarly, some Commonwealth fisheries (e.g. small pelagics) are similar to those in South Australia (Sardines) and have similar research and assessment programs (AFMA 2024a). Other Commonwealth fisheries (e.g. Northern Prawns) use similar FIS approaches to those applied in South Australia using chartered commercial vessels (AFMA 2024b) allowing comparison of the costs of monitoring and assessment.

Under the Commonwealth small pelagics harvest strategy (AFMA 2025b), the frequency of FIS (DEPM estimates of biomass) is linked to a tiered structure with a trade-off of research cost for exploitation rate. Thus, the maximum exploitation rate of 20% for sardines (Commonwealth) is when DEPM estimates are available within 5 years (AFMA 2025b). A similar trade-off is not applied in South Australia with a less conservative exploitation rate of 27.5% applied to Tier 1, 25% to Tier 2, and 22.5% to Tier 3 Sardines. DEPM are conducted annually for Tiers 1 and 2, and biennially for Tier 3 (PIRSA 2023b). Costs of DEPM for SA Sardines (2024/25) are $574 K compared with Commonwealth Jack Mackerel ($243K - $416K) (AFMA 2024). Thus, South Australian Sardine assessments appear to be expensive when benchmarked against similar Commonwealth assessments.

The Commonwealth Northern Prawn fishery is much larger (both geographically and annual production) than the combined South Australian prawn fisheries and targets several prawn species. Commercial vessels are chartered each year for up to two FIS (spawning and recruitment surveys) each year. Indicative costs of vessel charter including observers (over three years) are up to $1,500K p.a. for up to 141 days (combined over three years i.e. ~ $11K/vessel/day). By comparison, the cost of vessel charter (63 nights) for the Spencer Gulf Prawn fishery (excluding observers) is $211K p.a. (i.e. ~$3K/vessel/night). Similarly, the cost of vessel charter (20 nights) for the Gulf St. Vincent Prawn fishery (excluding observers) is $130K (~$6K/vessel/night). In addition to FIS costs, the Northern Prawn fishery recovers costs from licence holders for an integrated monitoring program (~$500K p.a.) and stock assessment for target species (~$265K p.a.) (AFMA 2024b). Based on these benchmarks, the monitoring and assessment of South Australian Prawn fisheries is inexpensive. However, the comparative vessel charter costs for the Gulf St. Vincent Prawn is twice that of those applied to Spencer Gulf Prawn.

In addition to the Sardines and Prawn fisheries, Southern Rock Lobster (Table 7) and Abalone (Table 8) are fisheries common to other jurisdictions including Victoria, Tasmania, Western Australia and New Zealand. Similarly, snapper are also fished in these jurisdictions. However, snapper costs are aggregated for SARDI within Marine Scalefish licence fees. Furthermore, there is currently a $5 million research program for snapper co-funded by the South Australian government and FRDC aimed at development of reliable independent methods to monitor population trends and inform management decisions. For comparison, stock assessment of snapper in New Zealand ranges from NZ$40K to NZ$500K[7]. It is therefore difficult to reliably benchmark monitoring and assessment of South Australia's Marine Scalefish fishery.

In 2023, NZ$505,283 was spent on rock lobster assessments in New Zealand: this funded two comprehensive stock assessments, three rapid update stock assessments and the implementation of management procedures for two rock lobster stocks. Comprehensive stock assessments of rock lobster in New Zealand are undertaken every five years. These assessments are comprehensive, resource intensive and include two management areas (equivalent to two Zones in South Australia). The stock assessment is estimated to involve 0.5 FTE of experienced stock assessment scientists (Rudd *et al.* 2022). By comparison, research and assessment of South Australian rock lobster involves 4.2 FTE.

In Victoria, between 2019 and 2022, stock assessments of Victorian Rock Lobster (eastern and western zones) and Giant Crab fisheries were undertaken by the University of Tasmania (IMAS) for a total cost of $348,711[8]. Similarly, the Victorian Fisheries Authority (VFA) has paid $390,285 to IMAS for assessment of Rock Lobster and Giant Crab fisheries, a review of a new stock assessment model and for conduct of ongoing work on development of the harvest strategy to reflect stock assessment outcomes[9]. Notably, SARDI has also been contracted by VFA to undertake stock assessment of Victorian Rock Lobster fisheries (Linnane *et al.* 2015). Based on these benchmarks, monitoring and assessment of South Australian Rock Lobster fisheries is expensive.

Under Victoria's cost-recovery system, contestability of service provision is considered to be an important driver of cost efficiency (Fisheries Victoria 2016). Since 2019, MRAG Asia Pacific has been contracted by VFA to undertake stock assessment of abalone in the central and eastern zones of Victoria. MRAG Asia Pacific use a weight of evidence approach including spatial analyses of catch, effort and CPUE data, fishery-

[7] Source 2020/21 indicative research contract range Fund Years 19_20 20_21 21_22 Final Update 21.07.22
[8] Source Klaas Hartmann, Utas website. Funds received from VFA for fishery stock assessment.
[9] Ibid.

independent surveys (radial transects at fixed sites) to assess stocks based on relative abundance, representative length frequency, and commercial catch sampling. Although specific costings are not publicly available indicative tenders range from $270,000 to $480,000[10].

For New Zealand, assessment of their Abalone (paua) fisheries is similar to those undertaken in South Australia i.e. spatial assessment of catch, effort, and CPUE; and FIS to assess relative abundance and size composition. For 2022/23, stock assessment of one management area (PAU 5D) was up to NZ$250K. Similar costs of assessment of abalone in PAU 3 were applied in 2023/24[11]. In addition to this a catch sampling program for the NZ abalone fishery was up to NZ$1 million[12]. Based on these comparative figures, research and assessment of South Australian Abalone fisheries incur similar costs, with competitive tenders awarded in Victoria being slightly less expensive.

Risk Cost Catch analysis for current programs

Commercial fisheries are exposed to multiple risks including human exploitation, human coastal development and environmental variation. Fishery managers seek to moderate fishing effort or catch with a range of approaches including input and output controls. These approaches are summarised below for individual South Australian fisheries (Appendix 1). Management plans and associated harvest strategies aim to address objectives including ecologically sustainable development, equitable distribution of harvest opportunities among commercial, recreational and Aboriginal fisheries (McShane *et al.* 2021) whilst maintaining biological and economically sustainable stocks.

Generally, fishery managers seek to reduce risk by applying conservative harvest strategies and by investing in monitoring and research to improve understanding of the dynamics of fish stocks/ecosystems and their response to fishing. However, targeted research over spatial and temporal scales typical of commercial fisheries is often expensive. Why invest in research on species with no or little commercial value? Priorities will need to be identified and (generally) scarce resources dedicated to those fisheries that deliver the most benefit (measured in socio-economic terms).

This process applicable to South Australian fisheries is summarised above under an activity-based costing model. Reducing short term costs associated with a fishery (e.g. by doing less or no research) can increase the risk to the fishery. Further to fishing impacts on stocks, there are increasingly concerns of environmental trends and

---

[1010] Source: Gov Market www.govmarket.com.au
[11] Source: https://www.mpi.govt.nz/dmsdocument/65799-Fisheries-Research-Projects-2023-2024/
[12] Source: Fisheries Research Projects 2022-2023

variability influenced by climate change (Pecl *et al.* 2014, 2017). This is of particular relevance to short lived species (e.g. prawns, southern calamari, pipis) (Plaganyi *et al.* 2023) but also to longer lived species that may be affected by external factors such as harmful algal blooms or, abalone viral ganglioneuritis (AVG) which can have devastating impacts on abalone stocks independent of fishing. Environmental changes in sea temperature driven by ENSO events are already factored into the harvest strategy for West Coast Prawns. Here we evaluate risk and cost by applying a risk cost catch analysis (Little *et al.* 2016, Plaganyi *et al.* 2023).

Fisheries assessed as moderate risk (Table 9) include Abalone (Central Zone), Prawns (West Coast), Giant Crabs, Marine Scalefish, Lakes and Coorong (finfish) (as detailed in Appendix 1). How can these risks be mitigated to acceptable levels? For the Abalone (Central Zone) fishery, monitoring and stock assessment were assessed as acceptable but the harvest strategy has been ineffective in rebuilding stocks of blacklip abalone. Is further investment in research and monitoring at extra cost warranted? Notwithstanding some concerns about the utility and representativeness of FIS and a need for a reliable pre-recruit index, the current annual assessments for abalone have been assessed as adequate (Table 9).

Table 9. Risk scores against Research criteria for South Australian fisheries. Colours indicate severity of risk (green for negligible, yellow low, orange moderate, red high, purple major). Risk scores for each fishery are detailed in Appendix 1.

Fishery	Monitoring	Stock Assess.	Harvest Strategy	Stock Status	Stock Risk	ERA	Fishery Risk
Abalone Central Zone	2	2	5	4	3.25	1	2.8
Abalone Southern Zone	1	2	2	1	1.50	1	1.4
Abalone Western Zone	1	2	3	3	2.25	1	2.0
Rock Lobster NZ	2	2	1	1	1.50	1	1.4
Rock Lobster SZ	1	2	1	1	1.25	1	1.2
Prawns Spencer Gulf	1	1	1	1	1.00	2	1.2
Prawns Gulf St Vincent	1	2	2	2	1.75	3	2.0
Prawns West Coast	1	2	3	4	2.50	3	2.6
Marine Scalefish	3	4	3	3	3.25	3	3.2
Blue crab	2	1	2	1	1.50	2	1.6
Giant crab	3	4	3	4	3.50	2	3.2
Lakes and Coorong (finfish)	3	3	3	2	2.75	3	2.8
Lakes and Coorong (pipi)	1	1	2	1	1.25	1	1.2
Sardine	1	1	1	1	1.00	3	1.4
Vongole	2	2	1	1	1.50	1	1.4
Average Score	1.7	2.1	2.2	2.0	2.0	1.9	2.0

For the Prawn West Coast fishery the current harvest strategy has not succeeded in supporting sustainable stocks and there has been no ERA completed yielding a higher risk rating (Table 9). This fishery will require additional research to address concerns identified in the strategic assessment of South Australian prawns (DCCEEW 2025c).

There are a number of issues identified in the monitoring, stock assessment, harvest strategy and general stock status of the Marine Scale fishery (see Appendix 1). Fishery independent surveys are conducted only on one or two species (snapper, King George whiting) with DEPM methods that have low credibility with industry (as noted above). Snapper are depleted in all fishing zones except for the SE zone. Southern garfish in Spencer Gulf are currently assessed as depleting but stocks have consistently been below the LRP. Estimates of recreational catch, significant for Tier 1 species such as King George whiting and southern calamari are uncertain and not spatially resolved. Catches of priority species (snapper and King George whiting) from the Charter Boat sector are better recorded. Therefore, there is a need for improved monitoring of recreational catches to reduce the risk of overfishing.

The quantitative models used to assess stocks of King George whiting, snapper and southern garfish don't estimate depletion. This can be rectified by migrating stock assessment to Stock Synthesis models and this is currently being implemented. Reliance on CPUE analyses to assess lower tiered Marine Scalefish stocks is problematic given obvious hyperstability in catch rates for many assessed species (Dennis *et al.* 2024) as noted above. There is a general lack of age and length sampling for many important species that erodes data quality for assessment. Many of the issues identified above may be resolved with the new harvest strategy applicable to the Marine Scalefish fishery (PIRSA 2025) but addressing key uncertainties, including a general reliance on CPUE as an abundance indicator, is also needed.

An ERA for the Marine Scalefish fishery was last completed in 2011 and identified moderate risks associated with removal or damage to habitat by fishing (PIRSA 2011). More recently, a strategic assessment against Part 13A of the EPBC Act noted a general lack of reliable information on bycatch (as noted above). Given these issues, a review of monitoring, assessment, and applicable costs is required with the aim of reducing or mitigating identified risks to the Marine Scalefish fishery.

Although a relatively small fishery operating within the Rock Lobster fishery zones, the Giant Crab fishery has received little monitoring and assessment. Although the fishery has been recently assessed (McLeay 2024), there is a general reliance on unstandardised CPUE with no other data as input to the assessment (e.g. no FIS, age/length). CPUE for Giant crabs is evidently hyper-stable, as noted above for other species. There is a need for improved monitoring, assessment and a more fit for purpose harvest strategy given the depleting status of the stock. Again, greater investment in targeted monitoring and investment is required to reduce the risk to this stock. The Giant Crab fishery has had an ERA (PIRSA 2018) and a recent strategic assessment identified a relatively low ecological risk (DCCEEW 2025b).

Monitoring of the Lakes and Coorong (finfish) fishery includes catch sampling for primary species albeit infrequent. This sampling yields age and length data. However, FIS are only undertaken for black bream (currently assessed as depleted) and for greenback flounder. As with the Marine Scalefish fishery, there is high uncertainty in recreational fishing mortality affecting the reliability of key species assessments in the Lakes and Coorong finfish fishery. Resolution of targeting behaviour in the fishery is complex and not well understood from current logbook data. CPUE data are unstandardised. Thus, catch rates can be affected by changes in gear, targeting and fishing power that can be independent of stock abundance. Catch rate data are also evidently hyper stable. Even so the annual stock assessment document (Sarakinis and Earl 2024) is comprehensive given the limitations of the data identified above. The harvest strategy for Lakes and Coorong finfish has been strengthened by the recent inclusion of biological indicators (CPUE) in addition to previously influential environmental indicators (PIRSA 2022a). However, the rather weak TACE input controls that constrain the amount of gear that can be used but not how often it can be used raises doubts about the effectiveness of the harvest strategy should stock status of individual species further deteriorate.

An ERA was completed in 2019 for the Lakes and Coorong fishery (finfish and pipis) then revised in 2024 (PIRSA 2024c). Further to this a strategic assessment under Part 13 A of the EPBC Act was recently completed (DCCEEW 2023a). Identified issues (as above) include a lack of reliable quantitative information on bycatch/discards. There are also interactions with ETPs, particularly long-nosed fur seals. More generally the fishery is highly responsive to variation in Murray River flows. Again, further investment in monitoring, assessment and harvest strategy development (and revision of the current costs) will be required to reduce or mitigate the risk to the Lakes and Coorong (finfish) stock.

The harvest strategy for South Australian Sardines is less conservative with higher exploitation rates (up to 27.5%) than those applied to Commonwealth small pelagic fisheries (including Sardines) (up to 20%). These exploitation rates are precautionary given that an exploitation rate of 33% is considered to be conservative taking into account the ecological importance of sardines (Smith *et al*. 2015). For the Commonwealth there is an explicit trade off of cost (of DEPM assessments) for exploitation rate with more precautionary rates applied for less frequent assessments (AFMA 2025b). This trade-off is much less evident in South Australia with DEPMs undertaken each year, except for Tier 3 (exploitation rate 22.5%) where DEPM is undertaken every second year. Thus, for South Australia, research and assessment of Sardines is much more expensive than similar Commonwealth stocks (AFMA 2024).

CRIS options

The trade-off of reduced risk and greater cost links to the current status of fisheries (as summarised above). There are also issues of cost identified in the review above which are recovered for specific programs. These costs were evaluated under program specifications, relative overhead costs, costs of human resources, affordability (relative to GVP) and benchmarking (against similar programs delivered in other jurisdictions). Affordability relative to GVP is used as a metric here to allow comparisons with other jurisdictions, but a better metric for future evaluation would be net economic returns (NER), which are available for several fisheries from the BDO survey data.

Our review shows that SARDI has generally aligned research programs to deliver annual evaluation of performance indicators for harvest strategies for individual fisheries. Furthermore, assessed overheads and salaries/FTE are consistent with other research organisations (e.g. government, University). However, there were issues identified with affordability with relatively high costs of research relative to GVP applied to some fisheries. Similarly, benchmarking of research and assessment of Sardine, Rock Lobster, Prawn and Abalone fisheries revealed differences in cost between South Australia and other jurisdictions. However, benchmarking was not uniform with costs of research evidently greater for South Australian Rock Lobster and Sardine fisheries, generally similar for Abalone fisheries, and lower for Prawn fisheries when compared with similar assessment programs in other jurisdictions.

In considering affordability (relative to the GVP of individual fisheries) a five-point rating was applied with costs of 3.5% GVP or greater for science services considered to be expensive, 5%and above as very expensive and 7.5% and above as extreme. The rationale for these thresholds is that cost-recovery for all services (directorate, information services, management, compliance and research/assessment) for Western Australian fisheries is 5% (a further 0.75% includes WAFIC and FRDC levies) (Neville 2015). For the sake of comparison, recovered costs less than 3.5% were considered to be reasonable, and less than 2% as inexpensive (Table 10). This analysis classifies four additional fisheries as having high costs; Abalone (Western Zone), Abalone (Southern Zone), Gulf St Vincent Prawns, and Sardine (but with relatively low risk (Table 9)). Abalone (Western Zone and Central Zone) fisheries recover research costs at more than 5% of GVP (Table 6). Research costs for Gulf St Vincent prawns are nearly 11% exclusive of other recoverable costs including management/compliance. Similarly, the at-risk Marine Scalefish fishery has research costs at 3.8% of GVP (Table 6) with further monitoring and research needs identified in this review (see above). Research costs are more than $1million per annum for the Sardine fishery and represent 3.6% of GVP justifying a high-cost rating. Relative cost data were unavailable for Prawns (West coast), Giant crab, and Vongole fisheries (Table 10).

For benchmarking of applicable fisheries (Abalone, Rock Lobster, Prawns and Sardines) costs were compared and assessed as either lower, similar (within reasonable bounds taking into account the nature of the fishery and extent of research and assessment), or significantly higher than programs undertaken in other jurisdictions (Table 10). Research costs for Rock Lobster fisheries (both zones) are significantly higher with more FTEs and overall costs compared with Victoria and New Zealand (see above). Similarly, FIS for abalone undertaken in the Western Zone were higher than comparable surveys undertaken in Victoria and in New Zealand. DEPM surveys of Sardines in South Australia were higher than those applied to similar small pelagic fisheries in the Commonwealth. Costs of research recovered for South Australian Prawn fisheries are less than comparable Commonwealth prawn fisheries (Table 10).

Table 10. Cost analysis of science services applied to South Australian Fisheries. Costs are evaluated against affordability (relative to GVP). Science costs > 3.5% are considered to be expensive (orange), > 5% high (red) and > 7.5% extreme (purple). In the case of Abalone, Rock Lobster, Prawns and Sardines benchmarking is against similar science services delivered elsewhere with comparative costs indicated as higher or lower.

Fishery	Science costs (% GVP	Cost Score Affordability	Cost Score Benchmarking
Abalone Central Zone	5.7	4	lower
Abalone Southern Zone	3.7	4	lower
Abalone Western Zone	5.2	4	**higher**
Rock Lobster NZ	2.1	2	**higher**
Rock Lobster SZ	1.6	1	**higher**
Prawns Spencer Gulf	2.8	2	lower
Prawns Gulf St Vincent	10.9	5	lower
Prawns West Coast	n/a	n/a	unavailable
Marine Scalefish	3.7	3	unavailable
Blue crab	1.8	1	unavailable
Giant crab	n/a	n/a	unavailable
Lakes and Coorong (finfish)	1.8	1	unavailable
Lakes and Coorong (pipi)	1.8	1	unavailable
Sardine	3.6	3	**higher**
Vongole	n/a	na	unavailable

Competitive tendering and alternative providers

Although SARDI is the preferred provider of fisheries research and assessment services, PIRSA has outsourced some aspects of fisheries research for many years. BDO Econsearch has provided, and continues to provide, detailed economic evaluation of South Australian fisheries on an annual basis. Previous reviews of PIRSA's cost-recovery process have noted that SARDI, as a monopoly service provider of research lacks incentive to improve cost efficiency (Deloitte 2009). Australian cost-recovery guidelines include principles of efficiency and effectiveness with government agencies using resources appropriately to meet policy objectives[13].

McCallum *et al.* (2023) noted the public good component of fisheries research reflecting societal benefits in maintaining sustainable local fisheries. They also noted that the FRDC levy recovered from most South Australian fisheries (at 0.25% of GVP) contributes to the public good through Commonwealth co-investment. Currently, fisheries research, monitoring and assessment is mostly recovered from licence fees. Some fisheries, notably Marine Scalefish, with a large recreational component, have research funded by the government roughly in proportion to the recreational catch as does the Rock Lobster fishery (as noted above).

Monopoly service provision has been highlighted as potentially detrimental to service delivery (Deloitte 2009). McCallum *et al.* (2023) noted industry concerns that SARDI research programs were expensive when compared with similar research undertaken in other jurisdictions (e.g. AFMA). This perception has been quantified above for the South Australian Rock Lobster fishery where similar research and assessment has been undertaken elsewhere (Victoria and New Zealand) at a fraction of the cost of that recovered from licence fees in South Australia. McCallum *et al.* (2023) noted AFMA's competitive research provider model but did not address or recommend alternative research providers as part of their recent review. Issues raised by industry through submissions and consultation did include a lack of contestability in provision of fisheries research services.

An earlier review of fisheries cost-recovery in South Australia (Deloitte 2009) found that potential savings through the introduction of a competitive tendering process for research and assessment may be eroded by transaction costs. Alternative providers could undertake fisheries research and assessment in South Australia and potentially reduce costs. In New Zealand, the Ministry for Primary Industries determines fisheries research needs through five-year operational plans for fisheries management and annual tactical plans that specify immediate research priorities[14]. It has an annual

[13] https://www.finance.gov.au/government/managing-commonwealth-resources/implementing-charging-framework-rmg-302/australian-government-cost-recovery-policy

[14] Source. MPI Fisheries Research Processes 2024.

research procurement process that includes open competitive tendering for research. Research tenders are evaluated through specialised research panels.

In New Zealand, the Rock Lobster Industry Council (RLIC) representing Rock Lobster fishery quota holders has successfully tendered and executed Rock Lobster fishery stock assessments (Harte 2008). These assessments have been undertaken by consultant stock assessment scientists. Industry, through the RLIC, have also been involved in stock monitoring programs (Harte 2008). However, concerns that Industry provision of research services may lead to a conflict of interests have prompted a more cautious approach from the New Zealand government (through its Ministry of Fisheries) to delegate fisheries research to Industry. The crown research institute, the National Institute of Water and Atmospheric Research (NIWA) as a specialist research provider has more than 80% of research contracts with the Ministry of Fisheries (Harte 2008).

A competitive tendering process such as employed for fisheries research in New Zealand (Stokes *et al.* 2006, Harte 2008) and Victoria allows entry of other research providers. Such competition at least nominally encourages cost efficiency in delivery of requisite services (e.g. quantification of performance indicators against specific harvest strategies, stock assessment). Under the New Zealand system, research providers: crown research institutes such as NIWA, universities, private entities compete for public good research funds and, in particular, fisheries research including stock assessment (Stokes *et al.* 2006). Although accountable to the government, NIWA has capability (i.e. research scientists) entirely funded by competitive research funds. This differs from SARDI which is a government funded research and development organisation with additional funds provided through cost-recovery and licence fees.

Although nominally encouraging efficiency, administration of a tender process is also costly with resources required to advertise, evaluate, negotiate and administer contracts for research (Deloitte 2009). With large and valuable fisheries, the marginal costs of research contract management in New Zealand are relatively low compared with those in South Australia. As noted by Deloitte Access Economics (2015), PIRSA's current approach to cost-recovery is already expensive given that it is an annual process with a relatively complex and time-consuming negotiation applicable to each fishery. To some extent, PIRSA has reduced the annual administrative burden of negotiation with stakeholders in potentially implementing a 5-year program (PIRSA 2024e).

Like SARDI, NIWA must cover its large fixed costs (research laboratories, research vessels, professional scientists) through potentially uncertain bids for funds. Similarly, SARDI, to a large extent, relies on funds recovered through licence fees to maintain its research capability. Stokes *et al.* (2006) argue that public funding of marine research is needed to provide greater certainty in budgetary planning for NIWA. Industry perceptions that SARDI research services are expensive arise in part from the notional maintenance of licence fee revenue designed in part to maintain SARDI's fixed cost (see Appendix 3 in McCallum *et al.* 2023).

Despite the open nature of fisheries research services in New Zealand as noted above, there is a general lack of competition given NIWA's concentration of research capability and this is perceived to be a flaw in New Zealand's cost-recovery process (Stokes *et al.* 2006). Extending procurement of fisheries research services to international providers is presented as an option (Stokes *et al.* 2006). In this context AFMA, although mainly services by CSIRO, has procured fisheries stock assessment services from New Zealand to evaluate the status of Commonwealth fisheries (e.g. Pink Ling), notably largely driven by industry. Although there is some evidence that cost efficiencies can be captured in the procurement of competitive research services (e.g. for Rock Lobster assessment in New Zealand and Victoria) it is by no means conclusive that competitive tendering yields improved outcomes all things considered. Entry of external providers erodes the generally well-regarded relationship with local scientists and threatens the maintenance of local research capability.

Overall, there is value in SARDI maintaining core skills in fishery monitoring, stock assessment and ecological risk assessment, for continuity and consistency of science programs, maintenance of key fishery science skills, corporate knowledge, and to support the critical (and generally very good) relationships between SARDI scientists and industry. Competitive tendering may reduce costs of science services, but such a process introduces additional costs in administration and may erode local science capability and established SARDI/Industry relationships. Furthermore, if such services are outsourced it may undermine the long-term consistency and quality of data and assessment methods. However, exclusive provision of all science services by SARDI promotes a perception of poor value for money by industry. Mixed provider model approaches to cost recovery (e.g. by enabling a process for external providers to bid for some science services) should be explored, particularly where capability or capacity in SARDI is limited, or research is outside core monitoring and assessment functions.

Synopsis of cost evaluation

The current science frameworks and cost structures within each commercial fishery sector in South Australia are aligned to management plans and designed to evaluate performance indicators specified for harvest strategies applicable to specific fisheries. Management plans are risk based and aim to maintain sustainable fisheries and deliver optimum benefits to the South Australian community under the provisions of the *Fisheries Management* Act 2007.

In relation to the objective of ensuring that costs are transparent and aligned to best practice we found that service level agreements applicable to SARDI provide, in general, detailed costings against time-specific deliverables for assessment of individual fisheries. Detailed costs including overheads are provided in cost-recovery implementation statements. These CRIS reports provide greater transparency than other jurisdictions in Australia for which the cost of fisheries research and assessment (including input costs, overheads, and staff resources) are generally unavailable. Under Australian cost recovery policy guidelines, clear roles and responsibilities should be established for industry representatives, government agencies and other stakeholders throughout the licence fee determination process. Although cost reporting is transparent there is dissatisfaction among stakeholders with the industry consultation process (as noted above).

This review shows that SARDI has moderate overhead costs when applied to cost-recovered research. As a state-funded research organisation, SARDI extends costs to include support staff and other expenses associated with maintaining the facility and allowing research staff to do their work. In addition to this, and not deducted from commercial fishery licence fees, SARDI contributes ~15% of the total cost of each research and assessment program reflecting an in-kind cost associated with capital infrastructure and research facilities. These overhead costs provide opportunities to support and develop career paths for specialised scientists and technical staff. These staff develop expertise and understanding of fisheries and ecosystem processes important to South Australia. They also contribute to public good research including, most recently, examining the cause and effect of a major algal bloom affecting South Australian coastal ecosystems.

Further to the public good, there is an intangible benefit in maintaining local research capability through SARDI. Relationships develop among fisheries research staff and Industry for mutual benefit. Industry can interrogate scientists on aspects of stock status or assessments, and scientists benefit from observations and insights from fishers on environmental changes. Such relationships require time to nurture to mutual trust. Previous reviews on cost-recovery have reinforced the value of SARDI science to Industry and the benefit of maintaining local science capability (Price Waterhouse Coopers 1999). These relationship benefits can be eroded through outsourcing to external providers. An excessive reliance on licence fees to maintain core science capability presents a risk that, with cost rationalisation, SARDI may lose capability through having insufficient funds to employ staff, present career opportunities for young scientists, or to offer secure employment. SARDI has a good reputation among the fisheries and marine science community with an excellent track record of applied research measurable through publication in peer-reviewed journals. Consultation with Industry undertaken as part of the current review revealed a generally good working relationship with SARDI. Industry participants praised the clarity of SARDI presentations at port meetings and openness to questions during consultation forums.

Consultation with SARDI revealed that much of their work is not cost-recovered under the CRIS framework. Costs not covered include most harvest strategy development, climate change impacts and preparedness, HAB impacts, biosecurity responses, impacts of MPAs, and Advice Notes not scoped in the SLA. For much of this work, there is no additional funding provided by PIRSA Fisheries and Aquaculture. Although difficult to quantify, there are benefits to having a local research agency with dedicated responsibilities and a long-term commitment to South Australian marine and coastal research.

This review has revealed some inefficiencies and opportunities for modernisation (e.g. electronic data recording and reporting). Some fisheries incur high relative research and assessment costs. Examples include Gulf St. Vincent Prawns at more than 11% of GVP. Similarly, Abalone fisheries (Western Zone and Central Zone) incur costs greater than 5% of GVP for research and assessment (exclusive of other costs such as compliance and management). Relative to other jurisdictions, the costs of research and assessment of Rock Lobster fisheries in South Australia are high (measurable as FTEs and as total annual funds included in licence fees). In comparison, formal stock assessments of Rock Lobster in New Zealand are only undertaken every five years. These detailed stock assessments involve < 0.5 FTE (Rudd *et al.* 2022). Similarly, costs of research recovered for the Sardine fishery are high compared with similar research conducted by the Commonwealth. However, benchmarking of research and monitoring of Prawn fisheries reveals South Australian costs to be lower than those recovered from other comparable fisheries.

Discussion

Transparency and Trust

Survey results and the interviews with industry indicated a wide range of views across and within fisheries about trust in SARDI science. Apart from overall and natural concerns about the costs of research, the concerns can be categorised into those arising from a lack of transparency and industry involvement in the cost recovery process to those arising from doubts about the quality of the science.

Regarding transparency and accountability, it has already been noted that the South Australian CRIS and SLA process is more detailed and transparent than comparable systems in other jurisdictions in Australia. Nevertheless, transparency could be further improved by more clearly separating and reporting the costs of different research, monitoring and assessment functions in the annual budgets. This would involve, for example, fully specifying the costs of fishery independent surveys, including specification of separate elements such as charter costs and staff costs, the latter broken down into time conducting surveys, processing samples, and analysing and reporting results. Preferably, CRIS costs should specify separate line items for FIS, other data collection (e.g. catch sampling), and stock assessment. Industry concerns were also raised about actual staff allocations and whether they were subsidising other activities of the same staff, such as contributions to FRDC reports. This concern might be addressed by specifying actual staff and their time allocations, as occurs already for FRDC projects.

Industry concerns about the quality of the science varied across fisheries. Trust in the science was especially poor in the Abalone fisheries, which perhaps notably lacked a MAC structure with input from an independent scientist and an independent chair. As noted elsewhere in this report, Abalone fisheries are difficult to assess and manage everywhere, and the track record is generally poor in all Australian jurisdictions. There are widely divergent views, even among abalone scientists, about the best methods for monitoring, and abalone assessments are frequently contested. Across fisheries there was general concern about a lot of repetition and lack of innovation in stock assessment reports, with annual updates adding little besides another data point. Both the requirements of harvest strategies and the form of the cost recovery process itself tend to lead to this type of repetition and potentially to lack of innovation. In some cases, there were more substantive concerns about the veracity of the data, including whether FIS data were properly representative of the actual state of the resource. There was a general concern about inability or unwillingness to make use of industry observations and data. Concerns were raised about insufficient or inadequate use of environmental data in interpreting or standardising catch rates. Legitimate concerns were also raised about the paucity and quality of recreational catch data. Some of these concerns were echoed in the scientific review of the research program which also noted the lack of a systematic process for external peer review of the science.

Recommendation 10. Trust in SARDI's science capability can be improved by:

1. More clearly specifying in annual CRIS the cost of the various elements of the research and monitoring programs, and the FTE contributions of individual scientists to those elements.

2. Identify and cost tasks that directly address legitimate industry issues including transparency of input to research programs, involvement of industry in research and monitoring, spatial mismatch of some FIS and fishing effort.

3. Develop a structured program for periodic external review of the research inputs to the fishery management process.

4. Consider the costs and benefits of a MAC process for those fisheries that lack one, in particular the benefits of having an independent Chair and scientist.

Options to improve the cost-effectiveness of monitoring and research

Recovered costs for monitoring and research are dominated by two components: 1) costs of undertaking fishery independent surveys (for those fisheries where they are used), and 2) the costs of producing stock assessments, including the analyses underpinning them.

Fishery independent surveys

- FISs are an essential element of the monitoring program for most South Australian fisheries, providing a key index of abundance for use in stock assessments and in quantifying performance indicators in harvest strategies.
- The importance of FIS data is reinforced by the widespread finding that CPUE (the main alternative index of abundance) is hyper stable for South Australian fisheries. This implies that CPUE is an unreliable index of abundance for most stocks and fisheries.
- FIS data tend to be more restricted spatially and temporally than CPUE, and involve fewer fishing operations, so using some combination of FIS and CPUE data may be appropriate in some instances, but not simply by averaging them.
- There are several options for reducing FIS costs:
    - Conducting surveys less frequently
    - Reducing the number of fishing operations or samples taken or the number of sites sampled
    - Finding more cost-effective ways to conduct surveys, such as greater involvement of fishers in sampling (e.g. dive loggers for Abalone fisheries)
    - Identifying new techniques or technologies for sampling, such as use of ROVs, application of AI, or adoption of novel methods such as Close Kin Mark Recapture (CKMR).
    - Altering the frequency, design or approach to FIS will generally require a detailed analysis of options and an identification of the trade-offs involved in potentially reducing or improving certainty in the indices of abundance. This will involve some form of Risk Cost Catch analysis, and perhaps its formal incorporation into harvest strategies.

Stock assessments

- Quantitative (model-based) assessments are not used as frequently in South Australia as in some other Australian jurisdictions. This in part reflects the more widespread availability of FIS data in South Australia, and its direct empirical application in harvest strategies.
- Quantitative assessments have been used for key stocks in fisheries such as the Marine Scale fishery, which generally lack FIS data. The models used (the various “Est” models) were developed many years ago and lack some key features of more recent models and approaches.

- This review noted that there is a process underway in SARDI to use the Stock Synthesis (SS) suite of models for future quantitative assessments. This will take time to implement, but offers several important advantages:
    - SS involves adopting a standard but very flexible set of tools that have been thoroughly tested.
    - SS models allow forward projections of stock status under various assumptions about future recruitment and catch levels (including HCRs) that are not possible with the South Australian Est models.
    - SS has the ability to accommodate assumptions about hyper stability in indices such as CPUE.
    - SS encompasses a wide range of model forms facilitating assessments for data-limited fisheries (e.g. Marine Scalefish, Lakes and Coorong finfish, Giant Crab).
    - SS can be used to formally test harvest strategies using its MSE capability.
    - Once implemented for a particular stock or fishery, updates to stock assessments should be easier and more cost-effective to run.
    - The standard and widespread adoption of SS should allow better and more straightforward peer review, both internal and external (independent).
- Another potential advance in quantitative stock assessment is to make more use of simple production models in South Australian fisheries assessments. There are many approaches for robust assessments of data-limited stocks which could be usefully applied in South Australia (see Cope 2024). Examples include the JABBA model and tools, which could be used across a number of the fisheries currently lacking a formal quantitative stock assessment, and which can be fitted to FIS as well as CPUE data.
- Adopting either or both of these more recent model approaches should improve the cost-effectiveness of the stock assessment process, either by reducing staff time and costs for specific assessments, by allowing more stocks to be assessed, and/or by facilitating periodic independent review of the assessments.

Harvest Strategies, RCC and MSE

- Many of the clearly articulated industry concerns about the cost-effectiveness of monitoring and stock assessment can be addressed more formally using methods such as management strategy evaluation (MSE).

- MSE allows the formal consideration of the trade-offs between the levels of catch (reflected in the harvest control rules), the form and costs of the monitoring and research programs underpinning harvest strategies, and the extent to which harvest strategies meet legislative and policy requirements concerning acceptable levels of risk. In other words, MSE allows a formal evaluation of the Risk Cost Catch (RCC) trade-offs.
- Improving the quantitative modelling capacity in SARDI would help improve this basis for MSE and therefore the more formal consideration of the costs and benefits of various forms of monitoring, including FIS, and the frequency and form of quantitative stock assessments. This, combined with the better use of the BDO economic data available for most fisheries, would enable a more formal and quantitative approach to evaluating and justifying the key monitoring, assessment and management costs attributable to cost recovery across fisheries in South Australia.

Further Considerations

Fishery types

Abalone fisheries

- Abalone stocks are both difficult to assess and to manage. These issues derive mainly from the fine scale spatial structure of abalone populations and their sedentary nature. The track record of managing abalone fisheries worldwide is poor.
- Assessment of abalone stocks is made all the more difficult because there is abundant evidence (including for both species in South Australia across management zones) that commercial catch rates (CPUE) are hyper stable. This means that CPUE alone is not a reliable index of abundance.
- The use of GPS and dive logger data to measure CPUA (catch per unit area) has somewhat reduced the degree of hyperstability in CPUE but not entirely eliminated it. Abalone fisheries with time series of CPUE, CPUA and FIS include greenlip in the Central Zone and blacklip in the Southern Zone. Further analysis of these data is required to establish the extent of hyper stability in both CPUE and CPUA.
- Although there are quite long time series of FIS conducted by SARDI scientists for both species in the Western Zone, greenlip in the Central Zone and blacklip in the Southern Zone, these surveys cover a limited range of the spatial distribution of abalone and are increasingly restricted by operational constraints and costs. While it will be essential to maintain some level of FIS sampling across species and zones, alternative approaches will need to be explored. One possibility is to

consider timed swims using commercial fishers, which can increase the number of areas surveyed. The commercial industry has clearly emphasised a desire to take a more active role in monitoring, and this approach is already under active discussion for the Southern Zone which is presently closed to commercial fishing due to AVG. Where survey methods change, a period of overlap is highly desirable.

- There is clear evidence that the harvest strategies for most abalone stocks in South Australia are not working as intended. In both the Western and Central Zones, fishers have repeatedly adopted voluntary catch reductions below levels set by the harvest control rules. A further issue is that the rules for monitoring and then reopening a closed fishery are not clearly spelt out. The recent development of an MSE capability for abalone fisheries via an FRDC project should enhance future prospects for the development of more effective harvest strategies.
- Across all the fisheries surveyed in this review, Abalone stands out as having the worst relationship between industry and government. A reset is needed and a move towards an improved co-management approach is indicated.

Multispecies fisheries

- Multispecies fisheries are another fishery type that pose challenges for monitoring, assessment and management. These challenges are compounded when the fisheries are also multi-sector (e.g. have a significant portion of catches taken by recreational fishing) and use multiple gear types. All three of these challenges are posed by South Australia's two main multispecies fisheries – the Marine Scalefish fishery and the Lakes and Coorong Finfish fishery.
- Neither of these fisheries has a broad-based fishery independent survey (although DEPM methods have been adopted for snapper and were used previously for King George whiting). This lack of FIS implies the need for an ongoing reliance on CPUE, raising the pressing issue of how to consider and incorporate the very real likelihood that CPUE is hyper stable for many of these species, as has been found for all South Australian fisheries and fishing methods where FIS data are available.
- The cost implications of adopting the new harvest strategy for the Marine Scalefish fishery are not clear. Costs are already high relative to GVP. There will be some savings from transitioning to Stock Synthesis for assessments, but this will take time and resources, and modelling capacity in South Australia is limited.
- While quantitative assessments are required for the four Tier 1 species in the Marine Scalefish fishery, approaches for other species are less clear. The MAC should take note of developments in similar multispecies fisheries, such as the Commonwealth SESSF, including use of indicator species. Further recent

developments in tools for ecosystem-based fisheries management (EBFM) for complex multispecies fisheries (e.g. Fulton *et al.* 2025) should also be considered. These novel approaches are potentially relevant to both the Marine Scalefish fishery and the Lakes and Coorong Finfish fisheries.

- Recreational fishing data are a problem for both fisheries and improvements to catch monitoring are required for both fisheries. For the Marine Scale fishery, better use could possibly be made of monitoring data from the Charter Boat fishery.

Co-managed fisheries

- On the positive side, there are at least two good examples of effective long-term co-management of fisheries in South Australia. Lessons can be drawn from both these examples.
- The earliest and best example is the Spencer Gulf Prawn Fishery where early collaboration between the commercial industry and SARDI scientist Neil Carrick developed innovative and effective approaches to industry-led surveys and their use in largely self-management of the resource. These approaches have been further refined over time and copied to a large extent in the two other South Australian prawn fisheries. They also helped to set an example of the value of fishery independent data that has spilled over into other South Australian fisheries resulting in South Australia's standout performance in this regard relative to other fishery jurisdictions in Australia.
- Discussions with the Spencer Gulf Prawn industry indicate strong ongoing support for both FIS and co-management, notwithstanding the increased economic pressure on the fishery due to recent lower prawn prices. This may result in some adjustment to the monitoring programs without abandoning the fundamental approach.
- The second example is the Pipi Fishery, part of the Lakes and Coorong Fishery. Development of the FIS driven approach to monitoring and management was in this case driven by independent knowledge broker Roger Edwards, strongly supported by effective collaboration between industry, PIRSA and SARDI.
- Both fisheries rank in the top three in South Australia with respect to (low) Stock Risk scores, and both have achieved MSC certification. Effective co-management has been instrumental in achieving these outcomes.

Small pelagic fisheries

- Small pelagic fisheries require special consideration due to the important role that these species play in the ecosystem.
- The South Australian Sardine Fishery (SF) is a well monitored and well managed fishery that achieved the equal lowest Stock Risk score across SA fisheries, but there are industry concerns about the costs of the annual fishery independent

surveys and there is evidence that monitoring and research costs are well above those for the comparable Commonwealth Small Pelagic Fisheries (SPF).

- Both the SF and the SPF use a tiered harvest strategy where the allocation to tiers depends on the frequency of FIS surveys, and allocation to Tier 1 allows the highest harvest rate to be applied. However, the SF harvest strategy requires annual surveys at Tier 1, whereas the SPF harvest strategy requires much less frequent surveys. The SPF harvest strategy covers multiple species, including sardines.
- The SPF harvest strategy was developed using an MSE analysis (Smith *et al.* 2015) that was recently used again to update the strategy. It should be possible to adapt and use this MSE software to evaluate options for the SF harvest strategy that include less frequent surveys while still maintaining relatively high but precautionary harvest rates.

Improvements to monitoring

- There was widespread support from most industry sectors for improved spatial and temporal resolution in recording catch and effort data. This can be facilitated by e-monitoring.
- Industry also supported improved capture of environmental data for use in interpreting CPUE and informing stock assessments. The capability to capture such data from fishing operations is improving. While generally a good idea, a word of caution should be noted. The success rate in identifying environmental factors and correlates for use in fishery assessments is patchy at best, though there are a few good examples.
- Problems with recreational catch data were widely noted and need to be addressed.

Harmful algal blooms

- The period for this review has overlapped with the occurrence of a major harmful algal bloom (HAB) along the South Australian coast and in both Gulfs. The extent of the impact on various fisheries is starting to emerge and will develop further.
- This review has not directly considered these HAB impacts or their consequences for Stock Risk scores.
- The impacts seem likely to be widespread and affect both stock assessments and harvest strategies. This will add another level of complexity to the issues discussed in this review.
- The scientific response to the HAB and its impact on fisheries has underlined two findings of this review – the importance and value of fishery independent surveys, and the value of having local scientific capability that can be rapidly deployed to address the issues.

Acknowledgements

We would like to thank Dr Paul McShane for his background research and critical input and editing of this report.

We would particularly like to thank all of the industry members that completed the survey and/or joined us in face-to-face meetings to assisted us better understand the issues of their individual fisheries from their point of view. We would also like to thank the SARDI and PIRSA scientists and managers that made time to discuss technical issues of specific fishery monitoring programs, stock assessments and harvest strategies.

We appreciated the administration and oversight of the project by the CRIC Steering Committee, including: the chair, Brian Jeffries; administrative officer Ms Georgina Ross, project coordinators Dr Keith Sainsbury and Dr Ian Cartwright who provided valuable suggestions into the content and consistency of the final report; Dr Gavin Begg, and Mr Kyri Toumazos. We appreciate the discussions with the other consultants reviewing aquaculture (Dr Ian Dutton and Dr Shane Roberts) and fisheries Compliance: Mr Simon Boag, Mr Richard Wells, Mr Dean Baigent and Dr Chantel Foord.

References

AFMA (2024a). Small pelagic fishery annual research statement 2024-25. Australian Fisheries Management Authority, Australian Government.

AFMA (2024b). Northern Prawn fishery annual research statement 2025/26. Australian Fisheries Management Authority June 2024.

AFMA (2025a). Cost-recovery implementation statement 2024-2025. Australian Fisheries Management Authority, Australian Government.

AFMA (2025b). Small pelagic harvest strategy. Australian Fisheries Management Authority February 2025, Australian Government.

Beckmann, C.L. and Hanamseth, R. (2024). Blue Crab (*Portunus armatus*) fishery 2022/23. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic and Livestock Sciences), Adelaide. SARDI Publication No. F2007/000729-20. SARDI Research Report Series No. 1227. 55 pp.

BDO (2023). Economic and social indicators for the South Australian Abalone fishery 2022/23. Report to Department of Primary Industries and Regions, South Australia. 24 June 2023.

BDO (2024). Economic indicators for the commercial fisheries of South Australia. Summary report 2022/23. Report to Department of Primary Industries and Regions 10 July 2024.

Booth, J.D. and McKenzie, A. (2009). Strong relationships between levels of puerulus settlement and recruited stock abundance in the red rock lobster (*Jasus edwardsii*) in New Zealand. *Fisheries Research* 95, 161-168.

Broadhurst, M. K., Larsen, R.B., Kennelly, S.J., and McShane, P.E. (1999). Use and success of composite square-mesh codends in reducing bycatch and in improving size-selectivity of prawns in Gulf St. Vincent, South Australia. *Fishery Bulletin* 97, 434-448.

Britten, G.L., Dowd, M., and Worm, B. (2016). Changing recruitment capacity in global fish stocks. *Proceedings of the National Academy of Sciences* 113, 134-139. www.pnas.org/cgi/doi/10.1073/pnas.1504709112

Bryars, S.R., and Adams, M. (1999). An allozyme study of the Blue Swimmer Crab (*Portunus pelagicus* (Crustacea: Portunidae), in Australia: stock delineation in southern Australia and evidence for a cryptic species in northern waters. *Marine and Freshwater Research* 50, 15-26.

Burnell, O. (2023). Status of the Central Zone Abalone Fisheries in 2022. Status Report for PIRSA Fisheries and Aquaculture. South Australian Research and

Development Institute (Aquatic and Livestock Sciences), Adelaide. SARDI Publication No. F2021/000378-2. SARDI Research Report Series No. 1203. 31 pp.

Burnell, O., Mayfield, S., and Hogg, A. (2022). Status of the Southern Zone Abalone (*Haliotis rubra* and *H. laevigata*) fishery in 2021/22. Report for PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic and Livestock Sciences), Adelaide. SARDI Publication No. F2014/000359-5. SARDI Research Report Series No. 1138. 29 pp.

Chick, R.C. Mayfield, S., Burch, P., Turich, S.N. and McGarvey, R. (2012). Detecting change in density and biomass of a benthic marine invertebrate following commercial fishing. *Fisheries Research* 129-130, 94-105. http://dx.doi.org/10.1016/j.fishres.2012.06009

Cope, J.M. (2024). The good practices of practicable alchemy in the stock assessment continuum: Fundamentals and principles of analytical methods to support science-based fisheries management under data and resource limitations. *Fisheries Research* 270, 106859 https://doi.org/10.1016/j.fishres.2023.106859

DAWE (2022). Assessment of the South Australian sardine fishery, January 2022. Department of Agriculture, Water and the Environment. Commonwealth of Australia

DCCEEW (2023a). Assessment of the South Australian Lakes and Coorong fishery January 2023. Department of Climate Change, Energy, the Environment and Water. Commonwealth of Australia.

DCCEEW (2023b). Assessment of the South Australian Lakes Marine Scalefish fishery December 2023. Department of Climate Change, Energy, the Environment and Water. Commonwealth of Australia.

DCCEEW (2024). Assessment of the South Australian Abalone Fishery November 2024. Department of Climate Change, Energy, the Environment and Water. Commonwealth of Australia.

DCCEEW (2025a). Assessment of the South Australian Blue Crab fishery, June 2025. Department of Climate Change, Energy, the Environment and Water. Commonwealth of Australia.

DCCEEW (2025b). Assessment of the South Australian Giant Crab fishery, July 2025. Department of Climate Change, Energy, the Environment and Water. Commonwealth of Australia.

DCCEEW (2025c). Assessment of the South Australian prawn trawl fishery, April 2025. Department of Climate Change, Energy, the Environment and Water. Commonwealth of Australia.

DEE (2015). Assessment of the South Australian rock lobster fishery. Department of the Environment and Energy. Commonwealth of Australia.

de Lestang, S., Caputi, N., How, J., Melville-Smith, R., Thomson, A., and Stephenson, P. (2012). Stock assessment for the west coast Rock lobster fishery. Fisheries research report no. 217. 200 p.

Deloitte (2009). Review of fisheries cost-recovery policy. Final Report to Department of Primary Industries and Resources South Australia. 11 February 2009.

Deloitte Access Economics (2015). Review of PIRSA's cost-recovery policy and practices, including their application to the fisheries and aquaculture industries. Report to Primary Industries and Regions SA.

Dennis, J.D., Drew, M.J., Earl, J., Matthews, D., Davey, J., Bussell, J., Tsolos, A., and Noell, C.J. (2024). Assessment of the South Australian Marine Scalefish Fishery in 2022-23. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic and Livestock Sciences), Adelaide. SARDI Publication No. F2017/000427-7. SARDI Research Report Series No. 1230.

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. South Australian Research and Development Institute (Aquatic and Livestock Sciences), Adelaide. SARDI Publication No. F2007/000523-7. SARDI Research Report Series No. 1155. 178 pp.

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 and Livestock Sciences), Adelaide. SARDI Publication No. F2014/000191-3. SARDI Research Report Series No. 1127. 37 pp.

Ferguson, G.J., and Hooper, G. (2025). Pipi (*Latona deltoides*) fishery. Stock assessment report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic and Livestock Sciences), Adelaide. SARDI Publication No. F2007/000550-4. SARDI Research Report Series No. 1248. 49 pp.

Fisheries New Zealand (2025). Fisheries cost-recovery levies annual report 2023/24. Fisheries New Zealand. ISBN No: 978-1-991380-11-1.

Fisheries Victoria (2016). Guidelines for the operation of the prospective cost-recovery system. Department of Economic Development, Jobs, Transport and Resources, Victorian Government, Melbourne February 2016.

Fletcher, W.J., Chesson, J., Fisher, M., Sainsbury, K.J., Hundloe, T., Smith, A.D.M. and Whitworth, B. (2002). National ESD reporting framework for Australian fisheries:

the 'how to' guide for wild capture fisheries, FRDC Project 2000/145, Fisheries Research and Development Corporation, Canberra.

Fletcher, W. J. 2005. The application of qualitative risk assessment methodology to prioritize issues for fisheries management. *ICES Journal of Marine Science* 62, 1576e1587.

Fletcher, W.J. (2015). Review and refinement of an existing qualitative risk assessment method for application within an ecosystem-based management framework. *ICES Journal of Marine Science* 72, 1043-1056.

Foster, S. (2022). Review of fishery independent surveys for Vongole. Report for Primary Industries and Regions South Australia (PIRSA). CSIRO's Data 61, Hobart, Tasmania. 10 pp.

Grammer, G.L., Bailleul, F., and Ivey, A. (2024). Stock assessment of Australian sardine (*Sardinops sagax*) off South Australia 2023. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic and Livestock Sciences), Adelaide. SARDI Publication No. F2007/000765-9. SARDI Research Report Series No. 12o8. 105 pp.

Haltuch, M.A., Brooks, E.N., Brodziak, J., Devine, J.A., Johnson, K.F., Klibansku, N., Nash, R.D.M., Payne, M.R., Shertzer, K.W., Subbey, S., and Wells, B.K. (2019). Unravelling the recruitment problem: a review of environmentally-informed forecasting and management strategy evaluation. *Fisheries Research* 217, 198-216.

Hanamseth, R. (2024). South Australian Charter Boat fishery 2022/23. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic and Livestock Sciences), Adelaide. SARDI Publication No. F2007/000847-7. SARDI Research Report Series No. 1210. 19 pp.

Heilbron, SG. (2023). Fisheries cost-recovery review. Report for the Department of Primary Industries and Regions South Australia. SG Heilbron Economic and Policy Consulting February 2023.

Heldt, K.A. and Hooper, G.E. (2023). Spencer Gulf prawn *Penaeus* (*Melicertus*) *latisulcatus* fishery. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic and Livestock Sciences), Adelaide. SARDI Publication No. F2007/000770-12. SARDI Research Report Series No. 1181. 81 pp.

Heldt, K.A. (2024). Stock status report for the west coast prawn *Penaeus* (*Melicertus*) *latisulcatus* fishery in 2023. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic and Livestock Sciences), Adelaide. SARDI Publication No. F2007/000772-14. SARDI Research Report Series No. 1219. 28 pp.

IMAS (2023). Sustainable marine research collaboration agreement activity report. Institute for Marine and Antarctic Studies, University of Tasmania 2023.

Kapur, M. S., Lee, Q., Correa, G. M., Haltuch, M., Gertseva, V., and Hamel, O. S. (2021). DRAFT Status of Sablefish (*Anoplopoma fimbria*) along the US West coast in 2021. Pacific Fisheries Management Council, Portland, Oregon. 136 p.

KPMG (2018). Fisheries and aquaculture cost-recovery policy review. Report to PIRSA November 2018.

Levings, A, Mitchell, B.D., Heeren, T., Austin, C., and Matheson, J. (1995). Fisheries biology of the giant crab (*Pseudocarcinus gigas*, Brachyura, Oziidae) in Southern Australia. In: High Latitude Crabs: Biology, management and economics. University of Alaska Sea Grant College Program Report. No. 96-02, Alaska. Pp. 126-151.

Linnane, A., McGarvey, R., Gardner, C., Walker, T.I., Matthews, J., Green, B., and Punt, A. (2014). Large-scale patterns in puerulus settlement and links to fishery recruitment in the southern rock lobster (*Jasus edwardsii*) across southeastern Australia. *ICES Journal of Marine Science* 71, 528-536.

Linnane, A., McGarvey, R., McCleay, L., Feenstra, J., and Reilly, D. (2015). Victorian rock lobster and giant crab fisheries status report – 2013/2014 fishing year. Fishery Status Report to Fisheries Victoria. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2012/000434-4. SARDI Research Report Series No. 863. 41 pp.

Linnane, A., Smith, A., McGarvey, R., Feenstra, J., Matthews, J., Hartmann, K., Gardner, C., (2019) Trends in productivity of Southern Rock Lobster *Jasus edwardsii*, across south-eastern Australia: Evidence of a regime shift? *Fisheries Research* 219, 105308. https://doi.org/10.1016/j.fishres.2019.105308

Linnane, A., McGarvey, R., Jones, A., Kimber, N., Feenstra, J.E., and Matthews, J.M. (2023). Reflecting on 25 years of quota management in a spiny lobster fishery: lessons learned from a harvest strategy perspective. *Fisheries Research* 257, 106516. https://doi.org/10.1016/j.fishres.2022.106516

Linnane, A., McGarvey, R., Feenstra, J., Mark, K., and Graske, D. (2024a). Northern Zone Rock Lobster (*Jasus edwardsii*) fishery stock assessment 2022/23. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic and Livestock Sciences), Adelaide. SARDI Publication No. F2007/000320-17. SARDI Research Report Series No. 1222. 67 pp.

Linnane, A., McGarvey, R., Feenstra, J., Mark, K., and Hawthorne, P. (2024b). Southern Zone Rock Lobster (*Jasus edwardsii*) fishery stock assessment 2022/23. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development

Institute (Aquatic and Livestock Sciences), Adelaide. SARDI Publication No. F2007/000276-17. SARDI Research Report Series No. 1221. 65 pp.

Linnane, A., McGarvey, R., Gardner, C., Hartmann, K., VFA, and de Lestang, S. (2024). Southern Rock Lobster (2023), in Anthony Roelofs, Toby Piddocke, Crispian Ashby, Simon Conron, Klaas Hartmann, Alex Hesp, Patrick Hone, Ian Jacobsen, Marlee Jesson-Kerr, Stephen Mayfield, John Stewart, Michael Usher, James Woodhams and Daniel Wright (eds) 2024, Status of Australian Fish Stocks Reports 2024, Fisheries Research and Development Corporation, Canberra.

Little, L.R., Punt, A.E., Dichmont, C.M., Dowling, N., Smith, D.C., Fulton, E.A., Sporcic, M., and Gorton, R.J. (2016). Decision trade-offs for cost-constrained fisheries management. *ICES Journal of Marine Science* 73, 494-502.

McCallum, B., Jennings, S., and Pascoe, S. (2023). Cost-recovery in commercial fisheries sector Department of Primary Industries and Regions (PIRSA). Final Report prepared for the Minister for Primary Industries and Regional Development (South Australia), October 2023.

McLeay, L. (2024). Stock status report for the South Australian Giant Crab (*Pseudocarcinus gigas*) fishery in 2022-23. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic and Livestock Sciences), Adelaide. SARDI Publication No. F2011/000332-13. SARDI Research Report Series No. 1212. 17 pp.

McLeay, L.J. and Hooper, G.E. (2024). Gulf St Vincent prawn *Penaeus* (*Melicertus*) *latisulcatus* fishery 2023/24. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic and Livestock Sciences), Adelaide. SARDI Publication No. F2007/000782-14. SARDI Research Report Series No. 1235. 51 pp.

McShane, P. E., Hall, S. J. and Carrick, N. A. (1999). Trophic consequences of prawn trawling: linking by-catch to benthos. In Buxton, C. D. and Eayrs, S. E. (eds). Establishing meaningful targets for bycatch reduction in Australian Fisheries. Australian Society for Fish Biology Workshop Proceedings, Hobart, September 1998, pp 106-112. Australian Society for Fish Biology.

McShane, P., Edwards, R. and Muggleton, M. (2005). Proactive environmental management: Clean Green rock lobster presents a fully integrated product management strategy. *InfoFish International*. 5, 65-68.

McShane, P.E., Knuckey, I., and Sen, S. (2021). Access and allocation in fisheries: the Australian experience. *Marine Policy* 132, 104702.

Morgan, E.M., Green, B.S., Murphy, N.P. and Strugnell, J.M. (2013). Investigation of genetic structure between deep and shallow populations of the southern rock lobster, *Jasus edwardsii* in Tasmania, Australia. *PLoS one*, 8, e77978.

Neville, P.J. (2015). Report on the review of the 2010 fisheries funding reform decisions of the Western Australian government. September 2015.

Noell, C.J., O'Neill, M.F., Carroll, J.D., and Dixon, C.D. (2015). A bioeconomic model for South Australia's prawn trawl fisheries. Final Report. Prepared by the South Australian Research and Development Institute (Aquatic Sciences), Adelaide. CRC Project No. 2011/750. 115 pp.

Ovenden, J.R., Brasher, D.J., and White, R.W.G. (1992). Mitochondrial DNA analyses of red rock lobster, *Jasus edwardsii*, supports an apparent absence of population subdivision throughout Australasia. *Marine Biology*, 112, 319-326.

Pecl, G.T. and others (2014). Rapid assessment of fisheries species sensitivity to climate change. *Climatic Change* 127, 505-520.

Pecl, G.T. and others (2017). Biodiversity redistribution under climate change: impacts on ecosystems and human well-being. *Science* 355, 6332 doi: 10.1126/science.aai9214

Pepin, P., King, J., Holt, C., Gurney-Smith, H., Shackell, N., Hedges, K., and Bundy, A. (2022). Incorporating knowledge of change in climatic, oceanographic and ecological conditions in Canadian stock assessments. *Fish and Fisheries* 23, 1332-1346. Doi:10.1111/faf.12692

PIRSA (2011). Ecologically sustainable development (ESD) risk assessment of the South Australian commercial marine scalefish fishery, July 2011. Department of Primary Industries and Regions, Government of South Australia.

PIRSA (2013). ESD risk assessment of South Australia's sardine fishery. Department of Primary Industries and Regions, Government of South Australia, September 2013.

PIRSA (2014). ESD risk assessment of South Australia's Spencer Gulf prawn fishery. Department of Primary Industries and Regions, Government of South Australia.

PIRSA (2018). Ecologically sustainable development risk assessment of commercial fishing for giant crabs in South Australia. Department of Primary Industries and Regions, Government of South Australia, July 2018.

PIRSA (2020a). Management plan for the South Australian commercial Spencer Gulf prawn fishery, October 2020. Fisheries Management Series paper number 78. Department of Primary Industries and Regions, Government of South Australia.

PIRSA (2020b). Ecologically sustainable development (ESD) risk assessment of the South Australian southern rock lobster fishery. Edition 2. Department of Primary Industries and Regions, Government of South Australia, August 2020.

PIRSA (2020c). Management plan for the South Australian commercial Southern Zone rock lobster fishery, July 2020. Fisheries Management Series paper number 79. Department of Primary Industries and Regions, Government of South Australia.

PIRSA (2021a). Management plan for the South Australian commercial abalone fisheries. Department of Primary Industries and Regions, Government of South Australia.

PIRSA (2021b). Ecologically sustainable development (ESD) risk assessment of the South Australian abalone fishery. Department of Primary Industries and Regions, Government of South Australia.

PIRSA (2021c). 2021 review of the ESD risk assessment of the South Australian Gulf St. Vincent prawn fishery. Department of Primary Industries and Regions, Government of South Australia.

PIRSA (2021d). Management plan for the South Australian commercial northern zone rock lobster fishery. South Australian Fisheries Management Series Paper number 81, July 2021. Department of Primary Industries and Regions, Government of South Australia.

PIRSA (2022a). Management plan for the South Australian commercial Lakes and Coorong fishery. South Australian Fisheries Management Series Paper number 82. Department of Primary Industries and Regions, Government of South Australia.

PIRSA (2022b). West coast prawn fishery harvest strategy, July 2022. Department of Primary Industries and Regions, Government of South Australia.

PIRSA (2022c). Management plan for the South Australian commercial Gulf St. Vincent prawn fishery (2022). Department of Primary Industries and Regions, Government of South Australia.

PIRSA (2022d). Addendum to the 2014 ESD risk assessment of the South Australian Spencer Gulf prawn fishery. Department of Primary Industries and Regions, Government of South Australia.

PIRSA (2022e). Fisheries and Aquaculture cost-recovery framework. Department of Primary Industries and Regions, Government of South Australia. May 2022.

PIRSA (2022f). Management plan for the South Australian charter boat fishery (2022). South Australian Fisheries Management Series Paper number 85. Department of Primary Industries and Regions, Government of South Australia, August 2022.

PIRSA (2023a). Revised ecological sustainable development (ESD) risk assessment of the South Australian commercial blue crab fishery. Department of Primary Industries and Regions, Government of South Australia, December 2023.

PIRSA (2023b). Management plan for the South Australian commercial sardine fishery. South Australian Fisheries Management Series Paper number 87, October 2023. Department of Primary Industries and Regions, Government of South Australia.

PIRSA (2024a). Management plan for the South Australian commercial blue crab fishery (2024). South Australian Fisheries Management Series Paper number 88. Department of Primary Industries and Regions, Government of South Australia.

PIRSA (2024b). Policy for the management of the South Australian commercial giant crab fishery. Department of Primary Industries and Regions, Government of South Australia, August 2024.

PIRSA (2024c). Ecologically sustainable development (ESD) risk assessment of the South Australian commercial Lakes and Coorong fishery, 2024 review. Department of Primary Industries and Regions, Government of South Australia.

PIRSA (2024d). Vongole harvest strategy, June 2024. Department of Primary Industries and Regions, Government of South Australia.

PIRSA (2024e). Government response to independent cost-recovery review reports for the South Australian seafood fishery and aquaculture sectors. Department of Primary Industries and Regions, Government of South Australia. February 2024.

PIRSA (2025). Management plan for the South Australian commercial marine scalefish fishery. South Australian Fisheries Management Series Paper number 90: Management Plan for the South Australian Commercial Marine Scalefish Fishery (2025). ISBN 978-0-6455545-3-3. ISSN 1322-8072.

Plaganyi, E.E., Blamey, L.K., Deng, R.A., and Miller, M. (2023). Accounting for risk-catch-cost trade-offs in a harvest strategy for a small, highly variable fishery. *Fisheries Research* 258 106518.

Price Waterhouse Coopers (1999). Comparison of SARDI costs with comparable institutions. Report to the Department of Primary Industries and Resources SA. Cited in Deloitte (2009).

Productivity Commission (2007), Public Support for Science and Innovation, Research Report, Productivity Commission, Canberra.

Productivity Commission (2016). Marine Fisheries and Aquaculture, Final Report, Canberra.

Punt, A.E., and Kennedy, R.B. (1997). Population modelling of Tasmanian rock lobster, *Jasus edwardsii*, resources. *Marine and Freshwater Research* 48, 967-980.

Punt, A.E. (2024). Stock assessment of rock lobster stocks: past, present and future. *Fisheries Research* 274, 106996. https://doi.org/1016/j.fishres.2024.106996

Richardson, B.J. (1982). Geographical distribution of electrophoretically detected protein variation in Australian commercial fisheries. III, Western King prawn, *Penaeus latisulcatus* Kishinouye. *Australian Journal of Marine and Freshwater Research* 22, 933-937.

Roelofs, R., Piddocke, T., Ashby, C., Conron, S., Hartmann, K., Hesp, A., Hone, P., Jacobsen, I., Jesson-Kerr, M., Mayfield, S., Stewart, J., Usher, M., Woodhams, J. and Wright, D. (eds) (2024). Status of Australian Fish Stocks Reports 2024, Fisheries Research and Development Corporation, Canberra.

Rudd, M.B., Webber, D.N., and Starr, P.J. (2022). Rapid updates for New Zealand rock lobster (*Jasus edwardsii*) stocks in 2021. New Zealand Fisheries Assessment Report 2022/36. 60 p.

Ruello and Associates (1998). An examination of fisheries research costs to industry. Prepared for the South Australian Fisheries. Cited in Deloitte (2009).

Sarakinis, K.G., and Earl, J. (2024). Assessment of the South Australian Lakes and Coorong Fishery in 2022/23. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic and Livestock Sciences), Adelaide. SARDI Publication No. F2020/000208-5. SARDI Research Report Series No. 1218. 98 pp.

Sloan, S. R., Smith, A.D.M., Gardner, C., Crosthwaite, K., Triantafillos, L., Jeffries, B. and Kimber, N (2014). National Guidelines to Develop Fishery Harvest Strategies. FRDC Report – Project 2010/061. Primary Industries and Regions, South Australia, Adelaide, March. CC BY 3.0

Smith, A., Ward, T.M., Hurtado, F, Klaer, N., Fulton, E., and Punt, A. (2015). Review and update of harvest strategy settings for the Commonwealth Small Pelagic Fishery – single species and ecosystem considerations. Final Report of FRDC Project No. 2013/028.

Stobart, B., and Daly, E. (2025). Western Zone Greenlip Abalone (*Haliotis laevigata*) and Blacklip Abalone (*H. rubra*) Fisheries in 2023/24. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic and Livestock Sciences), Adelaide. SARDI Publication No. F2017/000331-8. SARDI Research Report Series No. 1246. 79 pp.

VFA (2025) 2023/24 Victorian Rock Lobster Stock Assessment. Victorian Fisheries Authority Report Series No.37

Ward, T.M., Wolfe, B.W., Grammer, G.L., Ivey, A.R., King, E., Schiller, A., McDonald, K.S., and Dambacher (2023). Large sardine resource discovered off south-eastern Australia: potential risks, challenges and benefits of establishing a new fishery. *Marine Policy* 155, 105739.

Appendix 1. Individual fishery details

Abalone, Western Zone

Fishery characteristics

- Main sectors: commercial (statewide allocation of 99.74% with recreational 0.15%, and Aboriginal 0.11%).
- Target species: blacklip abalone (*Haliotis rubra*), greenlip abalone (*H.laevigata*).
- Fishing method(s): dive, hand collection
- Spatial complexity: spatially disaggregated stocks on shallow subtidal reefs. The fishery is assessed according to spatial assessment units (SAUs) with map codes included within these SAUs for reporting purposes.
- Shared stocks: blacklip abalone can show genetic heterogeneity among closely located populations (< 15 km) whereas greenlip abalone are more widely dispersed (Stobart and Daly 2025).
- Main management controls are output: TACCs (quota units held as entitlements by individual licences), spatially variable size limits by SAUs. Input: controls include limited entry (licences).
- Management plan/harvest strategy (PIRSA 2021a).
- Number of licences: 22
- Catch (t) blacklip 50.8, greenlip 55.6
- GVP ($) 10 million
- Net Economic Return (NEC) ($) statewide decreasing trend currently $5 million
- NER/GVP statewide: 28%
- Licence fee/GVP: 11.9%
- SAFS classification / fishery status: blacklip Sustainable, greenlip Sustainable
- Export competition is decreasing prices and affecting NER and GVP (BDO 2023)

CRIS information

- GVP: $10 million
- CRIS cost
    - Total
    - Science and monitoring: $573,369
    - Compliance
- CRIS science breakdown
    - Catch sampling, FIS, stock assessment. Survey cost $174,474
    - Elements not covered under cost-recovery: harvest strategy development, environmental studies, biosecurity.
- Benchmarking
    - FIS comparable with similar surveys elsewhere (Victoria, New Zealand).

Stock Risk

- Note 1: two species (greenlip and blacklip abalone)
- Note 2: Catches controlled by TACC but additional protection provided by legal minimum size.
- Note 3: abalone inherently at high potential risk due to fine scale spatial population structure relative to scales of reporting, assessment and management.

Monitoring

- Catch sampling
    - Some size (grade) data recorded from commercial catches
    - FIS collects detailed length frequencies (limited number of sites)
- FIS (frequency, coverage)
    - FIS surveys conducted in several SAUs, separately for greenlip and blacklip
    - Collect density information for legal and sub-legal sizes
    - Generally, a longer time series for greenlip (since 1990s) than blacklip (since 2005)
    - Most surveys now biennial
    - Some of the greenlip survey sites have been discontinued
    - Increasing challenges for surveys due to sharks, logistic issues
    - FIS data for both species show that commercial CPUE is strongly hyper-stable
- Catch uncertainty (e.g. recreational harvest)
    - Recreational catches are very small
- Additional industry-led monitoring
    - Diver assessment reports available since 2015 (both species)
        - Presented at stock assessment and TACC meetings but not (yet) formally compared with commercial CPUE or FIS data
    - GPS and logger data recording have not been implemented in the western zone
- **Monitoring Score – 1**
    - With the exception of GPS logger data, this is a data rich abalone fishery by most standards

Assessment

- Latest assessment: Stobart and Daly (2025).
- Methods
    - There is a sophisticated stock assessment process that builds up a picture of zonal status from SAU level data and trends for commercial CPUE and FIS data where available.

- Key uncertainties
    - Assessment reports acknowledge a range of uncertainties including:
        - CPUE is known to be hyper-stable but this is only partially accounted for in the assessment
        - There have likely been changes in fishing effectiveness and targeting (positive and negative) also affecting interpretation of CPUE
        - Effort by species is not recorded in logbooks and assumptions need to be made to allocate effort by species
        - Changes in spatial distribution of catch are not accounted for
        - FIS for blacklip are available for a short time period for some SAUs, and FIS for greenlip have been discontinued in many SAUs
- Frequency of assessments
    - Annual (Stock Assessment or Status) reports are undertaken
    - These reports look to be quite comprehensive, analysing spatial and temporal trends and providing key inputs into the TACC setting process for application of the harvest strategy. They could be enhanced by undertaking a more formal evaluation of the utility of the time series of data from the Diver Assessment Reports.
- **Stock Assessment Score – 2**
    - By the standards of abalone assessments, these are relatively robust (particularly due to the availability and use of FIS data), but risk inevitably arises due to the limited spatial coverage of FIS and the fine scale local dynamics of abalone populations (finer than the SAU unit of analysis).

Harvest strategy

- Form of HCR/decision table
    - The harvest strategy specifies in detail how zonal scores are calculated from SAU specific data, and translated into a target catch.
    - For a Zone Score of 5, the target catch for greenlip is 78 t and for blacklip is 77 t
    - TACs can be adjusted up to 10% (up or down) using information from secondary indicators such as proportion Grade 1, market changes, diver changes (including information from Diver Assessment Reports)
- Robustness of primary indicator(s)
    - The limitations and uncertainties in the Zonal Scores have been discussed above
- Selection of reference points
    - Reference points are set for each SAU
    - Reference points for both CPUE and FIS are taken from a reference period that does not include the period of greater productivity from 2000 to 2007.

    - TRPs (Score 5) are set based on the middle 40% of the range for the reference period, the LRP (Score 0) is set at 20% below the second lowest value for the reference period, and a maximum score (10) is set at 20% above the second highest value in the reference period.
- Harvest strategy performance
    - Allowing for uncertainties in the assessments, the greenlip stock has increased recently and is within the target range, whereas the decline in blacklip has stabilised, but at values well below target levels.
    - A key concern with the performance of the harvest strategy is that industry has requested considerably lower TACCs in a number of years for both species due to concerns about stock status.
    - This suggests that the catch levels corresponding to the TRP (Zone Score 5) in the HCR have been set too high and need to be reconsidered.
- **Harvest Strategy Score – 3**
    - Voluntary catch limits (VCL) versus TACC recommendations from the HCR suggest that target catch levels in the harvest strategy are set too high.

Current stock status

- Relative to TRP and LRP
    - greenlip Zone Score has risen recently and is above the TRP
    - blacklip Zone Score has declined and possibly stabilised, but at levels well below the TRP
- Trend
    - greenlip increasing
    - blacklip stable
- **Stock Status Score – 3**
    - Although both stocks are classified as "sustainable", blacklip is well below the TRP and uncertainties not addressed in the assessment (fine spatial structure, hyperstability in CPUE) suggest a medium level of risk

Summary risk score (1-5)

- Average across the four measures above
- **Stock Risk Score = 2.25**

Ecological risk assessment

- Recently assessed according to Part 13 A of the EPBC Act (DCCEEW 2024). Export approval until 2035.
- ERA undertaken (PIRSA 2021b). This follows the ESD risk assessment framework of Fletcher *et al.* (2002).

- Bycatch/byproduct, ETPs and ecosystem risks ranked as negligible given hand collection nature of the fishery.
- Summary risk score 1.

Ecological risk management

No specific management measures required given evidence of negligible impact from ERA/Strategic Assessment

Stakeholder Feedback

Data collection

The Western Zone industry has invested in data collection through its long-standing Memorandum of Agreement (MOA) and structured fishing programs. Respondents noted that finer-scale spatial and temporal data is necessary for abalone because of the patchy distribution of stocks and localised depletion risks. Logbook data, supported by electronic tools such as Deckhand, dive loggers, and GPS-enabled systems, provides detailed information on catch, effort, and spatial distribution of abalone. Respondents claimed high accuracy, particularly when high-grading is accounted for, and that integration of emerging technologies will further improve precision. Time-in/time-out reporting of dive effort requires improvement, and standardising catch time through dive loggers was suggested as essential.

ETP reporting can be improved with tools such as the Deckhand app. which will simplify reporting and improve accuracy. Respondents noted that species such as Great White Sharks are being logged, but they want clearer feedback on how this information is used in management.

Spatial data were rated high to medium quality. Respondents noted that fine-scale spatial information is already captured through Deckhand and GPS systems, whereas SARDI's coding system is outdated and not spatially representative. Temporal data were rated between medium and very high quality. Dive loggers, dive-time formulas, and pending e-logbook upgrades were seen as important to improving precision.

Environmental data such as water temperature and broader oceanographic variables should be better coordinated, standardised, and integrated into assessments. VMS was seen as potentially useful for reducing compliance risk and improving efficiency, though concerns were raised that it could lead to unnecessary inspections if used primarily as a compliance tool.

Fishery independent surveys

There was strong agreement that the current fishery independent survey (FIS) program is unsustainable. Diver transects were described as costly, logistically constrained, and vulnerable to shark risk or weather disruptions. Industry argued that extrapolating from small survey samples can be misleading when compared with the extensive daily commercial catch data collected across the zone. Survey responses reflected these views, with most rating FIS as medium or very low quality.

Suggestions included adopting fixed transects, improving timing, or moving toward industry-led surveys. Respondents proposed that structured observer programs, dual-purpose compliance inspections, and diver logger datasets could be formalised and independently validated to replace current FIS practices.

Stock Assessment

Respondents questioned the utility of CPUE and FIS as performance indicators, with many claiming that use of CPUE data becomes problematic under declining quotas and that FIS results are not representative. They noted that diver surveys and industry-collected data could augment CPUE and FIS information.

They described the number of FTEs deployed in research, duplication of work, cut-and-paste reporting, and poor separation of costs for fieldwork, analysis, and reporting as key concerns. Survey responses added that the cost of FIS is inflated by SARDI overheads and that reporting delays reduce its relevance for management.

Transparency was nevertheless acknowledged, with fishers noting that the process is open and consistent, even if outcomes are inefficient. However, assessments were considered useful for guiding voluntary TACC reductions, introducing mid-season closures, and managing spatial harvest zones. This, together with industry's stewardship, has delivered positive management outcomes. However, respondents noted that this often came at the expense of profitability.

Harvest Strategy

The harvest strategy was described as rigid and formulaic, at times producing outcomes that did not align with industry observations. Respondents acknowledged that abalone stocks can deplete quickly, but argued that fishers in the Western Zone have consistently taken a conservative approach, including voluntary quota undercuts to accelerate rebuilding. They claimed that this stewardship is not recognised in the harvest strategy framework, which portrays the fishery to be at unrealistically high risk.

Although decision rules were rated as clear by most, respondents noted that clarity did not imply accuracy, and gaps in the management plan were identified, such as the lack of a restart rule for closed fisheries. Responsiveness received mixed scores, with some saying rules were too reactive and others saying they were too rigid.

On balance, fishers noted that the harvest strategy reduces depletion risk, citing their proactive actions in reducing TACC, imposing caps, and introducing closures. However, they criticised the narrow scope of performance indicators and the formula-driven approach. Survey respondents noted that even when conflicts arose between CPUE and diver surveys, adjustments were modest, limiting flexibility. They also expressed frustration that industry input is only partially incorporated into outcomes, despite formal involvement in harvest strategy reviews.

Survey responses suggested that economic data has not influenced licence fees or triggered management plan actions. They noted that economic performance indicators have been removed from the harvest strategy, leaving a gap in management evaluation.

Suggested improvements to the harvest strategy included measuring the same indicators consistently each year, increasing the influence of industry knowledge and historical data, and developing a multilateral process whereby adjustments require agreement between PIRSA, SARDI, industry, and potentially an independent scientist. Respondents also sought recognition of voluntary stewardship actions within the harvest strategy, potentially through exceptional circumstances provisions or modified reference points.

Research Costs and Efficiency

Respondents emphasised that most licence fees are currently directed to monitoring and reporting, leaving little funding for applied research and development such as spawning studies, recruitment dynamics, reef health, and growth variation.

Concerns were raised about the transparency, efficiency, and cost of current research and assessment programs. Respondents noted that Western Zone licence holders pay significantly more than those other zones for what is essentially the same suite of services. Respondents also stressed the need for benchmarking costs and outputs across abalone zones and across jurisdictions. They suggested consultancy-led or industry-commissioned projects as more efficient models, pointing to examples where industry data programs have been successfully managed outside government at lower cost.

Relationship with SARDI and PIRSA

On a personal level, fishers expressed respect for SARDI scientists, acknowledging their passion and commitment. However, they described the institutional relationship as strained. They said SARDI staff are overworked and under-resourced, required to juggle cost-recovered assessments with FRDC projects and government disease work, which reduces capacity to focus on Western Zone priorities. Respondents noted that this reflects a broader structural problem where government expectations are unrealistic and industry is left to bear escalating costs.

Overall, respondents claimed that the Western Zone has shown maturity and leadership in self-management and should be trusted as having input to more efficient research and management arrangements. They called for independent data custodianship, greater industry involvement in program design, and mixed models combining industry, consultants, and SARDI oversight to deliver more efficient and credible research outcomes.

Fishery Review and Recommendations

The fishery includes two species with individual FIS and assessment reflecting a long time series of data relevant to evaluating the status of each fishery. However, spatial coverage of logbook data FIS at SAU scales may not account for finer scale dynamics of each fishery and some FIS have been discontinued for greenlip abalone. There is limited information on recruitment forecasting e.g. surveys of post-settlement abalone in known juvenile habitat.

Stock assessments are comprehensive and timely (annual). Uncertainties include: hyperstability of CPUE and its influence on assessment, and changes in fishing behaviour and effectiveness. Greater use of technology e.g. dive loggers to evaluate fine-scale effort distribution could assist in addressing the scale imbalance in assessment.

The harvest strategy does not appear to be working effectively as evident from the catch levels for the TRP being set too high and industry voluntarily requesting lower TACCs for both species reflecting concerns about stock status. Blacklip abalone is currently well below the TRP.

Abalone, Central Zone

Fishery characteristics

- Main sectors: commercial, recreational (low estimated to be < 1% of commercial catch). Allocation (statewide abalone): commercial 99.74%, recreational 0.15%, Aboriginal 0.11%
- Target species: greenlip abalone (*Haliotis laevigata*), blacklip abalone (*H. rubra*)
- Fishing method(s): dive, hand collection
- Spatial complexity: spatially disaggregated stocks on shallow subtidal reefs. Managed as spatial assessment units (SAUs).
- Shared stocks: blacklip abalone can show genetic heterogeneity among closely located populations (< 15 km) whereas greenlip abalone are more widely dispersed (Stobart and Daly 2025).
- Main management controls (input, output). Output: TACCs (quota units held as entitlements by individual licences), spatially variable size limits by SAUs. Input: limited entry.
- Management plan/harvest strategy (PIRSA 2021a).
- Number of licences: 6
- Catch (t) 68 (greenlip), 0 (blacklip)
- GVP ($) statewide decreasing trend $4 million
- NER ($) decreasing trend 5 million
- NER/GVP = 28%
- SAFS classification / fishery status: greenlip Sustainable, blacklip Depleted.
- Export competition is decreasing prices and affecting GVP/NER

CRIS information

- GVP: $4 million
- CRIS cost
  - Total
  - Science and monitoring $146,294
  - Compliance
  - Licence fee/GVP: 11.9%
- CRIS science breakdown
  - Catch sampling, FIS, stock assessment (no fieldwork costs specified)
  - Elements not covered under cost-recovery: harvest strategy development, environmental studies, biosecurity.
- Benchmarking
  - FIS costs comparable with similar surveys elsewhere (Victoria, New Zealand).

Stock Risk

- Note 1: two species (greenlip and blacklip abalone)
- Note 2: Catches controlled by TACC but additional protection provided by legal minimum size.
- Note 3: abalone inherently at high potential risk due to fine scale spatial population structure relative to scales of reporting, assessment and management
- Note 4: blacklip fishery effectively closed since 2018

Monitoring

- Catch sampling
    - Fishery dependent limited – shell measurements discontinued
    - FIS – length frequency data
- FIS (frequency, coverage)
    - None for blacklip
    - Extensive time series for greenlip based on timed swims, later converted to leadline transects
        - Since 1960s at Tiparra (reliably since 1983)
        - Several other SAUs since 2007
        - Several more SAUs since 2015
    - Plots of CPUE vs FIS for all SAUs show CPUE to be hyper-stable
- Catch uncertainty (e.g. recreational harvest)
    - Recreational catches are negligible
- Additional industry-led monitoring
    - GPS and depth logger data collected since 2013 for GL
        - Data coverage has declined substantially since 2020
- **Monitoring Score – 2 (1 for greenlip, 3 for blacklip)**
    - Relative to most abalone fisheries, the fishery for greenlip is data rich (conventional CPUE, FIS, GPS logger data). However, since closure of the blacklip fishery in 2018, this fishery is data poor, with no clear plan developed to collect suitable data (some fishing currently allowed under miscellaneous research permits).

Assessment

- Latest assessment: Burnell (2023)
- Methods
    - Analyses of CPUE and FIS are undertaken at the SAU level and then aggregated up to a Zone Score (0 to 10)
    - Trends in CPUE and FIS are also used to estimate a zone trend score, used as a proxy for fishing pressure

    - Details of the methods used are specified in the Harvest Strategy section of the Management Plan
    - GPS depth logger data
        - These data, limited to greenlip fishing, have been analysed and reported in stock assessment reports and provide a further indicator on trends in stock abundance
- Key uncertainties
    - Uncertainties mentioned in the stock assessment reports include
        - Few recent data to assess the blacklip fishery
        - In the past, mixed species fishing but a single daily effort measure complicates CPUE estimation
        - CPUE does not account for trends in effective effort or hyperstability in CPUE
        - No FIS data for blacklip
- Frequency of assessments
    - Reports (stock assessment or stock status) provided annually
- **Stock Assessment Score – 2 (1 for greenlip, 3 for blacklip)**
    - By the standards of abalone assessment, the greenlip assessment is robust, whereas the assessment for blacklip is more uncertain (e.g. no FIS or GPS logger data). Better use could be made of the temporal overlap of CPUE, FIS and GPS logger data for key greenlip SAUs such as Tiparra.

Harvest strategy

- Form of HCR/decision table
    - The harvest strategy specifies in detail how zonal scores are calculated from SAU specific data, and translated into a target catch.
    - For a Zone Score of 5, the target catch for greenlip is 78 t and for blacklip is 9 t
    - TACs can be adjusted up to 10% (up or down) using information from secondary indicators
- Robustness of primary indicator(s)
    - Uncertainties in the Zone Scores and their basis are covered above under stock assessment risk
- Selection of reference points
    - Reference points are set for each SAU
    - Reference points for both CPUE and FIS are taken from a reference period that does not include the period of greater productivity from 2000 to 2007. TRPs (Score 5) are set based on the middle 40% of the range for the reference period, the LRP (Score 0) is set at 20% below the second lowest value for the reference period, and a maximum score (10) is set at 20% above the second highest value in the reference period.

- Harvest strategy performance
    - MSE testing for the Central Zone GL fishery has been undertaken as part of a current FRDC project (final report not yet available, but draft report suggests that the harvest strategy may not be sufficiently precautionary)
    - Although the greenlip stock is classified as sustainable, the blacklip stock as depleted, the harvest strategy is not performing well
    - Industry has voluntarily reduced TACs well below those determined by the harvest strategy in recent years.
    - This suggests that the catch levels corresponding to the TRP (Zone Score 5) in the HCR have been set too high and need to be reconsidered.
- **Harvest Strategy Score – 5**
    - See points under "harvest strategy performance" above.

Current stock status

- Relative to TRP and LRP
    - greenlip above LRP but below TRP.
    - blacklip depleted
- Trend
    - greenlip – slightly down, but classified as sustainable (Burnell 2023).
- **Stock Status Score – 4**
    - greenlip sustainable, blacklip depleted
- Summary risk score (1-5)
- Average across the four measures above
- **Stock Risk Score = 3.25**
- **Stock Risk Score = 1.5**

Ecological risk assessment

- Recently assessed according to Part 13 A of the EPBC Act (DCCEEW 2024). Export approval until 2035.
- ERA undertaken (PIRSA 2021b). This follows the ESD risk assessment framework of Fletcher *et al.* (2002).
- ETPs, bycatch and habitat risks. Ranked as negligible given hand collection nature of the fishery.
- Summary risk score 1.

Ecological risk management

No specific management measures required given evidence of negligible impact from ERA/Strategic Assessment.

Stakeholder Feedback

Data collection

Catch and effort logbooks remain the primary data source for both greenlip and blacklip abalone, but how these data are aggregated in assessing stock status is of concern to fishers. Divers track catch rates at very fine spatial scales, such as the Tiparra "main reef," surrounding "away-fish" reefs on Western Yorke Peninsula, and sub-areas around Kangaroo Island. They reported that most of the catch (~ 80%) can come from just 20% of ground, with clear differences over only a few kilometres. To address this, industry has trialled structured, near-zero-take monitoring for Kangaroo Island blacklip using a standardised "one hour then move" effort unit to produce comparable CPUE and size data without materially impacting biomass.

Survey ratings reflected mixed confidence in logbook data: some rated target species data as high, while others rated it low, suggesting that real-time data collection and electronic reporting systems could improve precision. Respondents highlighted the value of independent dive logger data, which provides fine-scale and real-time reporting.

Industry has supplied extensive shell-size measurements, particularly during the Kangaroo Island low-take program, and emphasised the importance of minimum legal size (MLS) settings. A voluntary greenlip MLS increase from 130 to 135 mm was credited with adding one to two spawning years and improving stock condition. Vessel tracking and logger data are being collated through an independent analyst into patch-scale CPUE and size-frequency summaries to protect individual IP while supporting management.

Fishery independent surveys

Fishery-independent surveys (FIS) are used with CPUE as performance indicators in the harvest strategy, but their scope, timing, and cost are contentious. Industry accepted that FIS correctly detected the Tiparra decline and subsequent improvement when pressure eased, but argued that surveys should be trigger-based, spatially informative at patch scales, and cost-sensitive, particularly given the small number of licences and the voluntary cuts already undertaken. Concerns were also raised about proposals for additional or uniformly distributed sampling, which were considered unsafe and inefficient in exposed waters.

Survey responses supported these concerns, with respondents noting disputes over the timing of Tiparra Reef surveys and highlighting the high costs quoted for some assessments (e.g. $140,000, later reduced by $50,000 without clear justification). They stressed the importance of independent surveys but called for methods to be more efficient, cost-effective, and reflective of diver observations.

Stock Assessment

Stock assessment advice blends FIS and standardised CPUE, but fishers argued that outcomes have been overly sensitive to methodological choices, such as which years or records are included and the reference levels applied in the harvest strategy. Respondents cited examples where using the full catch dataset produced substantially different TACC ranges compared with earlier subsets. Although assessment outcomes are considered to have improved, they are still not always consistent with diver observations.

Assessments were described as useful when corrective actions are needed but are not seen as the sole determinant of management. Fishers highlighted that Central Zone divers have taken voluntary TACC reductions even when the harvest strategy supported higher catches. Some said assessments have delivered positive sustainability outcomes, whereas others noted little change to either sustainability or profitability.

Harvest Strategy

The previous “colour-band” harvest strategy was seen as subjective; the current version is considered an improvement but still insufficiently precise or responsive at relevant spatial scales. For greenlip at Tiparra, the harvest strategy failed to reduce effort sufficiently such that divers voluntarily cut catches by around 40–67% from 2020–2024 to rest the main reef and protect refugia. For Kangaroo Island blacklip, industry initiated a near-zero-take research program under permit, limiting catches to ~200 kg per licence with “hour-then-move” rules to provide comparable CPUE and size data without over exploiting the stock. Respondents noted that such industry-initiated surveys and spatial management addressed gaps in information based only on CPUE and FIS data. Suggested improvements to the harvest strategy included giving more weight to fishery-derived data and observations, ensuring indicators are measured consistently across spatial scales, and formalising a multilateral decision process where adjustments require agreement between PIRSA, SARDI, industry, and possibly an independent scientist.

Survey responses confirmed that decision rules are considered clear, although some noted that clarity does not mean accuracy. Concerns were raised that the harvest strategy does not balance economic and social factors, and that fisher input is not always incorporated. One example was PIRSA and SARDI excluding part of the catch data from an agreed diver harvest survey, leading to blacklip being classified as depleted and TACC suspended from 2022–2024. Once all data were later included, the stock was reclassified as sustainable, but only under strict permit conditions.

Research Costs and Efficiency

Respondents noted that the small scale of the fishery (six licences) makes the cost of assessments disproportionately high. Additional FIS impose high costs relative to the marginal benefit gained, particularly in logistically challenging environments such as

Kangaroo Island and Western Yorke Peninsula. Industry argued that resources should be directed toward analyses that leverage data they can collect efficiently, such as fine-scale CPUE, shell sizes, and GPS tracks. Respondents argued for more collaborative and cost-effective methods, modernisation of approaches, and greater reliance on diver observations to demonstrate stock health. They suggested shifting funds toward co-designed R&D, such as spawning studies, reef health, and growth variation, rather than repeating expensive surveys each year. Consultancy or industry-commissioned projects may be more efficient alternatives to current SARDI programs.

Relationship with SARDI and PIRSA

Relationships with SARDI scientists ranged from constructive to strained but currently more towards the latter. Fishers expressed appreciation when errors were corrected and outputs aligned with industry knowledge. Frustrations centred on selective data use, survey duplication, inflated costs, and designs that did not match practical constraints.

Survey responses reflected similar concerns, noting that industry input is often disregarded and describing SARDI as operating without accountability. Respondents recalled past disputes over Tiparra survey timing, lack of clarity on management plan requirements, and slow responsiveness to industry proposals. Respondents suggested that a circuit-breaker is needed to rebuild trust. Suggestions included independent chairing or mediation, pre-assessment data meetings to agree on inputs and methods and documented decisions.

Fishery Review and Recommendations

The fishery targets greenlip abalone given the decline and subsequent closure of the fishery for blacklip. There is an extensive time series of FIS (timed swims, transects) but only for greenlip limiting the ability to assess recovery (if any) for blacklip. For greenlip, both logbook and FIS data show hyperstability. Dive loggers are being included in assessment methods and provide a further indicator of abundance trends potentially addressing the issue of hyperstability shown by coarser scale assessments. Better use of dive loggers, particularly for important SAUs such as Tiparra reef could improve monitoring and assessment.

As with the Western Zone, fishers in the Central Zone have voluntarily reduced catch limits suggesting that the harvest strategy is underperforming. MSE evaluation further suggests that the harvest strategy is insufficiently precautionary. Greenlip is currently below the TRP.

Abalone, Southern Zone

Fishery characteristics

- Main sectors: Allocation (statewide abalone): commercial 99.74% recreational 0.15%, Aboriginal 0.11%
- Target species: blacklip abalone (*Haliotis rubra*)
- Fishing method(s): dive, hand collection
- Spatial complexity: spatially disaggregated stocks on shallow subtidal reefs.
- Shared stocks: blacklip abalone can show genetic heterogeneity among closely located populations (< 15 km) (Stobart and Daly 2025).
- Main management controls (input, output). Output: TACCs (quota units held as entitlements by individual licences), spatially variable size limits by spatial assessment units. Input: limited entry.
- Management plan/harvest strategy (PIRSA 2021a).
- Number of licences: 6
- Catch (t) 140.
- GVP ($) 3.5 million
- NER ($) statewide decreasing trend currently $5 million.
- NER/GVP statewide = 28%
- Licence fee/GVP statewide: 11.9%
- SAFS classification / fishery status: Sustainable
- Export competition is decreasing prices and affecting GVP/NER

CRIS information

- GVP $3.5million
- CRIS cost
  - Total
  - Science and monitoring: $183,530
  - Compliance
- CRIS science breakdown
  - Catch sampling, FIS, stock assessment: Fieldwork cost $15,788, other attributable costs not specified.
  - Elements not covered under cost-recovery. Harvest strategy development, environmental surveys, biosecurity issues.
- Benchmarking
  - FIS costs comparable with similar surveys elsewhere (Victoria, New Zealand).

Stock Risk

- Note 1: AVG was detected in Southern Zone populations in 2024 and the fishery was closed in March 2025. The latest assessment (Burnell and Hogg 2023) has classified the blacklip fishery as sustainable with the greenlip fishery undefined.
- Note 2: Greenlip is only a minor species in the Southern Zone, so the risk scores are based primarily on blacklip.

Monitoring

- Catch sampling
  - Commercial blacklip shell sampling, FIS length frequency data
- FIS (frequency, coverage)
  - 4 blacklip sites, 1 greenlip site
  - Each site surveyed biennially
  - Most sites surveyed since 2010
  - FIS surveys will continue post AVG closure, likely using commercial divers, not subject to cost-recovery
- Catch uncertainty (e.g. recreational)
  - Recreational catches are not significant
- Additional industry-led monitoring
  - GPS location and depth logger monitoring implemented on some fishing days since 2010
- **Monitoring Score – 1**
  - Comprehensive monitoring for blacklip.

Assessment

- Latest assessment: Burnell *et al.* (2022).
- Methods
  - Zone Scores built up from catch weighted SAU scores, in turn comprising analysis of CPUE and FIS data, equally weighted where both are available
  - Additional analysis of secondary indicators from length frequency and other data
  - Preliminary analysis of GPS logger data and comparison with FIS and commercial CPUE
- Key uncertainties
  - CPUE: not standardised, no account of changes in effective effort
  - CPUE known to be hyper-stable
  - Changes in spatial distribution of catch not accounted for
  - FIS only available from a limited number of SAUs
- Frequency of assessments
  - Reports (stock assessment or stock status) annual
- **Stock Assessment Score – 2**

    - Further analysis of hyperstability in CPUE and relationship to catch per area (from GPS loggers) would improve the assessment

Harvest strategy

- Form of HCR/decision table
    - Same as for Central Zone and Western Zone fisheries
    - The harvest strategy specifies in detail how zonal scores are calculated from SAU specific data, and translated into a target catch
    - For a Zone Score of 5, the target catch for blacklip is 132 t
    - TACs can be adjusted up to 10% (up or down) using information from secondary indicators
    - Basis for setting the greenlip TACC not clear
- Robustness of primary indicator(s)
    - Uncertainties in the Zone Scores and their basis are covered above under stock assessment risk
- Selection of reference points
    - Reference points are set for each SAU
    - Reference points for both CPUE and FIS are taken from a reference period that does not include the period of greater productivity from 2000 to 2007. TRPs (Score 5) are set based on the middle 40% of the range for the reference period, the LRP (Score 0) is set at 20% below the second lowest value for the reference period, and a maximum score (10) is set at 20% above the second highest value in the reference period.
- Harvest strategy performance
    - Note – scored before AVG
    - The blacklip stock is well above its TRP and trending up
    - SARDI stock assessment report notes concerns about stock status in some individual SAUs
    - The greenlip stock is classified as undefined (although there is some evidence of a decline based on very limited FIS data)
- **Harvest Strategy Score – 2**
    - HS is working for the principal stock (blacklip)
    - HS needs further consideration of implications of hyperstability in CPUE

Current stock status

- Relative to TRP and LRP
    - blacklip Zone Score well above TRP
    - greenlip status "undefined"
- Trend
    - blacklip status trending up (before AVG impact)
- **Stock Status Score – 1**

    - Currently vulnerable to AVG.
- Summary risk score (1-5)
- Average across the four measures above
- **Stock Risk Score = 1.5**

Ecological risk assessment

- Assessed by DCCEEW (2024) under provisions of Part 13A of the EPBC Act. Export approval until 2035.
- Recent ERA (PIRSA 2021b) following ESD framework (Fletcher *et al.* 2002).
- ETP, bycatch and habitat risks. Ranked as negligible given hand collection nature of the fishery.
- Summary risk score **1**

Ecological risk management

No specific management measures required given evidence of negligible impact from ERA/Strategic Assessment

Fishery Review and Recommendations

Nominally a two species fishery but primarily based on blacklip with no catches of greenlip currently recorded (status "undefined"). Although the AVG virus threatens stocks of blacklip Abalone the zone has been performing well with no sustainability issues related to current levels of fishing effort. Time series of FIS including length frequency data are comprehensive. Use of dive logger technology is increasing. However, hyperstability in logbook CPUE data could be addressed with finer scale evaluation using dive loggers.

Blacklip abalone are currently well above the TRP.

Blue Crab

Fishery characteristics

- Main sectors: commercial (pot and marine scale sectors, recreational) and allocations: commercial pot 65.5%, commercial marine scale 4.5%, recreational 29%, Aboriginal 1%
- Target species. Blue swimmer crab (*Portunus armatus*)
- Fishing method(s): baited pots (pot sector), marine scale (hoop, drop nets, trawl byproduct)
- Spatial complexity: widespread populations with two management zones: Spencer Gulf and Gulf St. Vincent
- Shared stocks. Blue crabs within Spencer Gulf and Gulf St. Vincent likely represent separate subpopulations with limited gene flow (Bryars and Adams 1999).
- Main management controls (input, output): Input; limited entry, seasonal and spatial closures, gear restrictions. Output TACCs (ITQs), prohibition of take of berried females, size limit of 110 mm carapace length.
- Management plan/harvest strategy (PIRSA 2024a)
- Number of licences: 9 pot, 1 marine scale
- Catch (t): TACC 458t Spencer Gulf, 245t Gulf St. Vincent. Catch 385t and 212 t respectively.
- GVP ($) 10 million
- NER ($) 3 million
- SAFS classification / fishery status Sustainable.

CRIS information

- GVP $10 million
- CRIS cost
    - Total
    - Science and monitoring: $184,235
    - Compliance
    - Licence fee/GVP 3.2%
- CRIS science breakdown
    - Catch sampling, FIS, stock assessment: Field work $12,000, payment to industry for surveys $34,000.
    - Elements not covered under cost-recovery: harvest strategy development, environmental studies, biosecurity.
- Benchmarking
    - Comparative research programs unavailable.

Stock Risk

Monitoring

- Catch sampling
    - None for commercial landings
    - Size, sex and condition for FIS
- FIS (frequency, coverage)
    - FIS for legal sized (secondarily pre-recruits) since 2015 (both Gulfs)
    - Previous FIS for pre-recruits 2002-2018 (both Gulfs)
    - Recent FIS shows high interannual variability (compared with commercial CPUE)
- Catch uncertainty (e.g. recreational harvest)
    - Infrequent and imprecise recreational catch surveys, not region specific
- **Monitoring Score – 2**
    - Higher risk due to uncertain recreational catch

Assessment

- Latest assessment: Beckmann and Hanamseth (2024).
- Methods
    - Empirical, indicator-based
    - Based primarily on trends in FIS (legal sized and pre-recruit)
    - Reference points defined in Harvest Strategy
- Key uncertainties
    - Commercial CPUE not standardised, no adjustment for changes in fishing power
    - Evidence for hyperstability in commercial CPUE
    - However, stock assessment and stock status are based primarily on trends in FIS, not commercial CPUE
    - Recreational catch estimates very uncertain
- Frequency of assessments
    - Annual
- **Stock Assessment Score – 1**
    - Comprehensive report including detailed spatial analysis.
    - Appropriate use of FIS information
    - There is the potential to apply simple quantitative models in future.

Harvest strategy

- Form of HCR/decision table
    - Decision Table with specified maximum biological sustainable catch across a range of bands of legal-sized FIS CPUE
    - Note that a feature of both HCRs is that harvest fraction increases as stock levels decline, despite catch levels decreasing. Presumably this

    - reflects a desire to maintain more stable catches but could become problematic if stock levels decline again.
- Robustness of primary indicator(s)
    - Based on FIS so should be robust
- Selection of reference points
    - Based on historical FIS information – roughly, lowest point in time series to define LRP, with TRP roughly double LRP
- Harvest strategy performance
    - Generally maintaining stocks at or above TRPs
    - Some possible concern about HCR setting catch levels too high in recent years, particularly for Gulf St Vincent (TAC under caught).
- **Harvest strategy score – 2**
    - Some concern that harvest fraction increases as stock declines.

Current stock status

- Relative to TRP and LRP
    - In both Gulfs, stocks are above the TRP
- Trend
    - Longer term trends are up
- **Stock status Score – 1**
    - Status and trends are positive

Summary risk score (1-5)

- Average score across the four measures above
- **Stock Risk Score = 1.5**
    - The main concerns are uncertainty about recreational catch levels and the form of the HCR (increasing harvest fraction as stock declines)

Ecological risk assessment

- Assessed under EPBC Part 13 A guidelines WTO approval until 2035 (DCCEEW 2025).
- ESD risk assessment completed by PIRSA in 2023 (PIRSA 2023a).
- Summary risk score **2**

Ecological risk management

- Further and more detailed assessment of impact on byproduct species required, improved information on discards (condition of EPBC assessment).

Stakeholder Feedback

Data collection

Respondents described the Blue Crab fishery as well run and professionally managed, with straightforward reporting requirements. No issues were raised about logbook data collection or interpretation, and costs associated with logbooks were not seen as a priority concern.

Survey responses confirmed that logbook catch data for target species is rated highly, with all respondents scoring it as high or very high quality. Byproduct and bycatch data were also rated from medium to very high, with no negative comments. ETP reporting received scores ranging from medium to very high quality. Spatial effort data attracted more varied ratings—low, medium, and very high—which may reflect differences in how data are captured or applied. Temporal effort data was rated medium by most respondents, with one rating it very high.

Some respondents noted that operational decisions are currently more influenced by environmental shocks such as algal blooms than by deficiencies in catch-and-effort data. There was interest in improving validation processes and ensuring that size-weight checks are conducted more frequently than the current five-year interval.

Fishery independent surveys

Annual fishery-independent surveys underpin stock assessment and harvest strategy decisions and are widely trusted by industry. Respondents claimed that the survey program is reliable, repeatable, and central to management. The recent ad hoc "mini" survey, conducted outside the usual March–April window, returned near-zero catches in Gulf St Vincent during the algal bloom. Despite the timing being "out of kilter" and involving a mix of old and new sample sites, the results corroborated industry observations and confirmed the impact of the bloom. Industry is comfortable with survey ownership, participation arrangements, and the periodic validation of size/weight conversions.

Survey responses supported these views, with all three respondents rating survey data as high or very high quality. One comment stressed the need to validate data across different years to ensure consistency.

Other information

The Blue Crab fishery is unusual in not relying on CPUE for control rules, which avoids the pitfalls of effort creep or environmentally driven changes in catchability. Nevertheless, environmental context is critical, particularly the algal bloom that recently devastated Gulf St Vincent. Respondents also pointed to anecdotal evidence of a southward range shift, with crabs now reported as far as Kangaroo Island, the Coorong, and even Robe.

To explore connectivity among populations, the association commissioned independent DNA work, which confirmed linkage between gulfs supporting mixing of crab populations and range expansion. Survey ratings of biological, economic, oceanographic, and other environmental data were generally positive, although mixed. Respondents recognised the importance of environmental information but noted that it is not consistently included in assessments.

Stock Assessment

Stock assessments are regarded as clear, transparent, and fit for purpose. Fishers noted that the process is straightforward and dependable, with strong survey inputs forming the basis of advice. Industry noted that there is good alignment between on-water observations and scientific conclusions.

Survey responses were broadly consistent, with respondents reporting good to extremely good understanding of the assessment process. Assessments were well regarded but respondents noted that environmental factors are not adequately considered. Transparency was scored only as somewhat transparent, suggesting a desire for clearer communication about methods.

Harvest Strategy

The harvest strategy is influenced by fishery-independent survey indices and not CPUE with good support from industry. Exceptional-circumstances provisions such as the recent algal bloom were highlighted as valuable to ensure the strategy can respond accordingly. Respondents noted that the harvest strategy balances sustainability and economic outcomes. Clear decision rules were highlighted as the most effective element, whereas suggested changes included ensuring biological data such as size-weight ratios are validated each year.

Research Costs and Efficiency

Some concerns of research relate to spatial coverage and range expansion. Industry has expressed interest in extending fishing grounds southward to track an apparent climate-driven shift in crab distribution. Respondents suggested that a more pragmatic, staged approach is needed: small-scale exploratory fishing under permit to confirm biomass, followed by structured consideration of boundary adjustments that do not dilute existing quota holdings. Survey responses reinforced that assessments and harvest strategies are useful, but that delays, costs, and infrequent validation undermine efficiency. Respondents called for greater collaboration with industry and more cost-effective approaches to applied research.

Relationship with SARDI and PIRSA

Industry participants described their relationship with SARDI scientists as constructive. The survey program runs smoothly, reports are intelligible, and assessments are viewed as professional and dependable. The harvest strategy development process was described as one of the easiest and most collaborative compared with other fisheries.

Frustrations lie more with policy and politics than with science. Respondents claimed that the main challenge is the cost and inflexibility of SARDI-led exploratory work south of the boundary, which has prevented testing new grounds. They argued that government prioritisation of algal-bloom recovery could provide an opportunity to unlock more cooperative and affordable approaches. Suggestions included industry-assisted sampling, partnerships with universities, or competitive tendering to reduce reliance on a single research provider.

Fishery Review and Recommendations

Monitoring of the Blue Crab fishery is extensive and includes catch sampling, FIS in both Gulfs, and commercial logbook information. A weakness is the uncertainty in recreational catch as surveys are infrequent and not region specific.

Annual assessments are comprehensive and based primarily on abundance trends provided from FIS not on CPUE (as in most other fisheries). There are opportunities, currently not realised, to develop simple quantitative models to aid assessment. CPUE from logbooks are not standardised with no adjustment for fishing power. These data show hyperstability in contrast to interannual trends in abundance shown for FIS data.

Although the harvest strategy is performing well with stocks at or above TRPs, there are concerns that the HCR may set catches too high as harvest fraction increases with stock decline.

There are few ERA concerns as a trap fishery has generally low ecological impact. However, strategic assessments responsive to EPBC conditions have noted a need for more detailed assessment on the impacts of fishing on byproduct species and on quantification of bycatch discards. the harvest fraction.

Giant Crab Fishery

Fishery characteristics

- Main sectors Commercial. Recreational insignificant, Aboriginal insignificant.
- Target species: Giant crab (*Pseudocarcinus gigas*)
- Fishing method(s): baited pot
- Spatial complexity: managed jointly under OCS arrangements with the Commonwealth. Separated into two zones corresponding to the Southern and Northern Rock Lobster zones.
- Shared stocks: Giant crab is likely a single biological stock across southern Australia (Levings *et al.* 2010).
- Main management controls: Input; limited entry, closed seasons, spatial closures, gear restrictions (number of pots). Output; TACC, size limit of 150 mm carapace length, prohibition of take of berried females.
- Management plan/harvest strategy (PIRSA 2024b).
- Number of licences: 2. Rock lobster licence holders can take up to five giant crabs per fishing trip as byproduct when fishing for rock lobster.
- Catch (t) ~14 t against TACC of 22 t. TACC now reduced to 9.3 t.
- GVP ($) unavailable but low
- NER ($) unavailable.
- SAFS classification / fishery status Depleting

CRIS information

- GVP unavailable
- CRIS cost
    - Total
    - Science and monitoring $16,881
    - Compliance
- CRIS science breakdown
    - Catch sampling, FIS, stock assessment: no field work specified, further details of attributable costs unavailable.
    - Elements not covered under cost-recovery. Harvest strategy development, biosecurity.
- Benchmarking
    - unavailable

Stock Risk

Monitoring

- Catch sampling
    - Sex, pre-recruits, mean weight, spawning females

- FIS (frequency, coverage)
    - None
- Catch uncertainty (e.g. recreational sector)
    - Not applicable
- **Monitoring Score – 3**
    - Small fishery, limited monitoring

Assessment

- Latest assessment: McLeay (2024).
- Methods
    - Trends in 3-year average CPUE
    - CPUE standardised for month, licence, MFA, depth
- Key uncertainties
    - Data limited, no FIS, small scale
    - Possibility / likelihood that CPUE is hyper-stable (not considered)
- Frequency of assessments
    - Annual
- **Stock Assessment Score – 4**
    - Trends in CPUE hard to reconcile with catch history (no stock assessment model)

Harvest strategy

- Form of HCR/decision table
    - TACC vs CPUE band
    - Harvest rate declines slightly with decreases I biomass, but still quite high just above LRP (both stocks)
- Robustness of primary indicator(s)
    - CPUE could be hyper-stable
    - Most other stocks in SE Australia have been overfished
- Selection of reference points
    - TRP = CPUE over the period 2000-2012
    - LRP is set at half the TRP
- Harvest strategy performance
    - TACC under caught over many years
    - Recent declines in both stocks towards the LRP
    - Recent strong declines in TACC for both zones (more severe than under harvest strategy decision tables)
- **Harvest Strategy Score – 3**
    - Harvest strategy should be reconsidered, especially with possibility of hyper-stable CPUE

Current stock status

- Relative to TRP and LRP
    - Northern Zone – CPUE below trigger reference point
    - Southern Zone – CPUE below trigger reference point
- Trend
    - Northern Zone – steep decline
    - Southern Zone – stable in recent years
- **Stock Status Score – 4**
    - Medium to high risk

Summary risk score (1-5)

- Average across the four measures above
- **Stock Risk Score = 3.5**

Ecological risk assessment

- Assessed by under the provisions of Part 13A of the EPBC Act in 2025. Conditional export approval until 2035 (DCCEEW 2025b).
- Last risk assessment by PIRSA in 2018 (PIRSA 2018).
- Limited interactions with ETPs e.g. whales
- Summary risk score **2**.

Ecological risk management

- Few bycatch issues but improved data collection and recording required to assess risk (condition of EPBC Assessment).

Stakeholder Feedback

To be completed

Fishery Review and Recommendations

There is relatively little information on this fishery including economic data. It is currently assessed as depleting but there is limited monitoring with no FIS. The fishery is assessed primarily by trends in standardised CPUE. However, these trends are difficult to relate to catch history as there has been no formal stock assessment. It is also likely that CPUE trends are hyper-stable. The TACC for Giant Crabs has been under caught for many years in both zones with recent reductions greater than indicated from HCRs in the harvest strategy. There are few ecological risk issues of concern although improved data collection and recording is required to assess risk (bycatch/byproduct, interaction with ETPs.

Lakes and Coorong – Finfish

Fishery characteristics

- Main sectors: commercial, recreational and Aboriginal. Allocations shared also with the commercial marine scalefishery as below:

Species	Fishery	Commercial	Recreational	Aboriginal	Total
Golden Perch	Lakes and Coorong	71.6%	27.4%	1.0%	100%
Mulloway	Marine scale	19.9%	79.1%	1.0%	100%
	Lakes and Coorong	71.4%	27.6%	1.0%	100%
Yelloweye mullet	Marine scale	54.2%	44.8%	1.0%	100%
	Lakes and Coorong	98.9%	0.55%	0.55%	100%

- Target species: golden perch (*Macquaria ambigua*), mulloway (*Argyrosomus japonicas*) and yelloweye mullet (*Aldrichetta forsteri*).
- Fishing method(s): gillnets (small and large mesh)
- Spatial complexity: A multi-species, multi-method community-based fishery that operates in a dynamic land-based environment. It includes three separate but closely linked lacustrine ecosystems: northern and southern lagoons, freshwater lower lakes of Lake Alexandrina and Lake Albert, and the adjacent coastal marine waters along the Sir Richard and Younghusband peninsulas.
- Shared stocks. Mulloway and yelloweye mullet widespread (including across state boundaries) but golden perch considered to be local stocks.
- Main management controls: Input: limited entry, Total Annual Commercial Effort, gear restrictions
- Management plan/harvest strategy (PIRSA 2022a)
- Number of licences: 30 (including Pipi)
- Catch (t). Total (1,404t including pipis). Golden perch 52.4, mulloway 28.9, yelloweye mullet 235.9
- GVP ($) 13.3 million (including highly profitable pipis)
- NER ($) 6.4 million
- SAFS classification / fishery status Main species Sustainable. Black bream depleted.

CRIS information

- GVP $13.3 million (including pipis)
- CRIS cost
  - Total
  - Science and monitoring $234,772 (finfish only)
  - Licence fee/GVP 5.5% (including pipis)
  - Compliance

- CRIS science breakdown
    - Catch sampling, FIS, stock assessment: payment to industry for surveys $13,500, Fieldwork $11,500
    - Elements not covered under cost-recovery. Harvest strategy development, environmental studies, biosecurity.
- Benchmarking
    - unavailable

Stock Risk

- Note: A complex fishery. Multispecies, multigear (primarily gillnet), multizone. Was MSC certified but lost certification. Strongly environmentally driven (River Murray flows). Managed using annual Total Allowable Commercial Effort (TACE). Primary species: golden perch, mulloway, yelloweye mullet, carp. black bream are currently under a rebuilding plan.

Monitoring

- Catch sampling
    - Periodically collected for primary species and annually for Black Bream
    - Length and age structure sampling
    - Samples collected at market (SAFCOL) with some sampling on board commercial vessels.
- FIS (frequency, coverage)
    - Only for black bream as part of recovery plan, occasional for greenback flounder. Contracted commercial vessels with SARDI observers. Data on abundance, distribution and age structure collected.
- Catch uncertainty (e.g. recreational sector)
    - Recreational catch data infrequent and uncertain
    - Allocation between commercial and recreational varies across species
- **Monitoring Score – 3**
    - Complexity of the fishery makes monitoring challenging. Uncertainty about recreational catch adds to the challenge.

Assessment

- Latest assessment: Sarakinis and Earl (2024)
- Methods
    - Species assessed using weight of evidence (except black bream, greenback flounder)
    - Long time series of CPUE (since 1984) and considerable data on age structure for a number of species
- Key uncertainties

- Definitions of effort: targeting is complex and not well understood from logbooks
- CPUE unstandardised
- CPUE does not consider changes in gear, targeting, fishing power, hyperstability etc
- Catch composition data – generally small sample sizes and infrequent

- Frequency of assessments
  - Annual with individual species focus for each report.
  - 2025 SLA includes a report on fishery-seal interactions (seal depredation issue)
- **Stock Assessment Score – 3**
  - Weight of evidence, no FIS (except black bream, greenback flounder) but relatively long time series of CPUE and some age structure
  - Note: the score reflects the difficulty of the challenge, not the quality of the research (doing the best with limited information).
  - The stock assessment report is comprehensive and thorough, given the limitations of the data and limited budget.

Harvest strategy

- Form of HCR/decision table
  - The main focus is on the sustainability of a key target species for each of the three net sectors: golden perch for the Freshwater (Lakes) Large Mesh Gillnet (FLMGN); mulloway for the Estuarine (Coorong) Large Mesh Gillnet (ELMGN); and yelloweye mullet for the Estuarine (Coorong) Small Mesh Gillnet (ESMGN) sectors.
  - The main indicator for each sector is an environmental variable used to define the “available habitat” for each sector’s main species. Target, trigger and limit reference points are defined for each environmental variable.
  - The most recent management plan (PIRSA 2022a) has added a secondary (biological) indicator used in the harvest strategy, derived from (unstandardised) CPUE for the main target species for each net sector.
  - The TACE level for each net sector is then set (annually) based on the combination of primary and secondary indicator scores.
  - Note that falling below the biological LRPs results in somewhat lower TACEs but does not result in fishery closure except when environmental scores are very low.
  - Note: the TACE level is for deployment of gear units (maximum 1,175) and not gear-day units.
- Robustness of primary indicator(s)

- Primary indicators are environmental variables – surrogates for habitat suitability or availability for main primary species – and are measured robustly. However, the relationship between these and fishery performance is less certain, though several scientific studies and reports form the basis for the relationships.
- Secondary indicators are CPUE for main target species; robustness of CPUE is difficult to establish in a multispecies fishery (apart from any other issues with use of catch rates, such as changes in fishing practices due to avoidance of long-nosed fur seals)

- Selection of reference points
  - The basis for the selection of reference points is outlined in some detail in the management plan. The arguments are largely qualitative and based around inferences from long term trends in CPUE (available since 1984).
  - Selection of the LRPs for each main species make the argument that the LRPs are "safe" due to the stocks within the fishery being part of larger stock units outside the fishery (into the River Murray for golden perch, and into marine waters for mulloway and yelloweye mullet).
- Harvest Strategy performance
  - The most recent stock assessment report (Sarakinis and Earl 2024) classifies most of the primary species targeted in the fishery as "sustainable" with one species – black bream – as "depleted".
  - The assessment report does not include information on how TACEs by sector have changed over time, so it is difficult to determine how the harvest strategy has responded to changing values of the primary and secondary indicators.
  - CPUE for many species appears to have increased in response to strong freshwater inflows from high rainfall in the Murray Darling Basin in 2022/23 (strongest flood event since 1956).
- **Harvest Strategy Score – 3**
  - This is an unusual fishery and an unusual harvest strategy and is difficult to score
  - The harvest strategy has been strengthened by the more recent inclusion of biological indicators (CPUE) in addition to the previous environmental indicators. Most stocks appear to be currently at high levels (above the TRP for CPUE) but the form of the decision tables and the rather weak TACE input controls (amount of gear that can be used but not how often it can be used) raise doubts about the effectiveness of the harvest strategy should stock status deteriorate substantially.

Current stock status

- Relative to TRP and LRP

    - Mostly above TRP for CPUE and classified as sustainable, with the exception of black bream, for which a recovery plan is in place.
- Trend
    - Mostly increasing in recent years
- **Stock Status Score – 2**
    - Mostly positive but uncertainty due to predominant reliance on CPUE

Summary risk score (1-5)

- Average across the four measures above
- **Stock Risk Score = 2.75**

Ecological risk assessment

- Assessed under Part 13 A provisions of the EPBC Act (DCCEEW 2023a).
- ESD risk assessment completed in 2019 then revised in 2024 (PIRSA 2024c). High risk for one retained species Black Bream.
- ETP, bycatch and habitat risks. Interactions with long-nosed fur seals.
- Highly responsive to variation in Murray River flows.
- Summary risk score **3**

Ecological risk management

- Independent data collection for bycatch/byproduct, discards required. An indicator group of bycatch species required to evaluate risk (condition of EPBC Assessment).
- Recovery plan required for depleted black bream stocks.

Stakeholder Feedback

Data collection

The finfish sector has used MSC Fishery Improvement Project funding to update its bycatch study and to secure SARDI's commitment to standardising the CPUE time series. This has replaced outdated work from the Millennium drought. Industry stressed that estuarine flow and environmental conditions remain central to interpreting stock trends, and that ancillary commercial sampling alongside fishing may add value but will not replace the need for longer-term survey time series. Survey responses on environmental data were mixed, with respondents noting that additional collections would be cost-prohibitive unless strongly justified.

Standardisation is recognised as important for correcting efficiency and availability effects, although industry claimed that it is incomplete without tightening the effort metric—moving from "days" to a more precise unit such as net-hours. Survey responses on logbook effort data were mixed (high to medium), with comments noting that finer-scale reporting would add costs and that resourcing is a persistent concern.

Fishery independent surveys

For finfish, a multi-panel gillnet survey focused on black bream is underway, with fixed sites sampled in seasonal windows to capture multiple size classes. Industry noted that the program has only been running for about two years and results have not yet been published. Challenges have included seal damage to nets and restrictions on site flexibility. Industry has supplied spare nets to support the work. Some respondents questioned whether fixed-site designs are robust to climate-driven shifts and suggested adaptive or partially randomised designs may be needed. Survey responses rated FIS highly overall but flagged costs and practicality as concerns.

Stock Assessment

Assessments are complicated by the multispecies estuarine environment and the absence of a long time-series of data for finfish. Standardised CPUE and the emerging FIS are intended to improve assessments, but industry emphasised that management precision—particularly how effort is controlled—is the limiting factor. Respondents claimed that aggregated assessments across pipi and finfish can confuse status narratives, and welcomed BDO's move to report them separately. Survey respondents highlighted that assessments should be updated annually but were critical of delays and perceived inefficiencies.

Harvest Strategy

Independent MSC reviewers identified that the main harvest strategy lever—controlling net numbers—lacks the precision needed to ensure timely and demonstrable management impact. Respondents noted that reform of effort metrics is necessary and pointed to Jason Earl's earlier work on allocation and participation as a starting point for redesign. They also emphasised the role of environmental indicators, particularly estuarine flows, which remain explicit in the harvest strategy. Survey respondents indicated scepticism about responsiveness and balance of harvest strategy rules and called for more systematic integration of fisher input.

Research Costs and Efficiency

Industry noted that the estuarine environment presents classic challenges: high variability, multiple species, and survey fatigue when operations are disrupted by seals or difficult conditions. They noted that FIS publication lags undermine learning and confidence, and that prices and margins for finfish have declined in recent years, reducing capacity to fund research. Respondents encouraged suggestions for cost-effective designs, including climate-robust sampling approaches. Survey responses across the fishery indicated that biological programs are adequate and not in need of expansion, and that additional surveys would only be viable if fish prices improved.

Relationship with SARDI and PIRSA

Engagement with SARDI was described as active and pragmatic. Respondents noted that SARDI scientists are leading the FIS and standardisation work, and that MSC processes have channelled attention to effort-control precision. Frustrations are procedural, not relational, with industry wanting clearer and timelier documentation of survey methods and results, faster progress on effort reform, and visible pathways for integrating new data into assessments and harvest strategy reviews. Survey responses across the fishery also emphasised the need for more feedback on how data are used and greater incorporation of fisher perspectives.

Fishery Review and Recommendations

The Lakes and Coorong (finfish) fishery is a complex multi-species, multi-gear species operating in a volatile environment (influenced by river flows and freshwater/seawater exchange). Although target species are generally managed sustainably, at least one species Black Bream, is depleted and responsive to a rebuilding plan.

Some target species are also caught by recreational fishers but recreational catches are poorly quantified. Most target species are assessed by weight of evidence. There is a long time series of CPUE data and information on age structure for some species. However, interpretation of CPUE trends is complicated by variation in gear, targeting behaviour, fishing power and CPUE data are not standardised.

Primary performance indicators in the harvest strategy are environmental (used to define “available habitat” for each net sector’s main target species. A secondary indicator CPUE is also used in the harvest strategy notwithstanding the issues noted above. The form of the HCRs and the rather weak TACE input controls raise doubt about the effectiveness of the harvest strategy should stock status of individual species deteriorate.

There are a number of issues relating to ecological risk given the responsiveness of the fishery to variation in Murray River flows. There are interactions with long-nosed fur seals and a need for improved quantification of bycatch/byproduct and discarding in the fishery.

Lakes and Coorong - Pipi

Fishery characteristics

- Main sectors: 73% commercial 26% recreational and 1% Aboriginal. NZ and SZ rock lobster also have access to 10kg of pipis per day for personal bait use. There are currently 14 Northern Zone rock lobster licence holders with this endorsement but no none in the Southern Zone.
- Target species: Pipi *Donax deltoides* now *Latona deltoides*.
- Fishing method(s): hand rake and collection.
- Spatial complexity. Spatially compact fishery with most of the catch coming from a 20 to 40 km section of the Younghusband peninsula.
- Shared stocks: localised population but likely shared with other pipi stocks elsewhere including Victoria.
- Main management controls; Output controlled (TACC/ITQ), legal minimum length of 35 mm. Limited entry, spatial and temporal closures, gear restrictions
- Management plan/harvest strategy (PIRSA 2022a).
- Number of licences: 19 (Lakes and Coorong); 2 MSF
- Catch (t) 442 tonnes landed of TACC 450t
- GVP ($) 8 million (pipis contribute about 60% of the GVP for the Lakes and Coorong fishery of $13.3 million).
- NER ($) 6.4 million (pipis and finfish combined)
- SAFS classification / fishery status Sustainable

CRIS information

- GVP $8 million
- CRIS cost
  - Total
  - Science and monitoring $239,233
  - Compliance
  - Licence fee/GVP 5.5% (pipis and finfish combined)
- CRIS science breakdown
  - Catch sampling, FIS, stock assessment: Fieldwork $5,500, payment to industry for surveys $29,250
  - Elements not covered under cost-recovery. Harvest strategy development. Response to HAB. Biosecurity.
- Benchmarking
  - unavailable

Stock Risk

- Note: 73% commercial, 26% recreational, 1% Aboriginal/traditional

    - Commercial and recreational fisheries are spatially separate

Monitoring

- Catch sampling
    - Size frequency from FIS surveys
- FIS (frequency, coverage)
    - Surveys annually since 2007
    - 3 surveys per year – early, mid and late season
- Catch uncertainty (e.g. recreational harvest)
    - Not applicable
- **Monitoring Score – 1**
    - Spatial range of the commercial fishery is fully monitored

Assessment

- Latest assessment: Ferguson and Hooper (2025).
- Methods
    - Trends in FIS over time
    - Additional information on presence/absence of pre-recruits
- Key uncertainties
    - Patch size relative to survey transects
- Frequency of assessments
    - Annual
- **Stock Assessment Score – 1**
    - Long time series of FIS

Harvest strategy

- Form of HCR/decision table
    - TACC vs FIS relative biomass band
    - Lower band value selected if 1) pre-recruit index low; or 2) fishery gross margin not expected to increase by 2.5%
    - Note: some concern as harvest fraction increases as stocks decline; presumably a trade-off with catch stability
- Robustness of primary indicator(s)
    - FIS is robust
    - Evidence for hyperstability in CPUE but CPUE not used
- Selection of reference points
    - Appears to be empirical
- Harvest strategy performance
    - Current harvest strategy is maintaining stocks above TRP
- **Harvest Strategy Score – 2**
    - Current harvest strategy is performing well; but

    - Harvest fraction versus biomass concern

Current stock status

- Relative to TRP and LRP
    - Stock currently well above TRP
- Trend
    - Current trend increasing
- **Stock Status Score – 1**
    - Sustainable above TRP

Summary risk score (1-5)

- Average across the four measures above
- **Stock Risk Score = 1.25**
    - Fishery is MSC certified

Ecological risk assessment

- MSC certified fishery (recertified 2022)
- Assessed under the provisions of Part 13A of the EPBC Act (DCCEEW 2023a).
- Updated ESD ERA (PIRSA 2024c).
- No recorded interactions with ETPs.
- Negligible bycatch and habitat impacts.
- Summary risk score **1**

Ecological risk management

- Mitigation measures included as part of MSC certification process.

Stakeholder Feedback

Data collection

The Pipi fishery operates under a shared quota structure, with Goolwa PipiCo holding about 70% of quota and the Southern Fishermen's Association holding the remaining 30%. Both groups collaborate closely on management and research through the MAC. Logbook and catch reporting are consistent, and industry did not raise concerns about data integrity. Survey responses, which applied across fisheries, showed mixed ratings for target catch data (high to medium). Comments emphasised the high cost of improving data collection and called for clearer and timelier feedback on how results are used, expressing concern that reporting benefits management more so than fishers.

The fishery has recently experienced closures due to harmful algal blooms and brevetoxin accumulation in shellfish. Industry noted that this was the first closure of its kind, and a working group has been established to investigate the causes. Although most algal biomass was non-toxic, small proportions of certain species drove toxin production, creating new monitoring challenges. A small translocation research project is also testing growth rates at alternative sites. Respondents highlighted that recreational beaches in the north are largely unmonitored and that more work is needed to understand interactions between commercial and recreational harvest.

Fishery independent surveys

The dedicated fishery-independent survey is conducted annually at three sites and covers the length of the main commercial beach. Industry noted that it has worked effectively, with the survey detecting stock changes after a localised die-off and confirming shifts in size structure. They regard the program as robust and responsive. Survey responses rated FIS data from medium to very high quality but stressed that new or expanded surveys would only be viable if returns improved substantially.

Stock Assessment

Stock assessment relies heavily on FIS data to inform TAC setting and harvest strategy rules. Industry generally supported the framework, although debates occur each year around TAC levels within the bounds of the harvest strategy. These debates reflect business model differences (price versus throughput) rather than disagreements about science. Survey responses showed no specific comments on Pipi assessment but indicated that across the fishery, assessments are considered costly and not always aligned with industry observations.

Harvest Strategy

The harvest strategy sets TAC limits with an upper bound of around 600 tonnes. Respondents noted that the strategy has generally maintained industry confidence and demonstrated robustness when it responded appropriately to the Coorong die-off event. They noted that although debates occur about TAC levels, the framework itself has legitimacy. Survey responses across the fishery rated rules as somewhat clear or not so clear, and responsiveness as only somewhat or not so responsive. One participant commented that changes “only happen quickly if it is against the fishers,” highlighting concerns about uneven responsiveness. Both survey responses agreed that sustainability and economics are not balanced effectively.

Research Costs and Efficiency

Industry considered the research program to be functional and cover core needs, aside from the new challenges posed by harmful algal blooms. They noted that most funding supports surveys and monitoring, with limited resources left for broader research and development. Respondents claimed that recreational harvest data are lacking, particularly on northern beaches, and that research should address how commercial and recreational catches interact. Survey respondents repeatedly raised cost concerns across fisheries, noting that improvements in data and surveys are only feasible if returns increase.

Relationship with SARDI and PIRSA

Industry described their relationship with SARDI as collaborative and constructive. They said the research program "ticks all the boxes" and builds confidence, with responsiveness during the die-off event reinforcing trust. Disagreements are more about TAC allocation philosophies than research design or execution.

Fishery Review and Recommendations

This is a demonstrably well managed fishery with formal inter-sectoral allocation (commercial and recreational) based on area (as a proxy for stock biomass) supported by annual fishery independent surveys which link to the harvest strategy. Trading of entitlements has increased the indigenous share from 1% to 25% (McShane et al. 2021). The stock is assessed at well above the TRP and the fishery is MSC certified with little concerns over ecological risk.

Marine Scalefish

Fishery characteristics

- Main sectors shared among commercial, recreational and Aboriginal with nominal allocation of 1% to Aboriginal and shares for specific species for commercial and recreational detailed in the management plan (see also below).
- Target species: four priority species: King George whiting (*Sillaginodes punctatus*), southern calamari (*Sepioteuthis australis*), southern garfish (*Hyporhamphus melanochir*) and snapper (*Chrysophrys auratus*). Many other species landed including elasmobranchs and molluscs. Valuable species landed include yellowfin whiting (*Sillago schomburgkii*), Australian herring (*Arripis georgianus*), snook (*Sphryaena novaehollandiae*), leatherjackets (Monocanthidae) and yelloweye mullet (*Aldrichetta forsteri*).
- Fishing method(s). More than 30 types of gear used but 60% is line based (long lines, rod and line, hand lines), 30% net based (gillnets and haul nets).
- Spatial complexity: managed and assessed within four fishing zones: west coast, Gulf St Vincent and Kangaroo Island, Spencer Gulf, and South east.
- Shared stocks. Stock structure species dependent. Many of the species targeted in the MSF are shared with stocks in neighbouring states.
- Main management controls. Output controls (TACCs/ITQs) for the four priority species, daily catch limits apply to some species, daily limit of 5 school and gummy shark combined (due to OCS arrangements). Input controls: limited entry, spatial and temporal closures, gear restrictions, permanent netting closures to protect significant juvenile fish habitats.
- Management plan/harvest strategy: PIRSA (2025)
- Number of licences: 211 following surrendering of 100 licences in 2021.
- Catch (t). 2,142 t. Four priority species comprise 60% of total weight landed and 70% of value). King George whiting 192 t, southern garfish 138 t, snapper 29 t, and southern calamari 295t. Large catches of lower value ocean jackets (*Nelusetta ayraudi*) ~ 522 t and Western Australian salmon (*Arripis truttaceus*) 362 t. are also landed.
- GVP ($) 22.4 million
- NER ($) 2 million
- NER/GVP 9%
- SAFS classification / fishery status: snapper Depleted (except for Snapper SE which is Sustainable); southern garfish Sustainable (except for Southern Garfish Spencer Gulf which is Recovering), southern calamari is Sustainable. Tier 2 and Tier 3 species are currently assessed as Sustainable or undefined.

CRIS information

- GVP $22.4 million
- CRIS cost
    - Total
    - Science and monitoring $810,699.
    - Compliance
    - Licence fee/GVP 11.5%.
- CRIS science breakdown
    - Catch sampling, FIS, stock assessment not available
    - Elements not covered under cost-recovery. Harvest strategy development, environmental studies, biosecurity.
- Benchmarking
    - Unavailable for such a complex multi-species fishery.

Stock Risk

- General note: This is the most complex fishery in South Australia. It is multispecies, multisector, multi-gear and spatially complex. It has recently been through a big reform program and has a new harvest strategy (PIRSA 2025) yet to be fully implemented.

Monitoring

- Catch sampling
    - Some market-based sampling for a few species collecting occasional age and length data
- FIS (frequency, coverage)
    - No general FIS
    - DEPM estimates for snapper over recent years due to closure of the fishery
    - Some historical DEPM data for King George whiting
- Catch uncertainty (e.g. recreational)
    - Variable recreational allocation across species
    - Recreational catch estimates uncertain and not spatially resolved
    - Charter catches more certain and better resolved
- **Monitoring Score – 3**

Assessment

- Latest assessment: Dennis *et al.* (2024).
- Methods
    - Mainly weight of evidence based on trends in CPUE and age structure for a few species

    - Occasional model-based assessments for King George whiting, snapper and southern garfish, using the 'Est' models
    - A number of problems with the quantitative models limit their usefulness (e.g. don't estimate depletion)
    - Plans to move to Stock Synthesis (SS) models for 3 main finfish species but not yet implemented
    - FRDC project in train to develop an assessment method for calamari
- Key uncertainties
    - Numerous:
        - SARDI have highlighted likelihood of hyperstability in CPUE
        - Highly skewed sex structure for southern garfish
        - Insufficient age and length sampling
        - No FIS for most species
        - Very uncertain recreational catches
- Frequency of assessments
    - Annual comprehensive report across all species (Tiers 1 to 3) but based on outdated and inappropriate performance measures
    - Plans to move to stock synthesis (SS) assessments for main stocks on 3-year cycle
- **Stock Assessment Score – 4**
    - Should improve considerably under the new harvest strategy and the move to SS assessments; however, this will not resolve most of the key uncertainties.

Harvest strategy

- Form of HCR/decision table
    - The form of the harvest strategy under the previous Management Plan was complex and not clearly linked to stock status
    - The new harvest strategy is a great improvement
        - Move to output controls
        - Defines a range of assessment categories with buffers
        - Hockey stick HCR for biomass assessed stocks
        - Multi-year recommended biological catches (RBCs) for Tier 1 stocks
        - Clarity about rebuilding depleted stocks
        - Separate implementation plan sitting outside the Management Plan allows adjustments within the life of the Management Plan
        - Future plans for Management Strategy evaluation
- Robustness of primary indicator(s)
    - Better under the new harvest strategy, but still highly dependent on CPUE
- Selection of reference points

    - Reference points for Tier 1 stocks under the new harvest strategy more objectively based
- Harvest strategy performance
    - Poor for the previous harvest strategy; should improve for the new harvest strategy but too soon to tell
- **Harvest Strategy Score – 3**
    - This score is based on the form of the new harvest strategy but its implementation is still uncertain and most stocks will continue to rely on CPUE as an index of abundance.

Current stock status

- Relative to TRP and LRP
    - Most stock are currently classified as sustainable, based on the analyses in the most recent stock assessment report (see Figure 2 below)
    - Three stocks (snapper in each Gulf and off west coast) are depleted and southern garfish in Spencer Gulf is classified as recovering.
    - However, the most recent southern garfish quantitative assessment suggests that the biomass has been below B_{20} for at least two decades, and the age structure is highly truncated. This suggests that the criteria for assigning stock status are dubious, at least for some stocks (but possibly for many).
- Trend
    - Trends are variable across stocks
- **Stock Status Score – 3**
    - Despite the classifications in the 2024 stock assessment report (Dennis *et al.* 2024), the uncertainties in the data and assumptions about CPUE, plus more quantitative assessments showing some other stocks should also be listed as depleted, casts doubt on the stock status classification. The score of 3 (moderate risk) reflects this uncertainty.

Summary risk score (1-5)

- Average across the four measures above
- **Stock Risk Score = 3.25**

Ecological risk assessment

- Assessed in 2023 under the provisions of Part 13A of the EPBC Act (DCCEEW 2023b).
- ESD risk assessment of the MSF last completed in 2011 (PIRSA 2011). Moderate risk associated with removal or damage to habitat by fishing.

- MSF catches limited numbers of CITES listed sharks and interacts with Australian sea lions although these interactions are infrequent with none recorded in the past 15 years.
- Hence a moderate risk score.
- Summary risk score **3**

Ecological risk management

Limited reporting of bycatch and discards. No monitoring of bycatch indicator species. Harvest strategy decision rules in the Management Plan do not apply to bycatch. These issues need to be addressed to reduce ERA score and to meet conditions of EPBC Assessment.

Stakeholder Feedback

Data collection

There is broad support for finer scale spatial reporting, similar to Prawn and Rock Lobster fisheries, but this must be practical for small-scale operators and not add excessive costs or complexity. Respondents stressed that although finer-scale information is valuable, it should be designed with the realities of diverse fishing methods in mind.

Survey responses rated target species logbook data as generally high quality, but they highlighted the need for timelier access to aggregated fleet data for use by associations. Some noted that after decades of data collection there has been little visible change or feedback. Byproduct and bycatch data were rated medium to high quality, although fishers stressed that current reporting often groups categories together, limiting usefulness. One suggestion was to reinstate broader bycatch surveys, with data shared across fisheries to meet MSC requirements.

ETP reporting was rated medium to very high quality, but respondents doubted whether this information is used in decision-making. One suggestion was to discontinue logbook-based ETP reporting for some species and rely instead on survey-based collection. Spatial effort data were rated high, although some respondents claimed that the current block system is too coarse and outdated. Temporal data were considered adequate overall but incomplete without comparable recreational and charter-boat effort information.

Other data inputs are viewed as problematic. CPUE is seen as heavily confounded by algal blooms, area closures, and fisher behaviour, making it unreliable as a sole indicator of stock status. Respondents noted that the recent algal bloom demonstrated how CPUE can collapse for environmental reasons unrelated to stock health, yet the system lacked flexibility to account for this.

Recreational catch data were highlighted as a major gap. For key species, PIRSA shares survey costs with industry, but for secondary and tertiary species industry pays the full cost despite recreational fishers taking a large proportion of the catch. Industry considers this to be inequitable and argued that government should fund about 45% of costs to reflect the recreational share of harvest. Survey responses reinforced this point, repeatedly calling for mandatory recreational reporting (e.g. via an app) to improve accuracy. Respondents noted that without reliable recreational data, assessments cannot be credible.

Environmental and oceanographic drivers were also considered to be important. Industry highlighted the importance of rainfall, wind strength, freshwater inflows, temperature, and salinity for species such as whiting and calamari but these data are not systematically incorporated into assessments.

VMS data were generally regarded as having little management value for a small-scale, multi-method fishery. Survey responses rated VMS inconsistently, with many responding that they “don’t know” or considering it primarily a compliance tool. Industry stressed that if VMS is to be used, it must deliver tangible benefits such as spatial effort mapping, not just enforcement.

Stock Assessment

Snapper

Industry participants expressed low confidence in the robustness and credibility of snapper stock assessments based on fishery independent surveys. They argued that outcomes vary between years due to reliance on untested assumptions, particularly those embedded in the daily egg production model (DEPM) approach. Concerns focused on uncertainties about spawning site selection, the weighting of survey areas, and the failure of DEPM to capture stock dynamics accurately. Many pointed out that most other jurisdictions have abandoned DEPM for demersal species, yet South Australia retains it. Respondents called for alternative methods such as pre-recruit surveys, hydroacoustic assessments, or fisher-assisted sampling, which they regard as more efficient, affordable, and aligned with actual stock dynamics.

Survey responses reinforced these concerns. Fishers consistently reported that assessments do not reflect their experience. Many said they continue to encounter healthy stocks, including in areas deemed to be depleted. The exclusion or unreliability of recreational catch estimates was identified as a major flaw, undermining credibility in the assessment.

The role of environmental drivers was another key issue. Respondents stressed that rainfall, freshwater inflows, temperature, and other oceanographic factors strongly influence recruitment and distribution but are not properly incorporated into assessments. Several said recent stock changes were more likely driven by environmental variability rather than fishing pressure, yet models continue to interpret declines through a narrow assessment framework.

Transparency of the assessment process was widely criticised. Respondents claimed that they do not understand how inputs are weighted, how decisions are made, or how the research is peer reviewed. Several described the process as “agenda-driven science,” with some questioning whether political considerations outweigh scientific objectivity. Survey respondents echoed this view, saying consultation felt tokenistic and decisions appeared predetermined.

The timeliness of assessments was also questioned. The 2019 stock assessment prompted closures that have remained in place, but industry are frustrated that region-specific reassessments have not been delivered despite signs of recovery in some areas. The lag between assessments, compounded by SARDI reports being 8–12 months late, means management is not responsive to stock recovery.

Confidence in the sustainability and economic viability of snapper assessments was very low. Respondents noted that inaccurate or incomplete assessments are harming the fishery, either by restricting access unnecessarily or by failing to adapt to environmental shifts. Survey respondents overwhelmingly described assessments as damaging to economic viability, with closures and quota cuts imposed despite strong local abundance of snapper.

Suggestions for improvement included:

- Incorporating accurate and up-to-date recreational catch data.
- Developing regionally tailored assessments rather than broad statewide averages.
- Using fishery-independent and technological methods (e.g. hydroacoustics, pre-recruit surveys).
- Factoring in environmental variability explicitly.
- Ensuring independent peer review of models and methods.
- Providing greater transparency about data inputs, assumptions, and weighting.
- Delivering more frequent and timely updates to track recovery and support adaptive management.

The overall sentiment expressed in interviews and surveys was one of disillusionment and distrust. Respondents noted that the current process does not reflect stock reality, undermines confidence in management, and damages both sustainability and profitability.

King George Whiting

Industry participants regard King George whiting (KGW) as structurally one of the better-performing assessment species in the MSF, but confidence is conditional on fixing several persistent weaknesses in inputs and methods.

First, coverage of total removals is viewed as incomplete. Respondents stressed that recreational and charter catches can be substantial and vary by region and season. Unless those removals are current and explicitly included, assessments risk mis-stating exploitation rates and stock status. Several comments tied the credibility of the assessment to visible, regular incorporation of updated rec/charter estimates rather than relying on infrequent surveys or broad scaling assumptions.

Second, standardisation of commercial CPUE needs to go beyond statistical modelling of historical "days fished." There is a perceived need for a clearer, operational effort unit (e.g., net-hours or hook-hours) so that standardisation corrects for changes in gear, soak time, crew efficiency, and targeted behaviour—not just calendar time. Without tightening the effort metric itself, respondents claimed that CPUE can be affected by fishing practices more so than stock abundance.

Third, the role of environmental drivers is under-weighted relative to their observed influence on KGW availability, movement, and recruitment. Respondents noted seasonal wind regimes, rainfall/freshwater pulses, and local temperature/salinity as explanatory variables for when/where KGW "turn on." They want these variables explicitly included in assessment diagnostics—both to explain interannual variation and to separate stock signals from catchability noise when exceptional conditions occur.

Fourth, regional differentiation is important. Fishers reported strong local catches in some areas whereas others fluctuate. The assessment should therefore present regional indicators rather than a collective narrative that averages strengths and weaknesses together. Further to this, there is an expectation harvest strategy triggers should incorporate regional variation (e.g., not penalising a strong area because of weakness elsewhere).

Fifth, industry require clear documentation and communication: what goes in (by region, season, fleet segments), what is standardised out, how weights are applied, and how updates change the narrative from the previous cycle. They want brief, timely technical notes that lock down inputs and methods before the main report, so they can see how new data (including recreational estimates) have altered conclusions.

On fishery-independent information, industry were open to calibrated, cost-effective options that target early life stages or pre-recruits (to provide a lead indicator), or structured fisher-assisted sampling that is less expensive and better aligned with where/when KGW are actually encountered. The request was not for "more surveys," but for fit-for-purpose indices that add predictive value and can be repeated without adding further costs.

Overall, industry consider the current KGW assessment useful but incomplete: it provides a baseline picture that broadly matches experience when conditions are normal, but it loses accuracy when (a) recreational removals move outside assumed bounds, (b) effort standardisation doesn't keep up with practice changes, or (c) environmental drivers dominate.

The improvement priorities suggested are:

- up-to-date rec/charter data incorporation.
- an operational effort metric (net-hours/hook-hours) in CPUE.
- explicit environmental covariates.
- regionalised outputs. and
- timely, pre-agreed documentation of inputs and methods each cycle.

Southern Garfish

Respondents expressed serious concern about the cost, design, and utility of southern garfish assessments. They noted that assessments often felt duplicative, with multiple stages of work delivering little new insight compared with previous years.

The design of surveys influencing southern garfish assessments was also questioned. Respondents claimed that sampling often fails to align with the fishery's operational realities, with sites and timing not always matching known areas of stock abundance. This results in a mismatch with fishers' observations. They also emphasised that southern garfish, like calamari, are highly influenced by environmental drivers such as water temperature, rainfall, and freshwater inflows, yet these variables are not properly integrated into assessments.

Survey responses echoed these concerns. Respondents rated their understanding of the garfish assessment as low to moderate noting that the results do not often align with fisher observations. They criticised transparency, noting that they did not know how data and models were chosen or applied. Some claimed that the process is dominated by SARDI's internal preferences, with little genuine consultation with industry or peer review.

The timeliness of southern garfish assessments was also highlighted as a problem. Respondents reported delays of 8–12 months in SARDI reporting, which undermines the ability of the assessment to guide real-time management or harvest strategy reviews. They noted that these delays result in decisions being made on outdated information.

Despite these criticisms, some acknowledged that assessments provide a benchmark for long-term tracking of trends and are important for MSC and government certification. However, respondents argued that the current approach is unsustainable both in cost and in relevance.

Improvements suggested included:

- A full review of southern garfish assessment design to ensure surveys target the right areas and times.

- Inclusion of environmental covariates to separate stock signal from environmental noise.
- More timely and transparent reporting, with shorter technical notes produced ahead of final reports.
- Clear cost breakdowns to demonstrate value for money and justify industry charges.
- Greater use of fisher data and structured fisher-led sampling to complement formal surveys.

Overall, respondents claimed that southern garfish assessments are too expensive, poorly aligned with industry observations, and lack transparency. Without reform, they fear the fishery will continue to pay for research that adds little practical management value while eroding profitability.

Southern Calamari

Industry described calamari assessments as poorly suited to the species' biology and fishery dynamics. They stressed that calamari are short-lived and highly responsive to environmental conditions, which means stock signals can shift rapidly from year to year. Applying quota-style assessments and management methods developed for long-lived species was seen as inappropriate. Respondents claimed that averaging CPUE across broad regions masks local variation, producing misleading results. Several noted instances where quota reductions or restrictive management occurred despite strong local catches, creating frustration and loss of confidence in assessment and management.

The reliance on CPUE for assessment was a central criticism. Respondents emphasised that calamari CPUE is confounded by environmental drivers such as water temperature, clarity, moon phase, and swell conditions. A poor run of conditions can produce low CPUE even if the stock is abundant. Fishers argued that these factors must be explicitly incorporated into assessments, otherwise stock variability is wrongly attributed to fishing pressure.

Survey responses reinforced these issues. Respondents said the assessment framework does not reflect reality, particularly when environmental drivers are ignored. Some questioned whether the current research is even capable of producing accurate calamari assessments under the current model. Confidence in the sustainability and profitability outcomes of the assessment was low, with respondents stating that the process has produced damaging management decisions.

Timeliness and transparency were also raised as concerns. Industry reported that they do not understand how inputs are chosen or weighted, and said reporting lags make assessments irrelevant by the time they are released. One specific concern was that elements of the harvest strategy were being applied before ministerial approval, effectively constraining calamari catches without proper process.

Suggested improvements included:

- Developing species-specific assessment tools designed for short-lived, environmentally driven stocks.
- Building environmental covariates (temperature, clarity, moon phase, swell) into CPUE standardisation.
- Producing regional indicators to avoid averaging away local strength.
- Establishing independent peer review of calamari models and methods.
- Providing more timely and transparent reporting so assessments can inform real-time decisions.

Overall, industry participants noted that calamari assessments in their current form are not credible, are economically damaging, and urgently need reform to reflect species biology, fisher knowledge, and environmental realities.

Harvest Strategy

Industry participants described the Marine Scalefish harvest strategy as untested, inflexible, and poorly adapted to the realities of a diverse, multi-species fishery. The new harvest strategy is scheduled to commence in July 2025, but concerns have already been raised about its structure, implementation, and transparency.

A recurring frustration was that elements of the harvest strategy were applied prematurely—particularly in the case of calamari—before full ministerial approval. Respondents claimed that this undermined legitimacy and created the impression that decisions were being made reactively and without due process. They stressed that if the harvest strategy is to have industry confidence, it must be implemented transparently and only after formal approval.

Exceptional circumstances provisions were another key issue. Industry noted the recent algal bloom that collapsed CPUE across wide areas, even where stock abundance was not in question. They noted that the harvest strategy as drafted was not equipped to recognise such events, creating the risk of perverse outcomes when environmentally-driven changes trigger management responses intended for stock decline. Respondents argued that these provisions need to be strengthened to address environmental anomalies. Without this, assessments and harvest settings will remain highly vulnerable to distorted signals independent of stock status.

Survey responses aligned with these views. On decision-rule clarity, most rated the rules as only “somewhat clear” or “not so clear.” On responsiveness, ratings were also low, with fishers claiming rules were either too slow to respond to real changes or too rigid to account for unusual circumstances. Balance between sustainability, social, and economic objectives was widely questioned. Respondents noted that the harvest strategy heavily favours sustainability, while ignoring social and economic viability.

Several respondents commented that the system "only changes quickly if it is against the fishers," reinforcing concerns about one-sided responsiveness.

Input from fishers was described as only partially incorporated. Respondents noted that although consultation occurs, their knowledge is rarely reflected in final decision rules. They gave examples where logbook coding changes or fisher observations were dismissed, despite clear evidence of value. This has created a sense that industry contributions are treated as secondary rather than integral to the harvest strategy framework.

Effective elements were identified, including the recognition of some clear biomass/catch-rate triggers, the attempt to create a structured framework across multiple species, and the principle of linking harvest strategy settings directly to stock assessments. However, industry stressed that unless the rules are applied consistently, incorporate environmental and socio-economic drivers, and meaningfully include fisher knowledge, these strengths will not be realised.

Suggested improvements included:

- Strengthening exceptional-circumstances provisions to explicitly account for environmental anomalies (algal blooms, freshwater inflows, climate effects).
- Ensuring that harvest strategy rules are not applied prior to full ministerial approval and transparent rollout.
- Establishing clearer documentation of decision rules so that all parties understand how inputs trigger outcomes.
- Rebalancing objectives to incorporate economic viability and workforce considerations alongside sustainability.
- Embedding fisher knowledge systematically into decision reviews and harvest strategy adjustments.
- Producing briefer, timelier updates (technical notes) between full reviews to keep the harvest strategy adaptive and relevant.

Overall, industry see the harvest strategy as a necessary framework but remain sceptical about its fairness, transparency, and adaptability. Without reform, they fear it will be perceived as another rigid tool that responds slowly when industry needs agility, yet overreacts when environmental anomalies distort data.

Research Costs and Efficiency

Industry noted that the transition to electronic logbooks has not reduced costs as expected. Current charges remain around $200,000 per year — the same as in 2007 — even though licence numbers have fallen from ~365 to fewer than 200. This creates a sense of inequity, especially compared with rock lobster, which pays less despite managing more licences. Respondents argued that charges should reflect reduced licence numbers and efficiencies delivered by e-logs, and that PIRSA has not demonstrated genuine cost savings.

The allocation of resources was a dominant concern. Respondents argued that too much expenditure is directed towards bycatch monitoring and expensive methods such as the snapper DEPM. In contrast, industry noted that too little is invested in understanding environmental drivers (rainfall, freshwater inflows, temperature, salinity, oceanographic variability) that strongly influence availability and recruitment for key species. This misalignment was described as both a scientific and financial inefficiency.

The cost of individual assessments was also heavily criticised. One southern garfish assessment reportedly cost $486,000, plus $391,000 for associated size and age work, with industry contributing up to 80%. Respondents demanded clearer cost breakdowns, separating survey design, fieldwork, analysis, and reporting, so that they can see where funds are being spent. They argued that duplication and "cut-and-paste" reporting further inflate costs without adding new value.

Survey responses reinforced these issues. Several highlighted FRDC projects that have run years behind schedule, eroding confidence that funds are being used efficiently. Others said economic data are not integrated into decision-making with costs not benefiting industry.

Industry questioned whether the number of FTEs charged to the fishery reflects actual time spent, and believe that Marine Scalefish licence holders are subsidising broader SARDI activities, such as FRDC projects or government-initiated research. Survey responses confirmed this concern, with calls for clearer accounting of staff time, overheads, and in-kind contributions.

Proposed improvements included:

- Benchmarking SARDI's science charges against other jurisdictions and non-government providers to test value for money.
- Redirecting resources away from repetitive bycatch monitoring and DEPM toward prawn/calamari-style pre-recruit surveys, fisher-assisted sampling, and environmental data collection.
- Ensuring full transparency of staff allocations, overheads, and reporting costs.
- Rebalancing cost-recovery so government contributes proportionately to recreational/charter components of harvest, especially for shared stocks.
- Introducing mixed service delivery models where consultants or industry-led programs provide certain data more cheaply and efficiently under SARDI oversight.
- Shortening and simplifying reporting outputs to avoid costly duplication and ensure industry receives timely, practical information.

The overall sentiment was that current research costs are unsustainable relative to the fishery's capacity to pay. Industry remain committed to independent research but want costs aligned with actual risks and outputs, and more modern, efficient methods trialled to reduce reliance on expensive, outdated approaches.

Relationship with SARDI and PIRSA

Industry described their relationship with SARDI and PIRSA as mixed — constructive with individual scientists, but strained at an institutional level.

On the positive side, respondents acknowledged that long-term SARDI scientists have contributed valuable expertise and shown commitment to the fishery. They recognised that some staff are approachable, professional, and genuinely interested in collaboration. In certain cases, industry noted that scientists had made efforts to explain methods and participate in working groups, which helped build trust.

However, systemic issues dominate industry perceptions. A recurring theme was lack of transparency in how data are selected, weighted, and modelled. Industry claimed that they are rarely provided with clear explanations of how assessments are constructed, and feel excluded from key methodological decisions. Several described the process as "agenda-driven science," with outcomes sometimes appearing predetermined regardless of industry input. Survey responses echoed this sentiment, saying transparency was only "somewhat" at best, and that consultation felt tokenistic rather than genuine.

Respondents also raised concerns about poor recognition of fisher knowledge. They said practical suggestions — such as separating dusky and bronze whalers in logbooks, or incorporating fisher observations of stock structure — were dismissed or ignored. This has led to a perception that scientific models are prioritised over direct industry evidence, even when the latter provides clear and timely signals of stock condition.

Engagement through MAC processes was described as procedural rather than collaborative. Several respondents noted that decisions often feel predetermined before discussions are held, with meeting outcomes already drafted in advance of formal minutes. This has undermined confidence in stated co-management approaches.

Despite these frustrations, industry stressed they are committed to independent science and want a constructive relationship. They called for changes to the model of engagement, including:

- Pre-assessment technical meetings to lock down inputs, assumptions, and methods before analysis.
- Shorter, timelier technical notes to improve transparency and provide interim outputs.

- Structured processes to ensure fisher knowledge is explicitly incorporated into assessments and harvest strategy reviews.
- Independent oversight or peer review to build confidence that research is objective and not shaped by political or institutional agendas.

The overall sentiment was that although individual relationships with scientists can be strong, the institutional relationship with SARDI and PIRSA is characterised by inefficiency, limited transparency, and insufficient recognition of industry expertise. Respondents claimed that a reset is needed, where industry is treated as a genuine partner in designing efficient research and management, rather than as a client paying for services with little influence on how such services are delivered.

Fishery Review and Recommendations

This is a complex multi-species, multi-gear fishery that has undergone structural reform to address issues including overfishing, latent effort, profitability and development of a harvest strategy (yet to be implemented). Three stocks of snapper (two Gulfs and west coast) are classified as depleted and are currently closed to commercial fishing. Stocks of southern garfish in Spencer Gulf is classified as recovering. However, the most recent assessment of southern garfish shows that the biomass has been below the LRP for at least two decades and the age structure is highly truncated suggesting that the stock status as assessed is overly optimistic.

There is limited FIS with a DEPM applied to snapper and previously King George whiting. Concerns over the utility of DEPM as it applies to a demersal species exist and an independent evaluation of the applicability of this method is required. Many of the target species are also important species for the recreational fishery with substantial formal allocation to this sector (e.g. nearly half of the TAC allocated to King George whiting). However, recreational catch estimates are uncertain with poor spatial resolution making it difficult to quantify shares and evaluate impacts of recreational catches on King George whiting, snapper, southern garfish and southern calamari (the primary or Tier 1 species in the fishery). These species also support the Charter Boat fishery for which logbooks apply and therefore provide improved data reliability.

Most species are assessed on weight of evidence primarily based on CPUE and age structure for a few species. Model based assessments are applied to King George whiting, snapper and southern garfish but these assessments do not estimate depletion which a planned migration to stock synthesis models can resolve.

Other than reliable recreational data there are a number of uncertainties compromising assessments:

- Hyperstability in CPUE
- Highly skewed sex distribution for southern garfish
- Insufficient age and length sampling for key species

The proposed new harvest strategy should improve management and provide greater certainty based on robust HCRs. However, the dependency on CPUE remains problematic for many species.

Ecological risk is assessed as moderate given strategic assessments and ERAs that assign moderate risk to habitat from fishing. The fishery interacts with ETPs but these are infrequent. There is no monitoring of bycatch indicator species and limited reporting of discards.

Prawns - West Coast

Fishery characteristics

- Main sectors: 100% commercial
- Target species: Western king prawn (*Penaeus* (*Melicertus*) *latisulcatus*). Can also retain Octopus, scallops and arrow squid.
- Fishing method(s). Bottom trawl.
- Spatial complexity. There are four regions within the West Coast prawn fishery but most fishing occurs in Venus Bay (72%) and the remainder in Coffin Bay.
- Shared stocks. Shared stocks with Spencer Gulf and possibly Gulf St Vincent prawn fisheries (Richardson 1982) but managed as a separate fishery.
- Main management controls. Mainly input controlled: limited entry, spatial and temporal closures, controls on effort (fleet nights fished). ENSO status also influences the harvest strategy.
- Management plan/harvest strategy (PIRSA 2022b)
- Number of licences 3.
- Catch (t) 43 t (30 fleet nights)
- GVP ($) not available
- NER ($) not available
- SAFS classification / fishery status Depleting

CRIS information

- GVP not available
- CRIS cost
  - Total
  - Science and monitoring $34,031
  - Compliance
- CRIS science breakdown
  - Catch sampling, FIS, stock assessment, not specified against attributable costs.
  - Elements not covered under cost-recovery. Harvest strategy development, biosecurity.
- Benchmarking
  - Unavailable.

Stock Risk

- Note: This is a relatively small and spatially complex fishery based on only 3 fishing vessels. The stock abundance in this fishing zone seems to be strongly environmentally driven. The main fishing area is Venus Bay, with fishing occurring sporadically in Ceduna, Corvisart Bay and Coffin Bay.

Monitoring

- Catch sampling
    - Bucket counts commercial and FIS
- FIS (frequency, coverage)
    - Annual since 1990
    - March and June surveys – catch rates, bucket counts, grade weights, length frequencies – SARDI observers
- Catch uncertainty (e.g. recreational harvest)
    - No recreational catch
- **Monitoring Score – 1**
    - Long time series of FIS

Assessment

- Latest assessment Heldt (2024).
- Methods
    - Trends in CPUE
    - CPUE index is average of commercial CPUE (March-September) and Venus Bay CPUE from March and June surveys
- Key uncertainties
    - Appears to be a relationship of abundance with ENSO but not well understood
- Frequency of assessments
    - Annual
- **Stock Assessment Score – 2**
    - Indication of hyperstability in CPUE needs to be considered

Harvest strategy

- Form of HCR/decision table
    - The current harvest strategy was implemented in July 2022 (PIRSA 2022b).
    - The harvest strategy rules are very complicated. Basically, driven by the CPUE index with additional considerations of bucket counts and, importantly, environmental conditions (ENSO status over previous months). There are additional rules that specify fishing limits by spatial area.
    - Real time within season management (similar to Spencer Gulf Prawn fishery).
- Robustness of primary indicator(s)
    - Primary indicator is the CPUE averaged over commercial CPUE and FIS CPUE from Venus Bay
    - The implications of evident hyperstability need some consideration
- Selection of reference points

  - Reference points are set based on historical CPUE index from 1990 to 2016. TRP is set at average over these years when CPUE index was above 59 kg/hour. The LRP is set at half the TRP, with the Trigger reference point half way between.
- Harvest strategy performance
  - The stock fluctuates and appears to be strongly environmentally driven. There has been a decline in the CPUE index since 2015, and it is now below the LRP.
- **Harvest Strategy Score – 3**
  - The harvest strategy maintains some level of fishing even when the stock is below the LRP. This may be reasonable given the strong environmental fluctuations but needs further consideration and testing.
  - The current harvest strategy is apparently under review.

Current stock status

- Relative to TRP and LRP
  - Composite CPUE index currently below LRP but ENSO data has triggered El Nino event classification
- Trend
  - Down since peak in 2015
- **Stock Status Score – 4**
  - Stock below LRP but may be environmentally driven

Summary risk score (1-5)

- Average across the four measures above
- **Stock Risk Score = 2.5**

Ecological risk assessment

- No ERA has been completed for the West Coast Prawn fishery as the fishery is subject to relatively low effort. However, DCCEEW has recommended an assessment if effort increases (DCCEEW 2025c).
- Assessed in 2025 under provisions of Part 13 A of the EPBC Act given that the fishery extends into Commonwealth waters (DCCEEW 2025c).
- Reported interactions with ETPs are very low.
- Summary risk score **3**

Ecological risk management

- No data collected on bycatch or discards. No decision rules applicable to indicator bycatch species. General lack of information to characterise ecological risk. An ERA should be undertaken if fishing effort increases above current levels.

Stakeholder Feedback

Data collection

The West Coast Prawn fishery is relatively small and simple in structure compared with Spencer Gulf, and logbook systems function without major concern. Data are collected consistently and provide a reliable basis for management. The main limitation identified is the lack of integration of environmental information. Catches are highly sensitive to temperature changes and oceanographic events such as cold-water upwellings. These can affect catch rates dramatically within days but are not captured in logbook datasets. One vessel currently carries a temperature–depth sensor, and respondents expressed support for expanding the use of such technology to improve understanding of environmental drivers in the fishery. The lack of systematic environmental data collection makes it difficult to fully understand recruitment variability and long-term stock dynamics.

Fishery independent surveys

Juvenile recruitment surveys are undertaken but are regarded as expensive and of limited direct benefit. These surveys use fine-mesh gear to sample juvenile prawns on nursery grounds, but their utility is questioned by industry. At times, industry have requested that surveys be cancelled for economic reasons, particularly when recruitment signals are already clear from fishing activity. Although the surveys provide input into the harvest strategy, they are not seen as critical for day-to-day management. There is acknowledgement that recruitment information is useful, but fishers questioned whether the frequency and cost of surveys are justified, especially during lean economic periods.

Stock Assessment

The smaller scale of the West Coast Prawn fishery has allowed relatively simple stock assessment approaches to be applied. Assessments draw on survey information and catch data but are not able to fully capture the sensitivity of prawns to environmental conditions. The October assessment in particular was criticised as poorly timed because it coincides with spawning activity and can misrepresent stock condition and prawn quality. Respondents noted that December or later provides a more reliable indication of prawn abundance, as prawns have completed spawning and are less stressed. Although assessments provide the formal basis for management, industry relies on their own knowledge and observations to guide operations.

Harvest Strategy

The harvest strategy was recently revised to better reflect operational realities. Trigger levels for catch rates were previously set too high and risked causing closures or reduced opportunities in years when stock remained healthy. Revised thresholds, lowered by around ten kilograms per hour, are seen as a significant improvement, creating a more workable framework that avoids unnecessary shutdowns. Respondents noted that the revised strategy is more flexible and reflective of actual conditions, although further adjustments may be required as experience with the new harvest strategy grows.

Research Costs and Efficiency

Fishers emphasised that research priorities should shift away from costly juvenile surveys, which are not considered cost-effective, and towards environmental drivers and juvenile ecology. Expanding environmental monitoring through temperature–depth loggers and other oceanographic tools was seen as a priority for understanding recruitment and survival. Broader concerns include climate variability and climate change, which respondents claim present particular risks for the West Coast Prawn fishery, where conditions are less stable than in Spencer Gulf fishery. Industry stressed the importance of avoiding unnecessary duplication of research and focusing on targeted projects that deliver practical benefits.

Relationship with SARDI and PIRSA

The relationship with SARDI was described as functional, though less direct than in the Spencer Gulf fishery due to the smaller size of the fishery. Research services are delivered as required, outputs are produced on time, and management processes are generally smooth. However, industry remain concerned about costs, particularly the expense of juvenile surveys, and would like resources allocated more efficiently. They stressed that management should reflect the simplicity of the fishery and avoid layering unnecessary complexity or additional cost.

Fishery Review and Recommendations

The West Coast Prawn fishery is a small fishery with only 3 active vessels. There is limited available information (including economic data). It is currently classified as depleting. Management of the fishery is based on annual FIS for which there is a long time series. The fishery is highly responsive to environmental fluctuation particularly ENSO events but the relationship of prawn abundance to ENSO is not well understood. CPUE data tend to be hyper-stable. The harvest strategy is complex based on CPUE but complemented with size distribution of prawns (bucket counts) and the ENSO status over previous months. Reference points are based on historical CPUE (1990 to 2016). There are additional rules that apply spatial closures. The harvest strategy as currently applied allows some fishing even when the stock is assessed to be below the LRP.

There has been no ERA conducted for this fishery as there is relatively little effort applied. However, a recent strategic assessment of South Australian prawn fisheries recommended that an assessment be completed if effort increases.

Prawns – Gulf of St Vincent

Fishery characteristics

- Main sectors: commercial (100%). Negligible recreational or Aboriginal catch.
- Target species: Western king prawn (*Melicertus latisulcatus*).
- Fishing method(s): bottom trawl
- Spatial complexity: limited to Gulf St. Vincent with spatially focused fishing controlled by the number of nights permitted to be fished each year.
- Shared stocks. Shared stocks with Spencer Gulf and possibly Gulf St Vincent prawn fisheries (Richardson 1982) but managed as a separate fishery.
- Main management controls. A mainly input-controlled fishery with limited entry, spatial and seasonal closures, prohibition of trawling in depths < 10m, gear restrictions (mesh size, headline length, vessel length and power) effort limitation (total nights fished).
- Management plan/harvest strategy (PIRSA 2022c).
- Number of licences: 10
- Catch (t): 112
- GVP ($) 3 million
- NER ($) - $2.5 million
- NER/GVP – 87%
- SAFS classification / fishery status: Sustainable

CRIS information

- GVP $3 million
- CRIS cost
    - Total
    - Science and monitoring $326,884
    - Compliance
    - Fee/GVP 19%
- CRIS science breakdown
    - Catch sampling, FIS, stock assessment: Payment to industry for surveys $130,000, fieldwork $7,500.
    - Elements not covered under cost-recovery. Harvest strategy development, biosecurity
- Benchmarking
    - Similar FIS and stock assessment conducted for Northern Prawns (Commonwealth) is more expensive.

Stock Risk

Monitoring

- Catch sampling
    - Size composition of commercial landings (grade weights)
    - Pre-recruit CPUE recorded for FIS surveys
- FIS (frequency, coverage)
    - FIS surveys available since 2004 (20 years)
    - Currently 3 surveys per year – Nov, March, Apr/May
- Catch uncertainty (e.g. recreational harvest)
    - Not applicable
- **Monitoring Score – 1**
    - Data uncertainty and risk low – FIS a strong positive

Assessment

- Latest assessment: McLeay and Hooper (2024).
- Methods
    - Monitor and report trends in standardised FIS (March and April surveys) and standardised commercial CPUE (annual) against reference points
    - Standardisation involves both spatial units and SST (plus other factors)
- Key uncertainties
    - No identified stock recruitment relationship
    - Possibility of changing productivity in the Gulf
    - HAB impacts (future assessments)
- Frequency of assessments
    - Annual
- **Stock Assessment Score – 2**
    - A generally robust assessment and thorough stock assessment report. A more formal quantitative assessment based on the FIS data would be possible.

Harvest strategy

- Form of HCR/decision table
    - Decision table specifies annual number of nights (TACE) allowed for the entire season – equal weighting of FIS and commercial CPUEs
    - Various metarules linked to staying above trigger reference points for 3 years (increase nights in decision table), absence of FIS surveys (default to commercial CPUE) and rules for reopening the fishery after a period of closure (undertake FIS)
    - The current harvest strategy was MSE tested using the Noell et al (2015) bioeconomic model
- Robustness of primary indicator(s)

    - FIS is sound
    - CPUE subsequently shown to be hyper-stable and may need to reconsider form of its use in the HCR
- Selection of reference points
    - Calculated using a bioeconomic model of the fishery (Noell et al 2015) – nb for FIS, LRP=14.8, TRP=22.2, questionable.
- Harvest strategy performance
    - Declining trends in CPUE and (more so) FIS over past 8 years
    - Decline in FIS CPUE may be slowing, but the harvest strategy has not prevented it falling below the TRP from a previously much higher level
    - TACE has actually increased under new Management Plan (PIRSA 2022c) despite declines in FIS – to the point where the number of nights actually fished is now well below the TACE.
- **Harvest Strategy Score – 2**
    - A strong point is that the harvest strategy has been MSE tested. However, there are some concerns about 1) whether the operating model for the MSE considered risks from hyperstability in commercial CPUE and 2) whether the current settings (TACE or number of nights) are set too high.
    - It should be possible to improve the form of the HCR (decision table) and make better use of the FIS data in the assessment and harvest strategy

Current stock status

- Relative to TRP and LRP
    - Commercial CPUE close to (just above) TRP
    - FIS CPUE between target and trigger reference points
- Trend
    - Down, perhaps stabilising
- **Stock Status Score – 2**
    - Declining trend in FIS is of some concern

Summary risk score (1-5)

- Average across the four measures above
- **Stock Risk Score = 1.75**

Ecological risk assessment

- Combined South Australian prawn fisheries assessed under Part 13A provisions of the EPBC Act 2025 (DCCEEW 2025c).
- ERA completed in 2021 building on a comprehensive assessment in 2016 (PIRSA 2021c).
- ETP, bycatch and habitat risks: syngnathids and common bottlenose dolphins but interactions low. Moderate risk to habitat. Hence a moderate risk score.

- Summary risk score **3**

Ecological risk management

Some issues identified over a general deficiency in recording and risk assessment of bycatch species. No decision rules for indicator species. These issues need to be addressed to reduce risk. Proactive measures to reduce bycatch have been successfully implemented (Broadhurst *et al.* 1999).

Stakeholder Feedback

Data collection

Logbook catch and effort data provide a standardised CPUE series that underpins the fishery's management. Respondents noted that catch data for target species is generally accurate because harvests are well defined and closely monitored. However, they were concerned that PIRSA relies too much on these data to limit fishing effort and catches, leading to restrictions that are seen as overly conservative and not reflective of actual abundance observed by fishers.

Byproduct data were described as "non-existent or incorrect," with respondents stating that the current system fails to capture these catches properly or apply them in decision-making. For bycatch, respondents claimed that there is little to no reliable data, and that bycatch information is effectively "lumped" together with byproduct in the logbooks. This lack of distinction reduces its utility.

Some respondents stated there are "no ETP interactions" in the fishery, whereas others acknowledged occasional occurrences but noted that these are not recorded in detail or included in decision-making.

Spatial effort data in logbooks were considered useful but in need of refinement. Respondents noted that the current grid reference system does not align well with actual fishing locations and lacks the precision needed for fine-scale management, especially for patchily distributed prawns. Temporal effort data were considered to be accurate on a day-to-day basis. However, respondents stressed that the data were of limited value when not combined with spatial information because fishing effort is spatially and seasonally variable.

Respondents noted gaps in environmental and oceanographic data. Temperature (particularly at the seabed) and salinity were identified as critical drivers of catchability and recruitment of prawns, yet they are not systematically incorporated into assessments.

Fishery independent surveys

Fishery-independent surveys are seen as valuable for stock monitoring and in-season guidance. Respondents recognised that the surveys provide useful biological information but were frustrated that results are not always integrated with commercial catch data. They emphasised that the FIS should be retained, but that their application in management must be clearer and better aligned with information provided by industry.

Stock Assessment

Stock assessment of GSV Prawns is based on a bioeconomic model developed under an FRDC project. Respondents noted that although the model is useful in determining optimal fishing nights and supports the harvest strategy, serious concerns were raised about its cost and transparency. Respondents questioned whether annual full assessments are necessary, suggesting that surveys could continue annually but model updates occur every two years if sustainability risk is low.

The model itself was described as "clunky," with outputs difficult to extract and interpret. It is not spatially explicit and cannot be used to evaluate management options such as area closures or spawning protections. Respondents noted that other jurisdictions are moving towards more generic and widely supported modelling platforms, which are easier to update and maintain.

Respondents claimed that the April survey is the most reliable indicator of biomass because prawns are highly active then, whereas the October survey is less reliable due to environmental variability. They stressed that assessments are used less to quantify absolute biomass and more to determine size composition and guide seasonal decisions. Real-time, at-sea management based on nightly catch rates is seen as more accurate for day-to-day decisions, whereas assessments remain important for certification and government reporting.

Harvest Strategy

Survey responses were highly critical of the current harvest strategy. Decision rules were described as inflexible, outdated, and unable to respond to changing conditions. One respondent emphasised that 75% of fishing grounds are left unfished, conserving the stock, yet restrictions continue to impose financial hardship.

Respondents also criticised the lack of meaningful fisher input. They felt their knowledge and experience are disregarded and said they are "looked down upon" in decision-making processes. Some called for a return to the previous system, which they credited with six years of high productivity and economic success, instead of persisting with the current framework that is seen as destructive.

Research Costs and Efficiency

The costs of maintaining surveys and updating the bioeconomic model are regarded as disproportionate to the economic scale of the fishery. The most recent update required about $100,000 of external expertise, yet no technical report was produced to document what was changed. This raises concerns that the same costs will recur without cumulative benefit from previous updates.

Survey participation also carries indirect costs. Even when reimbursed, vessels forgo fishing opportunities, which is a significant burden in a fishery with low and declining GVP. Respondents claimed that although surveys are valuable, the current system is inefficient. The bespoke nature of the model is seen as a major driver of expense, tying the fishery to individual specialists and preventing efficiencies from being carried forward.

There was strong support for moving to a more generic, widely supported modelling framework that could be shared across jurisdictions. Fishers claimed that this would reduce long-term costs, improve transparency, and ensure that future assessments build on past work instead of starting over.

Relationship with SARDI and PIRSA

The relationship with SARDI scientists was described as constructive and professional. Fishers appreciated the careful approach being taken to review survey design, where changes are trialled before implementation. This methodical process provides confidence that cost savings will not undermine data quality.

The main frustration lies with the lack of documentation and transparency in model updates. Industry have called for clear technical reporting to capture the value of past investment and ensure that assessments are reproducible.

Fishery Review and Recommendations

This is a demonstrably sustainable and productive fishery with a long time series of FIS which provide indices of abundance for recruits and pre-recruits. Annual assessments are generally robust with bioeconomic model currently applied. A more formal quantitative assessment based on FIS data could be undertaken. CPUE data tend to be hyper-stable.

The current harvest strategy has been MSE tested but the use of CPUE as a performance indicator may need to be reevaluated given evidence of hyperstability. There is also concern that the current application of TACE (number of fishing nights) may be too high.

An ecological risk assessment has been undertaken revealing a moderate risk to habitat (from trawling). Proactive measures to reduce bycatch and associated impact apply and ETP interactions are low.

An issue affecting South Australian prawn fisheries more generally is the decline in GVP associated with lower prices driven by competition with increasing quantities of aquaculture product worldwide. This is reflected in a negative NER.

Prawns - Spencer Gulf

Fishery characteristics

- Main sectors: 100% commercial. Some fish species caught as byproduct are managed under marine scale fishery allocation.
- Target species. Western king prawn (*Penaeus* (*Melicertus*) *latisulcatus*). Southern calamari, and Balmain bugs (*Ibacus* spp.) are also landed and retained by Spencer Gulf prawn licence holders.
- Fishing method(s). Bottom trawl
- Spatial complexity. Fine scale management applied under co-management arrangements to fish more than 100 spatially defined blocks.
- Shared stocks. Shared stocks with Spencer Gulf and possibly Gulf St Vincent prawn fisheries (Richardson 1982) but managed as a separate fishery.
- Main management controls. Mainly input control with limited entry, spatial and temporal closures, no trawling in waters shallower than 10 m. Co-management arrangements apply to set effort (nights and spatial distribution of fishing).
- Management plan/harvest strategy (PIRSA 2020a).
- Number of licences 39.
- Catch (t) 1,578 t
- GVP ($) 26.5 million
- NER ($) - $5.7 million (Cost of catching prawns is $16.4/kg against an average price of $16.8/kg
- NER/GVP – 21.5%
- SAFS classification / fishery status Sustainable

CRIS information

- GVP $26.5 million
- CRIS cost
  - Total
  - Science and monitoring $709,502
  - Compliance
  - Licence fee/GVP 4%
- CRIS science breakdown
  - Catch sampling, FIS, stock assessment: Payment to industry for surveys $211,000, fieldwork $12,130
  - Elements not covered under cost-recovery. Harvest strategy development, biosecurity.
- Benchmarking
  - Similar FIS and stock assessment conducted for Northern Prawns (Commonwealth) is more expensive.

Stock Risk

Monitoring

- Catch sampling
    - Bucket counts and grade data for FIS and commercial landings
- FIS (frequency, coverage)
    - Annual since 2004
    - 3 surveys per year; one estimates pre-recruits, one estimates spawning biomass
- Catch uncertainty (e.g. recreational fishing)
    - negligible
- **Monitoring Score – 1**
    - 3 FIS surveys per fishing year since 2004

Assessment

- Latest assessment: Heldt and Hooper (2023).
- Methods
    - Trends in FIS CPUE (averaged over 3 annual surveys)
    - Trends in adults and pre-recruits
- Key uncertainties
    - Assumes FIS CPUE as proxy for biomass
- Frequency of assessments
    - Annual
    - Plus within-season real-time reporting
- **Stock Assessment Score – 1**
    - Based on long time series of fishery independent surveys

Harvest strategy

- Form of HCR/decision table
    - Rather complex, with different HCRs pre- and post-Christmas
    - Considerable within season adjustments implemented in real time according to specific rules
    - Generally based on stock status from surveys including adult and recruit CPUE
- Robustness of primary indicator(s)
    - Primary indicators based on FIS surveys (3 per year)
- Selection of reference points
    - Empirical
- Harvest strategy performance
    - Has been MSE tested

    - Long-term maintenance of primary indicators fluctuating around or above target reference points
- **Harvest Strategy Score – 1**
    - Complex but effective with strong industry support

Current stock status

- Relative to TRP and LRP
    - Consistently above trigger reference point
- Trend
    - Very slight downward trend
- **Stock Status Score – 1**
    - Low uncertainty

Summary risk score (1-5)

- Average across the four measures above
- **Stock Risk Score = 1**
    - Note: fishery is MSC certified

Ecological risk assessment

- MSC Certified fishery
- Ecological risk assessment completed in 2014 (PIRSA 2014) with an addendum in 2022 to include additional species (PIRSA 2022d).
- ETPs, bycatch and habitat risks. There is no mandatory requirement to report bycatch and discards. Crab bags used to exclude sharks and rays. Square mesh codends reduce the retention of unwanted bycatch. Syngnathids are occasionally caught but with exception of potbelly seahorses, interactions with pipefish and seahorses are not recorded to species level. There is a moderate risk to benthic habitats because of trawling but the fishery is spatially constrained (by depth and fishing area) mitigating risk.
- Summary risk score **2**

Ecological risk management

Proactive measures have been applied in this fishery to reduce ecological risk (McShane *et al*. 1999). The fishery is MSC certified. However, further measures are required to improve recording of ETP interactions and to reduce risk to benthic habitat.

Stakeholder Feedback

Data collection

Electronic logbooks are now standard and considered essential for management. Respondents expressed frustration that although these systems provide catch and effort data instantly, industry access is often delayed by months. This forces fishers to rely on informal sharing of catch estimates to guide operations in real time, rather than using the data already stored by government. The lack of immediate access undermines efficiency and confidence, particularly for decisions such as catch limits before Christmas. There was also concern that data are filtered and processed through multiple layers, creating unnecessary cost. Fishers noted that projects such as the FRDC-funded “Data Commons” dashboard could improve transparency by giving associations direct access to their own data, potentially reducing compliance and research costs.

Survey responses confirmed that target species logbook data is rated highly, with most describing it as high or very high quality. Some wanted faster access to fleet-wide data for association-level monitoring. One respondent said data should be provided more quickly to support decisions, whereas another noted fatigue that after 70 years of data collection there has been little change.

Byproduct and bycatch data were also rated as high quality in the survey, but comments suggested reinstating a Gulf-wide bycatch survey and sharing results across fisheries to align with MSC requirements. ETP data were rated highly but not universally — one comment suggested discontinuing logbook-based ETP reporting, arguing that fishery-independent survey data is more representative for these species.

Spatial effort data were widely rated as high or very high quality, and respondents noted that electronic logbooks have improved mapping precision. Temporal effort data received similarly strong ratings and was described as adequate for management purposes.

Respondents consistently pointed to gaps in environmental and oceanographic data. They noted that temperature, salinity, and broader climate drivers such as El Niño and La Niña cycles strongly influence prawn availability and recruitment, yet these are not routinely included in stock assessments. Although vessels carry some sensors and hydrodynamic models exist, outputs are not integrated effectively. Respondents were concerned that this lack of systematic environmental data collection has left the fishery unprepared for climate variability and climate change. They pointed to historical work under Neil Carrick, which provided valuable insight into salinity, reproduction, and recruitment, and lamented the lack of comparable research in the last decade.

VMS was in trial stages during the survey, resulting in mixed views. Some said it had not yet been implemented, whereas others rated it as high or very high quality. Comments suggested it could be used for footprint mapping and compliance once fully operational.

Additional suggestions for data gathering included reinstating juvenile surveys to monitor nursery areas and protect recruitment, and exploring market value analysis to support maximum economic yield.

Economic data were mostly rated as medium or high quality but criticised for lagging about 15 months, limiting its relevance. Some respondents suggested biennial reviews would suffice, whereas another said economic data are not central to management.

Fishery independent surveys

Fishery independent surveys are seen as the backbone of management, particularly the three major surveys each year that establish size composition and guide seasonal management decisions. Respondents emphasised that although stock assessments provide useful outputs, they are often less accurate than fishers' real-time observations, making surveys vital to assess stock structure and size distribution.

Survey responses rated survey data as very high or high quality, with some selecting medium or "I don't know." The overall view was that current practices are effective, although some described them as simply "good enough." Respondents stressed that although surveys remain essential, their outputs must be delivered more quickly to improve their utility in management.

Stock Assessment

Respondents noted that the April survey provides the most accurate indicator of biomass, whereas the October survey is less reliable due to environmental conditions affecting catchability. They emphasised that assessments are used less for absolute biomass estimates and more for determining size composition and guiding decisions about when and where to fish. Real-time, at-sea management based on nightly catch rates and observations is important in guiding effort distribution and preventing overfishing. Assessments are still essential for certification and government reporting. However, respondents claimed they could be more useful with incorporation of additional environmental variables and aligning more closely with industry's real-time practices.

Survey respondents generally expressed confidence in the assessment process, describing their understanding as good and the results as reflective of the fishery. They said assessments provide a useful baseline, although they acknowledged that real-time industry management remains superior. More research into environmental effects could strengthen the assessment framework.

Transparency was rated highly, with praise for the strong working relationship between the management committee, SARDI, and PIRSA. Opinions on assessment frequency varied: some preferred annual, others biennial or less frequent updates. Respondents pointed out that three surveys already provide in-season information, making the final assessment less relevant by the time it is released. Even so, assessments were considered extremely useful for monitoring long-term trends in the fishery.

Survey feedback showed industry believe assessments have led to management improvements, and no negative outcomes were reported. Comments highlighted the collaborative relationship with SARDI and PIRSA as a strength. However, some inefficiencies were identified. Including Marine Scalefish species in bycatch surveys was seen as an unnecessary burden on prawn skippers, and one respondent raised concerns about uneven cost-sharing across the fleet. Suggestions included incorporating maximum economic yield into assessments and streamlining data collection and reporting.

Harvest Strategy

The harvest strategy is regarded as functional but rigid. Respondents noted rules such as size-based decision triggers can reduce catch quotas even when overall biomass is high, creating inefficiencies. They argued that the rules should adapt to prevailing conditions and provide flexibility for exceptional circumstances such as algal blooms, environmental anomalies, or market factors. Respondents stressed that co-management gives them capacity to make real-time decisions that protect stocks and maintain product quality, but these decisions are not always recognised within the harvest strategy.

Survey responses were broadly positive about the clarity and responsiveness of harvest strategy decision rules. Most said they are extremely or very clear, and many described them as responsive. Views on balance were mixed. Although some agreed that the harvest strategy balances sustainability, economic, and social needs, others argued that sustainability dominates and that workforce issues like fatigue are neglected.

Most respondents agreed that their input is considered, although some believed that this was only partial. Effective elements identified included real-time management, trigger limits, size targets, and closures. Respondents said clear communication and the responsibility placed on fishers to conserve stocks were strengths. Suggested changes included lowering bucket count thresholds (as trialled in autumn 2025), removing the pre-Christmas catch cap, adopting a more conservative approach in March and April due to higher growth rates, and increasing submission of real-time fleet data to support decision-making.

Research Costs and Efficiency

The scale and direction of research expenditure were identified as major concerns. Respondents claimed that surveys and assessments are expensive, and even when reimbursed for participating, there is significant opportunity cost because time could have been spent fishing profitably. Frustration was expressed that research effort has been dominated by repetitive bycatch monitoring under MSC requirements, which has consumed substantial resources without generating new knowledge. Respondents argued this has come at the expense of research into prawn biology, recruitment processes, juvenile ecology, spawning dynamics, and environmental drivers such as temperature and salinity.

Survey feedback reinforced these issues. Biological and economic data were seen as useful but undermined by delays. Respondents also raised concerns that cost-sharing arrangements are uneven across the fleet. Overall, participants called for resources to be redirected towards research that supports long-term resilience and addresses climate variability and climate change impacts, rather than continuing to repeat bycatch studies that have already demonstrated the fishery's sustainability many times over.

Relationship with SARDI and PIRSA

The relationship with SARDI scientists was described as constructive and professional, and fishers praised the collaborative approach, particularly in survey design and transparency. Scientists were acknowledged as helpful and committed, but fishers expressed frustration at the lack of deeper analysis in some stock assessment outputs and the limited incorporation of environmental drivers.

There was also concern about transparency of costs and staff allocation. Fishers noted that they are charged for full FTEs but suspect that scientists are sometimes diverted to other projects or government priorities while still being costed to the fishery. This lack of clarity has created suspicion that industry is subsidising broader research. Respondents remain committed to independent research but want clearer accounting of staff time, greater accountability for outputs, and a stronger role for industry-generated data in assessments.

Fishery Review and Recommendations

The Spencer Gulf prawn fishery is arguably the best managed prawn fishery in the world. It is MSC certified, demonstrably sustainable over decades, and has an established track record of successful co-management including fine-scale spatial and temporal real-time management based on regular FIS. There is no trawling in waters shallower than 10m and there are proactive measures to limit ecological impact.

An issue affecting South Australian prawn fisheries more generally is the decline in GVP associated with lower prices driven by competition with increasing quantities of aquaculture product worldwide. This is reflected in a negative NER.

Rock Lobster - Northern Zone

Fishery characteristics

- Main sectors (comm, rec, indigenous) and allocations. Commercial 95.5%, Recreational 3.5%, Aboriginal 1%. There are also allocations of species fished in the Marine Scale fishery to NZRLF licence holders.
- Target species. Southern rock lobster *Jasus edwardsii*.
- Fishing method(s) baited pots
- Spatial complexity. Managed within two zones. The Northern Zone extends from Port Lincoln to the West Australian border and involves fishing in both state and Commonwealth waters (under OCS arrangements)
- Shared stocks. Stocks of southern rock lobster are likely shared among South Australia, Victoria and Tasmania (Ovenden *et al*. 1992, Linnane *et al*. 2024c). However, biological characteristics vary among populations including within the two management zones in South Australia.
- Main management controls. Output controls TACCs (ITQs), size limits, prohibition of taking berried females. Input controls, limited entry, gear restrictions, numbers of pots/vessel.
- Management plan/harvest strategy (PIRSA 2021d).
- Number of licences: 62
- Catch (t) 253 of TACC 306
- GVP ($) 14.2 million.
- NER ($) - $1.1 million
- SAFS classification / fishery status Sustainable

CRIS information

- GVP $14.2 million
- CRIS cost
  - Total
  - Science and monitoring $300,932
  - Compliance
  - Licence fee/GVP 11.5%
- CRIS science breakdown
  - Catch sampling, FIS, stock assessment: costs are mostly aggregated for both zones (e.g. against 4.2 FTEs) and not specified for individual activities in each zone.
  - Elements not covered under cost-recovery. Harvest strategy development, biosecurity.
- Benchmarking
  - Similar assessments (Victoria/New Zealand) completed for less cost.

Stock Risk

Monitoring

- Catch sampling
  - Commercial and FIS pot sampling
  - Voluntary and observer length frequency data collected
- FIS (frequency, coverage)
  - No FIMS
  - Annual puerulus monitoring – PRI index since 1996
- Catch uncertainty (e.g. rec)
  - Recreational catch allocation 3.5%
- **Monitoring Score – 2**
  - No FIS available for the Northern Zone but could be considered in future

Assessment

- Latest assessment: Linnane *et al.* (2024a).
- Methods
  - Time series of adult CPUE, a pre-recruit CPUE (PRI), both from logbooks, PSI and length frequency data all available
  - Two quantitative models are applied
    - LenMod (size structured model)
    - qR model (catch by numbers and weight)
    - spatial analyses by Marine Fishing Area (MFA)
  - both models are fitted to CPUE
  - LenMod also fitted to PRI time series (pre recruit index CPUE), length data
  - Strong relationship between PSI and PRI; PSI reported but not used in the assessment. It has been used in MSE analyses to inform recruitment projections.
  - Note: Inner Region modelled using both LenMod and qR model; Outer Region only uses qR model
- Key uncertainties
  - Changes in productivity – evidence of a strong downward shift about 2000 analysed in 2015 (Linnane *et al.* 2019)– not subsequently examined but current plans to do so
  - Evidence that CPUE is hyper-stable in the Southern Zone
  - Assessment for the Outer Region is less certain (large area, low effort, no reliable length frequency data)
- Frequency of assessments
  - Annual stock assessment reports
  - Additional mid-season updates
- **Stock Assessment Score – 2**

    - Changes in productivity and hyperstability in CPUE to be considered further

Harvest strategy

- Form of HCR/decision table
    - Inner Region
        - Primary indicator is CPUE of legal sized lobster
        - Secondary indicator is PSI (used in meta rule)
        - Additional indicators reported but not used in the HCR - % unfished egg production, PSI, model estimated biomass, exploitation rate, recruitment
        - Decision table with TACC versus CPUE bands
        - Harvest fraction increases from LRP (0.4) to trigger reference point at 0.6, still increases up to 0.8, flat or declining above 0.8
        - Meta rules use PRI to determine if increase in TACC is allowed
    - Outer Region
        - Also uses a decision table with TACC for various bands of CPUE
        - The HCR for the Outer Region was recently revised downward (maximum TACC reduced from 46 t to 25 t) due to concerns about non-recovery of CPUE in this region.
- Robustness of primary indicator(s)
    - CPUE may be hyper-stable (cf Southern Zone)
- Selection of reference points
    - Trigger reference point at CPUE of 0.6 – seems to correspond to the lowest point in the CPUE time series
- Harvest strategy performance
    - MSE tested at last Management Plan update (using LenMod)
    - Current harvest strategy is resulting in rapid increases in CPUE (and egg production) in line with expectations from the MSE analyses
    - Outer Region CPUE not increasing so TACC levels have been reduced substantially
- **Harvest Strategy Score – 1**
    - The current harvest strategy is resulting in stock recovery
    - Future revisions to the harvest strategy should consider shifting productivity, possibility of hyperstability in CPUE, and whether to continue to have a separate harvest strategy for the Outer Region

Current stock status

- Relative to TRP and LRP
    - CPUE is well above the trigger reference point
    - Current % egg production is 14% (previous low of 10%)

- Trend
    - CPUE and egg production are trending upwards in line with MSE projections (but trends in Outer Region are flat)
- **Stock Status Score – 1**
    - Stock status needs to consider overall status of southern rock lobster and perhaps reconsideration of reference points
    - How should the performance in the Outer Region be considered?

Summary risk score (1-5)

- Average across the four measures above
- **Stock Risk Score = 1.5**

Ecological risk assessment

- An ERA risk assessment completed in 2011 (PIRSA 2013) and updated in 2020 (PIRSA 2020c).
- Assessment under Part 13A provisions of the EPBC Act completed in 2015 (DEE 2015).
- ETP interactions, ecosystem impacts assessed as low to negligible (DEE 2015, PIRSA 2020c).
- Summary risk score **1**

Ecological risk management

- A voluntary industry driven product management system Clean Green Rock lobster promotes codes of practice to minimise harm to target species, bycatch, byproduct, ETPs or the environment more generally (McShane *et al.* 2005).

Stakeholder Feedback

Data collection

Survey feedback confirmed that logbook catch and effort data for target species are generally seen as high to very high quality. However, MFA blocks are considered to be too coarse to support fine-scale management, and respondents recommended moving to smaller zones with finer resolution. The shift to electronic logbooks is regarded as an opportunity to deliver these improvements. Similarly, tools that collate and return data in real time to both individual fishers and the association are required.

Byproduct and bycatch data were also rated positively, but concerns were raised about accessibility. For ETP interactions, views were mixed. Although interactions are considered rare, respondents stressed that stronger evidence is needed to demonstrate this. The concern is that, without better evidence, unnecessary regulation could be imposed in the future.

Fishery-independent surveys were not considered necessary given the dominant role of CPUE in assessment and management. However, some respondents strongly advocated for developing a fishery-independent approach to address data gaps caused by declining vessel numbers.

Economic data (BDO Econsearch) were considered to be outdated, overly focused on owner-operators, and unsuitable for a fishery now dominated by company-held licences. Oceanographic and other environmental data were also judged to be inadequate with a lack of in-water temperature loggers and land-based Doppler systems. Given the importance of environmental change, integration of data collection across regulatory agencies and a shared platform would be valuable.

VMS data were rated highly, but frustration centred on its use solely as a compliance tool. Respondents claimed that giving operators access to their own VMS data would support validation of spatial patterns, strengthen access rights, and provide valuable information for planning.

Stock Assessment

Stock assessments are seen to rely heavily on fishery dependent CPUE and breakout rules, raising concerns about the value of costly annual assessments that add little additional information over that contained in raw catch data. Respondents claimed that mid-season outcomes can be predicted with high confidence, which makes annual assessment presentations feel repetitive.

Views on assessment frequency varied. A shift to stock assessments every three to five years, depending on scientific advice, was seen as an efficient balance between precaution and practicality. Although assessments were described as generally useful for management, frustrations were voiced about delays when disagreements arise between science outputs and industry positions.

Harvest Strategy

There was strong support for moving towards a more stable, multi-year harvest strategy framework. Fishers suggested detailed modelling and review be undertaken during scheduled harvest strategy reviews—perhaps every five years—with CPUE tracked annually to guide interim adjustments.

Survey feedback indicated that the harvest strategy is generally clear and responsive, though reliance on catch rates means it can lag behind real changes in stock. Respondents suggested incorporating recruitment indices such as the pre-recruit index (PRI) or a pre-spawner index (PSI) to provide more timely signals. Although maximum economic yield is included in the management plan, it is not reflected in practical assessments, and some respondents would like it integrated more directly.

Research Costs and Efficiency

Research costs are a dominant concern. Respondents believe the current science services could be delivered at less cost. Inefficiencies were identified in several areas: outdated economic surveys, lack of access to logbook and VMS data, and the costs associated with reviews that require additional industry payments. The consensus is that research expenditure is excessive relative to outputs.

Relationship with SARDI and PIRSA

SARDI scientists were described as professional and committed, but constrained by inflexible systems and an institutional reluctance to change. Frustration was expressed at delays in implementing agreed harvest strategy improvements and at the limited transparency around model choices. Respondents believed that constructive change is best achieved through structured harvest strategy reviews, which provide a collaborative forum for aligning science, management, and industry. However, they also stressed that political oversight and strong industry advocacy will be needed to ensure reforms are pursued.

Broader Strategic Considerations

Any transition away from the current system must be carefully managed to avoid conflict with regulators or between sectors. A staged approach was recommended, maintaining essential monitoring while gradually shifting towards more cost-effective arrangements. Respondents emphasised that gaps in environmental, economic, and biological data must be addressed to underpin future strategies. The upcoming appointment of a new SARDI Chief Scientist was identified as an opportunity to drive reform, provided the new leadership embraces collaboration, efficiency, and responsiveness to industry needs.

Fishery Review and Recommendations

The Northern Zone fishery is part of a broader stock of Southern Rock Lobster distributed across Southern Australia. Notwithstanding this stock structure, the biological performance of the stock varies regionally with differences in responses to fishing apparent between the two management zones in South Australia.

Research and assessment of Rock Lobster is resource intensive with 4.2 FTEs supporting both zones. Two quantitative models are used in assessing the Northern and Southern zone fisheries: LenMod (size structured) and the qR model (catch by numbers and weight). The LenMod model is used widely to assess Southern Rock Lobster (including in Victoria, Tasmania and New Zealand). A change in productivity, likely environment driven, applies generally to Southern Rock Lobster stocks including those in the Northern Zone. Changes in productivity and apparent hyper stability in CPUE need to be further considered in assessment.

Although quantitative assessments are completed annually, the harvest strategy relies solely on CPUE as a performance indicator linked to HCRs. The harvest strategy has been MSE tested. The effectiveness of the harvest strategy is apparent from upward trends in CPUE and in egg production.

A voluntary industry wide product management system incorporating sustainability, ecological impact, and product quality measures applies (McShane *et al.* 2005). This proactive approach has reduced harmful ETP interactions.

The fishery currently has a negative NER which will influence capacity to pay (for research and assessment).

Rock Lobster - Southern Zone

Fishery characteristics

- Main sectors: Commercial 95.5%, recreational 3.5%, Aboriginal 1%.
- Target species Southern rock lobster *Jasus edwardsii*. Licence holders can also land Giant crabs and Octopus responsive to formal allocations in the marine scale fishery.
- Fishing method(s) Baited pots
- Spatial complexity, Managed within two zones. The Southern Zone extends from the mouth of the Murray River east to the Victorian border. It involves fishing in both state and Commonwealth waters (under OCS arrangements). The zone is divided into 7 marine fishing areas (MFAs) but most of the fishing occurs in four MFAs.
- Shared stocks. Stocks of southern rock lobster are likely shared among South Australia, Victoria and Tasmania (Ovenden *et al.* 1992, Linnane *et al.* 2024c). However, biological characteristics vary among populations including within the two management zones in South Australia.
- Main management controls. Output controls TACCs (ITQs), size limits, prohibition of taking berried females. Input controls, limited entry, gear restrictions, numbers of pots/vessel, spatial and seasonal closures.
- Management plan/harvest strategy (PIRSA 2020c).
- Number of licences: 180
- Catch (t) 1,327 against a TACC of 1,330
- GVP ($) 70.5 million
- NER ($) 8 million
- NER/GVP 11.4%
- SAFS classification / fishery status Sustainable

CRIS information

- GVP $70.5 million
- CRIS cost
  - Total
  - Science and monitoring $1,053,859 but includes FRDC levy of $200,537 (by GVP should be ~ $170K)
  - Compliance
  - Licence fees/GVP 4.9%
- CRIS science breakdown
  - Catch sampling, FIS, stock assessment. FIS $125,410 exclusive of staff costs. Other attributable costs are mostly aggregated for both zones (e.g. against 4.2 FTEs) and not specified for individual activities in each zone.

    - Elements not covered under cost-recovery. Harvest strategy development, environmental studies, biosecurity.
- Benchmarking
    - Similar assessments completed in Victoria and New Zealand for less cost.

Stock Risk

Monitoring

- Catch sampling
    - Commercial and FIS pot sampling
    - Voluntary and observer length frequency data collected
- FIS (frequency, coverage)
    - Annual FIS (FIMS) surveys since 2006
    - FIMS in August and January across pre-determined transects using contracted commercial vessels with SARDI observers
    - Annual puerulus monitoring – PSI index since 1991
- Catch uncertainty (e.g. recreational sector)
- **Monitoring Score – 1**
    - Comprehensive long-term monitoring

Assessment

- Last assessment: Linnane *et al.* (2024b).
- Methods
    - Time series of adult CPUE, a pre-recruit CPUE (PRI), both from logbooks, FIS, PSI and length frequency data all available
    - Two quantitative models are applied
        - LenMod (size structured model)
        - qR model (catch by numbers and weight)
        - spatial analyses by Marine Fishing Area (MFA)
    - both models are fitted to CPUE, FIS data reported but not used in the assessments
    - LenMod also fitted to PRI time series (pre recruit index CPUE), length data
    - No relationship between PSI and PRI so PSI reported but not used in the assessment
- Key uncertainties
    - Changes in productivity – evidence of a downward shift about 2000 analysed in 2015 (Linnane *et al.* 2019) – not subsequently examined
    - Evidence that CPUE is hyper-stable, but not accounted for in the assessment
- Frequency of assessments
    - Annual stock assessment reports

    - Mid-season and end of season reports to industry
- **Stock Assessment Score – 2**
    - Changes in productivity and hyperstability in CPUE should be considered further

Harvest strategy

- Form of HCR/decision table
    - Primary indicator is CPUE of legal sized lobster
    - Secondary indicator is PRI (used in meta rule)
    - Additional indicators reported but not used in the HCR - % unfished egg production, PSI, FIMS, model estimated biomass, exploitation rate, recruitment
    - Decision table with TACC versus CPUE bands
    - Harvest fraction increases from LRP (0.4) to trigger reference point at 0.6, decreases after that
    - Meta rules use PRI to determine if increase in TACC is allowed
- Robustness of primary indicator(s)
    - CPUE has been shown to be hyper-stable but still used as the main input to the HCR
- Selection of reference points
    - Trigger reference point at CPUE of 0.6 represents the lowest CPUE observed in the fishery to date
- HS performance
    - MSE tested at last Management Plan update (using LenMod)
    - Current HS is resulting in rapid increases in CPUE (and egg production) in line with expectations from the MSE analyses
- **Harvest Strategy Score – 1**
    - The next HS review should consider the implications of hyperstability in the primary indicator - CPUE

Current stock status

- Relative to TRP and LRP
    - CPUE is well above the trigger reference point
    - Current % egg production is 15% (previous low of 10%)
- Trend
    - Trending upwards in line with model projections
- **Stock Status Score – 1**
    - Stock status needs to consider overall status of southern rock lobster and perhaps reconsideration of reference points

Summary risk score (1-5)

- Average across the four measures above

- **Stock Risk Score = 1.25**

Ecological risk assessment

- Assessment under Part 13A provisions of the EPBC Act completed in 2015 (DEE 2015).
- An ERA risk assessment completed in 2011 (PIRSA 2013) and updated in 2020 (PIRSA 2020c).
- ETP interactions, ecosystem impacts low to negligible.
- Summary risk score **1**

Ecological risk management

- A voluntary industry driven product management system Clean Green Rock lobster promotes codes of practice to minimise harm to target species, bycatch, byproduct, ETPs or the environment more generally (McShane *et al.* 2005).

Stakeholder Feedback

Data collection

The Southern Zone Rock Lobster Fishery has fully transitioned to electronic logbooks and compliance reporting since 2018–19. The system is considered to be effective. However, promised efficiency gains have not reduced costs. Instead, the fishery bears additional expenses through contracts with Deckhand for electronic logbook services and weigh-session applications.

Survey responses rated logbook catch data for target species as very high quality, although one respondent recommended expanding fisher catch sampling to improve geographic coverage. Byproduct and bycatch data were rated high to medium quality, but comments noted under-reporting of bycatch. ETP reporting was rated high quality.

Spatial resolution of effort data was rated high to medium quality. Suggestions included expanding pot-by-pot catch recording to enhance resolution, although some respondents noted that finer detail was unnecessary. Temporal resolution was rated high to very high, with respondents noting reliability but also highlighting that not all vessels consistently provide pot-level data — currently estimated at 60–70% of the fleet.

Environmental monitoring is increasingly important given the fishery’s proximity to the Bonney Upwelling. Respondents highlighted integration of IMOS data and SARDI presentations on temperature anomalies as useful, noting bottom temperature differences of 7–8.5°C versus 10°C between seasons.

Survey responses rated biological and economic data as high to very high quality. Oceanographic data were considered medium to high, with respondents noting year by year improvements. Other environmental data were rated medium by all three respondents. VMS was not rated, although one comment described it as outdated, expensive, and unnecessary in the Southern Zone given more rigorous existing compliance mechanisms.

Fishery independent surveys

The fishery maintains a strong time series of independent survey data, supported by long-term logbooks. Respondents value the continuation of annual surveys, noting that historically high harvest fractions justify close monitoring. Some questioned aspects of the FIMS, suggesting variability in results due to timing and environmental conditions. However, external reviewers and MSC certification processes consistently value the independent dataset as a validation of logbook records.

Survey responses showed mixed ratings: one very high, one high, and one medium. Suggestions included expanding surveys further north or refining methods to better target the bottom rather than relying on random sampling. Although industry recognises the need to retain surveys, they stressed that efficiency improvements should be explored.

Stock Assessment

The Southern Zone stock assessment program is well established, with datasets spanning long time series and structured annual processes. Industry are generally satisfied with outputs and value the independent oversight of the Management Advisory Committee and external reviewers. The fishery is still considered to be rebuilding, and industry supports maintaining rigour in the assessment program despite acknowledging costs are higher than in comparable jurisdictions.

Survey responses indicated a generally high level of confidence in the assessments. They rated assessments as extremely useful for management, with positive outcomes and no negatives. Parts working well included timely, reliable fishery-dependent data, and clear links to harvest strategy decisions. However, concerns were raised about the reliability of model outputs, especially in estimating unfished biomass or egg production. This prompted SARDI to commit to reviewing model assumptions and comparing them to those used in Tasmania and Victoria. The frequency of assessments was debated: while annual updates are standard, one respondent suggested biennial assessments might be feasible given the stability of recent years. Improving recreational data collection was also recommended, although recreational take is relatively low compared to other rock lobster fisheries.

Harvest Strategy

The harvest strategy, built on annual assessments and independent surveys, is broadly supported by industry. Respondents accepted the need for conservative settings given historical fishing pressure and the ongoing rebuilding process. They noted that the transparency of the harvest strategy has built confidence, and its alignment with long-term sustainability objectives is valued.

Survey responses reflected strong endorsement of the harvest strategy. Decision rules were rated as extremely or very clear, and responsiveness as extremely or very responsive. Two respondents said the rules are well balanced, with one describing them as only partially balanced. All agreed that stakeholder input is adequately considered. Effective parts of the harvest strategy included its explicit nature and reliance on catch rates, which align well with fisher observations. Suggested improvements included ongoing evaluation of trigger points, quicker reaction times if feasible, and consideration of shifting the quota year to March to better align catch with market conditions.

Research Costs and Efficiency

Research investment remains focused on assessments and surveys, with little scope for additional projects. Industry noted that this is appropriate, as safeguarding established datasets is the priority. However, they expressed interest in further integration of environmental data (temperature, salinity, upwelling, freshwater inflows) to improve understanding of variability in stock condition and catch rates. They also supported targeted work on anomalous events such as algal blooms, flooding, or shifts in upwelling, and potential links to rock lobster health indicators.

Survey responses supported this focus, with respondents describing biological and economic datasets as useful but limited by sampling scope and reporting lag. One highlighted that oceanographic data are improving but not systematically integrated into assessments. Respondents generally did not prioritise expansion of research programs beyond these areas.

Relationship with SARDI and PIRSA

Industry participants reported a strong and trusted working relationship with SARDI scientists. Key individuals were praised as accessible and engaged, with regular participation in port meetings and effective communication. The presence of independent oversight through the MAC further builds confidence. Compared with other South Australian fisheries, the Southern Zone is seen as having one of the most collaborative and constructive relationships with its science providers.

Survey responses supported this view, noting that SARDI and PIRSA provide transparency but that fishers' understanding depends on their willingness to engage with inputs and assumptions. Although costs are recognised as high, industry noted that they value the continuity, local knowledge, and dedication of scientists working closely with the fishery.

Fishery Review and Recommendations

The Southern Zone Rock Lobster fishery is by far South Australia's most valuable fishery. It has a long time series of catch and effort data supported by formal biological data collection programs. There is an annual FIS conducted across fixed transects. Puerulus monitoring also applies with a good correlation between settlement rates (on regional collectors) and recruitment to the fishery.

Similar issues and recommendations to those noted above for the Northern Zone apply i.e. changes in productivity and hyperstability of CPUE.

Sardine Fishery

Fishery characteristics

- Main sectors. Commercial 100%
- Target species: Australian sardine (*Sardinops sagax*), take of the Australian anchovy (*Engraulis australis*) is also permitted.
- Fishing method(s). Purse seine
- Spatial complexity: Sardines include wide ranging pelagic species harvested in South Australian and in Commonwealth waters under OCS arrangements. There are three spatial management zones: Spencer Gulf, Gulf St Vincent and an offshore Outside zone.
- Shared stocks. Sardines off southern Australia are considered to comprise four biological stocks. A single biological stock occurs off South Australia and western Victoria (Ward *et al.* 2023).
- Main management controls. Input: limited entry, gear restrictions, depth limits, closed areas. Output: TACC (ITQ), size limits applicable to catch.
- Management plan/harvest strategy (PIRSA 2023b).
- Number of licences: 14
- Catch (t): 47,000 of 50,000 t TACC
- GVP ($) 31 million
- NER ($) 8.6 million
- NER/GVP 27.8%
- SAFS classification / fishery status Sustainable

CRIS information

- GVP $31 million.
- CRIS cost
    - Total
    - Science and monitoring $1,053,859
    - Compliance
    - Licence fee/GVP 4.1%
- CRIS science breakdown
    - Catch sampling, FIS, stock assessment: DEPM survey and spawning biomass report $573,899, stock assessment report including catch sampling $296,982, Dolphin interaction (assessment of code of practice effectiveness) $59,716.
    - Elements not covered under cost-recovery. Harvest strategy development, biosecurity
- Benchmarking

  - Comparable DEPM programs delivered elsewhere (Commonwealth small pelagic fishery) for less cost.

Stock Risk

Monitoring

- Catch sampling
  - Comprehensive by fishery-independent observers, covering about 20% of net sets
  - Length, weight, age, sex, gonad stage
- FIS (frequency, coverage)
  - DEPM surveys since 1995
  - Observer validation of dolphin interactions
- Catch uncertainty (e.g. rec)
  - negligible
- **Monitoring Score – 1**
  - Comprehensive monitoring

Assessment

- Latest assessment: Grammer *et al.* (2024).
- Methods
  - Trends in DEPM biomass estimates
  - Integrated stock assessment model using SardEst
    - Spawning biomass, recruitment, harvest fraction, total biomass, relative depletion
  - CPUE not used
- Key uncertainties
  - Age estimation using otolith growth increments – partly overcome using age-otolith weight relationship
  - Environmental forcing
- Frequency of assessments
  - Annual
- **Stock Assessment Score – 1**
  - Robust assessment

Harvest strategy

- The current HS is the 4th and provides for
  - Increased exploitation rates at each tier to reflect higher certainty in biomass estimates from refined DEPM surveys
  - Increased TRP to 200,000t
  - TACC based on linear relationship with spawning biomass (SpB) above the upper trigger reference point

    - Spatial management over three fishing zones – Spencer Gulf, Gulf St Vincent, Outside Zone
- Form of HCR/decision table
    - Tiered harvest strategy
    - Exploitation rate decreases with SpB and with frequency of surveys
    - Maximum catch limits for each Gulf depend on mean size of sardines
    - HCR
    - Various meta rules
- Robustness of primary indicator(s)
    - Primary indicator is FIS (DEPM estimates of SpB) – robust
- Selection of reference points
    - Selected empirically based on biomass history
- Harvest strategy performance
    - Harvest strategy has maintained SpB above the TRP for the past decade, despite fluctuating abundance
- **Harvest Strategy Score – 1**
    - The harvest strategy is consistently maintaining the stock well above the TRP

Current stock status

- Relative to TRP and LRP
    - Stock fluctuating well above TRP
    - See outputs from the stock assessment model (Figure 4 below)
- Trend
    - Steady or increasing
- **Stock Status Score – 1**
    - Consistently above TRP

Summary risk score (1-5)

- Average across the four measures above
- **Stock Risk Score = 1**

Ecological risk assessment

- Last ERA in 2013 (PIRSA 2013b).
- Assessed against Part 13A provisions of the EPBC Act (DAWE 2022).
- High interactions with short-beaked common dolphins prompting a code of practice for mitigation. There are rare interactions with seals and white sharks.
- Summary risk score **3**

Ecological risk management

- Evaluation of the code of practice published by SARDI (2024) noted that some issues remain. Although interactions with ETPs, particularly dolphins have decreased with application of the code of practice, there remain concerns of underreporting. This requires further management to reduce risk to ETPs.
- This is an MSC certified fishery requiring compliance to ecological risk mitigation measures.

Stakeholder Feedback

Data collection

The sardine fishery has transitioned to electronic logbooks, enabling near real-time recording of catch and interactions with dolphins. Industry noted that this system has the potential to streamline reporting and management decisions. However, there is frustration that data recording processes are still slow and expensive, with observer data taking more than a year to be compiled into reports.

Survey responses rated target catch logbook data as high to very high quality. The single-species focus enable straightforward and accurate reporting. However, some raised concerns about delays in processing of data and the cost of scientific "over-servicing." Byproduct and bycatch reporting were consistently rated high to very high, reflecting their limited relevance to this fishery. Comments described current arrangements as adequate, with some suggestion that eCatch could offer improvements.

ETP reporting received high to medium ratings. Although some considered current reporting to be sufficient, others expressed concern that data are over-analysed or poorly contextualised. Suggestions included moving away from simple empirical multipliers and adopting more spatially sophisticated modelling.

Spatial effort reporting was rated high to very high, with mixed views on whether GPS-level detail is too fine or appropriately detailed. Temporal resolution was also rated high to very high, and respondents noted that effort timing can be validated via VMS. Both interviews and surveys highlighted the need for improved fisher access to their own data through electronic platforms.

Size sampling rules, which differ slightly between gulfs, were seen as unnecessarily strict when biomass is high. Respondents noted that enforcing minimum size thresholds to decimal-level precision, and reducing quotas for minor deviations, imposes costs without ecological benefit. They suggested that existing industry wharf-based samples could replace or complement observer-collected data.

Survey responses on biological data were mixed to high. Concerns centred on the Mean Size Sampling (MSS) program, which was criticised for high cost and duplication between industry and scientists. Several recommended decoupling MSS from ETP observer programs and shifting to fishery-dependent data collection.

Economic data were rated mostly medium, but comments highlighted complexity, confidentiality issues, and lack of utility. Fishers said they often guessed or withheld information due to commercial sensitivity, and they requested simplified processes to improve participation.

Oceanographic and other environmental data received varied ratings from low to very high. Some noted that the data were irrelevant or not systematically collected, whereas others called for more detailed satellite-derived temperature and monitoring of features like thermal and salinity fronts.

VMS was rated inconsistently. Some respondents said it is underutilised or over-analysed, particularly for compliance, whereas others highlighted a lack of transparency, with data sent to PIRSA but then not shared among fishery participants. Suggestions included using VMS more constructively for unloading checks or spatial access notifications, and providing fishers with direct access to their own data.

Additional data requests were split: some argued the fishery is already over-serviced, whereas others sought improved information on sardine behaviour, distribution, and migration, with ideas such as stable isotope analysis or refined spatial datasets.

Fishery independent surveys

The principal independent survey is the Daily Egg Production Method (DEPM), conducted annually when catches are set at 50,000 tonnes. Industry questioned whether both the cost and frequency of DEPM surveys are justified, given more than 30 years of data and a conservative harvest fraction of around 17%. They argued that biennial or risk-based surveys would often be sufficient, pointing to examples in Commonwealth small pelagic fisheries where lower harvest fractions are sustained with less frequent surveys.

Survey responses reflected this divergence. Some rated DEPM data highly, whereas others gave low ratings, citing risks of missing spawning events and high costs. Critics noted anomalies in past estimates, including one year where unrealistically high results led to inappropriate quota settings. Although the DEPM dataset is considered to be robust and long-standing, its efficiency and sole contribution to stock assessment were widely questioned.

Industry also suggested that adult biological sampling could be undertaken by trained industry participants rather than scientists, addressing both cost and OH&S issues. Acoustic methods were raised as a potential complementary tool, with some skippers trialling sonar equipment that may provide biomass estimates.

Stock Assessment

The sardine fishery operates under a two-yearly assessment cycle supported by DEPM surveys and size sampling. Industry noted improvements following external reviews but considered the assessment to be expensive and reliant on dated methods. They expressed frustration at bundled FTE charges that obscure how much of each scientist's time is dedicated to stock assessment versus other tasks.

Survey responses indicated that most respondents understood the assessment process "very well," though one said only "somewhat well" and admitted not understanding the $870,000 cost breakdown for the assessment and DEPM. Most respondents believed the assessment reflects the fishery well, although one rated this only "somewhat well."

A consistent criticism was the failure to incorporate environmental factors in assessments. All survey respondents noted assessments do not account for environmental influences on size, age, or spawning. Interview responses echoed this, noting that environmental variability is rarely discussed in assessments despite its obvious impact.

Transparency was rated from "transparent" to "a little transparent." Concerns were raised about political influence, lack of industry input into model selection, and limited access to detail. Although CSIRO reviewed the model in 2020 and high-level briefings are provided to industry, many noted that these are insufficient to build confidence.

On frequency, both interviews and surveys called for fewer surveys. Some suggested biennial or less frequent assessments, especially in high-biomass years. They argued that the rigid harvest strategy mandate for annual DEPM at 50,000 tonnes is unnecessary and should instead be tied to harvest fraction.

Usefulness for management was rated from "very useful" to "not at all useful." Although one respondent said assessments give confidence that low harvest rates do not harm sustainability, others described the process as "guesswork" and said fisher insight could be more reliable.

Concerns about deterioration in confidence of assessments focused on past overestimates, such as when a 52,000-tonne TACC led to depletion in Spencer Gulf. Others noted that recent quota reductions based on MSS are unlikely to affect sustainability but increase costs.

Working parts of the process included the Sardest model, particularly in years without DEPM, and the large baseline dataset underpinning confidence in stock status. Expressed concerns included the high costs, ineffective use of MSS, and overly frequent surveys. Suggested improvements centred on co-management, greater use of fishery-dependent data, reduced reliance on DEPM, and clearer evaluation of data use and cost-effectiveness.

Harvest Strategy

The current harvest strategy sets survey requirements based on quota levels: annual DEPM surveys at 50,000 tonnes, biennial at 45,000 tonnes, and more intensive monitoring if catches increase further. Industry criticised this as rigid and costly, arguing that monitoring intensity should be tied to harvest fraction relative to biomass, not arbitrary quota ceilings.

Survey responses showed mixed views on clarity. Although one respondent rated the decision rules as extremely clear, most said "somewhat clear" or "not so clear," noting that the tiered framework is complex and requires constant explanation. Some argued that understanding the harvest strategy requires consulting multiple documents, and recommended a consolidated "rulebook" format.

Responsiveness was rated mostly very responsive, with one "somewhat." Industry acknowledged that quotas do adjust from one season to the next, but called for greater flexibility and real-time adaptability to market and environmental conditions.

Balance was considered only partial. Respondents noted that sustainability is already well protected through conservative harvest rates, but the harvest strategy continues to prioritise low risk at significant cost to industry. They argued that the framework is too conservative, limiting economic returns without ecological justification.

On incorporation of industry input, survey responses were critical. Most said industry views are either not considered or only partially considered. Comments described decisions as predetermined, with scientific advice dominating and little receptiveness to industry perspectives.

Effective parts of the harvest strategy included the biomass tiers, tiered exploitation rates, and catch verification systems such as sea unloads. However, some respondents noted that there were no effective elements. Suggested changes included more flexible spatial management, allowing quota to shift between zones as sardines move, and linking MSS and DEPM requirements to spawning biomass estimates rather than fixed quotas. Reducing regulation and monitoring to cut costs was a recurring theme expressed by stakeholders.

Research Costs and Efficiency

Research costs in the sardine fishery were described as very high. DEPM surveys and associated assessments are expensive. Industry noted that high costs inflate licence fees and forces operators to increase catch just to cover costs. They were also frustrated by bundled FTE charges that obscure the true cost of assessment versus survey work.

The observer program was another focus of criticism. Reports cost about $80,000 annually but were said to add little new information (only ~5% each year), repeat previous content, and arrive a year late. Industry noted that AFMA reporting is shorter, timelier, and less costly. They called for reports to be streamlined, with quarterly electronic updates from e-log data replacing bulky annual reports.

Survey respondents echoed these concerns, with many arguing that the fishery is over-serviced with data and that monitoring could be scaled back without compromising sustainability. They stressed that resources should be used more efficiently, with greater reliance on fishery-dependent data and structured industry sampling.

Suggested improvements included:

- Requiring SARDI/PIRSA to report costs at a finer level, separating survey, assessment, harvest strategy support, and reporting.
- Streamlining observer reporting to reduce cost and improve timeliness.
- Allowing biennial DEPM surveys in high-biomass years.
- Training and accrediting industry to collect biological samples, reducing reliance on scientists.
- Trialling acoustic biomass surveys and expanding industry-led sampling to complement DEPM.
- Acknowledging industry's strong compliance history within harvest strategy frameworks, potentially reducing monitoring intensity and costs.

Relationship with SARDI and PIRSA

Industry participants noted that their relationship with SARDI scientists is professional and respectful, but characterised by frustration at cost structures and bureaucratic inflexibility. They acknowledged the dedication of individual scientists but argued that rising costs and limited transparency are undermining trust.

Survey responses reinforced this concern, with several noting that PIRSA and SARDI operate in an "echo chamber" that is unreceptive to industry perspectives. Respondents noted that their strong stewardship and compliance record is not recognised, and that management decisions often appear predetermined regardless of input.

Industry argued for a shift in roles: SARDI should focus on quality assurance and analysis, whereas industry should take greater responsibility for primary data collection. They believe that this approach would cut costs, empower fishers, and maintain scientific credibility. Suggestions included joint design of survey programs, clearer cost accounting, and regular updates delivered in accessible formats.

Fishery Review and Recommendations

The Sardine fishery is a valuable fishery with good economic returns. Monitoring and assessment is primarily based on the DEPM conducted annually. Catch sampling and a dolphin interaction program are also included in the research program. Annual assessments are robust and inform spatial management over three fishing zones: Spencer Gulf, Gulf St. Vincent, Outside.

The primary performance indicator applied in the harvest strategy is spawning stock biomass derived from the DEPM (and not CPUE). The harvest strategy is consistently maintaining the stock well above the TRP.

Interactions with dolphins is the primary concern arising from the ERA. Although a code of practice applies to reduce harmful interactions, there remains concerns of underreporting. However, the fishery is MSC certified with demonstrably sustainable management and relatively low ecological impact.

Vongole

Fishery characteristics

- Main sectors (comm, rec, indigenous) and allocations
- Target species: Vongole *Katelysia scalarina* (greys), *K. rhytiphora* (yellows) and *K. peroni* (whites).
- Fishing method. Hand harvest (rake)
- Spatial complexity Managed as two zones (Coffin Bay and West Coast) within which are Marine Fishing Areas for reporting purposes. The West Coast zone includes Streaky Bay, Smoky Bay, and Venus Bay. A further zone (Port River) has been closed to fishing since 2011.
- Shared stocks. Broad distribution in temperate waters from Western Australia to New South Wales.
- Main management controls. Output controls (TACCs, size limits). Input controls limited entry, spatial closures.
- Management plan/harvest strategy (PIRSA 2024d).
- Number of licences. Not available
- Catch (t) TACC Coffin Bay 40.8t, West Coast 16t (all species pooled).
- GVP ($) Not available
- NER ($) Not available
- SAFS classification / fishery status Both zones Sustainable

CRIS information

- GVP Not available
- CRIS cost
    - Total
    - Science and monitoring $40,062
    - Compliance
- CRIS science breakdown
    - Catch sampling, FIS, stock assessment. Additional costs specified: payment to industry for surveys $5,700, fieldwork $6,500.
    - Elements not covered under cost-recovery: harvest strategy development
- Benchmarking
    - Not available

Stock Risk

- Note: 3 species caught; not distinguished in commercial landings or TACC, but separately recorded in FIS surveys. Three major fishing zones: Coffin Bay, West Coast (3 separate Bays), and Port River (closed since 2011).

Monitoring

- Catch sampling
    - Commercial catches not sampled but FIS surveys record size structure by species.
- FIS (frequency, coverage)
    - FIS surveys since 2009
    - Not annual; currently every second year for Coffin Bay and every third year for West Coast
    - FIS survey methods externally reviewed (Foster 2022). Finding that survey designs should be standardised and not change over time.
- Catch uncertainty (e.g. recreational sector)
    - No mention of recreational catch in stock assessment reports
- **Monitoring Score – 2**
    - Marked down slightly due to past temporal variations in FIS design; but now resolved.

Assessment

- Latest assessment: Ferguson *et al.* (2022).
- Methods
    - Estimates of fishable biomass by fishing zone from FIS surveys
- Key uncertainties
    - 3 species, but resolved within FIS surveys
- Frequency of assessments
    - Every 2 years for Coffin Bay fishing zone, every 3 years for West Coast fishing zone
- **Stock Assessment Score – 2**
    - Strong reliance on FIS but not sampled every year
    - Basis for reference points could be clearer

Harvest strategy

- Recently implemented (PIRSA 2024d)
- Form of HCR/decision table
    - TACC vs harvestable biomass by Fishing Zone
    - Harvest fraction 7.5% for biomass above the Trigger reference point, 3% below the Trigger reference point, zero below the LRP
    - Meta rules for Bay specific management in West Coast zone
    - Penalties if FIS surveys not undertaken or published at required frequencies
- Robustness of primary indicator(s)
    - Based on FIS
- Selection of reference points

    - Basis not clearly stated
- Harvest strategy performance
    - A new harvest strategy but seems appropriate
    - Relatively conservative harvest fractions implemented (compared with other bivalve fisheries)
- **Harvest Strategy Score – 1**
    - Appropriate to the scale and spatial structure of the fishery

Current stock status

- Relative to TRP and LRP
    - Coffin Bay fishing zone – sustainable
    - West Coast fishing zone – sustainable
- Trend
    - Quite variable – large interannual variability likely driven by recruitment variability
- **Stock Status Score – 1**

Summary risk score (1-5)

- Average across the four measures above
- **Stock Risk Score = 1.5**

Ecological risk assessment

- No recent ERA or DCCEEW assessment available. The Vongole fishery is no longer included as part of the marine scale fishery assessment
- Summary risk score undefined but as a hand harvested operation, the Vongole fishery may be expected to have a relatively low impact on bycatch, habitat, and the ecosystem more generally (as with the Pipi assessment).
- Summary risk score **1**.

Ecological risk management

- Although it is likely that the hand harvest nature of the fishery is ecologically benign, a formal ERA should be undertaken to confirm low risk.

Stakeholder Feedback

Data – logbooks

Industry members described the logbook system as well established and reliable, with catch and effort information accurately recorded due to strong traceability and processor verification. Fishers said “every kilo is counted,” ensuring compliance and a high degree of confidence in data integrity. Because catch is weighed and cross-checked through processors, deliberate misreporting is minimal.

Survey responses confirmed these views, rating target catch data as very high quality and describing it as accurate, consistent, and fully traceable. Byproduct and bycatch were not considered significant, with respondents noting that undersized or discarded Vongole are not treated as bycatch in the conventional sense. However, some suggested that recording discard rates could provide a useful indicator of juvenile abundance and recruitment strength.

Spatial effort data were rated as moderate to poor, due to the coarse reporting zones currently used (e.g. Port Gawler, Thompson Beach). Fishers explained that catch and effort can vary substantially across small areas depending on substrate, tide, and access points. Both interview and survey participants supported a finer-scale, GPS-enabled system to map harvesting effort and identify localised pressure or productivity trends. Temporal data were rated as reliable but basic, with fishers recording days and hours worked but without finer detail such as start and finish times that could better standardise effort.

The interview highlighted that fishers already collect additional data informally — such as rake hours, catch rates, and size grading — while sorting their product. They argued this information could form a simple and cost-free "pre-recruit" index if incorporated into electronic logbooks, strengthening co-management and improving the accuracy of stock assessments.

ETP interactions are virtually non-existent, reflecting the selective and low-impact hand-harvest method. Respondents consistently marked this field as "nil," and no expansion of reporting was considered necessary.

Data – fishery independent surveys

Fishery-independent surveys are a cornerstone of the Vongole Fishery's management system, providing the biomass estimates that underpin quota decisions. Both interview and survey feedback demonstrated strong support for their continuation. Fishers regard pre-season biomass surveys as credible and scientifically sound, with most saying the results generally match what they observe in the field.

Nonetheless, industry members raised several practical concerns. They said the current survey design is too rigid, relying on fixed transects that can miss active cockle beds when stocks shift slightly. Several reported instances where poor survey results contradicted strong fishing outcomes nearby, suggesting that flexibility and fisher input in site selection could improve accuracy.

There was broad agreement that the frequency and cost of surveys should be reviewed. Fishers suggested that surveys could occur every three years rather than every two, given the fishery's stability and low risk, while expanding spatial coverage when surveys do take place. Some also proposed tendering parts of the survey (e.g. counting or data entry) to consultants or trained industry staff to reduce costs.

Survey respondents generally rated FIS data highly, recognising it as the most critical information source for sustainable management. They praised recent improvements in methodology and transparency, but asked for faster turnaround times, noting that delays in reporting reduce the relevance of results for quota setting.

Data – other

Environmental factors such as tide height, salinity, sedimentation, and water quality were widely acknowledged as key influences on Vongole abundance and condition. Fishers noted that while these drivers are well understood informally, they are not consistently recorded or integrated into management. Several suggested installing independent sensors to monitor salinity and temperature, particularly in areas affected by freshwater inflows or sedimentation.

Biological data collection, particularly size-frequency sampling, was supported by nearly all respondents. Fishers see this as critical for detecting recruitment pulses and adjusting size limits. Some participate in cooperative sampling programs and want sampling to occur more regularly, with results shared prior to quota decisions.

Economic data are not currently collected, but fishers expressed concern that cost recovery and management fees are disproportionate to the fishery's profitability. They supported collecting economic information only if it would be used to benchmark management efficiency or support cost-reduction arguments.

VMS is not used in this wading fishery, and fishers unanimously said vessel-based tracking is irrelevant. Some suggested that handheld GPS or app-based systems could be used to improve spatial mapping if required.

Stock Assessment

Industry members demonstrated a high level of understanding and confidence in the Vongole stock assessment process. They recognised that assessments are biomass-based, rely on fishery-independent surveys, and are supplemented by commercial catch and effort data. Many have participated in or observed survey work and understand how biomass estimates translate into Total Allowable Commercial Catch (TACC) decisions.

Fishers said the assessment process "matches what we see on the ground" when survey data are current and representative. They supported the science-led approach and believed it provides a robust, defensible basis for management. However, some expressed concern that delays in survey reporting occasionally undermine the timeliness of quota decisions, and that fine-scale patchiness in cockle distribution may be missed by current sampling intensity.

Environmental and external factors such as freshwater inflows, sedimentation, and coastal runoff were repeatedly identified as important but underrepresented in assessments. Members said that habitat quality and sediment movement directly affect productivity, yet these are rarely integrated into risk assessments or harvest planning. They suggested including water quality and sediment monitoring in stock status reviews, potentially in collaboration with local councils or coastal managers.

Transparency of the process was rated as good, with fishers acknowledging regular briefings from PIRSA or SARDI. They said these sessions help demystify biomass estimates and improve understanding of TACC decisions. However, they requested faster delivery of preliminary results before management meetings.

Industry unanimously supported annual assessments, seeing them as vital for maintaining accuracy and responsiveness in a small, variable fishery. Some proposed mid-season verification checks in years where catches diverge from forecasts. Overall, the assessment process was viewed as critical for sustainability, though its cost and timeliness could be improved.

Harvest Strategy

The harvest strategy is well understood and widely trusted. Industry members described it as clear, predictable, and scientifically grounded, with transparent links between survey biomass estimates and catch limits. They said this predictability assists business planning and reinforces confidence in management.

Survey results confirmed this strong endorsement. Fishers rated decision-rule clarity as very high, describing the tiered harvest control rules (HCRs) as logical and easy to follow. Responsiveness was also rated high, with members citing recent examples where TACC was adjusted in line with survey outcomes. They acknowledged that responsiveness depends on the timeliness of survey data, and suggested that quicker reporting or mid-season reviews could enhance flexibility.

The balance between sustainability, social, and economic objectives was viewed as skewed toward biological conservation. Fishers accepted this emphasis but said it sometimes constrains profitability in years when quotas are reduced as a precaution. They called for mechanisms to recognise the economic impacts of TACC reductions, such as scaling management fees in proportion to catch opportunity.

Industry members reported that consultation during harvest strategy development and review has improved markedly. They described engagement with PIRSA and SARDI as genuine and two-way, noting that their feedback on thresholds and decision rules has influenced revisions. However, they requested more regular review cycles to ensure that rules remain proportionate to risk.

Overall, fishers said the harvest strategy works well, providing transparency, consistency, and strong industry confidence. Suggested improvements included:

- Incorporating economic and operational feasibility indicators.

- Introducing optional mid-season reviews in abnormal years.
- Aligning cost recovery with harvest outcomes.
- Integrating habitat or environmental stress indicators into risk assessments.
- Tracking and reporting how fisher input leads to changes over time.

Research Costs and Efficiency

Research costs were described as high relative to the fishery's small scale and low risk. Industry members said much of the scientific program has become routine and risk-averse, with little innovation or new research focus. They questioned the value of repeating similar survey work every two years when results are stable and harvest levels remain below limits.

Fishers suggested reducing survey frequency to three-year cycles, cutting costs while maintaining oversight, and reallocating effort to juvenile studies, environmental monitoring, or analysis of fisher-collected data. Several proposed involving consultants or accredited industry members in simple tasks (e.g. counting samples) to lower costs.

Transparency of SARDI costs was also raised. Members said they are unclear how staff time is divided among surveys, assessments, and reporting. They requested detailed cost breakdowns to clarify what they are paying for and ensure resources are directed toward activities that directly inform management decisions.

Survey responses echoed these points, noting frustration that management fees and cost recovery do not decrease when TACC is reduced. Fishers urged a closer link between science costs, quota levels, and demonstrated risk.

Relationship with SARDI and PIRSA

The relationship with SARDI was described as constructive but could be more collaborative. Industry members valued having a consistent, experienced scientist assigned to the fishery, which provides continuity and a point of contact for questions or concerns. However, they said greater recognition of fisher knowledge would strengthen co-management and improve survey design accuracy.

While communication and transparency have improved, some fishers felt that scientists occasionally dismiss local observations when they conflict with survey data. This, they said, erodes confidence in the process. They urged more genuine collaboration in survey planning and stronger acknowledgment of industry's precautionary practices.

Overall, members expressed trust in individual scientists and satisfaction with the fishery's stability and management outcomes. However, they want future engagement to emphasise partnership, cost

Fishery Review and Recommendations

The Vongole fishery is small with no current economic information available. It is based on the hand harvest of three species of clams. The fishery is monitored and assessed through logbooks (collective harvest of the three species) and FIS (with separate species assessments). FIS are conducted every second year for Coffin Bay and every third year for the West coast. FIS survey methods have been externally reviewed. A harvest strategy applies with relatively conservative harvest fractions implemented (compared with other bivalve fisheries).

No recent ERA is available for the fishery but as a hand harvest operation (similar to Pipis) it is unlikely that any serious risk applies.

Charter Boat

The Charter Boat fishery is a commercial extension of recreational fisheries for popular target species (Snapper, King George whiting, Redfish). Accordingly, the fishery does not align to the usual yardsticks of performance presented for other commercial fisheries (above).

Fishery characteristics

- Main sectors (commercial/recreational) and (Snapper 10%, King George whiting 3%)
- Target species: Snapper, King George whiting, Bight redfish (*Centroberyx gerrardi*)
- Fishing method. hook and line
- Spatial complexity. Reported as five regions: west coast, Spencer Gulf/Coffin Bay, Gulf St. Vincent/Kangaroo Island, Victor Harbour/south east, Other (offshore).
- Main management controls. Output controls: boat limits, bag limits, size limits, trip limits, TAC for Snapper. Input controls limited entry, spatial closures, gear restrictions.
- Management plan/harvest strategy (PIRSA 2022)f.
- Number of licences. 84, 49 active
- Catch (t) not available
- GVP ($) 3.4 million
- NER ($) Not available
- SAFS classification / fishery status Snapper Depleted other target species Sustainable

CRIS information

- GVP: $3.4 million
- CRIS cost
    - Total
    - Science and monitoring: $105,888
    - Compliance
- CRIS science breakdown
    - Information services data collection: $43,148, Economic assessment $24,083
- Benchmarking
    - Not available

Stock Risk

- Snapper currently depleted and closed to all fishing

Monitoring

- Catch and effort data collected from active licence holders for target species.

Assessment

- Latest assessment: Dennis *et al.* (2024).
- Status of target species assessed through the Marine Scalefish research and assessment program.
- Annual catch and effort report provided
- Research report provided every three years

Harvest strategy

- PIRSA (2022f).
- Reference points applicable to individual target species as specified for the Marine Scalefish harvest strategy. This is a newly implemented strategy with performance indicators mostly based on CPUE (PIRSA 2025).
- No specific reference points or performance indicators specified for the Charter Boat fishery.

Current stock status

- Snapper stocks depleted
- Other target species assessed as sustainable (Dennis *et al.* 2024).

Ecological risk assessment

- Most recent assessment 2018 (PIRSA 2022f).
- Moderate risk to target species and discards
- Negligible risk to habitat or ecosystem more generally

Ecological risk management

- Management plan (PIRSA 2022f).

Stakeholder Feedback

Data – logbooks

Data collection for the Charter Boat Fishery is complicated by overlap with the Marine Scalefish and recreational sectors, meaning that charter logbook information is not treated as a standalone dataset in assessments. Charter operators submit catch and effort records, but these data are largely absorbed into broader frameworks without direct feedback to operators. Industry members said this leads to frustration and a sense that their reporting effort is underutilised.

Both the interview and survey results identified inconsistency and limited accuracy in logbook data. Distinctions between retained and released catch are not applied consistently across operators, creating what some described as "consistently inconsistent" data. Some said there is no clear incentive to ensure accuracy, as the data are rarely used in visible management applications. Nevertheless, charter logbooks have contributed valuable discard information for species such as snapper and nannygai, which SARDI has acknowledged as a useful long-term dataset.

Temporal effort data were viewed as of limited value due to delayed data entry and varying definitions of "effort." One operator said this information is "barely used." Spatial data were considered low quality because fishing activity is recorded by broad area codes rather than precise locations, which fails to capture the multi-site nature of typical charter trips. Industry members said more spatially accurate data, potentially via GPS-linked reporting, would significantly improve management relevance.

The sector strongly supports the transition to electronic logbooks with GPS integration. Operators see this as the most practical way to automate spatial and temporal reporting and improve data quality. However, current PIRSA systems are not fully compatible with GPS-linked e-logs, limiting progress. Many charter operators already export their catch and trip data for their own business or marketing purposes, which demonstrates willingness and technical capacity to adopt electronic systems.

Byproduct and bycatch data were rarely recorded, and where they were, consistency and reliability were low. Respondents noted that selective fishing practices and low-impact gear mean that bycatch and ETP interactions are rare, but they also said there is no clear framework for reporting such events. ETP data were described as effectively absent. Operators admitted uncertainty about whether reporting such interactions is mandatory, and some expressed concern that accurate reporting could invite punitive responses. Members supported a safe, clear framework for ETP reporting, including standard definitions and assurances that self-reporting will not be penalised.

Survey responses rated overall logbook data for target species as medium to high quality and byproduct, bycatch, and ETP data as low to medium quality. Both sources agreed that more useful data collection will depend on a visible feedback loop showing how information is applied to management.

Data – fishery independent surveys

There are no dedicated fishery-independent surveys for the charter sector. Operators said they were unaware of any validation or supplementary programs focused on charter fishing, and most had never seen outputs relevant to their operations. Several said they would support cooperative survey or sampling work—such as hosting observers or contributing environmental observations—if invited or resourced to do so.

Data – other

Environmental and biological data are not routinely collected in this fishery. Operators noted that weather, water temperature, and sea conditions strongly influence fish behaviour and catch success, yet none of these variables are recorded or used in analysis. Many said they could record this information if prompted via an electronic logbook interface, especially if automated or simplified.

Biological data (e.g. fish size or condition) are not currently collected. Some operators said they could record size data for retained fish, especially for heavily targeted species like snapper or King George whiting, if provided with an efficient, resourced system. Economic data are also absent, though some supported collecting it in principle if confidentiality and purpose were clear.

VMS is not fitted to charter vessels. Some operators supported voluntary, non-invasive spatial tracking for research or access management, provided it would not be used as a compliance tool.

Stock Assessment

Because the charter fishery's catch overlaps almost entirely with the Marine Scalefish and recreational sectors, no stock assessments are conducted specifically for the charter fishery. Industry members said this exclusion means their data and observations have little influence on management, despite operating at the interface between recreational and commercial fishing.

Survey responses confirmed that understanding of the stock assessment process is low. Most operators said they do not know how assessments are conducted, whether charter data are used, or what agencies are responsible. Several assumed assessments are done by SARDI or PIRSA but had never seen results or received feedback.

Confidence in the accuracy of assessments was also low. Operators said assessments for species such as snapper and whiting do not align with what they observe on the water. They felt assessments rely on commercial and recreational CPUE that do not reflect local charter experiences. For example, members noted instances where snapper closures or catch restrictions were implemented even when local abundance was high.

Environmental drivers—such as water temperature, storm events, and spawning timing—were described as critical factors that strongly affect catch rates and distribution. However, operators said these are not considered in assessments or management responses, resulting in seasonal closures that often misalign with periods of peak abundance.

Transparency was a major issue. Most respondents said they had never seen assessment outputs or summaries relevant to charter operations. There was widespread frustration that even if charter data are used, it occurs without consultation or acknowledgment. Some suspected that management decisions are driven more by political or precautionary motives than by real-time evidence.

Operators said assessments could improve sustainability if they were inclusive and locally informed, but that misapplied science can harm the fishery by imposing blanket restrictions that damage local businesses. They noted that snapper closures in particular have reduced profitability for charter operators, who depend on access to specific high-demand species.

Industry members offered constructive suggestions, including:

- Tailoring assessments to include charter-specific data and effort profiles.
- Involving charter operators directly in cooperative monitoring programs.
- Integrating environmental and spatial indicators into models.
- Establishing a feedback loop so operators see how their data are used.
- Producing regionally focused updates to reflect local catch patterns rather than statewide averages.

Harvest Strategy

There is no formal harvest strategy specific to the Charter Boat Fishery. Instead, charter operations are governed by the harvest strategies of the fisheries that manage shared species—primarily the Marine Scalefish Fishery and, to a lesser extent, the Lakes and Coorong Fishery.

As a result, charter operators reported very low awareness of harvest strategy rules or processes. Most were unsure whether any HS applied directly to them, or whether their input was sought in the development or review of rules. One operator stated that they were "not aware of any harvest strategy specific to charter operations," while others said decision rules that affect their businesses are unclear, inaccessible, or inconsistent.

Operators said management actions such as area closures, bag limit changes, and species restrictions often appear disconnected from real-time conditions. Snapper closures were the most common example: fishers said these rules remained in place long after local abundance had recovered, and that management was slow to recognise improvement.

Members viewed the balance of objectives as heavily skewed toward biological sustainability, with minimal regard for social or economic impacts. They argued that charter catches are small relative to commercial fisheries but support substantial tourism and regional employment. They believe the sector faces disproportionate restrictions despite its low ecological risk.

Survey responses supported these views. Clarity and responsiveness of decision rules were rated as low, and operators said harvest strategies are designed for commercial or recreational fisheries, not for charter operations. They called for inclusion in consultation processes and flexibility to recognise local conditions.

Industry members suggested several practical improvements:

- Develop charter-specific harvest strategy components within broader frameworks.
- Incorporate social and economic indicators alongside biological metrics.
- Enable regional flexibility rather than applying blanket statewide settings.
- Establish formal mechanisms for charter representation in HS reviews.
- Use real-time digital reporting to provide more responsive, data-driven decision-making.

Research Costs and Efficiency

Research and assessment costs for the Charter Boat Fishery are low compared to other sectors—approximately $30,600 annually—but members said the sector receives little direct benefit from this expenditure. Most research funding and activity occur within the Marine Scalefish framework, and charter operators rarely see outputs or have opportunities to participate.

Members expressed interest in greater involvement in research, particularly in observer programs or collaborative monitoring, noting that charter boats could easily support fieldwork for shared species. Despite repeated offers, operators said their vessels have seldom been used for such programs. They believe this represents a missed opportunity to capture valuable data and demonstrate stewardship.

Survey feedback reinforced that the sector is under-represented in scientific processes. Respondents called for more efficient use of funds by involving charter operators directly in data collection, rather than maintaining external programs that do not use existing effort on the water.

Relationship with SARDI and PIRSA

The charter sector has representation on the Marine Scalefish MAC and science subcommittees, which ensures its views are at least presented in cross-sector discussions. Members described their relationship with SARDI scientists as constructive but limited. They appreciated that SARDI recognises the value of charter discard data, but frustration remains that this information is not consistently used in analyses or communicated back to the sector.

Charter operators said they feel marginalised compared to larger commercial sectors and overlooked in management planning. They emphasised that they are licensed, compliant, and publicly visible, yet are often treated as peripheral stakeholders rather than active participants in data collection and science.

Survey responses were consistent with this view. Operators described communication with agencies as minimal, saying they “never see the results” of the data they provide.

They called for better feedback, acknowledgement of their contributions, and inclusion in research and decision-making processes.

Cost-recovery Review Survey

SA - Fisheries Cost Recovery Review

Background

The fisheries resources of South Australia need to be managed in an efficient and cost-effective manner (Section 7(3) of the Fisheries Management Act 2007). The Cost Recovery Implementation Committee (CRIC) was formed to implement the recommendations of the Independent Cost Recovery Review Panel. Benchmarking was a recommendation of this review to ensure that science activities (i.e. monitoring and stock assessment) and compliance activities and their associated costs are transparent, risk-based and aligned with best practice.

This survey forms part of the benchmarking study and is designed to help us better understand your views of science and compliance activities relevant to your fishery and to evaluate whether these activities are risk-based, cost-effective, and appropriately designed to meet industry and legislative needs.

It would be appreciated if you could please complete this survey by the end of July 2025. It takes around 15 minutes to complete, so please don't rush, grab a cuppa, sit down and tell us what you think.

SA - Fisheries Cost Recovery Review

About you

We don't need to know who you are but in this section we would like to know about your involvement in the SA Seafood Industry.

1. What is your involvement in the industry?
(You can tick more than one)

- [ ] Wildcatch fisher
- [ ] Charter Boat Operator
- [ ] Quota Owner
- [ ] Licence Holder
- [ ] Fishing Vessel Owner
- [ ] Other (please specify)
- [ ] Wholesaler
- [ ] Processor
- [ ] Marketer / retailer
- [ ] Fish Receiver
- [ ] Association leader

* 2. What fishery are you mainly involved in?
(You can tick more than 1)

- [ ] Abalone - Central Zone
- [ ] Abalone - Southern Zone
- [ ] Abalone - Western Zone
- [ ] Blue Crab Fishery
- [ ] Charter Boat Fishery
- [ ] Giant Crab
- [ ] Other (please specify)
- [ ] Lake Eyre Basin Fishery
- [ ] Lakes and Coorong Fishery
- [ ] Marine Scalefish Fishery
- [ ] Prawn - Gulf St Vincent
- [ ] Prawn - Spencer Gulf
- [ ] Prawn - West Coast
- [ ] Rock Lobster - Northern Zone
- [ ] Rock Lobster - Southern Zone
- [ ] Sardine
- [ ] Vongole

* 3. Are you a member of an industry association?

- ( ) Yes
- ( ) No

SA - Fisheries Cost Recovery Review

About you

* 4. What industry association are (were) you involved in?

- [ ] The Spencer Gulf & West Coast Prawn Association
- [ ] Marine Fishers Association
- [ ] Gulf St Vincent Prawn Boat Owners Association
- [ ] Abalone Industry Association of SA
- [ ] Central Zone Abalone Industry Association
- [ ] Southern Zone Abalone Industry Association
- [ ] Lakes and Coorong Fishery Southern Fishermen's Association
- [ ] SA Blue Crab Pot Fishers Association
- [ ] Other (please specify)
- [ ] Goolwa PipiCo
- [ ] Northern Zone Rock Lobster Industry Association
- [ ] South East Professional Fishermens Association
- [ ] South Australian Rock Lobster Advisory Council
- [ ] South Australian Professional Fishers Association
- [ ] Vongole Fishery Association SA
- [ ] Charter Boat Association
- [ ] Sardine Association

SA - Fisheries Cost Recovery Review

Science - overview

This section of the survey seeks to understand your views on the appropriateness and cost-effectiveness of science services across commercial fisheries as a whole, and at the individual fishery level. The primary objectives of the Fisheries Science Benchmarking process are to:

- Evaluate current science frameworks and cost structures within the fisheries sectors to determine if these are appropriate, risk-based and effective.
- Ensure science costs are transparent, and aligned with best practice.
- Identify efficiencies in current activities and future opportunities for modernisation, particularly through innovation and new approaches to stock assessment and monitoring.
- Ensure Compliance with Legislation. Confirm that SARDI service provision aligns with the requirements of the Fisheries Management Act 2007, where the aquatic resources of the State are to be managed in an efficient and cost-effective manner.

SA - Fisheries Cost Recovery Review

Science - monitoring

Monitoring is the ongoing collection of biological, ecological, fishery, and environmental data to inform stock assessments and management decisions. There are different components of a fishery that may be monitored including: key (retained) ***target*** species; secondary (retained) ***byproduct*** species; ***bycatch*** (discarded) species; endangered, threatened, protected (***ETP***) species; and sometimes communities and habitats. A well-designed monitoring program ensures that sufficient, reliable data are available to evaluate the status of the fishery and to trigger appropriate management responses under the harvest strategy.

Monitoring programs typically draw on two main data sources:

- **Fishery-dependent data** are collected through the commercial or recreational fishing activity itself. This includes logbook records (e.g., catch and effort - either paper or electronic), observer data, electronic monitoring, port sampling, GPS and VMS, gear- or diver-mounted temperature depth recorders, and other fisher-reported data. These data are generally cost-effective and provide insights into catch composition, fishing practices, and spatial and temporal trends in resource use. However, they can be biased by changes in fisher behavior, targeting strategies, market dynamics, or gear efficiency.
- **Fishery-independent data** are collected through surveys or research that are independent of commercial or recreational fishing operations. Examples include scientific trawl or diver surveys, egg production surveys, and tagging programs. These data provide a more controlled and unbiased measure of stock abundance and distribution, especially valuable for validating trends observed in fishery-dependent data, but they can also be relatively expensive.

An effective monitoring strategy often uses both data types in a complementary way. Fishery-dependent data provide broad temporal and spatial coverage, while fishery-independent data offer greater scientific control and standardization. Together, they underpin robust stock assessments and responsive harvest strategies.

In this section we would like to understand your thoughts on how well the science program collects and reports data on your fishery.

* 5. Generally, how would you rate the quality of the data collected in your fishery?
(e.g. timeliness, representativeness, completeness, reliability etc)

	Very high quality	High quality	Medium quality	Low quality	Very low quality	I don't know	N/A
Logbook catch - target spp	◯	◯	◯	◯	◯	◯	◯
How could it be improved?							
Logbook catch - byproduct spp	◯	◯	◯	◯	◯	◯	◯
How could it be improved?							
Logbook catch - bycatch spp	◯	◯	◯	◯	◯	◯	◯
How could it be improved?							
Logbook catch - ETP spp	◯	◯	◯	◯	◯	◯	◯
How could it be improved?							
Logbook effort - spatial resolution of where catch taken	◯	◯	◯	◯	◯	◯	◯
How could it be improved?							
Logbook effort - temporal	◯	◯	◯	◯	◯	◯	◯

resolution of when catch taken

How could it be improved?

Fishery Independent survey data

How could it be improved?

Biological data (length/sex/weight etc)

How could it be improved?

Economic data (fuel, salaries, fixed costs etc)

How could it be improved?

Oceanographic data (Temp/salinity etc)

How could it be improved?

Other environmental data

How could it be improved?

VMS data

How could it be improved?

6. Is there any additional data that could be collected to improve assessment or management of your fishery? Please explain what it could be used for?

7. Would you like to comment on a stock assessment

- ◯ Yes
- ◯ No

SA - Fisheries Cost Recovery Review

Science - Stock Assessment 1

Assessment is the scientific process of analysing monitoring data to estimate stock status and fishing pressure. It may range from simple indicators (e.g., CPUE trends) to complex population models that use all available data (catch, effort, CPUE, length-frequency, survey indices etc) to estimate biomass, recruitment, and exploitation rates.

In this section we would like to understand your thoughts on how well the science supports an understanding of stock status and trends as well as inputs/requirements for harvest strategies and TACC setting?

* 8. You have the option to comment on up to two stock assessments of species/fisheries you are familiar with. Which stock assessment would you like to comment on first?

* 9. How well do you understand this stock assessment process for your fishery?

- ◯ Extremely well
- ◯ Very well
- ◯ Somewhat well
- ◯ Not so well
- ◯ Not at all well

Any comments?

* 10. How well does the stock assessment reflect the actual state of the fishery based on your observations and experience?

- ◯ Very well
- ◯ Well
- ◯ Somewhat well
- ◯ Not so well
- ◯ Not well at all

Any comments?

* 11. Are environmental changes and other outside factors (e.g., temperature, ocean conditions, habitat changes) appropriately considered in the assessments?

- ◯ Yes
- ◯ Partially
- ◯ No
- ◯ Not sure

How could this be done better?

* 12. How transparent is the process used to decide which data and models are used in the assessment?

- ◯ Very transparent
- ◯ Transparent
- ◯ Somewhat transparent
- ◯ A little transparent
- ◯ Not transparent at all

Any comments?

* 13. How often should stock assessments be updated for your fishery to stay relevant and accurate

- ◯ Every year
- ◯ Every 2–3 years
- ◯ Less often
- ◯ Only when a problem arises
- ◯ Not sure

Any comment?

* 14. How useful are the assessment results for supporting management decisions (e.g., quota setting, effort limits, closures)?

- ◯ Extremely useful
- ◯ Very useful
- ◯ Somewhat useful
- ◯ Not so useful
- ◯ Not at all useful

Any comments?

* 15. Has the assessment led to management decisions that you believe have improved the sustainability or profitability of the fishery?

- ◯ Yes
- ◯ Sometimes
- ◯ No
- ◯ Not sure

Any comments?

* 16. Has the assessment led to management decisions that you believe have degraded the sustainability or profitability of the fishery?

- ◯ Yes
- ◯ Partially
- ◯ No
- ◯ Not sure

Any comments?

* 17. What parts of the stock assessment process do you think are working well?

* 18. What parts of the stock assessment process do you think are not working well?

* 19. What specific improvements would you like to see in how the stock assessment is done or communicated?

* 20. Would you like to comment on another assessment?
If not, we will now move on to the harvest strategy section.

- ◯ Yes
- ◯ No

SA - Fisheries Cost Recovery Review

Science - Stock Assessment 2

21. You opted to comment on a second stock assessment you are familiar with. Which other stock assessment would you like to comment on?

22. How well do you understand this stock assessment process for your fishery?

- Extremely well
- Very well
- Somewhat well
- Not so well
- Not at all well

Any comments?

23. How well does the stock assessment reflect the actual state of the fishery based on your experience?

- Very well
- Well
- Somewhat well
- Not so well
- Not well at all

Any comment?

24. Are environmental changes and other outside factors (e.g., temperature, ocean conditions, habitat changes) appropriately considered in the assessments?

- ◯ Yes
- ◯ Partially
- ◯ No
- ◯ Not sure

How could this be done better?

25. How transparent is the process used to decide which data and models are used in the assessment?

- ◯ Very transparent
- ◯ Transparent
- ◯ Somewhat transparent
- ◯ A little transparent
- ◯ Not transparent at all

Any comments?

26. How often should stock assessments be updated for your fishery to stay relevant and accurate

- ◯ Every year
- ◯ Every 2–3 years
- ◯ Less often
- ◯ Only when a problem arises
- ◯ Not sure

Any comment?

27. How useful are the assessment results for supporting management decisions (e.g., quota setting, effort limits, closures)?

- ◯ Extremely useful
- ◯ Very useful
- ◯ Somewhat useful
- ◯ Not so useful
- ◯ Not at all useful

Any comments?

28. Has the assessment led to management decisions that you believe have improved the sustainability or profitability of the fishery?

- ◯ Yes
- ◯ Partially
- ◯ No
- ◯ Not sure

Any comments?

29. Has the assessment led to management decisions that you believe have degraded the sustainability or profitability of the fishery?

- ◯ Yes
- ◯ Partially
- ◯ No
- ◯ Not sure

Any comments?

30. What parts of the stock assessment process do you think are working well?

31. What parts of the stock assessment process do you think are not working well?

32. What specific improvements would you like to see in how the stock assessment is done or communicated?

SA - Fisheries Cost Recovery Review

Science - Decision Rules

In addition to monitoring and assessments, fishery harvest strategies include formal decision rules that guide pre-specified management responses to catch rate changes or stock abundance levels relative to target and limit reference points.

* 33. How clear are the harvest strategy decision rules for your fishery?
(what conditions/indicators, e.g. biomass or catch rate, lead to effort or TACs changes, or fishery closures)

- ◯ Extremely clear
- ◯ Very clear
- ◯ Somewhat clear
- ◯ Not so clear
- ◯ Not at all clear

Any comments?

* 34. How responsive are the decision rules to changes in stock status?

- ◯ Extremely responsive
- ◯ Very responsive
- ◯ Somewhat responsive
- ◯ Not so responsive
- ◯ Not at all responsive

Any comments?

* 35. There are always trade-offs in fishery management decisions, sometimes described as Risk-Cost-Catch tradeoffs. Do you believe the decision rules strike a good balance between sustainability, social requirements and economic return?

- ◯ Yes
- ◯ Partially
- ◯ No
- ◯ Not sure
- ◯ Any comments?

* 36. Do you feel your input is considered when decision rules are developed or reviewed?

- ◯ Yes
- ◯ No
- ◯ Partially
- ◯ Not sure

Any comments?

* 37. What aspects of the current decision rules are effective?

* 38. What changes to decision rules or their use would you suggest?

SA - Fisheries Cost Recovery Review

Compliance

The purpose of this survey is to gather information from the commercial fishing sector regarding the delivery of cost recovered fisheries compliance services in South Australia. This feedback will form the basis of further direct interviews with members of the commercial fishing sector as part of the Compliance Review Project.

* 39. List the top three activities that you see as a compliance risk to the integrity and sustainability of the fishery in which you are involved.

- [ ] Taking undersize fish
- [ ] Incorrectly recording fish counts
- [ ] Incorrectly tagging/labelling boxes/cases
- [ ] Incorrectly recording catch weight
- [ ] Non-compliance with closures & marine parks
- [ ] Landing to unlicenced fish receivers (black marketing)
- [ ] Non-adherence to quota system
- [ ] Non-adherence to seasonal rules
- [ ] Non-adherence to gear regulations
- [ ] Non-compliance with TEP mitigation measures
- [ ] Trucking (declaring catches in areas it is not caught)
- [ ] No Issues
- [ ] Other (please specify)

* 40. List the three most difficult regulations to comply with, where you (or your sector) struggles to meet compliance obligations.

- [ ] Taking undersize fish
- [ ] Incorrectly recording fish counts
- [ ] Tagging/labelling boxes/cases
- [ ] Correctly declaring catch weight
- [ ] Compliance with closures & marine parks
- [ ] Landing to licenced fish receivers
- [ ] Adherence to quota system
- [ ] Adherence to seasonal rules
- [ ] Adherence to gear regulations
- [ ] TEP mitigations
- [ ] No issues
- [ ] Other (please specify)

* 41. List any regulation or compliance issues that you feel PIRSA are enforcing that present low or no risk to the integrity of your fishery (because they are not happening and/or are unimportant)

- [ ] Taking undersize fish
- [ ] Incorrectly recording fish counts
- [ ] Incorrectly tagging/labelling boxes/cases
- [ ] Incorrectly recording catch weight
- [ ] Non-compliance with closures & marine parks
- [ ] Landing to unlicenced fish receivers (black marketing)
- [ ] Non-adherence to quota system
- [ ] Non-adherence to seasonal rules
- [ ] Non-adherence to gear regulations
- [ ] Non-compliance with TEP mitigation measures
- [ ] Trucking (declaring catches in areas it is not caught)
- [ ] No issues
- [ ] Other (please specify)

SA - Fisheries Cost Recovery Review

Compliance

* 42. Which PIRSA compliance services does your sector believe are not being delivered in the most efficient manner?

- [ ] Monitoring/inspection
- [ ] Investigation
- [ ] Coaching & education
- [ ] Enforcement/prosecution
- [ ] None - all being done well
- [ ] Other (please specify)

* 43. List your industry's greatest concerns (if any) regarding how PIRSA delivers compliance services?
(i.e. maximising voluntary compliance and effective deterrence, enforcement and prosecution. How do they inspect, coach and educate, enforcement and prosecution etc)

* 44. In your sector, is there someone responsible for industry training of fishers about management and compliance rules?

- ( ) No
- ( ) Yes

If yes, describe.

* 45. Do you use education materials, training or other resources (if any) to understand the fishery's rules?

◯ No

◯ Yes

If yes, describe

* 46. In your sector, do you have codes of practice or other non-mandatory procedures?

◯ No

◯ Yes

If yes, describe.

* 47. Does your sector, or your business, operate any technology or processes that mitigate compliance risk?
(i.e. pre-sailing briefings, buffer zones, electronic reporting, internal camera system, company training, other)

◯ No

◯ Yes

If yes, describe.

* 48. What technologies do you believe could improve compliance and efficiency in your fishery?

- [ ] Video monitoring
- [ ] VMS
- [ ] eLogs
- [ ] Geofencing (alerts in real time to vessels if they come near closures and marine parks)
- [ ] Other (please specify)

49. In the last 12 months, have you ever been inspected or investigated during your fishing activities?

	Not applicable	No	1x	2x	3x	4x	5x	>5x
Inspected?	○	○	○	○	○	○	○	○
Investigated?	○	○	○	○	○	○	○	○

Any comments?

* 50. Do you think that processes, services and advice from Fishery Officers and other PIRSA staff are delivered consistently?
(i.e the approach and explanations are similar across personnel).

- ◯ Yes
- ◯ Most of the time
- ◯ No

Any comments?

SA - Fisheries Cost Recovery Review

End of the survey

Many thanks in taking part in this survey. We will analyse the results and make them available to all participants and the wider industry.

51. Is there anything else you'd like to share about cost recovery for SA fisheries?