

PIRSA



Management Plan for Recreational Fishing in South Australia

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of South Australia

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and Regions SA

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1 Fishery to which this plan applies

This plan applies to recreational fishing occurring in South Australia. As defined in the *Fisheries Management Act 2007* (the 'Act'), recreational fishing means fishing other than commercial fishing or Aboriginal traditional fishing.

Recreational fishing across South Australia is controlled by the Act and *Fisheries Management (General) Regulations 2017* (the 'Regulations'). The recreational fishery is not licensed but is subject to a range of regulatory restrictions such as size, bag, boat and possession limits, restrictions on the types of gear that may be used, temporal and spatial closures, and the complete protection of some species. Registration requirements exist for the use of recreational Rock Lobster pots and recreational mesh nets for Lake George and the Lower Lakes and Coorong.

This plan does not apply to recreational fishing undertaken by persons facilitated by the South Australian Charter Boat Fishery, which is guided by its own management plan (PIRSA 2011a); it is consistent with that plan and other commercial fishery management plans.

2 Consistency with other management plans

The aquatic resources accessed by recreational fishers are also subject to a number of existing commercial fishery management plans, including the multi-species Marine Scalefish Fishery and other commercial single species fishery management plans (e.g. Blue Crab Fishery). The provisions relating to the allocation of recreational access shares to many of these aquatic resources have recently been addressed for the first time during the development of these fishery management plans. The access shares prescribed in this plan reflect the shares allocated between fishing sectors in other existing fishery management plans.

This management plan has also been developed so that it can be integrated with any Aboriginal traditional fishing management plans that are made in the future and apply to the waters of this management plan.

3 Term of the plan and review of the plan

This management plan applies for a period of 10 years.

Section 47 and 49 of the Act prescribe the requirements for extending or replacing this management plan upon expiry.

Under the Act, management plans are subject to periodic review by PIRSA and key stakeholders. Section 49 of the Act outlines the process of reviewing a management plan. A review of the plan may be conducted at any time if needed earlier than the minimum requirements of the Act. A review of this management plan will be undertaken two years after its commencement.

4 Fisheries management in South Australia

South Australia's fishery resources are community owned public resources. The South Australian Government, as custodian of these fisheries resources, has a fundamental role in managing them to ensure they are biologically sustainable and any economic and regional benefit arising from their exploitation is maximised for the benefit of the whole South Australian community, including recreational fishers, commercial fishers, Aboriginal traditional fishers and the wider seafood consuming public.

As these community-owned fisheries resources support a shared access fishery, there is a shared responsibility between Government (on behalf of recreational and traditional fishers) and the commercial industry for any management actions required to address issues of fish stock sustainability and commercial economic viability. The role of Government centres around ensuring these fisheries resources are managed for long-term biological sustainability on behalf of all South Australians, maximising the community/societal benefits arising from their exploitation and ensuring access to the fisheries resources is fair and equitable for all sectors.

The South Australian Research and Development Institute (SARDI) of Primary Industries and Regions South Australia (PIRSA) conducts research and publishes stock assessment reports for the commercial fishing industry, and PIRSA conducts regular recreational fishing surveys. These reports create a scientific basis for managing and ensuring sustainability of South Australia fisheries. PIRSA has developed a number of commercial management plans and high level policy documents on allocation, harvest strategy development and co-management which support sustainable fisheries management.

5 Description of the fishery

Recreational fishing means fishing other than commercial fishing or Aboriginal traditional fishing wherein fish are captured for personal consumption, sport or pleasure and either retained (e.g. consumed, shared) or released. A recent definition of recreational fishing is “fishing activities undertaken either for personal consumption or for fun, sport, thrill of the catch or social bonding” (Arlinghaus et al. 2010). This definition highlights the social shift whereby increasing numbers of recreational fishers seek to enjoy the total fishing experience in addition to harvesting fish. However, research has shown that a relatively small proportion of fishers exert a significant proportion of the total recreational fishing effort in Australia (Henry and Lyle 2003) and in South Australia (Jones 2009; Giri and Hall 2015).

The South Australian Recreational Fishing Survey 2013/14 indicated that 20% of South Australian recreational fishers accounted for 56% of the total effort in 2013/14. This highlights the potential for a relatively small proportion of the recreational fisher population to have a substantial impact and suggests that minor changes within this part of the fishery could have significant implications for total recreational fishing effort (and catch) (Giri and Hall 2015).

Recreational fishing is an important aspect of social, cultural, and economic life in South Australia. Not only is the fishing experience a cornerstone of recreational activity, it contributes significantly to jobs and economic activity in metropolitan and regional South Australia. Recreational fishing is one of the most popular leisure activities in South Australia with over 277,000 South Australian residents aged five years or older participating (approximately 18% of the State’s total population) (Giri and Hall 2015). Fishing activities also generate valuable social returns, particularly in regional communities. For several coastal regions, more than one in every three residents went recreational fishing in the period 2007/08 and 2013/14 (Jones 2009; Giri and Hall 2015).

The Act acknowledges the importance of recreational fishing to South Australia. The Act:

- Requires that shares of aquatic resources (fish and aquatic plants) are allocated to the recreational fishing sector
- Requires that management decisions are made that ‘foster’ recreational fishing for the benefit of the community
- Provides for a management plan to be developed for recreational fishing.

Recreational fishing is undertaken in all coastal habitats and the majority of freshwater habitats in South Australia, using a variety of permitted gear types (see Appendix 4) and platforms (boats, jetties, breakwaters and shore). The main species harvested by number by recreational fishers include Blue Swimmer Crab, King George Whiting, Australian Herring, Pipi (Goolwa Cockle), Southern Garfish, Southern Calamari, Striped Trumpeter, Snapper, European Carp, Western Australian Salmon and Scallop. Recreational fishers

access a broad range of South Australian coastal waters including gulfs, bays and estuaries (including the Coorong estuary) from the Western Australian border (129°E longitude) to the Victorian border (141°E longitude) and many inland areas (Figure 1).

Most recreational fishing effort occurs in marine waters, including estuaries, and inshore and offshore waters; freshwater environments only accounted for a small amount of fishing effort (Jones 2009; Giri and Hall 2015). The gulfs are where most of the recreational fishing activity takes place in South Australia. In 2013/14, the Spencer Gulf region had the highest level of fishing effort followed by Gulf St Vincent and Kangaroo Island, the West Coast and the Limestone Coast. Most freshwater fishing occurred in the River Murray (Giri and Hall 2015).

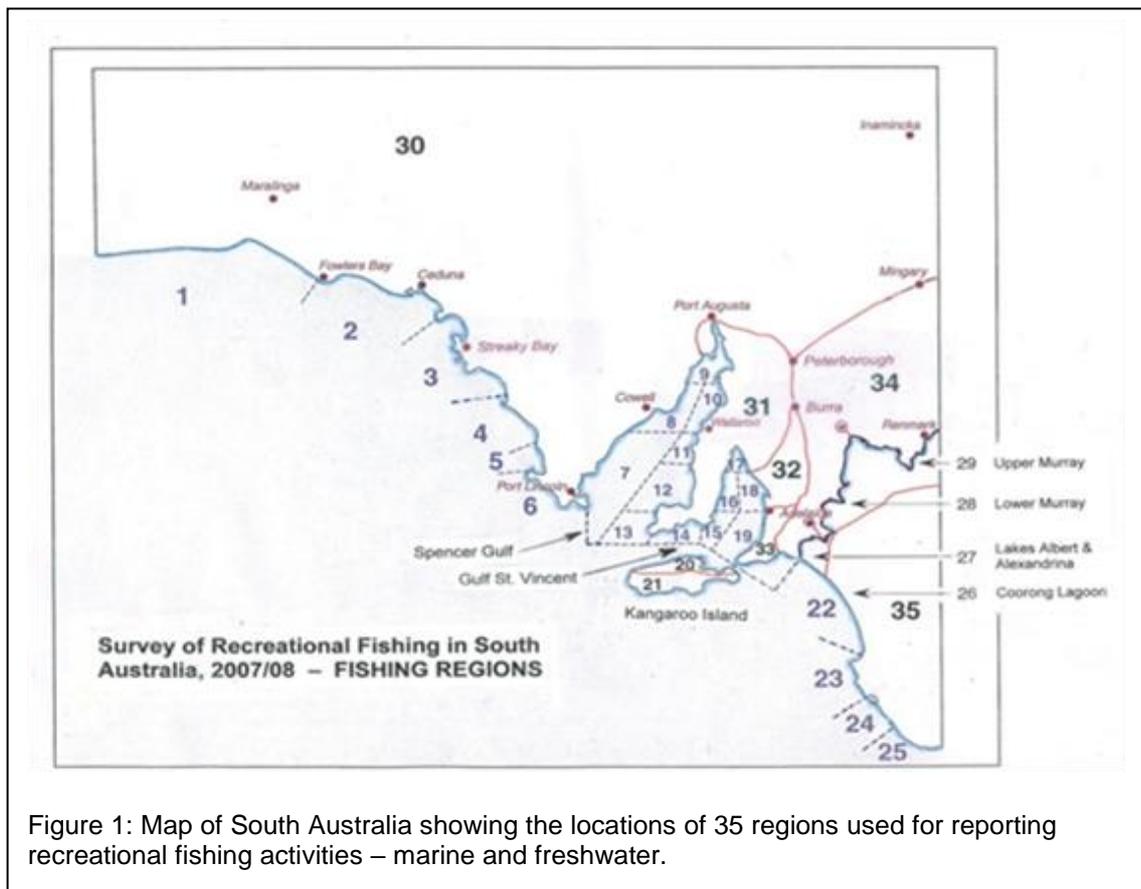


Figure 1: Map of South Australia showing the locations of 35 regions used for reporting recreational fishing activities – marine and freshwater.

The most recent data available for the South Australian Recreational Fishery were collected through the South Australian Recreational Fishing Survey 2013/14 (Giri and Hall 2015). This survey conducted a state-wide assessment of recreational fishing in South Australia. It provides a statistically robust estimate of participation levels and demographics of South Australian residents and their fishing effort and catches. These data allow for comparison to be made between the recreational and commercial fishing sectors, especially when making decisions relating to access and allocation of resources.

During the period of the 2013/14 survey, an estimated 12.7 million finfish, crustaceans, molluscs and other animals were caught by South Australian residents fishing in South

Australia. Of these, 8.2 million (~65%) were harvested and 4.4 million (~35%) were released. The most caught species by number were Blue Swimmer Crab, King George Whiting, Australian Herring and Pipi, with more than one million individuals caught of each of those species (approximately 2.4, 2.0, 1.2 and 1.0 million, respectively) (Giri and Hall 2015). In descending order, Southern Garfish, Snapper, Southern Calamari, Striped Trumpeter, European Carp, Western Australian Salmon, Arrow Squid, and Scallop were the next most numerous species caught.

In terms of harvested numbers, a total of almost 4.9 million marine finfish were retained, with King George Whiting, Australian Herring, Southern Garfish and Snapper comprising a significant proportion (almost 68%) of the finfish harvest. For marine shellfish, an estimated total catch of about 3.0 million animals were taken by recreational fishers, with Blue Swimmer Crab (47%), Southern Calamari (16%) and Pipi (13%) being the three most numerous species taken. For the freshwater species, an estimated total of 0.4 million finfish and other species were caught, with European Carp (55%), Golden Perch (10%) and freshwater Yabbies (16%) being the three most numerous species taken.

Recreational fishing techniques include hand gathering, spearfishing, netting, angling (hook and line) and trapping; refer to Section 13.1.4 for further details.

5.1 Biological and environmental characteristics

5.1.1 Marine ecosystem and habitat

South Australia's coastal regions support a diverse range of ecosystems, marine habitats and aquatic resources. An inventory of coastal fisheries habitats by Bryars (2003) identified 12 important habitats in South Australia: reef, surf beach, seagrass meadow, un-vegetated soft bottom, sheltered beach, tidal flat, tidal creek, estuarine river, coastal lagoon, mangrove forest, saltmarsh, and freshwater spring. Many of these habitats are found within the Gulf St Vincent and Spencer Gulf, which is where the majority of recreational fishing is undertaken.

Both gulfs contain significant areas of seagrass meadows, saltmarshes and mangroves which are all recognised nursery areas for key recreational fish species such as King George Whiting, Southern Garfish and Blue Swimmer Crab. The range of habitats throughout South Australia's coastal regions provide important habitat for all life history stages of each of South Australia's key recreationally targeted species.

The more southern waters of the gulfs are of oceanic character whilst to the north salinity increases, reaching 48 parts per thousand in the most northern reaches. This rising salinity is brought about by the decreasing water depth and higher summer water temperatures causing high evaporation rates. These environmental conditions are optimal for some species of more tropical distribution (e.g. Blue Swimmer Crab).

Primary production in the more sheltered parts of the gulfs, and in embayments off the west coast of Eyre Peninsula and the north coast of Kangaroo Island, is dominated by a number of seagrass species that occur at depths to about 20 m in clearer waters but about 10 m in the gulfs. The natural and artificial reefs in the gulfs provide high quality habitats for a number of species including juvenile and adult Snapper, which form spawning aggregations during the summer.

Understanding ecosystem functions and the potential impacts of the fishery on these functions is a key aspect of fisheries management. Managing recreational fishing as part of the broader ecosystem is a goal of this plan. A risk-based approach to managing ecosystem impacts has been undertaken and is considered in more detail in Section 7 'Ecosystem Impacts'.

5.1.2 Freshwater ecosystem and habitat

South Australia's inland area is expansive and has considerable variation in its climate. A large part of the State has little or no surface water due to low rainfall and a lack of significant mountains. However, freshwater fish can be found from tiny mound springs in flat, hot desert landscapes, to small local streams and wetlands, to local rivers in Adelaide through to the iconic River Murray, the largest river in South Australia. As unique as South Australia freshwater habitats are, there are also places such as the Lake Eyre Basin where fish are able to colonise temporary or seasonal habitats.

Around 60 freshwater fish species have been recorded in South Australia. They range in size from the iconic, large-bodied Murray Cod to the tiny Dwarf Galaxia, which have a maximum size of two to three centimetres. The River Murray is the largest inland system for recreational fishing; in South Australia the river itself extends from the border of New South Wales and Victoria all the way to the its mouth, where it enters the Southern Ocean.

Many freshwater fish species are dependent on movement and river flows including the volume, duration and timing of water delivery. There has been investment in infrastructure changes in recent times (e.g. fish passages in the River Murray and River Torrens) and water delivery (e.g. the Adelaide and Mount Lofty Ranges Natural Resource Management Board environmental flows project in the Torrens, South Para and Onkaparinga rivers) which will assist in providing environmental needs for fishes.

In 2014, the Government of South Australia committed to investigate the opening of five offline reservoirs to recreational fishers to increase opportunities for recreational fishing. The five reservoirs that are being investigated (at the time of writing this plan) are the Warren, Bundaleer, Baroota, Tod and Hindmarsh Valley reservoirs.

5.2 Biology of key recreational species

The key recreational species targeted and harvested by recreational fishers include Blue Swimmer Crab, King George Whiting, Australian Herring, Pipi (Goolwa Cockle), Southern Garfish, Southern Calamari, Snapper and Western Australian Salmon.

Detailed information on the biology and stock status of key recreational fish species is provided in stock assessment and stock status reports prepared by SARDI. All completed reports are available on the PIRSA website at www.pir.sa.gov.au by searching for 'research report series' and the 'name of the fish' you are looking for (e.g. 'research report series Snapper'). In addition, further information regarding the regulated recreational species is available in the support document to this publication, the Review of size, bag and boat limits in South Australia's recreational fishing sector, marine and freshwater.

Summary descriptions of the biology of key species can be found in the corresponding fishery management plans as listed below:

- Blue Swimmer Crab - Management Plan for the South Australian Commercial Blue Swimmer Crab Fishery 2012 (PIRSA 2012a)
- King George Whiting, Snapper, Southern Garfish and Southern Calamari - Management Plan for the South Australian Commercial Marine Scalefish Fishery 2013 (PIRSA 2013a)
- Pipi - Management Plan for the South Australian Commercial Lakes and Coorong Fishery 2016 (PIRSA 2016). The biology of Mulloway, Golden Perch, Murray Cod and Mullet spp. can also be found in this plan.

Copies of the fishery management plans can be found at www.pir.sa.gov.au/fisheries/publications.

In addition to the above listed species, the biology of recreational species with bag limits (Australian Herring, Western Australian Salmon) is outlined in the Review of size, bag and boat limits in South Australia's recreational fishing sector, marine and freshwater.

Further information on all species can be found in the Status of Australian Fish Stocks Reports fish.gov.au.

5.3 Social and economic characteristics

In Australia, limited information has been collected on the economic and social impacts of recreational fishing. In South Australia, there has been some application of well-established methods for measuring the social and economic value, both direct and indirect. It is clear that recreational fishing brings economic benefits to the State, through attributable and associated expenditure. For example, expenditure generally attributed to recreational fishing includes fishing gear, bait and boating costs. Other associated expenditure includes travel costs, accommodation and food. Much of this expenditure associated with fishing is spent in regional areas of South Australia.

Some of the recreational economic valuation projects that have been undertaken are:

- In Victoria: Economic study of recreational fishing in Victoria, prepared for VRFish (Ernst and Young 2009 & 2015)
- In the Murray-Darling Basin (across jurisdictions): Economic Study of Recreational Fishing in Victoria Murray Cod Assessment, prepared for VRFish (Ernst and Young 2010 & 2011); and Economic contribution of recreational fishing in the Murray-Darling Basin, prepared for Department of Primary Industries (Victoria) (Ernst and Young 2011). The report indicated that recreational fishing contributed to a direct expenditure of \$114 million in the South Australian section of the MDB.
- Nationally: The 2000/01 National Recreational Fishing Survey Economic Report (Campbell and Murphy 2005).

The most recent expenditure estimate for South Australia was in 2015-16 where the annual estimated recurrent expenditure by the State's recreational fishers was \$160.8 million. This expenditure included direct expense related fishing items, such as bait and boat hire, as well as indirect expense items such as travel and accommodation (Deloitte Access Economics, 2017).

Some industries depend either wholly on the recreational fishing sector (the fishing tackle and bait industry, and the fishing tour and charter industry) or rely on it for a large proportion of income (the recreational boating industry and the tourism industry in coastal regions) (Stephan and Hobsbawn 2014).

There are various methods that can be used to assess the economic value of recreational fishing. Each method has its own advantages and disadvantages and each method's appropriateness depends on the purpose of the valuation (FRDC 2013). Regardless of the approach chosen to assess the economic valuation, the task of establishing a standard and robust procedure for recreational fishing will present challenges (FRDC 2013). There is no common agreement on the use of an appropriate and comparable economic value to both the recreational and commercial fishing activities, which is often sought for considering allocation or reallocation of a resource. Care should be used when recreational expenditure information is used to compare to the commercial value. Generally, Gross Value of Product (GVP) is used to value the commercial sector, which is based on the price received for fish taken to market. This cannot be done for the recreational fishing sector because the fish are not sold, and in some cases not landed (catch and release). Furthermore, the commercial GVP does not include the value of expenditure of the commercial sector in boats, accommodation, travel, equipment, etc., the value of locally caught seafood bought by consumers and at the restaurant, or the attraction this may provide for local tourism.

Measurement of the social aspects of fisheries management is a developing area of interest and there are a number of national initiatives currently underway which aim to assist management agencies to collect and monitor relevant social data. PIRSA has led a Fisheries Research and Development Corporation (FRDC) project that investigated the social aspects of recreational fishing in South Australia. A survey of recreational fishers

was undertaken and a subsequent report was completed in 2014, which outlines the social aspects of recreational fishing in South Australia (Triantafillos et al. 2014).

To date, attitudinal surveys of recreational fishers have identified the key benefits of fishing as being to relax and unwind, to get outdoors, to spend time with family and friends, and the enjoyment or sport of catching fish (Triantafillos et al. 2014). Recent studies have emphasised that recreational fishing may have important benefits for fisher health and wellbeing (McManus et al. 2011).

A social survey was undertaken in 2011/12 to understand the social dimension of recreational fishing in South Australia. The Triantafillos et al. (2014) survey was targeted towards avid fishers and formed part of a broader research project into identifying social objectives and indicators. A copy of the report can be found at:

http://frdc.com.au/research/final-reports/Full_report-2010-040/Appendix13/Pages/default.aspx.

Some key findings from the Triantafillos et al. (2014) survey are provided below:

- Most fishers fished in the same region they lived: for example, 62.6% of fishers from Adelaide and surrounds reported fishing in the inner Adelaide fishing region, and 94.3% of fishers living in Port Lincoln reported fishing in the Port Lincoln region.
- A large majority (61.2%) of fishers had fished in South Australia for more than 30 years, with most fishers learning to fish during their childhood (>80%). It was uncommon for people to have begun fishing as a hobby after childhood.
- The most common platform reported was non-charter boat fishing (78.9% of respondents), followed by land-based fishing (70.6%), with 18.4% reporting they did charter fishing. Of respondents, 66.7% reported participating in inshore fishing (defined as within the 5 kilometres of shore), 45.2% in offshore fishing (greater than 5 kilometres from shore), and 31.9% in freshwater fishing.
- The most common use of fishers' legal catch across all respondents was for the catch to be eaten; however, this varied by fisher age. Younger fishers reported eating a much smaller proportion of their catch compared to older age groups, and were more likely to report that they engaged in catch and release fishing, and used some of their catch as bait compared to older fishers.
- The most common methods of learning fishing skills were through self-teaching, from family members, and from other fishers.
- The majority of respondents indicated fishing was moderately or highly important to their life overall. Respondents were significantly more likely to rate fishing as highly important to their life if they also:
 - o fished a large number of days, with more avid fishers more likely to consider fishing as very important to their life
 - o were more satisfied with their fishing activities overall
 - o spent larger amounts on recreational fishing
 - o had lower household income, although the relationship was not as strong as for other factors
 - o had lower levels of formal education, or
 - o were an active member of a recreational fishing organisation.

- The aspects of fishing that were considered to be important varied depending on the demographic characteristics of the fisher and varied somewhat by the region in which they lived.
- The importance of fishing for solitude was greater for people in age groups between 18 and 44, and lower for older age groups. Meanwhile, eating what they catch was more important to older respondents than younger fishers, while the importance of fishing to spend time with family was greatest for those aged between 30 and 50 years. Fishing with friends was of similar importance across most age groups except those aged 65 and above.

The survey also provided information on the satisfaction with fishing, fishing infrastructure, recreational fishing rules, regulations and stewardship, accessing information about recreational fishing, fisheries management, involvement in fisheries management and fishing expenditure (Triantafillos et al. 2014).

The 2013/14 South Australian recreational fishing survey estimated that in the 12 months prior to November 2013:

- An estimated 277,000 South Australian residents recreationally fished at least once in South Australia, representing 18.3% of the resident population.
- Males have a higher participation rate than females.
- By age, the highest participation rates occurred within the youngest age group surveyed (5–14 years), with both male and female participation rates in this strata showing an increase from 2007/08. Female participation in this age group almost doubled.
- The greatest number of male recreational fishers occurred in the age group of 45–59 years.
- The lowest participation rates again belonged to the oldest age group (60 years or more), and similarly both male and female participation rates in this age group have increased since 2007/08.
- For males, the greatest number of recreational fishers occurred in the age group of 45–59 years; whereas for females, the greatest number of recreational fishers came from the youngest age group of 5–14 years (Giri and Hall 2015)

The social information described above and collected through the 2013/14 survey have been considered in the strategies in Section 8 'Goals and Objectives'. PIRSA will support a recent Australian Government discussion regarding progressing implementation of a national recreational fishing survey focussing on obtaining social and economic data, which has been supported by recreational fishing peak bodies.

The 2011 Ecologically Sustainable Development (ESD) risk assessment workshop for the recreational fishery considered a number of community components that related to social and economic issues associated with recreational fishing (PIRSA 2015).

6 Co-Management Arrangements

Co-management is an arrangement whereby responsibilities and obligations for sustainable fisheries management are negotiated, shared and delegated at appropriate levels between government, recreational fishers, Aboriginal traditional fishers, the commercial fishing industry and other key stakeholders such as conservation groups (Neville 2008). Co-management is recognised as a collection of positions starting from centralised government regulation with no stakeholder input at one end, to more autonomous management by industry groups and key stakeholders at the other, where government plays more of an audit role. Co-management is designed to achieve efficient regulatory practice (among other things) and is by no means a way of industry or other key stakeholders avoiding regulatory scrutiny and influence.

The Minister's Recreational Fishing Advisory Council (MRFAC) was formed in 2019 to improve dialogue and communication between recreational fishers and Government. The role of the Council is to provide feedback and advice to government on recreational fishing development issues, initiatives and policies that impact the recreational fishing sector. An initial task of the Council is to create a Recreational Fishing Strategy for South Australia.

Membership of the council consists of representatives from recreational fishing organisations, as well as independent members nominated through a nomination process through a preferential voting system.

The Council determined that from 1 July 2019, where a recreational fishing representative is required for an advisory committee established under section 20 of the Fisheries Management Act 2007, the Council will provide the Minister with direct recommendations of individuals who would be suitable.

PIRSA and recreational representatives on advisory committees will continue to pursue opportunities to improve the co-management arrangements for the recreational fishery. This is undertaken in accordance with the principles provided in the Policy for the *Co-Management of Fisheries in South Australia* (PIRSA 2013d), in an effort to deliver sound, effective and efficient management outcomes and the strategies outlined in this plan.

The following provides examples of participation by recreational fishers in fishery management processes:

- Participated in discussions prior to the protective measures in response to sustainability concerns to manage the Snapper fishery, which resulted in the submission of a proposal on behalf of recreational fishers to inform the management decision. Post-decision, consultation was maintained through the representation role of a MRFAC on the Snapper Management Advisory Committee to ensure equitable management arrangements and effective implementation of the resulting arrangements
- Membership in key management advisory committees and groups like the Snapper Management Advisory Committee and Rock Lobster Fisheries Management Advisory Committee.

- Informing the Reservoir Fishing Taskforce to create new fishing opportunities through opening offline SA Water reservoirs suitable for recreational fishing.
- Joint communications such as the fact sheet on 'Helping Snapper Survive - A best practice guide to catch and release'. This was developed as a recreational education tool to improve recreational fishing practices, thereby increasing survival rates of released fish to support the sustainability of the Snapper fishery.
- Development and refinement of metropolitan shark fishing restrictions to address community concerns through targeted consultation with key recreational fishing stakeholders to assist in striking a balance between community concerns and recreational fishing activities.
- A Catfish working group was established to understand the current stock status and provide advice on the future management of Catfish. The working group includes community and recreational fishing representatives. To inform the stock status of Catfish, a recreational FRDC project¹ undertook community fishing surveys to collect Freshwater Catfish specimens, biological data and catch information. This information will be used in conjunction with other fishery-independent data collected in the past decade from a range of fish monitoring and research projects to develop a preliminary understanding of the population status of this species in the lower River Murray.
- Murray Cod Stock Enhancement Program - PIRSA has committed \$200,000 funding and is working with River Murray communities to investigate building up stocks of the species in the South Australian section of the River Murray. The current abundance of Murray Cod is significantly low, in comparison to historical levels, and there is a need to identify and develop methods that can ensure the sustainability of the population long term.
- Co-management arrangements regarding Murray cod management and handling have been developed. This project links to the Catfish work previously undertaken in the River Murray, and has strong linkages to Murray Cod stock enhancement and habitat related work in the River Murray. It is a component of a broader co-management project funded through the FRDC.
- Artificial reef project – PIRSA implemented the SA Habitat Enhancement Project to build an artificial reef to improve recreational fishing opportunities. This project informed the establishment of Windara Reef, an area of approximately twenty hectares of native shellfish reef in north-western Gulf St. Vincent in partnership with The Nature Conservancy and other partner groups.
- Potential release of the Carp Herpes Virus – PIRSA and recreational fishing stakeholder groups have been actively engaged in the investigation of the effect of the release of this virus on the South Australian section of the River Murray, and of complementary action that could be taken to promote native species in the areas where there may be significant reductions in Carp numbers.

In 2010/11, an engagement project was undertaken by PIRSA to better understand what recreational fishing means to people and what future they want for their sector.

¹ 'Engaging recreational fishers and the community to integrate fishery-dependent and fishery-independent data to inform management of a protected species, Freshwater Catfish (*Tandanus tandanus*) in the lower River Murray'

Discussions generated consistent themes and issues of concern to recreational fishers, including sustainable fishing, ongoing access, funding and leadership, governance, education and promotion of the sector.

Opportunities for incorporating 'grass roots' input from the recreational sector into fisheries management processes in South Australia include:

- Consultation with the MRFAC
- Public consultation opportunities on advertised occasions.
- Participation on working groups regarding recreational fishing enhancement.
- Recreational fishing committees (RFC's). These regional based committees are established by the recreational sector to represent the interests of recreational fishers. They are generally area based (e.g. West Coast). These committees will be directly linked to Government through the MRFAC.

When significant management changes to recreational fishing rules are proposed, the following consultation options may be used:

- Targeted consultation with the MRFAC in conjunction with other peak stakeholder groups, Recreational Fishing Committees, local councils, commercial industry associations and the conservation sector.
- Public consultation, which includes public meetings and information sessions where required.
- Feedback to recreational fishing groups and other stakeholder groups on the outcomes/comments from public consultation and PIRSA's consideration of the feedback.
- Finalisation of management changes and community education (e.g. media releases, articles in PIRSA's Fish Facts newsletter, website announcements, SA Recreational Fishing Guide app updates).

7 Ecosystem Impacts

The Act requires that ecological impacts be identified and assessed as the first step in developing a management plan. The goals and objectives for the Recreational Fishery are found in Section 8. One of these goals directly relates to ecosystems – Goal 3:

Recreational fishing impacts on the ecosystem are minimised - and includes a number of strategies. It is acknowledged this goal relates to the management of the fishery using an ecosystem-based fisheries management (EBFM) approach. The Act specifically requires that the following impacts are identified:

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

The ecological impacts associated with the fishery were identified in consultation with stakeholders and assessed through the process of conducting two ecologically sustainable development (ESD) risk assessments for recreational fishing (one marine and one freshwater). The National ESD Reporting Framework for Australian Fisheries (Fletcher et al. 2002) was used as a guide throughout this process.

Risks and important issues in the fishery were identified in consultation with stakeholders and were prioritised by stakeholders at ESD risk assessment workshops using risk ratings from negligible to extreme. The risk categories emerging from the stakeholder workshops have not been amended by PIRSA. These risks were taken into account when developing the management objectives for the fishery (Table 1). A full list of stakeholders that participated at the workshops is provided in the ESD risk assessment report.

The ESD risk assessment identified minimising external impacts on the ecosystem as a key risk. These external factors include, but are not limited to water quality, habitat modification, exotic species, climate change, defence areas shipping and other development. It is acknowledged that management of these factors is outside the scope of this management plan. PIRSA and appropriate recreational fishing representatives will endeavour to participate in external processes that influence these factors when appropriate.

The report Ecologically Sustainable Development (ESD) Risk Assessment for the South Australian Recreational Fishing in South Australia provides detailed information about recreational fishing and the outcomes of the ESD risk assessments (PIRSA 2015). A copy of the full ESD report can be found at the PIRSA website <www.pir.sa.gov.au/fishing>.

8 Goals and Objectives

As set out in Section 7 of the Act, one of the 'Objects of the Act' is to protect, manage, use and develop the aquatic resources of the State in a manner consistent with ecologically sustainable development. The Act also requires that management plans be consistent with the 'Objects of the Act'.

A number of biological, social and economic factors are identified in the 'Objects of the Act' that must be balanced in pursuing ecologically sustainable development. However, it is specified that the following principle applies: 'proper conservation and management measures are to be implemented to protect the aquatic resources of the State from over-exploitation and ensure that those resources are not endangered'.

The four goals for the Recreational Fishery described below are linked to the operational objectives for the fishery set out in Table 1. The goals of this plan are consistent with 'Objects of the Act' and are consistent with other South Australian fishery management plans. The performance indicators and reference points for each objective are provided to allow for the assessment of this management plan in meeting the identified goals.

Goal 1 – Ensure that recreational fishing resources are harvested within ecologically sustainable limits

This goal relates to ensuring that species targeted by recreational fishers are managed sustainably and that adequate information exists and is collected to ensure this occurs.

The objectives in this management plan in relation to sustainability are:

- Manage total catch and effort across the sector to ensure species are harvested at sustainable levels
- Sufficient information is collected to manage fishing activities to sustainable levels.

These objectives aim to ensure that the recreational resources are harvested within sustainability limits.

Goal 2 – Optimal utilisation and equitable distribution of recreational fishing resources

This goal relates to the economic and social benefits derived from recreational fishing, in that the allocation and fishing activities are managed to provide a benefit to the community.

The objectives of this management plan in relation to these benefits and within the constraints of ecological sustainability are:

- Allocate access to fishery resources and manage shares to deliver optimum utilisation and equitable distribution
- Increase the flow of economic and social benefit from the fishery to the broader community
- Maximise cultural, recreational and lifestyle benefits (including health benefits) of fishing for those who participate in fishing activities, within the constraints of ecologically sustainable development and allocated shares
- Maximise fishing experience within allocated shares.

The objectives and strategies under this goal aim for the fishery to operate at a level that is ecologically sustainable while meeting economic and social outcomes that contribute to vibrant regions and the health and wellbeing of South Australians. Optimising the use of the fishery is addressed in the objectives and strategies in terms of maintaining equitable access to the resource for the recreational sector and other sectors and fostering recreational fishing.

The recreational sector takes a significant proportion of many shared species, and with an estimated 277,000 recreational fishers in South Australia (Giri and Hall 2015) interactions between commercial and recreational fishers is inevitable. At times these interactions lead to conflict, as access to a finite resource is highly valued. The allocation framework described in this plan (see Section 10) will go some way to alleviating this conflict;

however, managing the fishery to provide fair and reasonable access for all is still a major challenge.

The MRFAC has been tasked with developing a Recreational Fishing Strategy for South Australia. This strategy is expected to guide priority areas of development for the recreational fishing sector in the future.

Goal 3 – Recreational fishing impacts on the ecosystem are minimised

This goal relates to the management of the fishery using an EBFM approach.

The objectives of this management plan in relation to EBFM are:

- Minimise fishery impacts on bycatch species and the ecosystem
- Minimise fishery impacts on fisheries habitat
- Avoid the incidental mortality and interactions with threatened, endangered and protected species.

The need to minimise the impacts of recreational fishing on the ecosystem, habitat and bycatch species (including threatened, protected and endangered species) is acknowledged in this plan and the objectives of the Act.

Goal 4 – Effective, efficient and participative management of recreational fishing

This goal relates to co-management of the fishery, planning of management activities, and transparency to the recreational sector and community of the decision making and management of recreational fishing.

The objectives of this management plan in relation to co-management, planning and communication are:

- Improve the ability of fishers to participate effectively in fisheries management advisory processes
- Ensure appropriate mechanisms exist for fisher involvement in the development of fisheries management advice
- Ensure transparent decision-making process by management agencies
- Maximise stewardship of fisheries resources by recreational fishers.

The key intention of this goal is to ensure that recreational fishers have opportunities to be involved in developing and adopting management arrangements and maximising voluntary compliance. Changes to the recreational fishery management arrangements also need to take into consideration the broader community's economic, cultural and social issues.

Table 1: Management goals, objectives, strategies and reference points for management of recreational fishing.

Objective	Strategies	ESD risk addressed ²	Performance Indicator	Description	Reference Point
Goal 1: Ensure the recreational fishing resources are harvested within ecologically sustainable limits					
1a Manage total catch and effort across the sector to ensure species are harvested at sustainable levels.	1a(i) Regulate size at which fish may be captured using minimum and/or maximum size limits	Fishery impacts on 'all retained species' Governance Research – Freshwater General Ecosystem impacts – Fishing Marine	General performance indicators for selected species as detailed in the harvest strategy	General indicators are derived from recreational catch and effort information and include total catch and species specific catches	Refer to Section 9 – Harvest Strategy
	1a(ii) Regulate catch limits through effective bag, boat and possession limits				
	1a(iii) Apply spatial and temporal restrictions to protect fish species during critical stage of life cycle				
	1a(iv) Regulate permitted fishing methods				
	1a(v) Understand and minimise discard mortality to minimise impacts on fishery stocks and bycatch species				
	1a(vi) Where a species is considered at risk, introduce appropriate measures (i.e. strategies listed above and/or protect the species until recovery is shown)				
1b Sufficient information is collected to manage fishing activities to sustainable levels.	1b(i) Obtain adequate and regular biological information for key and selected other species	Fishery impacts on 'all retained species' Governance Research – Freshwater General Ecosystem impacts – Fishing Marine	Stock assessment and stock status reports produced to a high standard and on schedule Sector participation in research projects where suitable Proposed research schedules and deliverables achieved Regular reviews of research programs Recreational survey undertaken at a minimum every 5 years	Good quality fishery data are essential to on-going monitoring of fishery status	Proposed research schedules and deliverables not achieved Regular reviews of research programs not undertaken Recreational survey not undertaken at a minimum every 5 years Status of key species is not reported in stock assessment reports, National and state status reports Lack of recreational participation in research projects where suitable
	1b(ii) Undertake and further refine stock assessment methods for recreational species as identified through the strategic research plan and reviews of the commercial fishery's harvest strategies				
	1b(iii) Review and update the strategic research and monitoring plan regularly				
	1b(iv) Explore opportunities for additional cost-effective recreational catch monitoring as required				
	1b(v) Undertake regular recreational fishing surveys to ensure collection of recreational fishing catch/effort data to be incorporated into stock assessments				
	1b(vi) Status of key species is assessed and reported				
Goal 2: Optimal utilisation and equitable distribution of recreational fishing resources					
2a Allocate access to fishery resources and manage shares to deliver optimum utilisation and equitable distribution	2a(i) Resource allocation between sectors provided in this management plan	External factors affecting performance of the fishery- Access and Commercial fishers	Catches managed within allocations and changes in shares detected and acted on appropriately	Adjusting allocations or restricting effort to maintain shares is unlikely to occur within the initial years	Catch shares are considered against the allocated shares when the data for all sectors are available
	2a(ii) Manage catches of recreational sector within allocated shares				

² See PIRSA (2015). *Ecologically Sustainable Development (ESD) Risk Assessment for Recreational Fishing in South Australia*.

Objective	Strategies	ESD risk addressed ²	Performance Indicator	Description	Reference Point
	2a(iii) Integrate information relating to Aboriginal traditional fishing as it becomes available, including adjustment of shares accordingly				
	2a(iv) Where shares require adjustment, processes are implemented as per the Management Plan				
2b Increase the flow of economic and social benefit from the fishery to the broader community	2b(i) Improve measures of economic value of recreational fishing	Community - Regional centres and City centres Community – Relationship with Community	Provision of publically accessible recreational fishing information through website, correspondence, media releases, FishFacts newsletters, Fishcare volunteer program, and compliance officers	At the time of writing this management plan, recreational and Indigenous fisheries have no reliable and acceptable methodology or mechanisms to measure their economic value (direct and indirect) to Australians.	Insufficient publically available information on positive economic and social outcomes of the recreational fishing sector
	2b(ii) Communicate positive sustainability and economic outcomes of the sector to the broader community	Governance SA Government DEWNR Governance – Other Government Agencies	Adoption of measures for determining the recreational fishing economic value	A national FRDC project – ‘Measuring the economic value of recreational fishing at a national level’ is currently being undertaken. It likely the outcomes from this research will assist in meeting strategy 2b(i) and 2b(iv) in conjunction with recreational fishing surveys (FRDC 2013).	Economic measures are not developed, implemented and or monitored once established
	2b(iii) Develop and maintain positive relationships with regional communities		Relationship with regional communities		Relationships with communities, satisfaction with recreational fishing decreasing
	2b(iv) Identifying and adopting measures for determining economic value when available		Potential impacts on Aboriginal cultural practices and traditional knowledge systems considered as information becomes available refer 2b(v)		Potential impacts on Aboriginal cultural practices and traditional knowledge systems not considered as information becomes available
	2b(v) Consider potential impacts the fishery may have on Aboriginal cultural practices (in particular Aboriginal cultural fishing) and traditional knowledge systems (specifically traditional fishing knowledge) as information becomes available			At the review of the plan, consider potential impacts the fishery may have on Aboriginal cultural practises (in particular Aboriginal cultural fishing) and traditional knowledge systems (specifically traditional fishing knowledge) and incorporated into the plan, where appropriate. This may include:	
	2d(ii) Gaps in availability of infrastructure needed by recreational fishers are identified by PIRSA and MRFAC and are jointly communicated to relevant authorities/bodies			<ul style="list-style-type: none"> Identifying ‘sea country’ relevant for this fishery Support for cultural practices included in management considerations 	
2c Maximise cultural, recreational and lifestyle benefits (including health benefits) of fishing for those who participate in fishing activities, within the constraints of ecological sustainability	2c(i) Consideration of cultural, recreational and lifestyle benefits are made when management arrangements are being considered or reviewed	Community- Lifestyle Community- Safety	Level of satisfaction recreational fishers have with their fishing activity		Fisher survey - <50% of fishers indicate they are neutral or highly satisfied with their fishing overall, but this proportion is increasing – should this be ‘decreasing’ i.e. lower levels are neutral or highly satisfied
	2c(ii) Recreational fishers to undertake/promote safe fishing practices, including the national code of conduct in relation to ‘Caring for our own safety and the safety of others when fishing’	Governance – codes of conduct	Perceived importance of fishing activities to fisher’s life Safety of recreational fishers promoted		Safety of recreational fishers is not promoted
2d Maximise fishing experience within ecological sustainable limits and allocated shares	2d(i) Identify relevant fishing experiences to species, gear, location etc.	Community- Lifestyle	Level of satisfaction recreational fishers have with their fishing activity		Fisher survey - A declining proportion of fishers are indicating they are satisfied with their ability to achieve the benefits most important to them
	2d(ii) Consider fishing experience when new/modification of management arrangements are being considered				

Objective	Strategies	ESD risk addressed ²	Performance Indicator	Description	Reference Point
Goal 3: Recreational fishing impacts on the ecosystem are minimised					
3a Minimise fishery impacts on bycatch species and the ecosystem.	3a(i) Regulate gear types, construction material and mode of operation to minimise bycatch as appropriate	Fishery impacts on 'non-retained species' General Ecosystem Impacts of Fishing- Ghost fishing freshwater General Ecosystem Impacts of Fishing - Addition / movement of biological material caused by the introduction of non-endemic species (freshwater) Non-retained species – small bodied species, freshwater turtle, water rats General Ecosystem – introduced freshwater pests General Ecosystem – introduced native freshwater fish Enforce regulations around biosecurity risks	Quantification of bycatch associated with key gear types and activities Estimates of discard rates and discard mortality Number of reported compliance breaches of relevant regulations. Number of untagged gear identified in compliance reports Processes and procedures are in place within PIRSA to manage any apparent biosecurity risks of pest introduction	Minimising unwanted or discarded bycatch to lowest possible levels and minimise release mortality Aim is to minimise impacts of recreational fishing on the ecosystem Some initiatives that could be further developed and communicated include the use of litter/hook line and sinker bins for recreational rubbish, encouraging use of non-lead sinkers/bird impacts, illegal dumping to create artificial reefs Note: this objective also links closely to objective 3c (TEPS)	Targeted research and on-going monitoring undertaken on quantifying the impact of recreational fishing activities on discarded bycatch Communication strategy for recreational sector considers identified ecosystem impacts The number of untagged gear in compliance reports remains low Incursion of pests and diseases occurs
	3a(ii) Develop methods to quantify impact of recreational fishing activities on discarded bycatch through targeted research and on-going monitoring				
	3a(iii) Conserve key habitats utilised by fishery resources				
	3a(iv) Promote educational material on how to minimise impact to by-catch				
	3a(v) Identify and develop educational material to minimise recreational fishing activities that can have an impact on ecosystems				
	3a(vi) Ensure biosecurity risks are minimised				
3b Minimise fishery impacts on fisheries habitat.	3b(i) Maintain appropriate regulations regarding the use of recreational fishing gear	Fishery impacts on 'all retained species' Fishery impacts on 'non-retained species' General Ecosystem Impacts of Fishing	Risk ratings from regular ecological risk assessment Opportunistic fishery independent research		Increases in number of risks to ecosystem rated as moderate or higher during the risk assessment
	3b(ii) Promote the adoption of recreational fishing codes of conduct and good fishing practices				
3c Avoid incidental mortality and interaction with threatened, endangered and protected species.	3c(i) Continue to educate recreational fishers about interactions with threatened, endangered and protected species (TEPS)	Fishery impacts on 'non-retained species'	Where interactions with threatened, endangered and protected species are identified management action is considered Educational material produced and distributed	Interactions of recreational fishers and TEPS are identified through public reporting, and ESD risk assessments	Where interactions with threatened, endangered and protected species are identified management action is considered Educational material updated at least once a year and placed on the PIRSA websites
	3c(ii) Where interactions are identified, develop management measures to avoid interactions with threatened, endangered and protected species as required				
Goal 4: Effective, efficient and participative management of recreational fishing					
4a Improve the ability of fishers to participate effectively in fisheries management advisory processes	4a(i) Support recreational fishing groups to participate and function within the co-management framework of the fishery	External factors affecting performance of the fishery- Aquatic reserves Governance – reserves, fisheries council, PIRSA, policy and management, MRFAC, SA RF Committee, Other NGOs, Community Participation	Engagement with recreational fishing groups to effectively participate in fisheries management processes Communication protocol between PIRSA and MRFAC developed and annually reviewed and delivery of fisheries management activities against communication protocol objectives	Annual communications protocol between MRFAC and PIRSA outlines a variety of roles and responsibilities	Communication protocol is not reviewed, agreed and implemented, and annually reviewed Lack of active recreational fishing groups participation in any proposed recreational management changes
	4a(ii) Promote stakeholder input to the management of the fishery, through co-management processes and communication strategies				
	4a(iii) Develop and implement communication protocol, with annual review				

Objective	Strategies	ESD risk addressed ²	Performance Indicator	Description	Reference Point
	<p>4a(iv) Ensure appropriate mechanisms exist for fisher involvement in development of fisheries management advice</p> <p>4a(v) In consultation with MRFAC identify opportunities to build capacity and access resources critical to ensuring they can successfully contribute to fisheries management</p> <p>4a(vi) Ensure fisheries information is available in a timely and publicly accessible manner</p> <p>4a(vii) Consult with MRFAC with sufficient time for them to gain wider stakeholder input where possible</p>	Community -Relationship with community	<p>Representative participation from MRFAC in co management of the recreational fishery</p> <p>Level of currency, independence and accessibility of information about the fishery</p> <p>Management decision outcomes for the recreational fishery are communicated to recreational fishers</p>		<p>Publically available information on recreational fishing and management is decreasing from previous year</p> <p>Feedback to recreational fishers on management decisions is not given or infrequently given</p> <p>>45% of fishers indicate they are dissatisfied with the level of consultation</p>
4b Ensure transparent decision-making process by fisheries agencies	<p>4b(i) Communicate decision making processes on reviews of recreational fishing management arrangements and commercial activities that impact on recreational fishing</p> <p>4b(ii) Information on fisheries management is available in timely and publicly accessible manner</p>	Community -Relationship with community Governance PIRSA, policy and management, Communication/Participation, MRFAC, SA RF Committee, other NGOs	<p>FishFacts newsletter, Media Releases, website</p> <p>Documentation of fisheries management decision making processes</p>		<p>Publically available information on recreational fishing and management is decreasing from previous year</p> <p>80% or less of management decisions are published in publically available forums</p>
4c Maximise stewardship of fisheries resources by recreational fishers	<p>4c(i) Undertake annual compliance risk assessment</p> <p>4c(ii) Develop and implement management arrangements that are clear and uncomplicated so as to promote voluntary compliance and assist with successful enforcement</p> <p>4c(iii) Encourage the community to report fisheries offences to the Fishwatch number</p> <p>4c(iv) Communication strategy developed to promote recreational fishing rules and address compliance risk assessment high risk areas</p>	<p>Fishery impacts on 'all retained species'</p> <p>Fishery impacts on 'non-retained species'</p> <p>General Ecosystem Impacts of Fishing</p>	<p>Compliance risk assessment undertaken annually</p> <p>Number of high-rated risks</p> <p>Proportion of fishers who believe that, overall, most fishers comply with fishing rules and regulations</p> <p>Number of calls to Fishwatch</p> <p>Trends in the number of infringements</p> <p>Compliance undertaken</p>	<p>Achieving sustainable management of fisheries requires fishers to comply with regulations regarding fishing activities, and to be responsible for their fishing activities. A key objective of fisheries management is therefore to ensure fishers are aware of their social responsibilities and are motivated to comply with these. This type of awareness and sense of obligation is often referred to as ensuring fishers feel they are 'stewards' of the fishery's resources (Triantafillos et al. 2014)</p> <p>The compliance risk assessment provides the opportunity to assess compliance status in fishery and prioritise work functions on high risk areas to fishery</p>	<p>Recreational fishery compliance risk assessment is not undertaken annually</p> <p>PIRSA website information and recreational fishing app is updated less the annually</p> <p>Number of prosecutions over 3 years does increases significantly</p> <p>Infringements increasing rapidly over time</p> <p>Decline (compared to previous survey) in the proportion of recreational fishers who agree with the statement "overall, most recreational fishers comply with fishing rules and regulations"</p> <p>Targeted number of compliance days achieved</p>

9 Harvest Strategy

9.1 Overview

A harvest strategy is a framework that specifies the pre-determined management actions in a fishery for defined species (at the stock or management unit level) necessary to achieve the agreed ecological, economic and/or social management objectives (Sloan et al. 2014)

This harvest strategy provides a structured framework for decision-making that specifies predetermined management actions necessary for the South Australian recreational fishery to achieve the ESD objectives of the Act.

Consistent with national guidelines (Sloan et al. 2014), this harvest strategy brings together all of the key scientific monitoring, assessment and management elements to form an integrated package to make decisions about the level of fishing intensity that should be applied to recreational fishing resources.

Monitoring of the fishery is achieved through various methods which are dependent on the suitability for assessment of each species. The indicators, operational objectives and trigger reference points and/or limit reference points are set out in the various commercial management plans.

Recreational fishing surveys are undertaken at a minimum every five years in South Australia. The surveys provide information to evaluate the size and impact of recreational fishing. In the years where recreational information is available, this information is included in the reported stock status reports and fishery assessment reports, and used to monitor catches against allocated shares. The recreational fishing survey provides statistically robust estimates of:

- a) The state-wide and regional participation levels and demographics of South Australian private-dwelling residents who recreationally fished in South Australia
- b) Recreational fishing effort and catches (harvested and released), by species.

The surveys are undertaken in a manner that allows the results from previous survey years to be compared with the results from the most recent survey. They generally consist of:

- a) A telephone interview screening survey of randomly chosen households, to ascertain participation and demographics of recreational fishers in the 12-months prior to the survey. Then some fishing households are randomly selected to participate in the 12-month diary survey where household

catches (numbers of harvested and released fish) and fishing effort are monitored.

- b) Supplementary on-site surveys which are undertaken to provide information on harvested lengths of key species, for later expansion to total harvest weights.
- c) Two short surveys at the completion of the 12-month survey. The first measures the additional fishing effort from those fishers whom originally had no intention of fishing, and the second determines the attitudes and motivation of the previously surveyed fishing households.

Catch information for commercial sectors is available annually and provides the opportunity to review the status of species more frequently.

Consistent with the Act, the principle of ecological sustainability has priority over the other principles of ESD; hence the sustainability aim is the primary assessment focus for the harvest strategy. Assessment outcomes lead to an annual stock status being determined for the fishery, which is reported in stock assessment reports and national stock status reports.

Consistent with the national agreed reporting framework for stock classification the classifications used in this section are:

- **Sustainable stock:** Biomass (or proxy) is at a level sufficient to ensure that, on average, future levels of recruitment are adequate (i.e. recruitment is not impaired) and for which fishing mortality (or proxy) is adequately controlled to avoid the stock becoming recruitment impaired (overfishing is not occurring).
- **Depleting stock:** Biomass (or proxy) is not yet depleted and recruitment is not yet impaired, but fishing mortality (or proxy) is too high (overfishing is occurring) and moving the stock in the direction of becoming recruitment impaired.
- **Recovering stock:** Biomass (or proxy) is depleted and recruitment is impaired, but management measures are in place to promote stock recovery, and recovery is occurring.
- **Depleted stock:** Biomass (or proxy) has been reduced through catch and/or non-fishing effects, such that recruitment is impaired. Current management is not adequate to recover the stock, or adequate management have been put in place but have not yet resulted in measurable improvements.

9.2 Objectives of the harvest strategy

The objectives of this harvest strategy are to:

1. Ensure long-term sustainable harvest of recreational species. Where sustainability issues are identified through commercial (or other) stock assessment processes, changes to the recreational sector are undertaken correspondingly to the commercial sector in line with each sector's allocated shares.

2. Maintain recreational catches within the allocated shares. The process for reviewing and/or adjusting shares will be undertaken in accordance with the limits specified in Section 10. The catches by relevant sectors will be presented within the stock status/ or fishery assessment report in years when available.
3. Maximise fishing experience within ecological sustainable limits and allocated shares.

9.3 Biological objectives, performance indicators and trigger/limit reference points

The biological objectives, performance indicators and limit reference points for assessing stock status for the key recreational species that are also commercially important species are outlined in the various commercial management plans. These plans outline the performance indicators and trigger/limit reference points which are used in assessing stock status (i.e. sustainable, depleting, recovering, depleted). In addition, they are used to determine/trigger the need to review/change management arrangements for the species. Trigger reference points define the values of a performance indicator for a fish stock or fisheries management unit at which a change in management is considered or adopted. Limit reference points define the values of a performance indicator for a fish stock or fisheries management unit that is no longer considered acceptable.

9.4 Decision rules

This plan outlines the management response for the recreational sector when a limit/trigger reference points is breached. The commercial management plans set out decision rules for reviewing the commercial sectors management arrangements when the limit/trigger reference points for the commercial sector are breached.

Harvest strategies should deal with all situations, including instances when the stock becomes depleted through recruitment impairment or unfavourable environmental conditions (or combination of both), and needs to be recovered.

In the case where a species' trigger/limit reference points are breached and the status of the species is determined to be depleting or depleted, a process for the recreational sector (outlined below) will be considered to ensure sustainability of the fishery. The need for a change to the recreational sector will need to be assessed based on the best available information. As the recreational fishing survey information is only available every five years, up to date information on the recreational sector is not available; a precautionary and risk based approach will be required to assess the need for a recreational management change.

When the need for a recreational fishery management change is identified, the recreational fishery management changes will be appropriate for maintaining the allocated shares between the sectors and ensure sustainability.

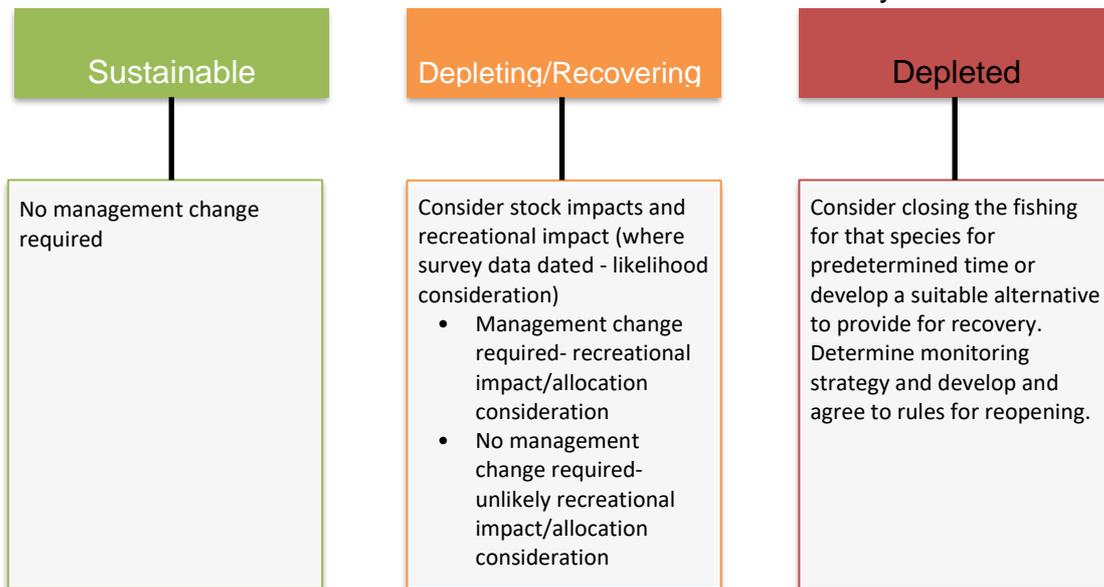


Figure 2: Process for the recreational sector where triggers are triggered

9.4.1 Process for considering and developing revised recreational fishery management arrangements

Consideration of the fishery status report and/or the stock assessment reports will be undertaken within the existing co-management framework. Where the species is depleting or depleted the following options may be used for considering and developing revised recreational fishery management arrangements:

- The need for a change to the recreational sector to be assessed
- Identify management targets/what is to be achieved by the changes
- Targeted consultation with MRFAC, RFCs, local councils, commercial industry associations and the conservation sector (as needed)
- Public consultation, which also includes public meetings and information sessions
- Feedback to MRFAC and other stakeholder groups as needed on the outcomes/comments from public consultation and PIRSA's consideration of the feedback
- Finalisation of management changes and community education (Media release/s, article in Fish Facts newsletter, website announcement, Recreational fishing app updated etc.)
- Development of a monitoring/review framework for the revised changes in consultation with MRFAC

9.5 Potential management options for revised recreational fishery management arrangements

In achieving the longer term objectives of this and future harvest strategies it is difficult to identify the appropriate management response to breaches of trigger reference points given the complexities of this fishery. There is a range of management tools available to achieve the operational objectives of this harvest strategy, which include:

- bag limits
- size limits
- spatial and temporal closures
- gear modifications.

The process outlined in Section 9.4.1 will be used to determine the most appropriate mix of controls in the circumstances to achieve the specified management target.

In developing revised recreational fishery management arrangements, the following will also be considered:

- The allocated share of the species and the commercial management changes
- Relevant fishing experiences to species, gear, location etc. associated with the relevant species being considered.

It is acknowledged that for shared fish stocks, management changes may also be required for the commercial sector. These are dealt with under separate management plans.

9.6 Species not covered by a commercial fishery management plan

For the species taken by the recreational sector and which are not covered by the commercial fishery management plans, there is generally a low level of recreational take. These species will be examined during the ESD risk assessment process undertaken every 5 years as part of the management plan review, and those species assessed as moderate, high or extreme risks will be considered using the process outlined in Section 9.4.1.

9.7 Review of harvest strategy

A review of this harvest strategy may be conducted at any time in line with the Act. A review of the harvest strategy would be conducted under Section 49 of the Act as it is part of this management plan.

10 Allocation of Access Between Sectors

10.1 Current allocated shares of the resource

The Act provides that a management plan must specify the share of the fishery to be allocated to each fishing sector under the plan (43(2)(h)). The Act also provides that, in determining the share of aquatic resources to be allocated to a particular fishing sector under the first management plan for an existing fishery, the share of aquatic resources to which that fishing sector had access at the time the Minister requested the preparation of the plan (based on the most recent information available to the Minister) must be taken into account (43(3)).

The Minister formally requested preparation of this management plan on 17 June 2010. Therefore, this plan must take into account the share of aquatic resources that the recreational sector, commercial sectors, and the Aboriginal traditional sector had access to at that time. The best available information regarding sector shares at that time was the catches from 2007/08 recreational fishing survey (see Appendix 1 which further details the information used to allocation shares). The key recreational species have already been allocated between the three fishing sectors in existing commercial fishery management plans.

When determining the share of aquatic resources to be allocated, it is important to clarify the temporal and spatial extent of the fishery to which the allocation applies.

Shares for a species may be allocated in a number of ways including:

- using variations in management arrangements
- biological or stock boundaries
- a single allocation across the region
- environmental factors e.g. flood events in Lake Eyre and recognising past allocation agreements.

Recreational fishing means fishing other than commercial fishing or Aboriginal traditional fishing wherein fish are captured for personal consumption, sport or pleasure and either retained and consumed, shared or released. Many Aboriginal people participate in recreational fishing, as well as Aboriginal traditional fishing, and have a strong cultural connection to sea country. There is diversity in the

recreational fishing community, including strong connections from all cultural backgrounds. See Appendix 2 for further details on the sectors related to recreational fishing allocations.

Recreational species are taken by both South Australian resident and non-resident (interstate and overseas visitors) recreational fishers. Information on the catch by non-residents is not routinely collected and there is currently no cost-effective method to capture this information. This information has only been collected once through the 2000/01 national recreational survey. For this reason, the allocation is based on recreational catch estimates from South Australian residents only. Future recreational fishing surveys will be undertaken in a manner to ensure that the data can be compared to ensure allocations are managed consistently.

Table 2: Shares of recreational species allocated to the commercial, recreational and Aboriginal Traditional fishing sectors.

Species	Commercial	Recreational	Aboriginal traditional	
Abalone ⁽¹⁾	99.74%	0.15%	0.11%	
Australian Herring ⁽²⁾	56.50%	42.50%	1%	
Australian Sardines ⁽³⁾	100.0%	0%	0%	
Australian Anchovy ⁽³⁾	100.0%	0%	0%	
Balmain Bug ⁽⁴⁾ Spencer Gulf	100.0%	0%	0%	
Black Bream	50.6%	48.4%	1%	
Blue Swimmer Crab ⁽⁵⁾	70%	29%	1%	
Bronze & Dusky Whaler Shark ⁽²⁾	73.7%	25.3%	1%	
Flathead	12.3%	86.7%	1%	
Golden Perch (Lake Eyre) Flood ⁽⁶⁾	99.00%	0.09%	0.01%	
Golden Perch (Lake Eyre) Non-Flood ⁽⁶⁾	0%	90%	10%	
Golden Perch (SAMDB) ⁽⁷⁾	71.6%	27.4%	1%	
Greenback Flounder ⁽⁷⁾	88.7%	10.3%	1%	
King George Whiting ⁽²⁾	50.50%	48.50%	1%	
King Prawns ⁽³⁾ Spencer Gulf	100.0%	0%	0%	
Mullet spp.	Marine ⁽²⁾	54.2%	44.8%	1%
	L&C (inland) ⁽⁷⁾	98.9%	0.55%	0.55%
Mulloway	Marine ⁽²⁾	19.9%	79.1%	1%
	L&C (inland) ⁽⁷⁾	71.4%	27.6%	1%

Pipi ⁽⁷⁾ (area based only in Coorong region)	73%	26%	1%
Sand Crab ⁽²⁾	85%	14%	1%
Snapper ⁽²⁾	81%	18%	1%
Snook ⁽²⁾	49.5%	49.5%	1%
Southern Calamari ⁽²⁾	61.6%	37.4%	1%
Southern Garfish ⁽²⁾	79.5%	19.5%	1%
Southern Rock Lobster ⁽⁸⁾	95.5%	3.5%	1%
Trevally	47.35%	51.65%	1%
Vongole (Mud Cockle) spp. ⁽²⁾	99.70%	0.15%	0.15%
Yellowfin Whiting ⁽²⁾	78%	21%	1%
Yellowtail Kingfish	0.12%	98.88%	1%

(1) Sources of existing allocations

(2) Management Plan for the South Australian Commercial Abalone Fishery 2012 (PIRSA 2012b)

(3) Management Plan for the South Australian Commercial Marine Scalefish Fishery 2013 (PIRSA 2013a)

(4) Management plan for the South Australian Commercial Marine Scalefish Fishery, Part B– management arrangements for the taking of Sardines (PIRSA 2014c)

(5) Management Plan for the South Australian Commercial Spencer Gulf Prawn Fishery (PIRSA 2014b)

(6) Management Plan for the South Australian Commercial Blue Swimmer Crab Fishery 2012 (PIRSA 2012a)

(7) Management Plan for Lake Eyre Basin Fisheries 2013 (PIRSA 2013b)

(8) Management Plan for the South Australian Commercial Lakes and Coorong Fishery 2016 (PIRSA 2016)

(9) Management Plan for the South Australian Commercial Northern Zone Rock Lobster Fishery 2014 and Management Plan for the South Australian Commercial Southern Zone Rock Lobster Fishery 2013 (PIRSA 2013c)

10.2 Species not allocated

Not all recreational species are allocated within this management plan. Only species for which an allocation already exists in a commercial management plan and species for which reliable data are available have been allocated.

Not all species allocated in Table 2 above are individual species; some include a number of similar species grouped together. This is because some species are difficult to identify and there may be non-differentiation by species by both commercial and recreational fishers. Where multiple species are included within a single species, the species name is followed by the abbreviation, 'spp.'. (e.g. Mullet spp.). Details of the species names and groups are provided in Appendix 3, Table 3.

Future consideration will be given to determining allocations for those species yet to be allocated when the plan is reviewed and will be consistent with the Allocation Policy (PIRSA 2011b). For a species to be allocated, the need will be identified through consultative processes with all the sectors. For example, Western Australian Salmon will require further work in determining the shares.

10.3 Review of Allocations

An important component of the allocation of shares is monitoring to identify a change in the relative value of those shares over time. The value of shares can be measured in a variety of ways including catch and effort, economic value and social values. It is difficult to measure the economic value associated with a recreational fishing species (or many of the commercial fisheries) as they are only one species of a multi-species fishery. Measuring the social values of a fishery is an evolving area of natural resource management, and there are no clearly identifiable indicators of social value that can be readily incorporated into an assessment of share value at this point in time.

For these reasons, catch will be used as the primary indicator to measure changes in the value of shares, as estimates of recreational catches is expected to be available every five years. All sectors' catch against their allocated share will be reviewed every five (5) years, to coincide with state-wide recreational fishing surveys when information is available for all sectors.

Allocations between sectors will be reviewed in accordance with the Allocation Policy and under the following scenarios:

- A review of the management plan, which will reassess the appropriateness of shares and may trigger an adjustment; or
- One or more sectors significantly exceed their allocation; or
- A major change in the management of a species and or a sector that results in a shift of allocations to a sector/s, including the making of an Aboriginal traditional fishing management plan.

10.4 Allocation review process

The process to review allocations under the scenarios described above will be a two-staged approach. The first stage is an initial assessment to determine whether a full assessment is necessary or appropriate.

10.4.1 Initial assessment

The initial assessment will be conducted by PIRSA in consultation with relevant sectors of the fishery. Once the need for a review has been recognised an independent assessor or assessment committee may be established. The need for a second-stage assessment will be based on the following:

- Has there been a shift in the access value of the fishery? Is there an emergence of a new commercial or recreational species that would bring additional social and economic benefits to the State if a reallocation was to occur?
- Is the potential change in shares significant and considered long-term? A minor shift/anomaly may not require a full review.

Should a committee be established, a written report is to be prepared by the committee, with a recommendation to proceed to a full assessment or not. PIRSA will determine whether to move to a full assessment or may refer a recommendation to the Minister.

10.4.2 Full assessment

As with the initial assessment, a full assessment of allocation will be conducted by PIRSA in consultation with relevant stakeholders. An evaluation panel is to be established with membership including an independent chair (external appointment), independent experts as required (e.g. economist, social scientist), representatives of each fishing sector and a fisheries manager from outside South Australia (preferably with allocation experience).

The panel needs to evaluate how the value of one or more sectors is changing and the likely trends in the future. In the context of these changes, all options being considered should be evaluated against the option of maintaining the status quo and the potential follow on effects with regard to:

- Contribution to Gross State Product
- Contribution to employment
- Access for consumers to fresh seafood
- Maintenance and growth of regional communities
- Health impacts
- Sport and recreation opportunities
- Consistency with tourism policies
- Other criteria relevant to the fishery.

10.4.3 Assessment outcomes

Following the full assessment, the Allocation Policy (PIRSA 2011b) provides that the review panel may recommend to the Minister one of two actions, either:

- Manage each sector within the existing allocated shares
- Proceed to adjust shares.

10.4.4 Process for managing within existing shares

If shares are to be maintained between sectors it may be necessary, depending on the circumstances, to alter the catch of one or more sectors. To determine the appropriate mechanism to re-establish initial allocations, the existing co-management arrangements will be used to develop a preferred option.

Adjusting recreational shares, if required, are likely to be made through alterations to existing bag and boat limits, seasonal closures or size limits. Managing adjustments to the commercial sector, if necessary, are likely to be achieved through a variety of controls consistent with current management arrangements and the harvest strategy for the commercial fishery such as seasonal and area closures, gear restrictions, catch limits and size limits.

10.4.5 Process for adjusting allocations

The following points are provided to guide an allocation adjustment process:

- Adjustments to the shares will, in the first instance, be implemented through a voluntary process and through direct negotiations between the relevant sectors.
- If agreement cannot be reached, a process of compulsory acquisition may occur in accordance with the *Fisheries Management Act 2007*. Adjustments are to be finalised within two years of the allocation adjustment process commencing.
- Where the commercial fishing sector's shares are reduced, so as to increase the share of another sector, compensation may be paid to the holders of commercial licences or licensed entitlements (sections 43(2) and 58 of the Act).
- The Act does not provide compensation requirements for changes to the recreational sectors shares. However, management plans for each commercial fishery includes objectives to manage the commercial take with the allocated shares as part of the harvest strategies set out in those plans.

11 Recreational Fishing Research and Stock Assessment

11.1 Data collection, reporting and analysis

To achieve the research and monitoring needs for the fishery, a variety of data types are collected and analysed:

- Fishery independent data
 - Biomass surveys (e.g. Mud Cockles/Pipi)
 - Puerulus sampling (Rock Lobster)
 - Fishing surveys (Blue Swimmer Crabs, Mulloway, Golden Perch, Yellow Eye Mullet)
 - Abalone timed swim and lead line surveys
- Fishery dependent data
 - Recreational fishing surveys (see below)
 - Recreational fisher data collection (citizen science)
 - Commercial catch and effort data (all species)
 - Commercial market sampling for collection of age/length information (Snapper, Whiting, Garfish, Mulloway, Golden Perch, Yelloweye Mullet)
 - Voluntary commercial Rock Lobster pot sampling program

The monitoring and data collection programs for the commercial fisheries are set out in the relevant commercial fishery management plans: e.g. Snapper - *Management plan for the South Australian Commercial Marine Scalefish Fishery* (PIRSA 2013a). Most of the above listed data are collected as part of the monitoring and data collection programs for the commercial fisheries.

11.2 Recreational fishing surveys

Recreational fishers collectively harvest significant proportions of the total catch for a number of key species caught in South Australia. The need for statistically robust estimates of their catches is crucial in managing allocated shares of the resource between sectors, as well as assessing the biological sustainability for each fishery and managing the State's aquatic resources under the Act. Regular estimates of the recreational take are required and, therefore, there is a need to develop cost-effective methods to collect such information in a timely manner.

The methods developed for surveying recreational fishers differ significantly from those used for commercial fishers who report on their fishing activities by way of compulsory logbooks. This latter method would clearly be cost-prohibitive for the recreational sector to undertake, given the number of participants. The primary source of data used for managing recreational fishing is the state-wide recreational fishing surveys, currently undertaken every five (5) years.

The primary objectives of these surveys are:

- To determine the participation rate in recreational fishing throughout South Australia by South Australian residents and to profile the demographic characteristics of these recreational fishers
- To quantify the catch and effort of the South Australian recreational fishing sector
- To assess attitudes and awareness of recreational fishers in terms of various fisheries-related issues.

The recreational catch estimated from the surveys is included in fishery models and assessments of the stock status.

11.3 Status reporting of species

The status of the key recreational species is reported in the national *Status of Key Australian Fish Stocks* <www.fish.gov.au> and, from time to time, the *Status of Key South Australian Fish Stocks* report. Furthermore, the stock status for many species is reported in the stock assessment reports for the individual species and is available on PIRSA's website. These reports are considered when reviewing management arrangements for recreational fishing.

The national *Status of Key Australian Fish Stocks* report brings together available biological, catch and effort information to determine the status of key wild catch fish stocks against a nationally agreed reporting framework and provides a resource to inform the general public, policy makers and industry on the sustainability of stocks. The agreed reporting framework is also used in reporting the status in the *Status of Key South Australian Fish Stocks* report and stock assessments reports.

11.4 Research services

Research needs are identified by PIRSA in consultation with MRFAC-(and other stakeholders) through co-management processes.

SARDI is currently the primary research provider for stock assessments and status reports which are used for assessing the status of the species taken recreationally and commercially in South Australia.

Other recreational research projects are also identified from time to time to improve knowledge for improving/reviewing management of species (e.g. Snapper movement project, Catfish and Murray Cod co-management projects). Other research providers are also used as appropriate for their expertise in undertaking research projects.

Costs of the research program for recreational fishing are currently appropriated from consolidated revenue. Funds from recreational fishing registration fees (recreational mesh nets and Rock Lobster pots) also contribute to funds for research programs. External sources such as the FRDC, Natural Resource Management (NRM) Boards and universities also provide opportunities. In addition, research and monitoring projects which have commercial importance are funded through cost recovery from commercial fishing licence fees (e.g. Blue Swimmer Crab stock assessment). In some instances these projects have some State funding attributed to the project where they are also important to the recreational sector; this level of funding is commensurate with the allocated shares for the species.

12 Compliance and Monitoring

12.1 Objectives

PIRSA runs a compliance program that has dual objectives:

- To maximise voluntary compliance with fisheries rules³
- To create effective deterrence to breaching fisheries rules.

These objectives are consistent with the *Australian National Fisheries Compliance Strategy*⁴.

Voluntary compliance is maximised through ensuring that recreational fishers are aware of the rules that apply to their fishing activities, understand the rules and the purpose of those rules, and operate in a culture of compliance.

Effective deterrence is created through the presence of Fisheries Officers and awareness of compliance operations, as well as through detection and prosecution of illegal activity.⁵

In addition to fisheries officers, PIRSA also employ two Volunteer Coordinators and 90 volunteers to deliver the Fishcare Volunteer program for recreational fishing across the State. Fishcare Volunteers commit in excess of 6,000 hours to provide information to over 24,000 fishers annually. Fishcare Volunteers regularly patrol beaches handing out information and often attend field days and other events with displays.

12.2 Recreational fishing initiatives assisting with voluntary compliance

Recognition of the need for more sustainable fishing practices and an agreed national standard for recreational fishing led to the development of the first national code of practice (COP) in 1995. The *National Code of Practice for Recreational and Sport Fishing* addresses four main areas of fishing responsibility:

- Treating fish humanely
- Looking after our fisheries
- Protecting the environment

³ Rules include regulations, licence conditions, closure notices or any other enforceable instrument under the *Fisheries Management Act 2007*.

⁴ The Australian National Compliance Strategy 2010-2015 was developed by the National Compliance committee, it outlines the objectives that Australian fisheries agencies will pursue to achieve an optimum level of compliance and create effective deterrence to illegal fishing activity.

⁵ Prosecution may include the issuing of a formal caution or an expiation notice, in addition to prosecution through the courts.

- Respecting the rights of others.

Under the above overriding objectives sits fourteen more specific principles. The ones relevant to compliance are:

- Using only appropriate, legal tackle, attending all fishing gear and valuing our catch
- Understanding and observing all fishing regulations and reporting illegal fishing activities.

Recreational fishing groups also undertake education/information initiatives from time to time which assist in educating fishers of the regulations.

12.3 Compliance costs

The costs of the recreational compliance program are funded by the South Australian Government from consolidated revenue.

12.4 Planning

PIRSA compliance programs are reviewed on an annual basis to direct effort and ensure compliance activities are intelligence-driven, efficient, cost effective and outcome focused. The compliance plan is underpinned by three core strategies: Education and Awareness, Effective Deterrence and Appropriate Enforcement, and is focused towards increasing voluntary compliance and maximising effective deterrence.

An analysis of intelligence and information holdings is conducted to identify the major risks for the fishery. A series of strategies, actions, and initiatives are detailed and used to focus the primary compliance effort in order to manage the risks and achieve targeted outcomes. Compliance plans are reviewed each year and are implemented for the full financial year.

12.5 Compliance risk assessment

A compliance risk assessment is undertaken on an annual basis for each fishery. This assessment identifies and prioritises the compliance risks that exist in the fishery. Risks are ranked according to the likelihood and consequence of the risk occurring.

The compliance risk assessment is used to inform annual compliance planning processes, and is reviewed each year; it is an internal confidential document. However, PIRSA will, through the co-management arrangements, gather MRFAC views on the priority risks in planning this document.

12.6 Responses and benchmarks

Compliance activities are planned to respond to the risks identified in each fishery, with an emphasis on the most serious risks. Responses must include measures aimed at both maximising voluntary compliance and creating effective deterrence.

The principal outcome of this compliance program is to support sustainable management of the recreational fishery by:

- Increased voluntary compliance
- Continued development of effective deterrence strategies
- Accurate intelligence and risk predictions
- Successful enforcement outcomes for repeat or serious offences
- Development of efficient and cost effective compliance strategies
- Continued development of stakeholder engagement programs
- Reduced incidence of reported illegal activity
- Reduced incidence of documentation errors and inconsistencies
- Increased positive interactions and collaboration with stakeholders

13 Regulatory Arrangements

Regulatory arrangements for recreational fishing are contained within the Act and the Regulations. The recreational fishing rules are available on the PIRSA website <<http://www.pir.sa.gov.au/fishing>> and are accessible on PIRSA's free SA Recreational Fishing Guide app.

Future amendments to the regulations could change the regulatory arrangements listed in this section. Appropriate consultation will be undertaken should that occur.

Recreational fishing regulations are in place for sustainability reasons (e.g. controlling the recreational harvest), to ensure fish stocks are shared equitably between all recreational fishers and between all extractive users (recreational, commercial and Aboriginal traditional sectors), as well as for social/economic reasons. There is a need to establish standards of recreational fishing which are acceptable to the community, whilst ensuring that recreational fishers are provided with opportunities to take a reasonable catch and to have quality recreational fishing experiences.

Other factors to take into account include the principle that recreational fishing is considered a sport/leisure activity and is not managed to provide a return on investment in boats or fishing gear. Additionally, the current harvest shares between recreational and commercial fishers should be maintained unless there are explicit reasons for changing shares.

The three tiers of regulations that are available in the Act to manage the specific issues that exist in the recreational fishery are outlined below. The issues that need to be managed, as outlined previously, include:

- Allowing recreational fishers to take a reasonable feed of fish for immediate needs: the primary management tool is bag and boat limits
- Addressing the taking and 'stockpiling' of recreational catches: the primary management tool is possession limits
- Addressing illegal activities such as poaching and illegal sales of high value species: the primary management tool is commercial quantity limits and the trafficking provisions.

13.1 Management arrangements

Recreational fishing in South Australia is managed through a mixture of input and output based management controls. It is illegal for recreational fishers to sell or trade any of their catch.

13.1.1 Recreational Bag, Boat and Size Limit

The daily bag limit is the maximum number of fish of a species that a person can take in any 24-hour period commencing at midnight. The daily boat limit is generally set at three times the daily bag limit (for most species) where three or more persons are fishing on board the boat. These limits have been set to take into account both sustainability, equity and social requirements, often to allow recreational fishers to catch a reasonable feed of fish that they can consume in any 24-hour period or to meet immediate family needs.

Minimum size limits often let fish reach maturity, which allows fish to reproduce at least once before entering the fishery and being harvested by any fishing sector. Minimum size limits apply to most recreational species.

Maximum size limits protect the larger breeding fish from harvest and by doing so create a higher broodstock (breeding fish) population. Maximum size limits in conjunction with minimum size limits are commonly referred to as slot size limits. The width of the slot size limit (between the minimum and maximum size limits) can be used to lower total harvest (i.e. the narrower the slot width, the less fish are available to be removed from the population). There are three species (Western Blue Groper, Wrasse and Murray Cod) that have a legal maximum size limit, although the take of Murray Cod is currently catch and release only in South Australia.

In developing this plan, a Recreational Bag, Boat and Size Limit Review was undertaken in 2016. The review updated the existing limits by taking into account the status of fishery stocks, harvest shares and recent biological research, and the principle that recreational fishing is considered a sport/pleasure activity and is not managed to provide a return on investment in boats or fishing gear.

13.1.2 Recreational Possession Limit

A possession limit is the maximum number of fish that a person is allowed to have in their possession or control in certain circumstances. Possession limits can provide a useful tool to constrain recreational fishers from taking and stockpiling large quantities of fish. Possession limits can also assist in controlling high levels of localised recreational fishing effort, thereby promoting stock sustainability and reducing the risk of localised depletion. Possession limits also aim to ensure that recreational catches and fishing opportunities are shared between all recreational fishers, rather than a small percentage taking most of the catch.

13.1.3 Commercial Quantity

The Act and regulations provide for species specific quantities of fish a non-licensed fisher can have in their possession, without the onus of having to satisfy that they obtained the fish legally and/or are not for commercial gain. The rules for commercial quantity involve evidentiary provisions that reverse the onus of proof. In the case where a fisher is proved to have commercial quantities in his or her possession or control, then it is assumed in the absence of proof to the contrary that they were for the purpose of sale. These provisions are in place to provide a mechanism to investigate, and if necessary prosecute those who may engage in the illegal trafficking of fish not taken pursuant to a commercial fishery or fish processor licence.

13.1.4 Fishing gear/devices

There are restrictions on permitted devices (see Appendix 4 for a list of permitted devices) and the number of devices that recreational fishers can use for fishing.

The regulation of fishing gear assists in managing effort, ecosystem impacts and sharing fishing areas with others (e.g. fishing from jetties).

Some recreational fishing devices must be registered before use:

- Rock Lobster pots
- Mesh nets in Lakes Albert and Alexandrina
- Mesh nets in Lake George
- Mesh nets in the Coorong.

There are also requirements for marking certain gear; all permitted devices that are left unattended must be marked with a tag/buoy and registered devices must be marked with a tag. Marking of devices assists in identifying ownership of the gear, enforcement of the number of permitted devices and drawing attention to any gear that may be a navigation hazard to others.

Where an offence is being committed, the gear and/or items that afford evidence to the offence may be seized by Fisheries Officer and subject to forfeiture. Such

offences may include use of illegal gear, unmarked gear, and/or using more than the permitted number of devices.

13.1.5 Protected species

Some aquatic species are protected under the Act and *Environment, Protection, Biodiversity and Conservation Act 1999* (EPBC Act) and must not be taken:

- at any time (e.g. sea horses)
- during certain stages of their life cycle such as during their reproductive period (e.g. female Rock Lobster and Blue Swimmer Crab with eggs)
- during certain times of the year (e.g. Snapper state-wide closure – 1 November to 15 December)
- from particular closed areas or reserves (e.g. Silver Perch in the River Murray).

Protected species that are accidentally caught must be returned to the water immediately. Interactions with Environment Protection and Biodiversity Conservation Act 1999 protected species which result in the unintentional death, injury, trading, taking, keeping or moving in Commonwealth waters (generally waters greater than 3 nm off the coastline and gulfs/bays) must be reported to Department for Environment and Water by phone: (02) 6274 1111 or <EPBC.Permits@environment.gov.au>. See <<http://www.environment.gov.au/marine/marine-species> for further information>.

13.1.6 Fishing closures

Fishing closures apply to recreational and commercial fishers for the management of fish species. These closures include aquatic reserves, intertidal rocky reefs and some species carrying eggs. Fishing closures can help manage fish stocks by:

- Protecting spawning areas
- Letting juvenile fish grow in safety
- Reducing fishing pressure on stocks
- Minimising disturbance to fish stocks from fishing activity.

Fishing can be banned in some areas all year and for some others temporarily (e.g. seasonal closures). Seasonal closures may be declared to protect fished species during their breeding season. Protected species caught during a closure or closure period must be returned to the water immediately. Additionally, temporary closures, which may use a combination of seasonal or regional closure, may occur when a fishery stock is considered depleting or depleted, exemplified by the Snapper fishery closure in 2019.

13.1.7 PIRSA's Policy for the Release of Aquatic Resources

Section 78 (2) of the Act specifies that it is an offence to release an exotic fish, any aquaculture fish or any fish that has been kept from its natural habitat into

(unconfined) natural waters. The Minister may issue a permit authorising a person to release aquatic resources into specified waters.

A policy has been developed to guide applicants who wish to translocate and enhance aquatic resources into South Australian waters under a permit. The policy establishes a risk-based assessment process to evaluate and regulate such translocations. Details of the policy and applications forms are available on the PIRSA website.

Three types of stocking (and then release) of aquatic resources are considered in PIRSA's policy for the release of aquatic resources. These are 'conservation stocking', 'stock enhancement' and 'harvest stocking'.

1. Conservation stocking is where a fish stock is not performing against biological or environmental fisheries management objectives and requires a recovery program (e.g. protected, endangered or threatened species).
2. Stock enhancement is where a fish stock or fishery is not performing against defined fisheries management objectives, whether they are biological, social, economic or environmental, or where a fish stock or fishery is performing satisfactorily, but production could be further improved (provided the environment can cope with the increase in fish stock without detriment to the ecosystem).
3. Harvest stocking is where a fish stock or fishery is to be established in waters where the fish stock or fishery did not previously exist (e.g. a freshwater impoundment or dam).

An increase in fish stocks, as a result of releasing aquatic resources, can provide many benefits environmentally, socially and economically to the community and to the various fishing sectors. This can include creating 'put and take' fisheries and augmenting existing fish stocks providing improved fishing opportunities, conservation outcomes, employment and subsequent economic benefits. Effective management of stocking activities is required because a number of risks, which are not always well understood, are possible (Gillanders et al. 2006).

13.1.8 Consequences of breaching the rules

There are a range of penalties for fisheries offences. They include monetary penalties and/or for serious offences, imprisonment. Our fish stocks are a precious and finite resource and PIRSA's ongoing efforts to investigate and prosecute illegal fishing activities helps secure the sustainability of our fish stocks for both recreational and commercial fishers.

Members of the public are urged to report suspicious or illegal fishing activity to the 24 hour Fishwatch number 1800 065 522 or via the SA Recreational Fishing Guide smartphone app available for free download from <www.pir.sa.gov.au/recfishingapp>.

14 Resources Required to Implement the Plan

14.1 Costs of managing recreational fishing

The Government contributes to PIRSA's total budget to undertake the public good component of many of the services provided by PIRSA. These include compliance, which incorporates monitoring, prosecutions, education and awareness for recreational fishers, and other services required to manage the recreational components of the fishing sector (policy, systems and information). The costs of these services for each commercial fishery are funded by the commercial sector through cost recovery and other programs may be funded through various service level agreements between PIRSA and external agencies.

Funding for research in fisheries including Blue Crab and Marine Scalefish contain a contribution made by Government on behalf of the recreational sector. This contribution is made because there is a high proportion of these aquatic resources taken by the recreational fishing sector and in recognition that they are recreationally very important species. In addition to funds appropriated from Treasury, some funding is sourced from recreational Rock Lobster pot licences and recreational net licences.

The key costs for implementing this plan and managing recreational fishing include activities in the following areas:

- Research - stock assessments and monitoring, status reporting, other research projects from time to time and undertaking the recreational fishing survey (which will include a social and economic component to track the objectives in this plan)
- Licensing - administration and management of recreational fishing device registrations (Rock Lobster pots and recreational mesh nets)
- Fisheries policy and management - day-to-day fisheries management services, advice and facilitation of fisheries policy and management issues, working and building relationships with fishery stakeholders, education and extension activities
- Compliance - PIRSA undertake coordinated compliance activities to educate fishers, deter fishery offences and enforce the rules and regulations.

PIRSA and the MRFAC will continue to explore resourcing opportunities for the sector, including management, compliance, research, fishing and fish habitat enhancement, education and extension.

15 Appendices

15.1 Appendix 1: Information used to allocate shares

In determining the share to be allocated to a particular fishing sector under the first management plan for an existing fishery, the share to which that sector had access at the time the Minister requested to prepare the plan (based on the most recent information available to the Minister) must be taken into account. The Allocation Policy requires that information about current use by sectors must be real, recent and reliable.

The information used to allocate shares of aquatic resources in this management plan is derived from the following sources:

- *2007/08 South Australian Recreational Fishing Survey* (Jones 2009)
- *The South Australian Recreational Charter Boat Fishery Report 2009* (Knight 2010a, 2010b)
- *South Australian Wild Fisheries Information and Statistics Report* (Knight and Tsolos 2009)
- SARDI Aquatic Sciences catch and effort database of licensed commercial fishers' logbook returns
- Commercial fishery management plans that have considered the above information and allocated access shares.

15.2 Appendix 2: Sectors related to fishing allocations

15.2.1 Recreational sector

The recreational sector accounts for a significant proportion of the total catch of a number of species, such as King George Whiting, Blue Swimmer Crabs, Mulloway and Southern Calamari. For the purpose of this management plan, Charter Boat Fishery catch is considered to be recreational catch and is allocated as part of the broader recreational fishing sector, with the exception of Snapper and King George Whiting where a specific allocation has been made to the charter sector, as these species were identified by this sector as a key species for their fishery.

15.2.2 Commercial sector

Licence holders in the Marine Scalefish Fishery, Southern Zone Rock Lobster Fishery, Northern Zone Rock Lobster Fishery, Miscellaneous Fishery, Lakes and Coorong Fishery, Blue Crab Fishery and Central Zone, Western Zone and Southern Zone Abalone Fisheries all have some form of access to recreationally

caught species. All commercial sectors with access have been considered in the initial allocation process.

Some recreationally taken species are also taken by Commonwealth managed fisheries such as the Southern and Eastern Scalefish and Shark Fishery and the Southern Bluefin Tuna Fishery. These species are managed by the Australian Fisheries Management Authority (AFMA), and the management of these commercial fisheries are outside the jurisdiction of the South Australian Government. As such, an allocation is not provided for these fisheries.

15.2.3 Aboriginal traditional sector

The Act acknowledges Aboriginal or Indigenous fishing in the form of Aboriginal traditional fishing. This is defined in part as being “non-commercial” in nature. It should be noted that, under the Act, the Minister may create separate management plans for Aboriginal traditional fishing where an Indigenous Land Use Agreement (ILUA) exists with any Native Title group.

In respect of any future traditional fishing management arrangements, the taking of recreational species will be subject to ILUA’s and traditional fishing management plans and any claims of Native Title as they relate to the taking of aquatic resources in SA waters. These will be assessed on their merits and on a case by case basis taking into consideration the circumstances raised at that time. Any necessary variation of this management plan resulting from this can be ascertained at that time.

The nature and extent of Aboriginal traditional fishing for recreational species (state-wide marine and freshwater) could not be ascertained at the time of preparing this management plan. In this management plan, a share of access has been allocated and set aside for the purpose of resolving any Native Title claims. Should the nature and extent of Aboriginal traditional fishing of species within this plan become evident the provisions of this plan can be reviewed. It should be noted that at the time of preparing this management plan, one claim for access or allocation for Aboriginal traditional fishing has been determined under a Native Title claim registered in South Australia. There are a number of applications before the Native Title Tribunal. See below and <<http://www.nativetitlesa.org/claims>> for more information.

Native Title Applications (registered and active, as 24 October 2019)

- First Peoples of the River Murray and Mallee #2
- Attorney General for South Australia (Wirangu)
- Walka Wani Oodnadatto #2
- Nauo #3
- First Nations of the South East #1
- First Nations of the South East #2
- Nauo No. 2

- Far West Coast Sea Claim
- Malyankapa Peoples
- Walka Wani Oodnadatta
- Narungga Nation
- Arabana No. 2
- Wilyakali
- Ngadjuri Nation #2
- Ndarrindjeri and Others Native Title Claim
- Nauo Native Title Claim
- Wirangu No. 2 Native Title Claim
- Nukunu Native Title Claim
- Barngarla Native Title Claim

Native Title Determinations (as at 24 October 2019)

- Nukunu Part A
- Adnyamathanha, Ngadjuri and Wilyakali Overlap Claim
- Kurna Peoples Native Title Claim
- Ngarrindjeri and Others Native Title Claim
- Barngarla Native Title Claim
- Yandruwandha/Yawarrawarrka Native Title Claim
- Adnyamathanha No.1
- Adnyamathanha People Native Title Claim No. 3
- The Wangkangurru/Yarluyandi Native Title Claim
- Kokatha People (Part A)
- Dieri No. 2 Native Title Claim
- Adnyamathanha No. 1 – Stage 2
- Adnyamathanha No. 1 – Stage 3
- Far West Coast
- Tjayiwara Unumuru Native Title Claim
- Arabana People
- Dieri
- Gawler Rangers People
- Eringa
- Eringa No. 2 and Wangkangurru/Yarluyandi
- First People of the River Murray and Mallee Region
- Antakirinja Matu-Yankunytjatjara
- Adnyamathanha No. 2
- Adnyamathanha No. 1 (Angepena Pastral Lease)

- Adnyamathanha No. 1 – Stage 1
- Eringa Part A Proceeding
- Wangkangurru/Yarluyandi Part A Proceeding
- Irrwanyere Mt Dare Native Title Determination
- Yankunytjatjara/Antakirinja
- De Rose Hill

Determination that exists in full (as at 24 October 2019)

- Dieri No. 3

It should be noted that, subject to meeting the requirements of section 211 of the Native Title Act 1993, Aboriginal fishers are entitled to take aquatic resources in South Australia outside requirements of the Act provided that it is established that they are:

- An Aboriginal person and native title holder in respect of the land/sea in which the activity is occurring
- The fishing activity in question forms part of the exercise of their customary native rights and interests, and
- The fishing activity was for the purpose of satisfying their personal, domestic, non-commercial community needs.

It should also be noted that the Aboriginal traditional sector's share provided in this management plan, and other management plans, has been deducted from the recreational share. This is because Aboriginal traditional fishing is non-commercial fishing and this approach is consistent with the Allocation Policy. For most species a nominal share has been allocated to Aboriginal traditional sector of 1%. Where the recreation allocation is less than 2%, half of the recreational allocation has been allocated to the Aboriginal traditional sector. Due to the unique arrangements for Lake Eyre Golden Perch, the allocation to the Aboriginal traditional sector is 10% and during flood events 0.01% (which is 10% of the recreational allocation for both during non-flood and flood times).

15.3 Appendix 3: Species names

Table 3: Species allocated, common names and scientific names.

Species common name	Species scientific names
Abalone spp.	Greenlip <i>Haliotis laevigata</i> Blacklip <i>Haliotis rubra</i>
Australian Herring	<i>Arripis georgianus</i>
Australian Sardines	<i>Sardinops sagax</i>
Australian Anchovy	<i>Engraulis australis</i>

Balmain Bug Spencer Gulf	<i>Ibacus spp.</i>
Black Bream	<i>Acanthopagrus butcheri</i>
Blue Swimmer Crab	<i>Portunus armatus</i>
Bronze & Dusky Whaler Shark	<i>Carcharhinus obscurus</i> and <i>C. brachyurus</i>
Flathead (all species)	Family <i>Platycephalidae</i>
Golden Perch (Lake Eyre) Flood	<i>Maquaria sp.</i> Lake Eyre sub species
Golden Perch (Lake Eyre) Non-Flood	<i>Maquaria sp.</i> Lake Eyre sub species
Golden Perch (SAMDB)	<i>Maquaria ambigua</i>
Greenback Flounder	<i>Rhombosolea tapirina</i>
King George Whiting	<i>Sillaginodes punctatus</i>
King Prawns Spencer Gulf	<i>Melicertus latisulcatus</i>
Mullet spp.	Family <i>Mugilidae</i>
Mulloway	<i>Argyrosomus hololepidotus</i>
Pipi (area based only in Coorong region)	<i>Donax deltoides</i>
Sand Crab	<i>Ovalipes australiensis</i>
Snapper	<i>Chrysophrys auratus</i>
Snook	<i>Sphyraena novaehollandiae</i>
Southern Calamari	<i>Sepioteuthis australis</i>
Southern Garfish	<i>Hyporhamphus melanochir</i>
Southern Rock Lobster	<i>Jasus edwardsii</i>
Trevally (Silver)	<i>Pseudocaranx dentex</i>
Vongole (Mud Cockle) spp.	Suborder Teledonta
Yellowfin Whiting	<i>Sillago schomburgkii</i>
Yellowtail Kingfish	<i>Seriola lalandi</i>

15.4 Appendix 4: Recreational permitted fishing gear

Subject to rules for their use, recreational fishers may use the following fishing gear to undertake recreational fishing activities:

- Rod and handline
- Bait fork
- Bait pump
- Bait spade

- Bow and arrow (other than a crossbow)
- Cockle rake
- Crab net
- Crab rake
- Dip tin
- Drop net
- Hand fish spear
- Hand net, including a dab net, dip net or shrimp net
- Hoop net
- Mesh net
- Mussel dredge
- Razorfish tongs
- Rock lobster pot
- Rock lobster snare
- Shrimp trap
- Spear gun
- Squid jig
- Yabby pot

16 Acronyms

AFMA	Australian Fisheries Management Authority
CPUE	Catch Per Unit Effort
ESD	Ecologically Sustainable Development
EBFM	Ecosystem Based Fisheries Management
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
FRDC	Fisheries Research and Development Corporation
GVP	Gross Value Production
ILUA	Indigenous Land Use Agreement
MPA	Marine Protected Area
MSF	Marine Scalefish Fishery
NRIFS	National Recreational and Indigenous Fishing Survey
NRM	Natural Resource Management
OCS	Offshore Constitutional Settlement
PIRSA	Department of Primary Industries and Regions South Australia
SAMDB	South Australian Murray Darling Basin
SARDI	South Australian Research and Development Institute
TACC	Total Allowable Commercial Catch
TEPS	Threatened, Endangered and Protected Species
SZRL	Southern Zone Rock Lobster
NZRL	Northern Zone Rock Lobster
LCF	Lakes and Coorong Fishery
WZAF	Western Zone Abalone Fishery
SZAF	Southern Zone Abalone Fishery

17 Glossary of common fisheries Management terms

These terms are intended to be used for the purposes of this management plan only and are not intended to be inconsistent with fisheries legislation.

Aboriginal traditional fishing Fishing engaged in by an Aboriginal person for the purposes of satisfying personal, domestic or non-commercial, communal needs, including ceremonial, spiritual and educational needs, and using fish and other natural marine and freshwater products according to relevant Aboriginal custom.

Age structure Numbers of fish in each age class from a sample of fish captured during a fishing season. Sometimes sampled separately for retained and discarded catch. An important data input for age-structured fisheries stock assessments

Aggregation Group of fish that come together, often to feed or spawn.

Allocation Distribution of the opportunity to access fisheries resources, within and between fishing sectors.

Aquatic plant An aquatic plant of any species, including the reproductive products and parts of an aquatic plant.

Aquatic reserve An area of water, or land and water, established as an aquatic reserve by proclamation under the *Fisheries Management Act 2007*.

Aquatic resource Fish or aquatic plants.

Bag limit The maximum number of fish of a species that a recreational fisher can legally take in any 24 hour period commencing at midnight.

Biodiversity The variability among living organisms from all sources (including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part) and includes: (a) diversity within species and between species; and (b) diversity of ecosystems.

Biological stock Functionally discrete population that is largely distinct from other populations of the same species and can be regarded as a separate entity for management or assessment purposes.

Biomass The total weight or volume of individuals in a fish stock.

Boat limit The maximum number of a species that can be legally taken by recreational fishers on a boat per day or per fishing trip, as specified.

By-catch At a broad level, fisheries by-catch includes all material, living and non-living, other than targeted species which is caught while fishing. It includes discards (that part of the catch that is returned to the water) and also that part of the catch that is not landed but is killed as a result of interaction with fishing gear.

Catch The total amount (weight or number) of a species captured from within a specified area over a given period of time. The catch includes any animals that are released or returned to the water.

Catch per unit effort (CPUE) The number or weight of fish caught by a unit of fishing effort (for example: kg (catch) per boat days fished, kg per person days, kg per fisher day etc.). It is often used as a measure of fish abundance.

Closures Prohibition of fishing during particular times or seasons (temporal closures) or in particular areas (spatial closures), or a combination of both.

Co-management Arrangements between governments and stakeholder groups to allow joint responsibility for managing fisheries resources on a cooperative basis. Co-management arrangements can range from a consultative model where stakeholders have an advisory role to government, to an informative model where co-managers have decision-making powers.

Commercial fishing Fishing undertaken for the purpose of trade or business.

Commercial quantity limit A commercial quantity limit under the *Fisheries Management Act 2007* is a prescribed number of fish for a species that represents what is considered a commercial quantity of that species. If a person has the prescribed amount of fish in their possession, then the onus of proof is reversed in any prosecution relating to having to satisfy that they obtained the fish legally and/or are not for commercial gain. It is assumed in the absence of proof that they were for the purpose of sale.

Common property resource A resource that is determined to be owned by the community, or by the State on behalf of the community, and to which no individuals or user groups have exclusive access rights.

Decision rules Agreed responses that management must make under predefined circumstances regarding stock status. Also called 'control rules' or 'harvest control rules'.

Depleted Stock for which biomass (or proxy) has been reduced through catch and/or non-fishing effects, such that recruitment is impaired. Current management is not adequate to recover the stock, or adequate management have been put in place but have not yet resulted in measurable improvements.

Depleting Stock for which biomass (or proxy) is not yet depleted and recruitment is not yet impaired, but fishing mortality (or proxy) is too high (overfishing is occurring) and moving the stock in the direction of becoming recruitment impaired.

Ecological Risk Assessment A tool used to evaluate the likelihood that adverse ecological effects could result from the exposure to a risk in the environment.

Ecologically sustainable development (ESD) Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.

Ecosystem A dynamic complex of plant, animal, fungal, and micro-organism communities and the associated non-living environment interacting as an ecological unit.

Effort Amount of fishing taking place, usually described in terms of gear type and frequency or period during which the gear is in use; for example, 'hook-sets', 'trawl-hours', 'searching hours'.

Fish An aquatic animal other than an aquatic bird, an aquatic mammal, a reptile or an amphibian.

Fishery A term used to describe the collective enterprise of taking fish. A fishery is usually defined by a combination of the species caught (one or several), the gear and/or fishing methods used, and the area of operation.

Fishery dependent data Information collected about a fishery or fish stock by the participants of a fishery, e.g. catch and effort information from fishery log sheets.

Fishery independent data Information collected about a fishery or fish stock by researchers, independent of the fishery, e.g. scientific surveys, observer reports.

Fishing mortality The rate of deaths of fish due to fishing.

Gear restriction A type of input control used as a management tool to restrict the amount and/or type of fishing gear that can be used by fishers in a particular fishery.

Gross value of production (GVP) Value of the total annual catch for individual fisheries, fishing sectors or the fishing industry as a whole, which is measured in dollar terms. GVP, generally reported on an annual basis, is the quantity of catch for the year multiplied by the average monthly landed beach prices.

Habitat The place or type of site in which an organism naturally occurs.

Harvest The total number or weight of fish caught and kept from an area over a period of time.

Input controls A management tool that restrains fishing effort, includes restraints on who fishes (licence limitations), where they fish (closed areas), when they fish (closed seasons) and/or how they fish (gear restrictions).

Limit reference points The values of a performance indicators for a fish stock or fisheries management unit that are no longer considered acceptable.

Logbook An official record of catch and effort data made by fishers. In South Australian commercial fisheries licence conditions make the return of logbooks mandatory.

Marine park In South Australia, marine parks are a type of marine protected area proclaimed under the *Marine Parks Act 2007* with the primary aim of protecting and conserving marine biodiversity. South Australia's marine parks are zoned and managed for multiple use to protect and conserve marine biodiversity while providing for the ecologically sustainable use of suitable areas.

Mortality Rate of deaths (usually in terms of proportion of the stock dying annually) from various causes. Comprises (i) Natural mortality — deaths in a fish stock from causes except fishing i.e. predation, pollution, senility, etc., and (ii) Fishing mortality — deaths in a fish stock caused by fishing.

Non-target species Any part of the catch, except the target species, and including by-catch and by-product.

Non-retained species Species that are taken as part of the catch but are subsequently discarded, usually because they have low market value or because regulations preclude them being retained.

Offshore Constitutional Settlement (OCS) An agreement between the state(s) and the Commonwealth whereby the state or the Commonwealth (or in some cases a Joint Authority) is given jurisdiction for a particular fishery occurring in both coastal waters (low tide mark to 3 nautical miles [nm]) and the Australian Fishing Zone (3 nm to 200 nm). When no OCS agreement has been reached, the fishery remains under the jurisdiction of the state out to 3 nm, and the Commonwealth from 3 to 200 nm.

Output controls Limitations on the weight of the catch (quota), or the allowable size, sex or reproductive condition of individuals in the catch.

Population A group of individuals of the same species, forming a breeding unit and sharing a habitat.

Possession Limit Possession limits restrict the quantity or total weight of fish that recreational fishers can catch and keep. Possession limits are a useful regulatory tool that prevents recreational fishers taking and stockpiling large quantities of fish.

Precautionary principle This concept asserts that where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decision-making should be guided by: (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and (ii) an assessment of the risk-weighted consequences of various options.

Quota Amount of catch (weight or numbers of fish) allocated to a fishery as a whole (total allowable catch), or to an individual fisher or company (individual transferable quota).

Recovering Stock for which biomass (or proxy) is depleted and recruitment is impaired, but management measures are in place to promote stock recovery, and recovery is occurring.

Recreational fishing fishing other than commercial fishing or Aboriginal traditional fishing.

Recruitment The addition of new individuals to a stock.

Recruitment Impaired Spawning stock biomass has been reduced through catch, so that average recruitment levels are significantly reduced. Current management is not adequate to recover the stock, or adequate management measures have been put in place but have not yet resulted in measurable improvements. Management is needed to recover this stock; if adequate management measures are already in place, more time may be required for them to take effect.

Reference point Indicator of the level of fishing (or stock size); used as a benchmark for assessment.

Retained species The species within the catch that are not discarded.

Sample A proportion or a segment of a fish stock which is removed for study, and is assumed to be representative of the whole. The greater the effort, in terms of both numbers and magnitude of the samples, the greater the confidence that the information obtained is a true reflection of the status of a stock (level of abundance in terms of numbers or weight, age composition, etc.).

Seasonal closure Closure of a fishing ground for a defined period; used as a management tool, often to protect a particular component of the stock e.g. used to protect a stock during a spawning season.

Socio-economic Relating to both social and economic considerations.

Spatial Of or relating to space.

Spatial closure A method of fisheries management that prevents fishing in a defined area.

Species A group of organisms capable of interbreeding freely with each other but not with members of other species.

Size limits A minimum or maximum legal size limit which determines the legal size at which a given species can be retained.

Slot size limit Refers to a situation where both a minimum and maximum size limit has been determined for a given species.

Stakeholder An individual or a group with an interest in the conservation, management and use of a resource.

Stock A group of individuals of a species occupying a well-defined spatial range independent of other groups of the same species, which can be regarded as an entity for management or assessment purposes.

Stock assessment A detailed analysis of stock status (abundance, distribution, age structure, etc.) to support the management of the species or fishery.

Sustainable Stock for which biomass (or proxy) is at a level sufficient to ensure that, on average, future levels of recruitment are adequate (i.e. recruitment is not impaired) and for which fishing mortality (or proxy) is adequately controlled to avoid the stock becoming recruitment impaired (overfishing is not occurring).

Target species A species that is, or has been, specifically targeted and is, or has been, a significant component of a fishery.

Target effort Effort that is directed at a particular species.

Temporal Of or relating to time.

Temporal closure Closure that is implemented to protect fish stocks during specific stages (time) of their life cycle (for example, while spawning).

Total allowable catch (TAC) For a fishery, a catch limit set as an output control on fishing. The total amount of a species that may be taken during a specified time period.

Total allowable commercial catch (TACC) For a fishery, a catch limit set as an output control specifically on commercial fishing. The total amount of species that may be taken by commercial fishing during a specified time period.

Threatened A species or community that is vulnerable, endangered or presumed extinct.

Traditional fishing Fishing for the purposes of satisfying personal, domestic or non-commercial communal needs, including ceremonial, spiritual and educational needs and utilising fish and other natural marine and freshwater products according to relevant Aboriginal custom.

Transitional–depleting Deteriorating stock—biomass is not yet recruitment overfished, but fishing pressure is too high and moving the stock in the direction of becoming recruitment overfished.

Transitional–recovering Biomass is recruitment overfished, but management measures are in place to promote stock recovery, and recovery is occurring.

Trigger reference points The values of performance indicators for a fish stock or fisheries management unit at which a change in management is considered or adopted.

Vulnerable species Under endangered species protection legislation, a species that will become endangered within 25 years unless mitigating action is taken.

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