1. Summary

Each year, an estimated 236,000 South Australians participate in recreational fishing activities with abundant onshore, offshore and inland fishing opportunities across the State. These opportunities contribute to the wellbeing of individuals and, in return, the recreational community contributes significantly to state and regional economies through tourism, and the purchase of fishing equipment, vessels, bait supplies and fuel.

The South Australian Government has committed to improving opportunities for the state’s recreational fishers by investing:

- $750,000 per year for the 2014/15 through 2016/17 financial years in a recreational fishing infrastructure grants programme;
- $600,000 in an artificial reef trial; and
- $200,000 per year for the 2014/15 and 2015/16 financial years to provide access and infrastructure at up to five offline reservoirs across the state.

The SA New Trial Artificial Reef Project (the Project) will establish a trial artificial reef for recreational fishers in South Australia. The outcomes of this Project will be enhanced recreational fisheries habitat and, as a result, increased recreational fishing opportunities. The results of the Project and associated monitoring will inform future decisions about further reefs for the state’s marine environment.

2. Background

Artificial reefs are a popular method for providing recreational fishing opportunities. Well-designed and ecologically sustainable artificial reefs can have a number of advantages, creating new places for fishing, increasing tourism, and generating benefits to regional businesses. Implementing a trial reef in South Australia, through considered design of the method and location as well as monitoring and evaluation, will provide advice on whether there is the need and capacity to implement further reefs.

The objectives of the Project are:

- to provide habitat for sustainable and safe recreational fishing;
• to enhance and encourage recreational fishing opportunities in South Australia, including in and around marine parks;
• to inform the ongoing development of fisheries enhancement through reefs; and
• to provide opportunities for regional areas to benefit from recreational fishing and tourism.

The Project will be carried out in three phases: Design, monitoring and evaluation; and implementation. A working group of representatives from key stakeholder and knowledge groups has been established to oversee all three phases of the Project.

The Working Groups comprises representation from:

• An independent Chair;
• Primary Industries and Regions SA;
• Department for Environment, Water and Natural Resources;
• Environment Protection Authority;
• South Australian Tourism Commission;
• Department for Planning, Transport and Infrastructure;
• RecFish SA;
• South Australian Research and Development Institute; and
• University of Adelaide.

The reef will be implemented in collaboration with the community through open consultation, including community forums, stakeholder meetings and the opportunity to provide online feedback. Information regarding the Project is available at www.yoursay.sa.gov.au/reef-habitat

3. Artificial reefs

Artificial reefs are popular with recreational fishers and have globally been used in other locations to enhance fishing opportunities. A range of substrates have been used, but recent research and expertise has led to the development of unique materials and products that do not harm the marine environment. In the past, tyres and recycled materials such as car bodies have been used. It is now recognised that these materials can be detrimental through pollution and acting as a substrate that does not enhance habitat but acts to aggregate fish, making them easier to catch, rather than improving fish stocks. This highlights the importance of approaching this project, and the reef design, with a well-planned and strategic approach that meets multiple fisheries and environmental objectives.

Several substrates are now used in other states of Australia, in particular concrete structures, either in high profile modular units for offshore environments (e.g. the Shoalhaven offshore reef in NSW), or lower profile ‘reef balls’. Reef balls are concrete dome structures with a hollow interior that marine life can colonise and take advantage of.

Habitat restoration, through the use of artificial substrate and ‘seeding’ to re-establish shellfish, seagrasses or kelp, is also now considered an important part of the development of artificial reefs. Shellfish, such as native oyster species can be seeded with juvenile or adult oysters, either by enabling the recruitment of spat within aquaculture systems or in the wild, or by manually attaching adult oysters. Habitat restoration will enhance the environment and increase productivity in a way that would exceed that of a traditional artificial reef structure.
Artificial reef programs in Victoria

Using two example artificial reef projects from the state of Victoria; a trial of recreational fishing reef areas in Port Phillip Bay, Victoria in 2009 comprised the deployment of 96 reef balls 2km offshore in 11m depth. Monitoring indicated that a variety of recreational target species were attracted to the reef, although the research angler catches were dominated by snapper and flathead. It was thought the attraction of juveniles to these reef areas may relate to a combination of increased availability and diversity of food and refuge from predation provided by the structures. Boat ramp surveys indicated strong support for the reef.

Further trial reefs through shellfish restoration (native oyster reefs and mussel beds) are now also being undertaken in Port Philip Bay, predicated on the experience of habitat enhancement and shellfish restoration in the United States of America. In the USA, there are approximately 200 active restoration projects. Shellfish reef restoration has been shown to directly increase the production of not only shellfish, but the animals and plants associated with these habitats, including fish species important to recreational and commercial fisheries. These projects are well-supported by the community and recreational fishers are active advocates for and contributors to shellfish reef restoration. In Port Phillip Bay, Fisheries Victoria, The Nature Conservancy and the Albert Park Yachting and Angling Club are trialling the implementation of shell seeded with native oysters and mussels, laid out in a low profile reef design.

More information about both of these projects can be found at:

Recreational Fishing Reefs Trial:

Shellfish Reef Restoration Trial:

4. Overview of consultation

Community feedback will be critical to ensuring the design and location of the artificial reef meets the needs and interests of stakeholders and the bio-physical characteristics of the target region, and that it will be used long-term.

A first round of consultation opened on 6 May 2015, through a community forum at the Adelaide Sailing Club. Approximately 40 participants attended, hearing presentations about interstate and international experiences with artificial reefs, from RecFish SA, Fisheries Victoria and The Nature Conservancy.

Feedback was invited from May to 5 June 2015, with more than 30 submissions received.

The Habitat Enhancement Working Group has considered all feedback and collated comments and suggestions, to refine key ideas and important recommendations.

5. Summary of comments received

5.1 Support for artificial reefs

Divergent views on the value of artificial reefs were expressed, including the opinion that no artificial reef should be implemented. Several comments were received that existing reefs which might be detrimental to the environment, such as tyre reefs or car bodies, should be actively removed as a part of the program. There was strong support for works that would take a proactive approach to repairing fisheries habitat, including restoration of seagrasses and shellfish or shellfish reefs.
Conclusion: A proactive approach to the SA Habitat Enhancement Project is needed. The best opportunity to add to the environment, rather than detracting from the environment by introducing structures that could place additional pressure of fish stocks or habitats, is habitat restoration, in particular shellfish reef restoration.

5.2 Suggestions for reef design

A range of artificial reef structures and substrates were highlighted, from large modular units, purpose built concrete, natural substrate, and the use of recycled materials and sunken vessels.

Novel suggestions were made for the design of substrate that would create artistic and visual structures or memorial opportunities. Artificial reefs of this type have been implemented in other countries. The ecological impacts versus the benefits of these types of reefs need to be considered.

The two most commonly favoured design options were concrete substrate, in particular reef balls, and shellfish reef restoration. Concrete blocks, or what are widely known as reef balls, were often discussed. Fortified reef balls, with the addition of material to promote the growth of fauna and flora, or concrete and reef balls designed in a way that would replicate natural rocky outcrops were highlighted.

The restoration of habitats, including kelp, seagrasses and shellfish reefs, in particular oyster and mussel reefs, was supported for the value that this would have in increasing fisheries productivity and the diversity that this would type of reef would provide. This method, of application of artificial substrate and reseeding native shellfish species, could be possible in South Australia and would provide significant benefits to fisheries and the environment through ecosystem services, in particular water filtration.

Conclusion: Although artificial reefs have historically been implemented in South Australia using recycled materials, such as tyres or vessels, these substrates can have negative impacts on the surrounding environments because they can contain pollutants. More suitable, purpose built substrates are now available that should be used for artificial reef development.

Although novel artificial reefs can be implemented that create artistic and visual structures or memorial opportunities, these structures could attract fish and make them easier to catch. Whilst these reefs could present unique opportunities the intent of the SA Habitat Enhancement Project is to proactively improve recreational fishing opportunities through habitat; such structures may not provide the best opportunity for recreational fishing and could impact fish stocks rather than assisting them by enhancing habitat.

5.3 Areas and locations

All regions listed on the feedback form were highlighted as potential areas appropriate for an artificial reef, these were: Far West Coast, Eyre Peninsula, Spencer Gulf, Gulf St. Vincent, Metropolitan Adelaide, Fleurieu Peninsula, Kangaroo Island, Murray River, South East.

Regions that were highlighted more often or as being particularly desirable for an artificial reef were: Metropolitan Adelaide, Gulf St. Vincent, Fleurieu Peninsula and Spencer Gulf.

Locations suggested that would benefit from an artificial reef were, in particular:

- Metropolitan Adelaide for proximity to a larger number of fishers;
- Metropolitan Adelaide specifically in relation to shellfish restoration, for the purposes of improving water quality;
- Yorke Peninsula generally due to the impacts of marine parks and visitation of recreational fishers;

(continues)
• Upper Gulf St Vincent, in particular Ardrossan and Port Wakefield, due to the impacts of the Marine Park and the spatial restrictions implemented for snapper, visitation of recreational fishers and the support services that are available, particularly within Ardrossan.

The metropolitan region received strong support, for its proximity and access for fishers and because marine parks located south and north of Adelaide have restricted fishing access. The opportunity for a greater number of volunteers to also be involved in work and monitoring of the reef was highlighted as a benefit to the metropolitan location.

Strong support was also received for the Yorke Peninsula, including from several peak organisations, because of the impacts of the upper Gulf St Vincent Marine Park.

For shellfish reef restoration key locations highlighted included where water quality presents an issue, as well as locations which have lost reefs due to overexploitation. Using concrete or substrate that can support the settlement of oysters was suggested.

Feedback was also received that the project should seek to implement artificial reefs in several locations rather than limiting the investment to one reef. Enhancing existing reefs was also suggested as a way to complement existing structures rather than having to build a foundation for a new reef.

Conclusion: Gulf St Vincent represents the region in which considerable value can be added to opportunities for recreational fishing, through access for the community to high rates of participation. It is also the region in which significant change has occurred to habitat, therefore it reflects the best opportunity to proactively enhance habitat.

Specific locations that could benefit from the trial reef, and have some proximity to marine parks are the southern metropolitan Adelaide coastline and the upper Gulf St Vincent. These locations will be the focus for development of the SA Habitat Enhancement Project.

6. Decision-making process

In determining the best opportunities for the location and design of the reef, the subsequent considerations and questions were taken into account and the decision-making process made according to the following:

**DECISION 1: Location (inc. link to marine parks)** > What locations present the greatest opportunity, including to support the commitment to offset impact of marine parks?

> **Comments:** Although marine parks have been implemented in other regions, GSV represent the most realistic opportunity to achieve positive impact because these regions have higher recreational fishing participation rates.

**DECISION 2: Value to recreational fishing** > What style of reef will present the highest value to recreational fishing within this region (the "boxing day test")?

> **Comments:** This decision criteria should consider the spectrum of reef styles from FADs to habitat enhancement and restoration.

**DECISION 3: Best practice/ecological value** > What style of reef supports a proactive and best practice approach to ensure it adds to rather than takes from the local environment?

> **Comments:** The decision criteria focuses on determining the approach that will support habitat enhancement/restoration rather than fish aggregation and potentially habitat impacts. This decision should also be considered with a view to scaleability.
7. Key recommendations

1. Based on the implementation of marine parks within the upper Gulf St Vincent and southern metropolitan Adelaide, as well as the highest participation rates for recreational fishing being within Gulf St Vincent, it is recommended that maximum benefit to recreational fishing will be achieved by locating the trial reef within this region, in either the upper or southern gulf.

2. Based on community feedback, interest and the SA New Trial Artificial Reef Project taking a proactive approach to the trial and not implementing an artificial reef that has the potential to negatively impact the environment and fish stocks, it is recommended that habitat restoration through the use of artificial substrates be the focus of the trial.

3. Based on the available information and knowledge, which indicates shellfish reefs have been lost from extensive areas of the South Australian coastline, it is recommended that the SA New Trial Artificial Reef Project focuses on shellfish, including the native flat oyster Ostrea angasi.

8. Further Information

RecFish SA, SA’s peak recreational fishing body, provides information and resource links on contemporary reef options.

The United Nations Fisheries and Agriculture Organization website provides background information on artificial reefs, including the issues that must be considered during their implementation.

Recfishing Research, a national Subprogram for the Fisheries Research and Development Corporation, provides an overview of artificial reefs in Australia.

A business case recently completed by the Fisheries Research and Development Corporation quantified the high economic benefit to fisheries of restoring habitats across a range of locations and ecosystems.

This background paper summarises community feedback received through a first round of consultation, May to June 2015 and the recommendations of the Habitat Enhancement Working Group to date.