Management Plan for the Lake Eyre Basin Fisheries

MARCH 2013
MANAGEMENT PLAN FOR THE SOUTH AUSTRALIAN LAKE EYRE BASIN FISHERIES

Part 1 – Commercial and recreational fisheries

Part 2 – Yandruwandha Yawarrawarrka Aboriginal traditional fishery

Approved by the Minister for Agriculture, Food and Fisheries pursuant to section 44 of the Fisheries Management Act 2007.

Hon Gail Gago MLC
Minister for Agriculture, Food and Fisheries
1 March 2013
Disclaimer:

This management plan has been prepared pursuant to the *Fisheries Management Act 2007* (South Australia) for the purpose of the administration of that Act. The Department of Primary Industries and Regions SA (and the Government of South Australia) make no representation, express or implied, as to the accuracy or completeness of the information contained in this management plan or as to the suitability of that information for any particular purpose. Use of or reliance upon information contained in this management plan is at the sole risk of the user in all things and the Department of Primary Industries and Regions SA (and the Government of South Australia) disclaim any responsibility for that use or reliance and any liability to the user.

Copyright Notice:

This work is copyright. Copyright in this work is owned by the Government of South Australia. Apart from any use permitted under the *Copyright Act 1968* (Commonwealth), no part of this work may be reproduced by any process without written permission of the Government of South Australia. Requests and enquiries concerning reproduction of this work should be addressed to the Chief Executive, Department of Primary Industries and Regions SA, 25 Grenfell Street, Adelaide, SA, 5000 (marked attention Executive Director, Fisheries and Aquaculture Division).

The South Australian Fisheries Management Series

Paper number 61: Management Plan for the South Australian Lake Eyre Basin Fisheries

ISBN 978-0-9807387-4-2
ISSN 1322-8072
13 REGULATORY ARRANGEMENTS .................................................................62
  13.1 Licensing ..............................................................................................62
  13.2 Management arrangements .....................................................................62
  13.3 Fish processing .......................................................................................62

14 REVIEW OF PLAN .....................................................................................63
  14.1 49—Review of management plans ............................................................63

15 RESOURCES REQUIRED TO IMPLEMENT THE PLAN .............................64
  15.1 Cost recovery - overview .........................................................................64

PART 2: YANDRUWANDHA YAWARRAWARRKA TRADITIONAL FISHING
MANAGEMENT PLAN .....................................................................................65

1 GENERAL PURPOSE OF AN ABORIGINAL TRADITIONAL FISHING
MANAGEMENT PLAN .....................................................................................66
  1.1 The Indigenous Land Use Agreement (ILUA) framework .........................66
  1.2 The legislative framework for managing fisheries .....................................66
  1.3 Definitions .................................................................................................67
  1.4 Aboriginal Traditional Fishing Management Plans under section 60 ..........68
  1.5 Relationship between ILUA and Aboriginal Traditional Fishing Management
    Plan .................................................................................................................69
  1.6 Ensuring ecological and cultural sustainability ..........................................69

2 YANDRUWANDHA YAWARRAWARRKA ABORIGINAL TRADITIONAL
FISHING .............................................................................................................70
  2.1 Brief history of fishing by Yandruwandha Yawarrawarrka People ...............70

3 MANAGEMENT OF YANDRUWANDHA YAWARRAWARRKA ABORIGINAL
TRADITIONAL FISHING ..................................................................................71
  3.1 Application of the Plan .............................................................................71
  3.2 The area that the Management Plan applies to ..........................................71
  3.3 Objectives of this Plan .............................................................................72
  3.4 Strategies and management tools for pursuing objectives of the plan ..........72
  3.5 Who can fish under the plan? ....................................................................73
  3.6 What fishing activities does the plan provide for? ....................................73
  3.7 Coongie Lakes National Park .....................................................................74
  3.8 Innamincka Regional Reserve ....................................................................74
  3.9 General fishing restrictions .......................................................................74
  3.10 Cooper Creek Turtles (Emydura macquarii) ..............................................75
  3.11 Reporting by YYTLOAC ..........................................................................75
  3.12 Net fishing ................................................................................................75
  3.13 Implementation of netting arrangements ..................................................76
  3.14 Net Permits ...............................................................................................76
  3.15 Other restrictions .....................................................................................76
  3.16 Use of traditional equipment to take Fish ...............................................77
  3.17 Commercial Quantity limits .....................................................................77
  3.18 Future modifications to these management arrangements .......................78

4 PROTECTION OF CULTURALLY IMPORTANT SPECIES AND AREAS ....78
  4.1 Species ......................................................................................................78
  4.2 Areas ..........................................................................................................78
  4.3 Access to aquatic reserves .........................................................................78

5 RESEARCH STRATEGY ..................................................................................79
LIST OF FIGURES

Figure 1. Map of the Lake Eyre Basin ................................................................. 8
Figure 2. Strategic goals for NRM in South Australia ........................................... 9
Figure 3. Functional relationships for NRM in South Australia ......................... 10
Figure 4. Determining PIRSA management responsibilities ................................ 13
Figure 5. Guiding principles for Lake Eyre Basin fisheries management .......... 17
Figure 6. Map of the Lake Eyre Basin Commercial Fishery ............................... 18

LIST OF TABLES

Table 1. Relevant Lake Eyre Basin Agreement NRM policies .............................. 11
Table 2. Key South Australian Lake Eyre Basin NRM agencies and programs .... 12
Table 3. Lake Eyre Basin community values and capabilities relevant to effective
NRM ...................................................................................................................... 15
Table 4. Example rehabilitation costs for the Murray River under the MDBA Native
Fish Strategy program .......................................................................................... 17
Table 5. Management chronology for the Mulka Station commercial fishery ...... 19
Table 6. Summary of moderate to extreme risks identified in the South Australian
Lake Eyre Basin Fisheries and the relevant objectives and the strategies to
manage them ........................................................................................................ 31
Table 7. Objectives and strategies for the Lake Eyre Basin commercial fishery .... 34
Table 8. Objectives and strategies for Lake Eyre Basin recreational fisheries ...... 35
Table 9. Sectoral shares for Lake Eyre Basin fisheries ........................................ 39
Table 10. Objectives, strategies, and performance indicators for the commercial
fishery ...................................................................................................................... 48
Table 11. Objectives, strategies, and performance indicators for recreational
fisheries ................................................................................................................. 52
Table 12. Knowledge areas for effective NRM in the Lake Eyre Basin ............. 58
1 FISHERY TO WHICH THIS PLAN APPLIES

This management plan applies to commercial, recreational and Aboriginal traditional fisheries that operate within the South Australia (SA) Lake Eyre Basin region. Aquatic resources (fish and aquatic plants) are managed by the State on behalf of the community and future generations. Currently, fisheries are managed in accordance with the *Fisheries Management Act 2007* (SA).

The commercial fishery is limited to one Miscellaneous Fishery licence, which is formally constituted by the *Fisheries Management (Miscellaneous Fishery) Regulations 2000*. Commercial fishing is confined to Lake Hope and Red Lake on Pastoral Lease 2399 (Mulka) and Pastoral Lease 2447 (Lake Hope). Only Lake Eyre Golden Perch (*Macquaria sp. B*), Welch's Grunter (*Bidyanus welchi*) and Barcoo Grunter (*Scortum barcoo*) may be taken.

The Lake Eyre Basin and all its rivers, lakes, lagoons, creeks, wetlands, floodplains and anabranches are defined as ‘waters of the State’. ‘Waters of the State’ as defined by the *Fisheries Management Act 2007* means any sea or inland waters (including any body of water or watercourse of any kind whether occurring naturally or artificially created); and the bed of such waters.

Recreational fishing across the Lake Eyre Basin is controlled by the *Fisheries Management Act 2007* and *Fisheries Management (General) Regulations 2007*. The recreational fishery is not licensed but is subject to a range of regulatory restrictions such as bag and boat limits, size limits, restrictions on the types of gear that may be used, temporal and spatial closures and the complete protection of some species.

The Act recognises Aboriginal traditional fishing as a separate category of fishing. An Aboriginal traditional fishing management plan to guide the implementation of the Yandruwandha Yawarrawarrka Fishing ILUA is provided in Part 2 of the management plan.

2 CONSISTENCY WITH OTHER MANAGEMENT PLANS

This management plan has been developed to enable integration with any future management plans for recreational fishing in South Australia; or other management plans developed for the management of Aboriginal traditional fishing, where such plans apply to South Australian inland waters of the Lake Eyre Basin.

3 TERM OF PLAN

This management plan applies from 1 March 2013 for a period of ten years.

Section 44 of the *Fisheries Management Act 2007* prescribes the requirements for replacing or extending this management plan upon expiry.
4 REGIONAL CONTEXT AND GOVERNANCE

4.1 The Lake Eyre Basin region

Australia’s Lake Eyre Basin covers a vast area of central Australia, including areas of South Australia, New South Wales, Queensland and the Northern Territory. Lake Eyre is the lowest point of the basin, and the terminating point for the system’s major arid zone rivers including the Diamantina, Georgina, Warburton, and Cooper Creek. The natural environment is unique, and relatively undisturbed with respect to human activity and development, particularly in comparison to arid land drainage systems elsewhere in the world. Principal human activities include pastoralism, tourism, mining, and petroleum and energy exploration and production.

Commercial, recreational and Aboriginal traditional fishing activities in the basin take place in a unique social and cultural environment, and often in areas of high conservation and heritage value. The South Australian portion of the Lake Eyre Basin includes terrestrial and aquatic conservation sites of international significance.

Figure 1. Map of the Lake Eyre Basin.
4.2 Natural Resource Management Governance in the Lake Eyre Basin

There are numerous government departments, community and industry groups, non-government organisations and individuals with a direct interest in strong fisheries and aquatic resource management outcomes for the Lake Eyre Basin. Many of these interests and responsibilities are expressed in the broader context of natural resource management (NRM) programs and policies, and community activities.

The Lake Eyre Basin Inter-governmental Agreement (LEBA) provides overarching cross-jurisdiction management and coordination to:

“provide for the development or adoption, and implementation of Policies and Strategies concerning water and related natural resources in the Lake Eyre Basin area to avoid or eliminate so far as reasonably practicable adverse cross-border impacts.” (Lake Eyre Basin: a five-year action plan 2009-2014).

The Lake Eyre Basin Ministerial Forum (LEBMF) has been established to provide coordinated support to ensure the Agreement is effective. The Ministerial Forum has established a Scientific Advisory Panel (SAP), and Community Advisory Committee (CAC) to provide expertise and advice on scientific matters, and issues related to community engagement.

The South Australian Government has a strong commitment to ensuring ecologically sustainable development (ESD) principles guide natural resource management in South Australia. At the highest level this is enabled through the South Australian Natural Resources Management Plan 2006 (State NRM Plan); and then through subsidiary legislation and policy. Overarching goals for the State NRM Plan are outlined below (Figure 2).

Goal 1 - Landscape scale management that maintains healthy natural systems and is adaptive to climate change

Goal 2 - prosperous communities and industries using and managing natural resources within ecologically sustainable limits

Goal 3 - Communities, governments and industries with the capability, commitment and connections to manage natural resources in an integrated way

Goal 4 - Integrated management of biological threats to minimise risks to natural systems, communities and industry

Figure 2. Strategic goals for NRM in South Australia.

“Meeting the long-term vision and goals set out in this Plan will require wide-ranging partnerships between governments, industry, landholders and communities. Working together within a common vision will lead to long lasting positive change that will benefit both current and future generations”.

Dennis Mutton, Presiding Member SA NRM Council (DWLBC, 2006)
The relationship between the State NRM Plan and other relevant NRM agencies and groups is illustrated below (figure 3).

Figure 3. Functional relationships for NRM in South Australia

For the South Australian Lake Eyre Basin region, key agencies include the South Australian Arid Lands (SAAL) NRM Board; Primary Industries and Regions South Australia (PIRSA) (including bio-security, aquatic research, and fisheries management); and programs under the control of the South Australia Department of Environment, Water and Natural Resources (DEWNR). The Australian Government is also a significant funding provider for some programs through its Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC).

As a key partner in ensuring natural resources sustainability for the Lake Eyre Basin, Queensland also manages NRM focused programs and activities at different scales. Queensland’s Department of Environment and Heritage Protection (DEHP), and the Department of Agriculture, Fisheries and Forestry (DAFF), which includes Queensland’s fisheries management programs, are the principal agencies.
4.3 Fisheries and NRM policy frameworks

4.3.1 Policies under the Lake Eyre Basin Inter-governmental Agreement (LEBA)

Within the Lake Eyre Basin Agreement framework there are policies to sustain river health and productivity. These are highly relevant to fisheries and aquatic resource management in South Australian water-bodies, and are summarised below.

Table 1. Relevant Lake Eyre Basin Agreement NRM policies

<table>
<thead>
<tr>
<th>Policy Description</th>
<th>Policy Intent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>River Flows Policy</strong></td>
<td>To protect and maintain the ecological integrity and natural function of in-stream and floodplain ecosystems, and the viability of human activities which do not threaten environmental values of the Lake Eyre Basin.</td>
</tr>
<tr>
<td><strong>Water Quality Policy</strong></td>
<td>Protect water quality in the river systems within the Agreement Area to maintain the ecological integrity and natural function of in-stream and floodplain ecosystems and the viability of human activities which do not threaten environmental values of the Lake Eyre Basin.</td>
</tr>
<tr>
<td><strong>Water and Related Natural Resources Policy</strong></td>
<td>Water and related natural resources associated with river systems within the Agreement Area will be managed to protect and maintain the ecological integrity and natural function of in-stream and floodplain ecosystems and the viability of human activities which do not threaten environmental values of the Lake Eyre Basin.</td>
</tr>
<tr>
<td><strong>Existing Entitlements and Water Resource Development Policy</strong></td>
<td>Ensure water resource planning, allocation and management arrangements, including the management of water entitlements, will be compatible with the Lake Eyre Basin Agreement. Efficient use of water will be a fundamental principle. Water resource development proposals will be assessed based on the best available scientific information and local knowledge to determine their potential impact on river flows and water quality.</td>
</tr>
<tr>
<td><strong>Research and Monitoring Policy</strong></td>
<td>Management of water and related natural resources associated with river systems in the Agreement Area will be guided by the best available scientific information and local knowledge, and the results of ongoing monitoring and periodic assessment of their condition. Targeted research may also be undertaken to address identified knowledge gaps.</td>
</tr>
<tr>
<td><strong>Whole of Basin Approach Policy</strong></td>
<td>Water and related natural resources in the Lake Eyre Basin Agreement Area will be managed through a whole-of-basin approach so as to achieve complementary outcomes. This will be enabled through implementation of state/territory legislation and the plans and associated investment strategies of relevant regional bodies in Queensland, South Australia and the Northern Territory.</td>
</tr>
</tbody>
</table>


Actions to give effect to these LEBA policies are described in the Agreement’s five year action plan for 2009-2014. Of note, the highest priority action presented in the action plan is to: “Re-assess the governance and support arrangements to implement the Lake Eyre Basin Intergovernmental Agreement. Other priorities include:
- Preparing and delivering a Lake Eyre Basin Communication Plan for the three years 2008-09 to 2010-2011
- Implementing the Lake Eyre Basin Rivers Assessment (LEBRA)
- Reviewing and updating Lake Eyre Basin knowledge needs and prioritising efforts to fill those needs
- Sectoral and basin-wide fore-sighting studies to consider future scenarios in order to better inform integrated decision making across the Lake Eyre Basin
- Enhancing engagement with Aboriginal people
- Managing tourism impacts on Lake Eyre Basin natural and cultural resources.

For fisheries and aquatic resource management the implementation and ongoing resourcing of the LEBRA is perhaps the most relevant and significant. Ongoing engagement between PIRSA Fisheries and Aquaculture, the South Australian Research and Development Institute (SARDI), and those responsible for managing and implementing the LEBRA, is likely to be the most efficient strategy to monitor and evaluate broader environmental performance of fisheries and aquatic resource management in the region. More localised monitoring and evaluation programs are also necessary (e.g. monitoring activities for the one commercial fishing licence; recreational fishing impacts basin wide; and high value aquatic sites like refugia).

### 4.3.2 Other relevant NRM frameworks

The South Australian State NRM Plan, and high level inter-governmental activities under the Lake Eyre Basin Agreement and Ministerial Forum reflect the importance of strong and efficient governance arrangements for the region. This is a recurrent theme across NRM agencies and groups. Key programs and larger scale policy initiatives for South Australian NRM agencies are outlined below:

<table>
<thead>
<tr>
<th>SAAL NRM Board</th>
<th>SA DEWNR</th>
<th>PIRSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>• SAALNRM PLAN</td>
<td>• State biodiversity plans</td>
<td>• Fisheries and Aquaculture</td>
</tr>
<tr>
<td>• SAAL biodiversity strategy</td>
<td>• Regional biodiversity conservation programs</td>
<td>• NRM including drought and bio-security</td>
</tr>
<tr>
<td>• Water allocation Plan</td>
<td>• State bio-security strategy</td>
<td>• Community development</td>
</tr>
<tr>
<td>• SAAL NRM Advisory Committees</td>
<td>• No species loss program</td>
<td>• NRM emergency management response</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>SA DEWNR</th>
<th>PIRSA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>State biodiversity plans</td>
<td>NRM including drought and bio-security</td>
</tr>
<tr>
<td></td>
<td>Regional biodiversity conservation programs</td>
<td>Community development</td>
</tr>
<tr>
<td></td>
<td>State bio-security strategy</td>
<td>NRM emergency management response</td>
</tr>
<tr>
<td></td>
<td>No species loss program</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water for Good</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lake Eyre inter-governmental Agreement</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Key South Australian Lake Eyre Basin NRM agencies and programs

The Queensland Government under the *Wild Rivers Act 2005* have declared two wild river areas including the Cooper Creek Basin Wild River and the Georgina and Diamantina Basin Wild River. The declaration is to preserve the relevant natural values of the wild rivers in these areas. The relevant natural values of the wild rivers in the wild river area, which this declaration intends to preserve, include, but are not limited to:

1. Hydrologic processes including the natural flow of water in the wild river catchments and river systems.
2. Geomorphic processes including the natural erosion, transport and deposition of sediments by water throughout the catchments of the wild rivers and along the river systems.

3. Riparian function including a range of processes that occur in, or as a result of, the vegetation growing adjacent to the streams, lakes, floodplains and wetlands.

4. Wildlife corridor function including areas of natural habitat within and along the river.

5. Water quality, including the physical, chemical and biological attributes of water in the wild river area.

4.3.3 Determining PIRSA Fisheries and Aquaculture management responsibility

To guide preparation of detailed management strategies for this fisheries management plan, and to identify areas and functions more appropriately addressed by other South Australian government agencies, it is useful to identify lead responsibility for fisheries management and related NRM activities (figure 4):

---

**Defining fisheries management responsibilities**

**Must Manage**
- Issues for which PIRSA has direct legislative responsibility (e.g. setting bag and size limits for recreational fisheries). PIRSA can generate regulations to deal explicitly and directly with these issues and has lead responsibility for them.

**Can Influence**
- Issues not under PIRSA direct legislative responsibility. They are the direct responsibility of another agency or department (e.g. water resource development for LEB rivers); PIRSA should have strong input into these processes (depending on the risk they pose to fisheries ESD outcomes), and an ability to influence decisions by related agencies.

**Can React to**
- These are external issues (externalities) and can neither be directly managed or influenced by PIRSA, but still impact ESD outcomes for fisheries. Strategies to mitigate their impacts as efficiently as possible should be introduced where possible (e.g. improving operational flexibility for licence holders so they can respond to externalities in the way that best suits their business operations).

---

South Australia’s single commercial licence in the Lake Eyre Basin fishery operates under a Miscellaneous Fishery licence issued and managed by PIRSA Fisheries and Aquaculture. It is the government’s policy that no additional commercial fishing licences will be issued for the South Australian Lake Eyre Basin region, as part of a conservative approach to fisheries management activities in this unique area of high conservation significance.
4.4 Fisheries management themes for the Lake Eyre Basin

4.4.1 ESD and risk based management

South Australia’s Fisheries Management Act 2007 is centred on ensuring that the State’s fisheries and aquatic resources are managed in accordance with established ESD principles. As defined in the Act, ecologically sustainable development comprises the use, conservation, development and enhancement of the aquatic resources of the State in a way, and at a rate, that will enable people and communities to provide for their economic, social and physical well-being while also:

- Sustaining the potential of aquatic resources of the State to meet the reasonably foreseeable needs of future generations
- Safeguarding the life-supporting capacity of the aquatic resources of the State
- Avoiding, remedying or mitigating adverse effects of activities on the aquatic resources of the State

Management considerations must also take the precautionary principle into account: “…if there are threats of serious or irreversible damage to the aquatic resources of the State, lack of full scientific certainty should not be used as a reason for postponing measures to prevent such damage” (SA Fisheries Management Act, 2007).

In most respects, management of aquatic resources and fisheries within the Lake Eyre Basin takes place in a decision making environment confounded by scientific uncertainty. Whilst large NRM focused projects in recent years (e.g. Dry/Wet, Dryland River Refugia, and ARIDFLO projects) have significantly improved the understanding of aquatic ecology in the region, “there remains a paucity of published information about the ecology and bio-physical characteristics of aquatic systems within the South Australian portion of the Lake Eyre Basin” (McNeil et al, 2008).

The region is ecologically unique and relatively pristine, and these qualities are widely recognised within Australia, and internationally. Thus the application of precautionary management is a key theme for this management plan.

4.4.2 Integrated catchment management

Fragmented governance structures, and/or unclear or duplicated responsibilities amongst NRM agencies can be a key risk to effective fisheries and natural resource management. An example from the Murray-Darling Basin Authority’s Native Fish Strategy illustrates this point:

“For the strategy to meet its objectives and achieve its goal, there must be strong linkages and partnerships between the Murray–Darling Basin Authority and other organisations that manage aquatic initiatives and programs. The success of the strategy also depends on the commitment of individual landholders, Indigenous communities, Landcare groups, catchment management organisations, waterway managers and users, urban and rural community groups, local, state and Australian government agencies, as well as the Murray–Darling Basin Authority” (see http://www.mdba.gov.au/programs/nativefishstrategy/governance-and-partnerships).
A central theme for this management plan is to promote clear management responsibility, and apply collaborative solutions for higher risk fisheries and aquatic resource management issues.

### 4.4.3 Community engagement

The unique social and cultural landscape of the Basin, and the associated challenge of understanding and aligning community values and objectives into NRM activities are key issues for the region. Social research has identified a range of core community values for the region that are highly relevant to effective and efficient aquatic resource management (Table 3). These values illustrate the importance of community education, engagement, and capacity building that can promote stewardship of the region’s fisheries.

For example, McNeil and Read (2009) show that there can be strong community support for native fish monitoring initiatives. This is important noting the large size of the area under management, its remoteness, and the resource constraints under which fisheries management and compliance programs must operate. Reliable access to water-holes on private leasehold, aboriginal community land, and private land is an important consideration for environmental monitoring. Effective communication, education, and engagement strategies can help in this regard.

Table 3. Lake Eyre Basin community values and capabilities relevant to effective NRM

<table>
<thead>
<tr>
<th>Community Values</th>
<th>Community Capabilities for effective NRM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appreciation of the worth of objective scientific research</td>
<td>Awareness of problems, as well as vision and commitment</td>
</tr>
<tr>
<td>The sustainable use of natural resources</td>
<td>Co-operative and team behaviour</td>
</tr>
<tr>
<td>Conserving the biological uniqueness of the Basin</td>
<td>The sharing of resources and outcomes</td>
</tr>
<tr>
<td>Inclusiveness in decision-making</td>
<td>Sound and effective consultation and communication</td>
</tr>
<tr>
<td>Openness and honesty</td>
<td>Good meeting practices, governance and power structures</td>
</tr>
<tr>
<td>Empowerment of community groups; ownership of problems by the community</td>
<td>Management ability and technical competence and adequate support structures.</td>
</tr>
<tr>
<td>More knowledge of the impacts of human activity on the Basin; and simultaneously achieving vibrant communities, viable industries and environmental security</td>
<td>Management ability and technical competence and adequate support structures.</td>
</tr>
</tbody>
</table>


### 4.4.4 Management of key aquatic refuge waterholes (Refugia)

The PIRSA Fisheries and Aquaculture Lake Eyre Basin ESD risk assessment process has re-affirmed the critical importance of permanent waterholes (refugia) for aquatic ecosystem health. Fortunately, recent monitoring as part of the Lake Eyre Basin Rivers Assessment initiative, and more localized waterhole condition monitoring (e.g. Costelloe et al, 2004; McNeil et al, 2008; Silcock, 2009), suggests permanent Lake Eyre Basin waterholes are in generally good ecological condition.

For South Australia, McNeil and Reid (2008), note that permanent, deep refuge waterholes such as Algebuckina waterhole on the Neales River, and Cullyamurra
waterhole on the Cooper Creek are absolutely critical habitats for Lake Eyre Basin fish species in the arid zone, serving as “…the most downstream refugia for the entire fish assemblage”. In relation to such key refugia, Silcock (2009) notes: “Their tiny surface area relative to the immensity of the surrounding landscape belies there immense ecological, cultural, economic and social significance”.

Recent fish assemblage monitoring in South Australian rivers (McNeil and Schmarr, 2009) suggest that the consequences of extended drought conditions in basin rivers can be severe, particularly for the more arid and highly variable western systems like the Neales River. During the drought period they studied, all but one of the native fish species present were confined to the single remaining refuge waterhole for that river (Algebuckina).

For native species like turtles and water rats, effective refugia management is likely to have substantial benefits. Whilst rated a low risk (at a basin scale) from fishing activities, there can be significant localised impacts on these protected species from illegal fishing, and in some cases careless handling from some recreational fishers. Helping to maintain the ecological integrity of key refugia through the management of fishing and related activities is a key priority.

4.4.5 Prevention is better than cure

With little flow modification and limited high impact human activity in most of the region Lake Eyre Basin aquatic systems are relatively healthy. This is a stark contrast to the highly modified Murray-Darling Basin (MDB). For the Murray-Darling adverse consequences from major flow regulation, habitat modification, and a myriad of other human induced impacts have collectively driven down the ecological productivity, biodiversity, and resilience of this iconic system. It is now degraded to the point where significant environmental improvements will only come at a huge financial and social cost, and take many decades to achieve.

Native fish remediation activities underway for the MDB system provide an example of some of these costs. Conversely they provide an indication of the potential savings – or return on investment - if the current ecological health of Lake Eyre Basin rivers can be maintained. The MDB Native Fish Strategy (NFS) uses river Demonstration Reaches to demonstrate the cumulative benefits of applying a number of interventions (e.g. fish passage, re-snagging, alien species management) to aid rehabilitation of native fish habitat and fish populations (NFS, 2003-13). The remediation costs associated with a specific NFS demonstration reach over a three year timescale are summarised below.

“We do know that avoiding degradation is about 100 times cheaper than trying to restore damaged systems, and we have proved elsewhere in Australia that treating symptoms without treating the cause of the problem is both futile and costly”.

Professor Peter Cullen, late Chair of the Lake Eyre Basin MF Scientific Advisory Panel.
Table 4. Example rehabilitation costs for the Murray River under the MDBA Native Fish Strategy program

<p>| Estimated Rehabilitation Costs - River Murray Lake Hume-Lake Mulwala Reach. |
|---------------------------------|---------------------------------|</p>
<table>
<thead>
<tr>
<th>Driving Action</th>
<th>Estimated cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rehabilitating fish habitat (re-snagging, restoration of pool/riffle sequence)</td>
<td>$1,650,000</td>
</tr>
<tr>
<td>Protecting fish habitat (riparian fencing, re-vegetation, provision of offstream stock watering)</td>
<td>$3,750,000</td>
</tr>
<tr>
<td>Restore floodplain connectivity</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Managing riverine structures for fish passage (fix Lake Mulwala fish lift, investigate Lake Hume, fishway on Wodonga ck)</td>
<td>$600,000</td>
</tr>
<tr>
<td>Mitigate thermal pollution</td>
<td>$10,000,000</td>
</tr>
<tr>
<td>Controlling alien fish species Carp and other alien fish control programs</td>
<td>$650,000</td>
</tr>
<tr>
<td>Protecting threatened native fish species Threatened species recovery actions</td>
<td>$300,000</td>
</tr>
<tr>
<td>Expanded fisheries enforcement and regulations</td>
<td>$300,000</td>
</tr>
<tr>
<td>Managing fish translocation and stocking with native species (Murray cod, Golden Perch, silver perch)</td>
<td>$300,000</td>
</tr>
<tr>
<td>Other actions - communication program</td>
<td>$500,000</td>
</tr>
<tr>
<td>Adaptive management monitoring actions and establish baseline for fish populations</td>
<td>$1,900,000</td>
</tr>
<tr>
<td><strong>Estimated costs over a 3 year timeframe</strong></td>
<td><strong>$20,955,000</strong></td>
</tr>
</tbody>
</table>

Source: MDBA Native Fish Strategy Implementation Plan 2003-20013

4.5 Guiding principles for the management plan

The management themes detailed in Section 4.4 reflect fundamental attributes for effective fisheries and aquatic resource management in the unique social, cultural and bio-physical environment of the Lake Eyre Basin. The themes lead to guiding principles for this management plan which are illustrated below.

![Guiding principles for Lake Eyre Basin fisheries management](image)

---

1 Intended as a guide to illustrate the prohibitive costs associated with remediation of serious river health issues.
5 DESCRIPTION OF LAKE EYRE BASIN FISHERIES

5.1 Commercial fishery

PIRSA Fisheries and Aquaculture has licensed one commercial fishing venture to operate in the Lake Eyre Basin in the lower Cooper Creek area. The fishery takes place on the pastoral holding of Mulka Station and the licence holder is permitted to take Lake Eyre Basin Golden Perch, Welch’s Grunter and Barcoo Grunter from Lake Hope and Red Lake, located within the boundaries of the station.

Mulka station is a large pastoral property south west of Innamincka approximately mid way between Innamincka and Marree. Lake Hope and Red Lake are both broad and shallow and are best described as ephemeral lakes. They are located on the southern side of the Cooper Creek in sand dune country.

Both lakes are usually filled after larger scale flooding, often after very heavy monsoonal rains in the headwaters of the Cooper Creek system. During these larger floods various fish species and other aquatic fauna are transported and disperse from the main channels and deep waterholes of Cooper Creek into ephemeral lakes, and other suitable habitat. Once Lake Hope and Red Lake have dried sufficiently to disconnect from the main Cooper Creek system commercial fishing may commence; largely on the basis that fish in the lakes will not re-enter the Cooper system and will not survive once water quality deteriorates significantly as the lakes dry.

Figure 6. Map of the Lake Eyre Basin Commercial Fishery.
5.1.1 Historical overview

A management chronology for the Mulka Station commercial fishery is provided below.

Table 5. Management chronology for the Mulka Station commercial fishery

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 1991</td>
<td>Application made for a commercial Miscellaneous licence to fish Lake Hope</td>
</tr>
</tbody>
</table>
| March 1992    | Minister grants Miscellaneous Fishery licence to take Golden Perch from Mulka Station March 1992 – 31 October 1993. Licence is issued on an experimental basis subject to the following licence and pre-licence conditions:  
  - Where a registered boat that is endorsed on this licence is being used pursuant to this licence no more than two persons who are acting as an agent of the licence holder may be on board the boat.  
  - Fishing activity must not be conducted from a registered boat that is endorsed on this licence by any person other than the holder of this licence.  
  - The fishing activity is only permitted in waters of the Cooper Creek system flowing over Mulka Station, as defined by Pastoral Lease 2399 (Mulka) and Pastoral Lease 2447 (Lake Hope).  
  - The waters have dried sufficiently to separate them from the rest of the system.  
  - The waters have deteriorated in quality to the point where the fish in them would most likely perish within the following twelve months.  
  - Nets and other equipment used to take fish had not been used in any other river system or waters.  
  - Recreational fishing of such waters is not directly or indirectly discouraged.  
  - The fish taken are properly handled to maintain hygiene and proper product quality standards.  
  - Prior approval has been obtained from the Pastoral board.  
  - Access arrangements are subject to review and variation at any time.  
  - Exempted from relevant requirements for a public tender to be called. |
| April 1993    | Licence holder requests approval from PIRSA Fisheries and Aquaculture to also harvest Welch’s grunter. Denied due to lack of adequate scientific knowledge of fish species in the waterways. |
South Australian Research Development Institute (SARDI) Aquatic Scientists conduct biological survey of fish stocks in the Cooper Creek system and make an assessment of the biological aspects of the licence and pre-licence conditions.

Aquasearch SA report commissioned by licence holder and provided to PIRSA – An investigation of a fish kill and catch history of the Mulka fishery, North-East Desert Region, South Australia.

Regulations on recreational catch were introduced to the Cooper Creek system.


Transfer of fishing licence to family member.

Fishing undertaken at Lake Hope with approval from the Pastoral board and under the licence conditions and agreed code of conduct.

SARDI Aquatic Sciences (Ye) undertake fishery dependant research and analysis of the Lake Hope and Red Lake fisheries.

PIRSA Inland Fisheries Manager visits Mulka Station.

PIRSA hosts Lake Eyre Basin ESD risk assessment stakeholder workshop in Adelaide (draft ESD risk assessment report completed in November 2009).

Draft Lake Eyre Basin fisheries management plan prepared.

New management arrangements developed as part of the Lake Eyre Basin Management Plan.

5.2 Recreational fishery

The 2007/08 recreational fishing survey indicated that approximately in that year 400 fishers undertook recreational fishing within the Lake Eyre Basin. Anecdotal evidence indicates that the recreational fishing effort is concentrated over the school holidays and cooler months (DENRAA, 1999). The 2007/08 recreational fishing survey identified that the main target finfish species is Lake Eyre Golden Perch (Maquaria sp B) and Yabbies (*Cherax destructor*). Other species, including Catfish (Family Plotosidae) and Grunters (Family Tereponidae) are also taken. Recent community engagement programs under the SAAL NRMB have revealed that Spangled Perch are a primary angling species for indigenous communities around the Lake Eyre Basin. (Dale McNeil (SARDI) pers comm).

Under the *National Parks and Wildlife Act 1972* there are regulations that restrict recreational access to significant sites within national parks. The following conditions apply:

- Motorised boats are allowed along Cooper Creek in Innamincka Regional Reserve provided the motor is less than ten horsepower and speed is kept below ten knots
- All boats must be registered and a licence is required
- Motorboats are not permitted in Coongie Lakes National Park
• Nets are prohibited in all waters of the Cooper Creek and the reserve
• Fishing is not permitted in Coongie Lakes National Park.

Additional registered and recorded sites for access for Aboriginal traditional people and recreational and commercial fishers may require observance and/or additional management under the Aboriginal Heritage Act 1988 due to their vulnerability and sensitivity.

5.3 Aboriginal traditional fishery

Aboriginal traditional fishing activities in the basin take place in a unique social and cultural environment, and often in areas of high conservation and heritage value. This plan specifically looks at the recent ILUA agreement between the state government and the YY people. Other Aboriginal traditional fishing activities occur in the Lake Eyre Basin region, including by the Dieri, The Arabunna People’s and The Wangkangurru/Yarluyandi.

Fishing has always been and continues to be integral to Yandruwandha Yawarrawarrka identity. Yandruwandha Yawarrawarrka People’s relationships to the waters of their country are fundamental to the understanding of their country as a whole. Fishing has been very important to the Yandruwandha Yawarrawarrka sustenance and to their cultural and spiritual lives. Traditional stories of Yandruwandha Yawarrawarrka People and the historical records of European and other explorers and settlers provide a record of widespread use of aquatic resources and the use of a range of technologies in harvesting them.

Yandruwandha Yawarrawarrka People and their ancestors have earned sustenance from the aquatic resources of the ILUA Area’s Waters for many years. The Yandruwandha Yawarrawarrka People established a body of laws and customs to govern management and use of the aquatic resources of the ILUA Area, including the trade of such resources with other groups. As such, Yandruwandha Yawarrawarrka People have used and continue to use a variety of fishing methods.

An indigenous land use agreement (ILUA) is in place between the State and the Yandruwandha Yawarrawarrka People in the Lake Eyre Basin region. A management plan that guides the implementation of the Yandruwandha Yawarrawarrka Fishing ILUA is provided by Part B of this plan. The Yandruwandha Yawarrawarrka Traditional Fishing Management Plan sets out how decisions will be made in relation to Aboriginal traditional fishing by the Yandruwandha Yawarrawarrka People in the area to which the ILUA applies. The plan provides the framework for authorising those fishing activities under the Fisheries Management Act 2007 and is intended to facilitate management of Aboriginal traditional fishing in a way that is consistent with the objectives of the Act.

Other fishing ILUA’s including for the Dieri, The Arabunna People’s and The Wangkangurru/Yarluyandi may be prepared in the future to guide the implementation of the future fishing ILUA’s in the region.
5.4 Biological and environmental characteristics

The Lake Eyre Basin includes catchments for the Cooper Creek system (including the Thomson and Barcoo rivers); the Georgina and Diamantina river systems within Queensland and South Australia; and western rivers (Neales and Finke). Lake Eyre is the lowest point of the basin and the terminating point for the Basin’s larger river systems.

5.4.1 Ecosystem and habitat

The Mulka Station commercial fishery is situated within the Coongie Lakes Ramsar area which is part of the Cooper Creek drainage system. The Ramsar classification provides for multiple use of these sites for human benefit where this does not compromise the natural function of these unique ecosystems.

The Coongie Lakes National Park is one of 65 listed Ramsar wetlands within Australia and is characterised by a mosaic of channels, waterholes, lakes, internal deltas, shallow flood-out plains and inter-dune corridors and swamps. Whilst the main lakes contain water most of the time, during flooding events the large expanse of interconnected ephemeral wetlands fill. They then become unique and valuable habitat for a diverse range of wildlife including vast numbers of native birds, fish, reptiles and frogs. The area is also recognised as a deeply spiritual site for Yandruwandha Yawarrawarrka, Ngamini and Dieri traditional owners (DENRA, 1999).

The Innamincka Regional Reserve covers more than 1.3 million hectares. The regional reserve classification allows for concurrent activities of livestock grazing, petroleum exploration and extraction, and managed recreation use. A draft Management Plan for the Innamincka regional reserve is under development.

The Lake Eyre Basin is one of the world's last unregulated wild river systems and is an area of very high conservation significance. The primary environmental influences on ecosystem structure and function within the Lake Eyre Basin are:

**Hydrology** - the pattern of water flows and drought periods across the Basin, with the most pronounced environmental influences and impacts arising from the very large floods and the extreme droughts that are a feature of the region. Dramatic productivity booms in response to high flow events are contrasted with localised extinction of species as water recedes and habitats disconnect and dry. At the extreme end of drought some species may be completely reliant on a very small number of refuge waterholes.

**Seasons** - there are dramatic seasonal differences in water flows and water temperatures across the Basin. These in turn have major impacts on species productivity, predator-prey relationships across species assemblages, and water quality. The dynamic nature of these key variables can result in a broad range of constantly changing scenarios and outcomes for aquatic ecosystem health.

---

2 The Ramsar Convention is the *Convention on Wetlands of International Importance Especially as Waterfowl Habitat*, and relies on treaty signatories committing to *Wise Use* to maintain the unique natural properties of these sites.
Geomorphology - the landscape of the Lake Eyre Basin is generally flat with the characteristics of rivers and other water-bodies heavily influenced by high flow events. Water-bodies comprise deeper refuge waterholes, primary and secondary channels, floodplains and lakes. Each of these habitat types is essential to the maintenance of ecological integrity.

Salinity - this is more influential in the lower reaches of the Lake Eyre Basin rivers. At higher concentrations salinity may have a dramatic impact on the diversity and abundance of biota. Where salinity is high, species composition changes across assemblages to reflect highly salt tolerant organisms. Algae species show the greatest tolerances to salinity with most algal species groups having salt tolerant species (Costelloe et al, 2004).

Water is the critical link between human communities and natural systems within the Lake Eyre Basin. As such many of the risks arising from human induced factors external to commercial or recreational fishing in the Basin are directly water related. These include human induced changes to flows; environmental influences on flows through human induced climate change apparent at a local or regional level (i.e. changing seasonality, more severe floods or longer drought periods); water quality influences from agricultural activity; infrastructure developments like weirs or barrages that interrupt flows; or impacts on groundwater availability through reduced artesian pressures from uncapped bores. Some of these external impacts may significantly compromise the spawning success, overall population health and productivity levels of native fish in the South Australian Lake Eyre Basin.

The flow volumes are considered to be the minimum total water flow volumes per annum that would maintain aquatic diversity and productivity within the permanent water holes in those systems and may be used as an indicator of the health of the basin. Scientific advice indicates that the smallest annual total freshwater flow volume recorded at the South Australian border on the Cooper Creek system was 41GL and on the Diamantina was 29GL (pers. com. Justin Costelloe, University of Melbourne, 01/11/2012). Estimates for the Neales and Macumba Rivers are still being developed.

5.4.2 Biology of key species

The following section provides brief background information on known and inferred biological characteristics for target species in the South Australian Lake Eyre Basin fisheries (recreational and commercial).

5.4.2.1 Lake Eyre Basin Golden Perch

The Lake Eyre Basin Golden Perch (Maquaria species) is now recognised as a separate species to the Murray-Darling Basin Golden Perch (M. ambiguа ambiguа) although this Lake Eyre Basin sub species has not yet been scientifically described. They are endemic to the Lake Eyre Basin region and are generally similar in appearance to the Murray-Darling species.

Lake Eyre Basin Golden Perch are the largest fish species found in the basin and are recorded to grow to around 600mm total length with a maximum recorded weight of 5-6 kilograms. They are widespread and abundant throughout the Cooper Creek, Diamantina, and Georgina river systems. Under flood conditions
they also disperse widely to suitable habitat, including wetlands and ephemeral lakes.

Golden Perch are known to spawn during a flood at water temperatures over 23°C (73°F) and are highly fecund, typically producing between 100,000 and 1,000,000 pelagic eggs depending on the size of the female. Newly hatched larvae are around 3.2mm in length. Total length at age one is between 100 and 300mm (Wager and Unmack, 2000). Larvae of Murray-Darling Golden Perch are able to tolerate considerable levels of salinity with an LC50 of 12ppt, although no specific data has been collected for Lake Eyre Golden Perch (McNeil et al. 2010).

The ARIDFLO project (DWLBC, 2004) provided further information about the life history characteristics of Lake Eyre Golden Perch, finding they are able to spawn successively within a season in response to increased flow events, and with rising water at a range of flood sizes. Lake Eyre Golden Perch can also breed over a longer season than those of the Murray-Darling, and have higher initial growth rates, and a lesser age of first maturity (males at 2 years old, and females 3 years old versus 3 and 4 years respectively for the Murray-Darling species). These adaptations provide a reproductive advantage in the context of highly variable flow regimes experienced in the Lake Eyre Basin region.

There are no available population status estimates for Lake Eyre Golden Perch however broad-scale monitoring of fish communities as part of ARIDFLO suggests that most Lake Eyre Basin native fish species are widely distributed across suitable habitats and generally abundant (DWLBC, 2004). Lake Eyre Basin Golden Perch are well suited to maintaining healthy populations within this highly variable environment in the absence of major human induced ecological disturbances.

5.4.2.2 Welch’s Grunter

Welch’s Grunter (Bidyanus welchi) is a small species commonly reaching 230 mm and 300 grams, it has been reported that a few specimens attain 350 mm and weigh up to 1.5 kg (Merrick and Schmida, 1984). Welch’s Grunter is widespread and abundant, but patchy in occurrence. Under flood conditions they also disperse widely to suitable habitat, including wetlands and ephemeral lakes.

Welch’s Grunter is known to spawn during a flood at water temperatures over 24°C and is highly fecund, typically producing up to 100,000 pelagic eggs depending on the size of the female. Newly hatched larvae are around 1.8 mm to 2.0 mm in length. Juveniles of Welch’s Grunter are able to tolerate considerable levels of salinity with an LC50 of 10ppt (Merrick and Schmida, 1984).

Welch’s Grunter is a carnivorous fish, predominately predating on shrimps, small fishes and earth worms. There are no available population status estimates for Welch’s Grunter however broad-scale monitoring of fish communities as part of ARIDFLO suggests that most Lake Eyre Basin native fish species are widely distributed across suitable habitats and generally abundant (DWLBC, 2004). Welch’s Grunter are well suited to maintaining healthy populations within this highly variable environment in the absence of major human induced ecological disturbances.
5.4.2.3 Cooper Creek Catfish

Cooper Creek Catfish (*Neosiluroides cooperensis*) are one of the few relatively large angling species in the region, growing to approx 600 mm, and considered good eating. They are recognised as a target species for recreational anglers in the region. It is the only known species in its genus and its relationship to other catfish genera is not known (Wager and Unmack, 2000).

The Cooper Creek Catfish is found in larger and more permanent waterholes and is believed to be restricted to the Cooper Creek system where it is relatively widespread and commonly encountered, although not abundant. They are known to have the largest egg size and smallest number of eggs per unit of length of any fish species found in the Lake Eyre Basin region, with a 450mm female estimated to contain around 1,000 eggs (Wager and Unmack, 2000).

There are no available population status estimates for this species. Reasonable assumptions about the likely population status are difficult in the face of almost no information about biological and life history characteristics. Their restricted distribution, status as a recreational target species, good eating qualities and generally low productivity suggest populations are vulnerable to fishing pressure.

5.4.2.4 Barcoo Grunter

The Barcoo Grunter (*Scortum barcoo*) is a species that commonly grows to a length of 250 mm and 400 g and can occasionally reach 350 mm (Merrick and Schmida 1984). The above species are considered widespread and abundant within suitable habitat in the region (Wager and Unmack, 2000). Like other species Barcoo Grunter can withstand temperatures of 40ºC and have a high salinity tolerance (Merrick and Schmida 1984).

The Barcoo Grunter is a schooling species and known be an aggressive fish, sometimes caught by recreational fishers. Their diet includes fishes, crustaceans, insects and molluscs (Allen *et al.* 2002).

5.4.2.5 Spangled Perch

A small species commonly growing to 150 mm in length; with some rarely reaching 250 mm and 550 g. Spangled Perch (*Leiopotherapon unicolor*) is one of the most widespread of the Australian freshwater species and is very abundant (Wager and Unmack, 2000). The Spangled Perch occurs in the largest numbers in still or slowly flowing waters, isolated billabongs, dams and natural streams. The species has wide physiological tolerances, withstanding salinities 35 ppt. and temperatures from 5 to 44ºC.

The Spangled Perch is a schooling fish, with an aggressive nature feeding on a range of small aquatic insects, crustaceans, molluscs and some plant material, it is also described as an opportunistic carnivore. Although active and easy to maintain in captivity, they are very aggressive to all other fish – including their own kind.

Recent community engagement programs under the SAAL NRMB have revealed that Spangled Perch are a primary angling species for indigenous communities around the Lake Eyre Basin. In particular, aboriginal women and children fish for
spangled perch using handlines and red meat as bait, roasting whole fish on coals prior to consumption (Dale McNeil (SARDI) pers comm). While it is not known what the level of take or reliance on this fishery may be, it should be considered as an important subsistence fishery for indigenous communities in the Lake Eyre basin. Spangled Perch are extremely widespread and common across northern and central Australia and are among the most tolerant and resilient of freshwater fish species (McNeil and Schmarr 2009).

5.4.2.6 Yabbies

The common Blue Claw Yabby (Cherax destructor) is a popular target for recreational anglers. They have spade-like claws, a short smooth rostrum (forward projecting spine between the eyes), and are generally pale brown or tan to dark brown. Yabbies are vigorous burrowers and a productive and resilient species. They can tolerate poor water quality and long periods of drought during which they burrow deeply to find moist soil and stay dormant for up to 5 years. They feed opportunistically on detritus and are opportunistically carnivorous as well as cannibalistic.

Yabbies are widely distributed across central and western NSW, south western Queensland, most of Victoria, and throughout South Australia. They are common in the Lake Eyre Basin region inhabiting freshwater creeks, rivers, lakes, farm dams, swamps, floodplains and channels. They prefer turbid shallow water that is slow flowing or still and in the Lake Eyre Basin region appear to be most abundant on the declining phase of a flood (DWLBC, 2004).

Spawning peaks between December and February, although under suitable conditions Yabbies may spawn throughout the year. Following spawning the female carries her eggs under her tail, where they incubate for three weeks. During the first two years of life Yabbies moult several times reaching a length of approximately ten cm. In their third year they moult twice and reach a length of about 13 cm. Under favourable conditions they may grow up to 28 cm total length.

5.5 Economic characteristics of Lake Eyre Basin fisheries

The Mulka Station commercial fishery is an opportunistic enterprise that can supplement revenue from the lessee’s pastoral activities. The operating costs for the fishery, and its revenue, are not publicly available. Operating costs are significant and include fuel costs for transporting boats, equipment and personnel to and from the fishing locations, and transporting the catch to major domestic fish markets (Adelaide, Sydney and Melbourne); and supply of ice and suitable containers that can work effectively in the high ambient temperatures of the region (D. Overton pers.comm.). Licence conditions also require that the gear not be used in other waters to minimise the risk of disease being introduced. The licence holder has advised that the price received for Lake Eyre Basin Golden Perch has remained relatively static whilst operating costs have consistently increased over time.

Without more economic data it is difficult to quantify the net economic benefit to the licence holder, and to the broader community from fishing activity. Market price for Lake Eyre Basin Golden Perch varies however is likely to be in the range of $12-16/kg for reasonable quality wild caught fish. The price depends to a large extent
on maintaining high product quality, with catch volumes and distribution to market managed to maintain a reasonable demand for the product.

5.6 Social characteristics of Lake Eyre Basin fisheries

The commercial fishery is a relatively small operation in employment terms. When fully active the operation employs the Mulka lessee and one to two immediate family. One to two locals may also be employed on a casual basis to help out with preparation and transport of the catch to Adelaide. Where possible the licence holder employs local staff.

The recreational fishery contributes to Lake Eyre Basin communities through less tangible but important factors like lifestyle quality, community identity, health effects from exercise and fish consumption. The building and extension of knowledge through research programs, and community connection with the land and related stewardship of natural resources are also important community aspects.

Some fishing related activities can make a relatively larger contribution to social value. Infrastructure such as fish-ways can build positive community stewardship, and contribute to a sense of community identity. Similarly, Lake Eyre Basin communities are environmentally aware and proud of the relatively natural state of their region, and value knowledge about natural resources and their management.

6 ECOSYSTEM IMPACTS OF FISHING

The *Fisheries Management Act 2007* requires that ecological impacts be identified and assessed as the first step in developing a fisheries management plan under the Act. This ecosystem-based fisheries management (EBFM) approach 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 performance of the fishery

These risks must then be assessed and strategies to address them developed. Ecological impacts associated with commercial and recreational fishing in the Lake Eyre Basin region have been identified and assessed through an ESD risk assessment for these fisheries. As for other South Australian commercial fisheries, the *National ESD Reporting Framework for Australian Fisheries* (Fletcher et al 2002) was the methodology used. The approach is described in detail at Appendix 1.

A collaborative stakeholder workshop was used to identify and assess the risks to ESD objectives for Lake Eyre Basin, with these risks then rated from negligible to extreme. The subsequent *Ecologically Sustainable Development (ESD) Risk Assessment for the Lake Eyre Basin Fisheries* (PIRSA, 2009), provides more detailed information about these risks and their basis. Risks identified as moderate, high, or extreme are summarised in the section below. Specific management strategies to minimise these higher level risks, and associated performance indicators, have been developed and are provided in Section 7.
overview of the ESD risk assessment results for the Lake Eyre Basin fisheries is also provided (Appendix 2).

A total of 21 risks with a rating moderate or higher were identified specifically for the Lake Eyre Basin Fishery. These risks are summarised in Table 7 (a summary of all identified risks is provided in Appendix 2). Five risks identified related to governance and community issues, but there were 16 moderate risks, 2 high risk and 3 extreme risks that were ecological in nature. A summary of the high and extreme ecological risks are provided below:

**Retained species Secondary Target Species - Cooper Creek Catfish**

Cooper Creek Catfish are generally found in the larger and more permanent waterholes of the Cooper system and are relatively widespread and commonly encountered, although not abundant (Wager and Unmack, 2000). Cooper Creek Catfish are significantly less productive and their apparent preference for larger waterholes and their complete reliance on refugia during extended drought periods are likely to make them very vulnerable under these circumstances. South Australia’s *Action Plan for Native Freshwater Fishes* also notes a range of additional threats including loss of habitat through water diversion or extraction, possible impacts from climate change on habitat, and the potential introduction of alien species which may increase predation on certain life stages of the species (Hammer et al, 2007). It was considered possible (L4) that the current recreational harvest of Cooper Creek Catfish could have a major (C4) impact on the sustainability of the population. The resultant risk was considered to be HIGH (16).

**General Ecosystem Impacts of Fishing - Inter-basin translocation of exotic species via stocking and/or bait usage**

Rivers of the Lake Eyre Basin are considered to be in good ecological health, particularly when compared to systems like the Murray-Darling. Significant adverse impacts that may arise from inadvertent or deliberate translocation of exotic or non endemic native species into Lake Eyre Basin water-bodies could include, additional competition for food and space, predation, alteration of food webs, alteration of habitat, disease introduction, loss of genetic integrity and diversity amongst endemic species. Some invasive species, like Redclaw, may have dramatic impacts on Basin ecology. In the areas where they have become established Redclaw have been implicated in the decline of native blue claw Yabbies to the extent that Yabbies are rarely found in any numbers in locations colonised by Redclaw. They have quickly become established in all three major drainages in the Queensland region of the Lake Eyre Basin and are likely to extend their range further south (Woodford, 2008). Other than their likely direct impact on native blue claw Yabbies, the broader ecological effects of their presence are unknown.

It was considered that the ecological impacts of translocation of biological material (via stocking or as bait) could be catastrophic (C5). This impact was considered likely (L6) given that some pest species have already been introduced (i.e. Redclaw and Cane Toads), and it was very difficult to ensure that others would not be introduced or the abundance and distribution of existing pest species would not increase. This results in a risk rating of EXTREME (30).

**External factors affecting performance of the fisheries - Introduction of Pest Species**

The translocation of other pest species such as Cane Toads via tourist vehicles, or
their rapid dispersal via floodwaters once established in the upper reaches of rivers, may also have a dramatic impact on ecosystem function and aquatic diversity. Other conduits for pest species translocation within the Lake Eyre Basin could include escapees from stocked farm dams or other artificial environments during flood events (European Carp are recorded as present in some artificial habitats within the basin), or transfers via man made water diversion features such as channels, or diversion pipelines (Hammer et al, 2007). Adverse impacts from increasing abundance and distribution of pest species could be expected.

Whilst there are programs in place to manage the risks from further expansion or establishment of pest species, the scale of the region, difficulties in establishing effective education and extension programs, limited human and financial resources, compliance challenges, and the prospects of rapid flood-borne translocation of some species (i.e. larval and/or juvenile cane toads) make these translocation risks difficult and expensive to mitigate effectively.

Further establishment, increased abundance and/or distribution of pest species as a result of external human activities was considered likely (L6) and this would have a major (C4) impact on fisheries ESD objectives for the basin. This resulted in a risk rating of EXTREME (24).

Retained species from Refugia:

**Lake Eyre Basin Golden Perch**

The life history and biological characteristics of Lake Eyre Basin Golden Perch make them a relatively productive and resilient species. The survival of the species does, however, depend on maintaining a viable population of spawning adults in refugia during extended droughts. Lake Eyre Basin Golden Perch are the primary target species for both the commercial fishery and the recreational fishery across the Lake Eyre Basin. Adult fish in key refugia are particularly vulnerable to recreational fishing and various forms of illegal fishing (either organised illegal activity or “accidental” illegal fishing through ignorance or deliberate contravention of management regulations).

Removals or incidental mortality of significant quantities of mature Lake Eyre Basin Golden Perch from key refuge waterholes on the major basin river systems during severe droughts was considered possible (L4) and this could be catastrophic (C5) for the sustainability of Lake Eyre Basin Golden Perch, and ecologically dependant species. This results in a risk rating of EXTREME.

**Cooper Creek Catfish**

Cooper Creek Catfish are found primarily in the larger and more permanent waterholes within the Cooper Creek system. Unlike Lake Eyre Basin Golden Perch their distribution is thought to be limited to these locations. Whilst little is known of their life history and biology they are considered to be significantly less productive than Lake Eyre Basin Golden Perch with a large female spawning up to 1,000 or so relatively large eggs. In comparison a large Lake Eyre Basin Golden Perch may spawn up to 1,000,000 pelagic eggs (Wager and Unmack, 2000). Cooper Creek Catfish are also a sought after recreational fishing target because of their relatively large size and good eating qualities.
This combination of characteristics suggests the species is at significantly higher risk of serious depletion, with a significantly slower population recovery trajectory than a species such as Lake Eyre Basin Golden Perch. Significant fishing related mortality, or incidental mortality from non fishing related events within key refugia could have a dramatic effect on species viability.

Removals or incidental mortality of significant quantities of mature Cooper Creek Catfish from key refuge waterholes on the Cooper Creek system was considered possible (L4) and this could have major (C4) consequences for the sustainability of Cooper Creek Catfish and ecologically dependant species. This results in a risk rating of HIGH (16).
Table 6. Summary of moderate to extreme risks identified in the South Australian Lake Eyre Basin Fisheries and the relevant objectives and the strategies to manage them

<table>
<thead>
<tr>
<th>Component</th>
<th>Risk</th>
<th>Description</th>
<th>Risk Rating</th>
<th>Objective</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refugia Management</td>
<td>Lake Eyre Golden Perch</td>
<td>Basin and catchment level stock productivity (and viability) depends on maintaining adequate adult biomass during drought</td>
<td>Extreme</td>
<td>2a</td>
<td>1a (iii), 2a (i), 2a (ii), 2a (iii), 2d (i), 2d (ii).</td>
</tr>
<tr>
<td></td>
<td>Cooper Creek catfish</td>
<td>Catchment level viability depends on survival of adults in limited range of refugia, susceptible to fishing &amp; low fecundity</td>
<td>High</td>
<td>2a</td>
<td>2a (i), 2a (ii), 2a (iv), 2a (v), 2a (vi), 2d (i), 2d (ii).</td>
</tr>
<tr>
<td></td>
<td>Grunter species</td>
<td>Susceptible to fishing, populations persist in refugia during drought</td>
<td>Moderate</td>
<td>2a</td>
<td>2a (i), 2a (ii), 2a (v), 2a (vi), 2d (i), 2d (ii).</td>
</tr>
<tr>
<td></td>
<td>Freshwater mussels</td>
<td>Cryptic species with high levels of endemism</td>
<td>Moderate</td>
<td>2a</td>
<td>2a (ii), 2a (v), 2a (vi), 2d (i), 2d (ii).</td>
</tr>
<tr>
<td></td>
<td>Yabby</td>
<td>May be susceptible to overfishing in severe drought conditions, may be pressured by introduced non-endemic species like Redclaw</td>
<td>Moderate</td>
<td>2a</td>
<td>2a (ii), 2a (v), 2a (vi), 2d (i), 2d (ii).</td>
</tr>
<tr>
<td></td>
<td>Shrimp</td>
<td>May be susceptible to overfishing in severe drought conditions</td>
<td>Moderate</td>
<td>2a</td>
<td>2a (ii), 2a (v), 2a (vi), 2d (i), 2d (ii).</td>
</tr>
<tr>
<td>Retained Species</td>
<td>Ecological sustainability of target species – Cooper Creek catfish</td>
<td>Endemic, low productivity species with limited range. Susceptible to recreational fishing and a preferred catch.</td>
<td>High</td>
<td>2a</td>
<td>2a (i), 2a (ii), 2a (iv), 2a (v), 2a (vi), 2d (i), 2d (ii).</td>
</tr>
<tr>
<td></td>
<td>Ecological sustainability of target species – Freshwater</td>
<td>Cryptic species with very little known about them. Some species may be limited to very</td>
<td>Moderate</td>
<td>2a</td>
<td>2a (v), 2a (vi), 2a (vii), 2d (i), 2d (ii).</td>
</tr>
</tbody>
</table>

3 Risk assessment applies to recreational fishing unless otherwise described.
<table>
<thead>
<tr>
<th>Component</th>
<th>Risk</th>
<th>Description</th>
<th>Risk Rating</th>
<th>Objective</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mussels</td>
<td>small range.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>General Ecosystem Impacts of Fishing</strong></td>
<td>Addition/movement of biological material caused by translocation</td>
<td>Deliberate or accidental inter-basin translocation of non-endemic native species (i.e. Redclaw used as bait)</td>
<td>Extreme</td>
<td>2a - 2e.</td>
<td>2a (v), 2a (vi), 2e (ii), 2e (iii).</td>
</tr>
<tr>
<td></td>
<td>Addition/movement of biological material caused by translocation</td>
<td>Deliberate or accidental intra-basin translocation of non-endemic native species</td>
<td>Moderate</td>
<td>2a - 2e.</td>
<td>2a (v), 2a (vi), 2b (iii), 2c (i) - (iv), 2d (i), 2d (ii) 2e (ii), 2e (iii).</td>
</tr>
<tr>
<td>Community</td>
<td>Commercial Fishery licencee well-being</td>
<td>Risk if the fishery ceased to operate</td>
<td>Moderate</td>
<td>1a - 1f.</td>
<td>All apply</td>
</tr>
<tr>
<td></td>
<td>Regional social value</td>
<td>Impact on regional social value if the recreational fishery ceased to exist</td>
<td>Moderate</td>
<td>2a - 2d.</td>
<td>All apply</td>
</tr>
<tr>
<td>Governance</td>
<td>Policy and management effectiveness</td>
<td>Risk to ESD outcomes if integrated catchment management not applied</td>
<td>Moderate</td>
<td>2c.</td>
<td>2c (i) – 2c (iv).</td>
</tr>
<tr>
<td></td>
<td>Research/information</td>
<td>Sufficient information to inform management decisions</td>
<td>Moderate</td>
<td>2a, 2b, 2c.</td>
<td>2a (ii), 2a (v), 2b (ii), 2c (i) – (iv).</td>
</tr>
<tr>
<td></td>
<td>Compliance with management arrangements</td>
<td>Encompasses deliberate and larger scale illegal fishing for profit, and smaller scale (accidental) illegal fishing</td>
<td>Moderate</td>
<td>2c.</td>
<td>2c (i) – 2c (v).</td>
</tr>
<tr>
<td><strong>External factors affecting performance of the fishery</strong></td>
<td>Pest species</td>
<td>Introduction and spread of pest (exotic) species (i.e. European carp)</td>
<td>Extreme</td>
<td>2a - 2e.</td>
<td>2a (v), 2a (vi), 2b (iii), 2c (i) - (iv), 2d (i), 2d (ii) 2e (ii), 2e (iii).</td>
</tr>
<tr>
<td></td>
<td>Water quality</td>
<td>Impact of human activities on water availability and quality (larger scale extraction, flow modification, point impacts of extraction)</td>
<td>Moderate</td>
<td>1g.</td>
<td>2e (iv).</td>
</tr>
<tr>
<td>Component</td>
<td>Risk</td>
<td>Description</td>
<td>Risk Rating</td>
<td>Objective</td>
<td>Strategy</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>-------------</td>
<td>-----------</td>
<td>----------</td>
</tr>
<tr>
<td>Infrastructure development</td>
<td>Barriers to natural fish movements from causeways, dams, roads, culverts etc</td>
<td>Moderate 1g. 2e (v).</td>
<td>Moderate</td>
<td>1g.</td>
<td>2e (v).</td>
</tr>
<tr>
<td>Climate change effects</td>
<td>Unknown changes to hydrological cycles intensifying stresses on natural systems</td>
<td>Moderate 1g. 2e (vi).</td>
<td>Moderate</td>
<td>1g.</td>
<td>2e (vi).</td>
</tr>
<tr>
<td>Economic drivers (commercial fishery)</td>
<td>Impact of external factors on performance and profitability of the fishery (e.g. fuel price)</td>
<td>Moderate 1g. 2e (vii).</td>
<td>Moderate</td>
<td>1g.</td>
<td>2e (vii).</td>
</tr>
<tr>
<td>Access</td>
<td>Impact of external factors (access issues) on amenity and quality of recreational fishing</td>
<td>Moderate 1e - 1g. 1e (i), 2e (viii).</td>
<td>Moderate</td>
<td>1e - 1g.</td>
<td>1e (i), 2e (viii).</td>
</tr>
</tbody>
</table>
7 GOALS, OBJECTIVES, AND STRATEGIES

7.1 Goals and Objectives

Section 7 of the *Fisheries Management Act 2007* sets out the objects of the Act with various biological, social and economic factors to be considered as part of these fisheries ESD outcomes. Object 7(a), relating to the avoidance of over-exploitation, is specified as the primary consideration.

Objectives and enabling strategies for the Lake Eyre Basin fisheries are set out below. The objectives are directly aligned with those of the Act and relate to the specific operational circumstances for Lake Eyre Basin commercial and recreational fisheries.

7.2 Strategies

The management plan strategies are designed to best pursue the plan’s objectives and mitigate the higher level risks to Lake Eyre Basin fisheries ESD objectives.

7.2.1 Goal 1 – Commercial fishing in the Lake Eyre Basin meets ESD requirements.

Table 7. Objectives and strategies for the Lake Eyre Basin commercial fishery

<table>
<thead>
<tr>
<th>ESD Objectives</th>
<th>Enabling strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Golden Perch catches are ecologically sustainable</strong></td>
<td>Fishing may only take place in Lake Hope and Red Lake. Both lakes to be disconnected from the Cooper Creek system before fishing commences.</td>
</tr>
<tr>
<td></td>
<td>Fishery independent monitoring occurs each financial year the fishery is active</td>
</tr>
<tr>
<td></td>
<td>Effective refugia management is applied.</td>
</tr>
<tr>
<td><strong>2. Broader ecological impacts of fishing are minimised</strong></td>
<td>Fishery independent monitoring occurs each time the fishery is active</td>
</tr>
<tr>
<td></td>
<td>Catches are limited to no more than 350 tons in any one fishing season</td>
</tr>
<tr>
<td></td>
<td>Nets and gear used in the fishery are not used in other waters</td>
</tr>
<tr>
<td><strong>3. The fishery is profitable</strong></td>
<td>Fishing to commence as soon as the likelihood of reconnection to the Cooper Creek system is low</td>
</tr>
<tr>
<td></td>
<td>Collect economic data for the fishery</td>
</tr>
<tr>
<td></td>
<td>Incidental catch of Welch’s Grunter and Barcoo Grunter may be retained for sale as by-product from the fishery</td>
</tr>
<tr>
<td><strong>4. Management is cost effective and efficient</strong></td>
<td>PIRSA Fisheries and Aquaculture to consult with licencee to determine an appropriate cost recovery model for the fishery</td>
</tr>
<tr>
<td></td>
<td>An appropriate proportion of research/monitoring costs are recovered from the licensee</td>
</tr>
<tr>
<td><strong>5. Resource access is fair</strong></td>
<td>Enable access to recreational fishers consistent with current pastoral lease access arrangements</td>
</tr>
</tbody>
</table>

4 See Miscellaneous Fishery licence conditions for the Mulka Station fishery (pg. 48)
5 Details are provided in management strategies for key refugia (pg 41)
6. **Precautionary management is applied where warranted**

<table>
<thead>
<tr>
<th>Enabling strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fishing gear not used elsewhere to minimise risk of disease introduction</td>
</tr>
<tr>
<td>Lakes disconnected from Cooper Creek system</td>
</tr>
<tr>
<td>350 ton catch limit applied</td>
</tr>
<tr>
<td>Independent monitoring occurs each time the fishery is active</td>
</tr>
</tbody>
</table>

7.2.2 **Goal 2 – Recreational fishing in the Lake Eyre Basin meets ESD requirements**

Table 8. Objectives and strategies for Lake Eyre Basin recreational fisheries

<table>
<thead>
<tr>
<th>ESD Objectives</th>
<th>Enabling strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Recreational fishing catches are ecologically sustainable</strong></td>
<td>Manage recreational catch and effort under normal(^6) conditions using existing bag and size limits</td>
</tr>
<tr>
<td></td>
<td>Collect adequate data on recreational catch and effort in the Lake Eyre Basin region</td>
</tr>
<tr>
<td></td>
<td>Effective refugia management(^7) for Golden Perch</td>
</tr>
<tr>
<td></td>
<td>Precautionary management of Cooper Creek catfish</td>
</tr>
<tr>
<td></td>
<td>Targeted community and tourism focused education campaign</td>
</tr>
<tr>
<td></td>
<td>Identify candidate no fishing areas for high conservation value refugia on SA river reaches</td>
</tr>
<tr>
<td>2. <strong>There is a overall community benefit from recreational fishing</strong></td>
<td>Maintain productivity and biodiversity of SA river reaches</td>
</tr>
<tr>
<td></td>
<td>Collect economic and “community value” data for the recreational fishery</td>
</tr>
<tr>
<td></td>
<td>Community engagement in fishing related infrastructure and management projects (e.g. design and build Innamincka causeway fish-way)</td>
</tr>
<tr>
<td>3. <strong>Management, including compliance operations, is effective and efficient</strong></td>
<td>Formalise risk based compliance planning and cooperation between SA and QLD compliance teams.</td>
</tr>
<tr>
<td></td>
<td>Formalise risk based management planning and cooperation between SA and QLD inland fisheries managers.</td>
</tr>
<tr>
<td></td>
<td>Promote and enable greater community awareness and support for recreational fisheries management</td>
</tr>
<tr>
<td></td>
<td>Reflect SA’s Lake Eyre Basin ESD risk assessment results in the next Lake Eyre Basin fisheries compliance strategy</td>
</tr>
<tr>
<td></td>
<td>Refugia management strategies involving closures or no take are carefully designed including community consultation and engagement</td>
</tr>
<tr>
<td>4. <strong>Precautionary management is applied where warranted</strong></td>
<td>Determine feasibility of establishing protected areas (riparian and aquatic) as part of high conservation value refugia for native fish.</td>
</tr>
<tr>
<td></td>
<td>Close critical refugia for each major reach of SA rivers to all fishing during severe(^8) drought conditions(^9)</td>
</tr>
</tbody>
</table>

---

\(^6\) Conditions other than severe drought conditions, in which case additional management controls may be appropriate  
\(^7\) Details are provided in management strategies for key refugia

Page 35 of 118
8 CONSULTATIVE ARRANGEMENTS

The *Fisheries Management Act 2007* establishes the Fisheries Council of South Australia. Section 16 of the Act sets out the functions of the Council, which include the preparation of management plans under the Act, advising the Minister on allocation issues and promoting the co-management of fisheries.

Essentially, co-management is an arrangement whereby responsibilities and obligations for sustainable fisheries management are negotiated, shared and delegated at appropriate levels between government, industry and other stakeholders. The Council is currently considering the development of a policy on co-management which will help inform discussion with the wider commercial fishing industry and other stakeholder groups as to how best to promote and implement co-management. In the meantime, consultation arrangements have been established between PIRSA Fisheries and Aquaculture and the representative industry body for each major commercial fishery.

There are currently no formal consultative arrangements in place regarding the ecologically sustainable management of the fisheries operating in the Lake Eyre Basin. The day to day management is conducted by PIRSA Fisheries and Aquaculture in conjunction with a range of South Australian government agencies with portfolio responsibility for aspects of natural resource management related to fisheries (Figure 2, section 4.2).

PIRSA has established consultative arrangements for recreational fishing in the Lake Eyre Basin with the South Australian Recreational Fisheries Advisory Council Inc. (SARFAC). Consultation on management issues related to the Mulka Station commercial fishery is undertaken directly between PIRSA and the commercial fishery licence holder as necessary. As defined in Part 2 of this plan, the Yandruwandha Yawarrawarrka Traditional Lands Organisation (YYTLOAC) is the contact point for consultation with the Yandruwandha Yawarrawarrka People on fisheries management issues. Consultation with the South Australian Pastoral Board, the Conservation Council of SA and other NRM groups and relevant stakeholders is undertaken by PIRSA Fisheries and Aquaculture as required.

9 ALLOCATION OF ACCESS BETWEEN SECTORS

9.1 Current allocated shares of the resource

The *Fisheries Management Act 2007* requires that a management plan specify the share of the fishery to be allocated to each fishing sector under that plan (Act, Section 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 Council to prepare the plan (based on

---

8 Severe needs to be defined from existing hydrological data and fish assemblage monitoring outcomes.
9 Requires further consideration and development.
the most recent information available to the Minister) must be taken into account (Act, Section 43(3)).

The Minister formally requested that the Fisheries Council prepare this management plan on 17 June 2010. Therefore, this plan must take into account the share of the Lake Eyre Basin Golden Perch resource available to the commercial, recreational and Aboriginal traditional sectors on that date.

**Commercial sector**

The Lake Eyre Basin fishery is unique compared to other fisheries due to the environment it operates within; as such, the commercial fishery has only operated twice in the previous 20 years, when the pastoral lakes filled following large scale flooding of the Cooper Creek system. The most recent available information on the removal of Lake Eyre Basin Golden Perch from Lake Hope and Red Lake by the commercial fishery was last recorded as 147 tonnes during the twelve month period from June 2001 to May 2002. No other species have been permitted to be taken in the past but this plan now provides for the take of Welch’s Grunter and Barcoo Grunter.

**Recreational sector**

The most recent survey for the recreational fishing sector was undertaken for the period October 2007 to September 2008 by Jones (2009). The survey estimated that the total state-wide recreational catch of Lake Eyre Basin Golden Perch in South Australia was 1296 fish. This was not during a period of large scale flooding in the system, however catches during a 2000/01 period of flooding did not indicated significantly higher levels of catch (1524 fish: Jones and Doonan, 2005). Individual weights of Lake Eyre Basin Golden Perch were not recorded in the 2007/08 recreational fishing survey diaries. To provide an estimate of total weight of recreational Lake Eyre Basin Golden Perch catch for allocation, catch returns from the Lake Eyre Basin commercial fishery from 1992 to 1994 and 2001/02 were used to estimate the recreational catch weight of 1.4 tonnes. The survey also indicated that recreational fishers caught 250 Spangled Perch and 1231 Cooper Catfish. These are the key species taken in the fishery. As the Lake Eyre Basin is located in the Far North East of South Australia, the information on the recreational harvest for the region was data poor, as large numbers are known to frequent the Lake Eyre Basin over the school holidays (DEHAA, 1999).

**Aboriginal traditional sector**

Access to South Australia’s aquatic resources by Aboriginal communities under the Fisheries Management Act 2007 is provided through Aboriginal traditional fishing management plans. These plans may be developed when an Indigenous Land Use Agreement (ILUA), agreed to resolve a native title claim, is in place in relation to a native title claim area.

The State is currently engaged in ILUA negotiations with native title claimants and other stakeholder groups, including the fishing industry. The agreements arising from these negotiation processes will inform the way that access to fisheries

---

10 The 2007/08 South Australian Recreational Fishing Survey collected data from the Lake Eyre Basin region as part of region 30.
resources by Aboriginal communities is defined and implemented. Aboriginal traditional fishing under the Act only relates to fishing agreed through the ILUA process. Aboriginal people are also recreational fishers outside of these arrangements.

The State has made commitments relating to Aboriginal traditional fishing activities in the Lake Eyre region in the Yandruwandha Yawarrawarrika Fishing ILUA, which are detailed in Part 2: Yandruwandha Yawarrawarrika Traditional Fishing Management Plan. There is little available information on the take aquatic resources in the Lake Eyre region by the Aboriginal traditional fishing sector; however the small number of claims with fishery-related interests and negotiations to date has informed the share that has been put aside for this purpose. A nominal share has been made to the Aboriginal traditional sector in this management plan for the purpose of determining first shares and providing access to implement the provisions of the ILUA. This share has been deducted from the total recreational share because Aboriginal traditional fishing is non-commercial fishing.

A key research priority of the Yandruwandha Yawarrawarrika Traditional Fishing Management Plan is the development of an appropriate method for collecting catch and effort information for Aboriginal traditional fishing by the Yandruwandha Yawarrawarrika People.

It is anticipated that all fishery-related ILUAs will be negotiated within five years. Therefore, at the five year review for this management plan, any difference between the nominal share put aside and the actual share agreed through the ILUA can be calculated. Any difference would then be re-allocated to or from the recreational sector.

**Temporal Allocation**

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 or a single allocation across the region.

Given the uniqueness regarding the timing of fishing and the limited spatial scale of commercial fishing in the Lake Eyre Basin, allocation of the resource in this management plan has been allocated at a temporal scale, to better reflect catch shares when commercial fishing activity takes place. Consideration has been given to the distinct time scales in which commercial fishing is permitted to operate (in times of flood) and when recreational and Aboriginal traditional fishing are the only activities being undertaken (in times of non-flood).

Given the lack of information available about the current shares of other species available in the fishery, only shares of the Lake Eyre Golden Perch resource have been allocated in this management plan.

The shares allocated to each sector in relation to the Lake Eyre Basin fisheries (in flood when the commercial Lake Eyre Basin Fishery is permitted to operate, or in non-flood when no commercial fishing is permitted) are:
Table 9. Sectoral shares for Lake Eyre Basin fisheries

<table>
<thead>
<tr>
<th>Species</th>
<th>Time</th>
<th>Commercial</th>
<th>Recreational</th>
<th>Aboriginal traditional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Eyre Basin Golden Perch</td>
<td>Flood</td>
<td>99%</td>
<td>0.9%</td>
<td>0.1%</td>
</tr>
<tr>
<td></td>
<td>Non-Flood</td>
<td>0%</td>
<td>90%</td>
<td>10%</td>
</tr>
</tbody>
</table>

9.2 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 the Council to prepare the plan (based on the most recent information available to the Minister) must be taken into account.

Quantifying current shares was an estimate based on the best available information on the current level of use of all sectors.

The Allocation Policy requires that information about current use by sectors must be:
- Real – that is, data must be available – it must have been collected and published.
- Recent – data on which the information is based should be the most recent available; no data older than five years old should be used.
- Reliable – the data on which the information is based should have been obtained, and the information or report collated or prepared, in a way that is verifiable. The process for obtaining the data and preparing the information should be documented.

The information used for 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)

9.3 Review of allocations

Allocations between sectors are to be reviewed periodically in accordance with the criteria set out in the Allocation Policy. For Lake Eyre Basin fisheries the first comprehensive review of shares will be conducted five years after the commencement of this management plan.

9.4 Method for adjusting allocations of access in future

A need for adjustment of shares between different sectors may be triggered by:
1. A review of the allocations between sectors (section 9.3 above);
2. A review of the management plan, which will reassess the appropriateness of shares and may trigger an adjustment; or
3. Outcomes of a resource assessment, which triggers a fisheries management decision that is made primarily to ensure sustainability of the fishery but that may result in a shift of shares between sectors.

9.5 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.

9.5.1 Initial assessment

The initial assessment is a process that will be overseen by the Fisheries Council. Once an allocation trigger is breached or the need for a review has been recognised, an assessment committee is to be established and chaired by an independent person (either Fisheries Council member or external appointment). The committee is required to assess the need for a second-stage assessment based on the following:

1. Has there been a shift in the access value of the fishery? Or is new information available that suggests a reallocation of shares would bring additional social and economic benefits to the State?
2. If a trigger limit has been breached, can the breach be readily explained and justified?
3. Is the potential change in shares significant and considered long-term? A minor shift/anomaly may not require a full review.

A written report is to be prepared by the committee to the Fisheries Council, with a recommendation to proceed to a full evaluation or not. The Fisheries Council will determine whether to move to a full evaluation, or may elect to refer a decision to the Minister.

9.5.2 Full assessment

As with the initial assessment, a full assessment of allocation is a process that will be overseen by the Fisheries Council. An evaluation panel is to be established with membership including an independent chair (either Fisheries Council member or external appointment), independent experts as required (e.g. economist, social scientist), representatives of each fishing sector and an independent appointment (with fisheries management and/or allocation experience).

The evaluation 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 flow on effects with regard to:

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

Following the full assessment, the review panel may recommend to the Minister one of two actions, either:
   a) manage each sector within the existing allocated shares; or
   b) proceed to adjust shares.

9.5.3.1 Process for managing within existing shares

If shares are to be maintained between all 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 commercial shares within the fishery is likely to be achieved through a variety of controls consistent with current management arrangements such as; seasonal and area closures, gear restrictions, catch limits and size limits. Recreational adjustments are likely to be made through alterations to existing bag and boat limits, seasonal closures and size limits.

9.5.3.2 Process for adjusting allocations

In the event that an adjustment of shares is required, the Fisheries Council will be responsible for determining the most appropriate adjustment package. 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 Allocation Policy.
   • Where possible, market mechanisms will be used to give effect to adjustments in share. Where there are no or limited market mechanisms available, adjustments to shares will be made in a similar manner used to manage shares within existing allocations.
   • Acquisition of entitlements will be compensated in accordance with the provisions of the Allocation Policy.
   • Adjustments are to be finalised within 2 years.

10 MANAGEMENT STRATEGIES

10.1 Spatial scale of fishery management

Part A of this management plan addresses commercial and recreational fishing activities within South Australia's borders as they relate to the area of the Lake Eyre Basin. Part B addresses management of Aboriginal traditional fishing activities by the Yandruwandha Yawarrawarrka People.

For the commercial fishery, management is focused on the local environment of Lake Hope and Red Lake, and the commercial fishing activities of the Mulka Station miscellaneous fishery licencee. A broad scale collaborative river health monitoring strategy (LEBRA, and associated finer scale monitoring) also collects information of primary relevance to stock sustainability of Lake Eyre Basin Golden...
Perch. Data from this broader monitoring program will complement a proposed fishery independent monitoring program, similar to that carried out by SARDI Aquatic Sciences (Ye, 2002); to operate each time the Mulka fishery is active. This program will collect commercial fishery catch and effort data, and relevant biological data.

For the recreational fishery, management is focused on protecting key species within refugia and preventing the introduction of pest species and movement of non-endemic native species caused by translocation. Strategies have been developed such as PIRSA Fisheries and Aquaculture’s education and compliance programs to reduce the likelihood of species translocation.

The overarching LEBRA monitoring program is the primary measure of ecological health of Lake Eyre Basin rivers, including South Australian reaches. The LEBRA monitoring program will be utilised to monitor the health of key refugia sites, which will also need to be supplemented by finer scale monitoring programs and should ideally be expanded through state investment to maximise the information return for the poorly studied SA section of the Basin. These will be required to inform on specific fisheries management issues and risks. An example is the monitoring of high conservation value refugia (e.g. Algebuckina waterhole on the Neales River). Analysis at finer spatial scales will inform the development of more precise fisheries management responses where necessary.

**10.2 Harvest strategy**

**10.2.1 Commercial fishery**

The Lake Eyre Basin fishery is managed differently to other commercial fisheries, due to Lake Hope and Red Lake filling after larger scale flooding, which occurs approximately once in every 10 years. Through the development of this management plan, a seasonal 350 tonne total allowable commercial catch (TACC) of Lake Eyre Golden Perch (*Macquaria* sp. B) is proposed. This is based on a maximum previous historical catch of 339 tonne (1991 – 1994 season), which had no observable impacts related to the risks highlighted through the ESD risk assessment. These included nutrient transfers, impacts on ecologically related species and spawning biomass, as all fish die once the lakes dry. The provision of a 350 tonne TACC gives the licensee some certainty to plan his business, is comparable to the highest historic catch and follows the precautionary approach and requirements under the *Fisheries Management Act 2007*.

Welch’s Grunter has been added as a permitted species to the licence, as previous fishing operations noted that Welch’s Grunter was a consistent proportion of the by-catch compromising 25% of the total catch. This condition will allow the licence holder to retain the catch of this species as by-product (that was previously required to be discarded). The ESD risk assessment highlighted that the commercial fishery had a low impact on the non-retained capture of the species and discussed that they are considered widespread and abundant within suitable habitat in the region (Wager and Unmack, 2000). Due to a higher prevalence of Barcoo Grunter in the catch during current fishing activities, the ability to take this species has also been added as a permitted species on the licence. PIRSA Fisheries and Aquaculture has considered scientific advice from SARDI Aquatic Sciences that the Barcoo Grunter are highly abundant and widespread, and can
therefore be added as a by-product species without increasing any risks to the ecosystem that are identified in the plan.

The fishing season is defined as the time when the water disconnects from the system until the waters have dried. Scientific advice has indicated that once the flows begin to recede past 70,000ML, it will take approximately 8 months for Lake Hope and Red Lake to disconnect from the Cooper Creek system. The change from the previous arrangements is a result from the difficulty of determining when and where the disconnection from system has occurred. The disconnection of the lakes is very important to protect the spawning population within the Lakes (as they continue to spawn when connected) and allows the movement of fish back into the Cooper Creek system and more importantly into permanent waterholes (refugia).

If additional waters are received and reconnected during the fishing period, the targeting of Lake Eyre Golden Perch will be closed until the system has disconnected. Scientific advice provided indicated that the system will reconnect from Cullymurra waterhole to Lake Hope and Red Lake if 70,000 ML is received for more than 12 days. This proposed decision rule has been implemented to protect the movement of Lake Eyre Golden Perch in the event that they return to the system (in particular back to Cullyamurra waterhole) and that Lake Eyre Golden Perch are known to spawn in association with spring floods.

In summary the Mulka Station commercial fishery is subject to the following licence conditions:

- The fishing activity is only permitted in Lake Hope and Red Lake on Pastoral Lease 2399 (Mulka) and Pastoral Lease 2447 (Lake Hope).
- (1) If one registered boat is endorsed on this licence, the licence holder must not cause or permit more than two persons to act as his agent, in addition to the registered master, when fishing pursuant to this licence. (2) If two registered boats are endorsed on this licence, the licence holder must not cause or permit more than four persons to act as his agent, in addition to the registered masters, when fishing pursuant to this licence compulsive.
- Only Lake Eyre Golden Perch (*Macquaria* sp. B), Welch's Grunter (*Bidyanus welchi*) and Barcoo Grunter (*Scortum barcoo*) may be taken. Welch's Grunter and Barcoo Grunter may only be taken as by-product when targeting Lake Eyre Golden Perch.
- A 350 tonne total allowable commercial catch limit will apply to Lake Eyre Golden Perch.
- Once the 350 tonnage limit of Lake Eyre Golden Perch is reached no further fishing will be allowed, including the removal of Welch's Grunter or Barcoo Grunter.
- Fishing may only commence eight months after the last peak of 70,000ML has been recorded at the Cullyamurra waterhole.
- If the fishery commences after disconnection, but then a pulse of water reconnects the system, the fishery should be closed again until after a subsequent disconnection (as listed below). After disconnection a decision on the tonnage limit will be determined depending on the size and timing of the flood.
• Reconnection will only be deemed to have occurred if waters flow past Cullyamurra waterhole at 70,000ML for more than 12 days.

• Nets and other equipment used to take fish must not have been used in any other waters.

• The Pastoral Board should be notified by the licence holder prior to fishing.

• Monitoring arrangements for the catch limit will apply.
  - A report must be made to PIRSA FISHWATCH (1800 065 522) providing the details of the Catch and Disposal Record (CDR) and details of the transportation company prior to transportation of the catch.
  - A copy of the CDR is to be provided to PIRSA Fisheries and Aquaculture, not later than the 14 days after being completed.

In general there has been strong cooperation on a range of administrative, science and management issues between the licence holder and PIRSA Fisheries and Aquaculture since the fishery's inception.

10.2.2 Recreational fishery

PIRSA Fisheries and Aquaculture manages the Lake Eyre Basin recreational fishery through a combination of input and output controls, aimed at ensuring the total catch is maintained within sustainable limits and to ensure that recreational access to the fishery is distributed equitably between participants. These controls include limitations on the type and amount of fishing gear that may be used, legal size limits for individual species and bag and boat limits.

Gear restrictions are input controls that limit the intensity of gear that fishers can use to catch fish and control fishing effort. In all fisheries, it is important to ensure that there is an effective breeding biomass to support the fishery. A minimum legal size limit is a tool used by fisheries managers to ensure that fish reach sexual maturity before they enter the fishery and have an opportunity to contribute to the population before they are caught.

Daily bag and boat limits are output controls used to restrict overall catch in the recreational sector to ensure harvest levels remain within sustainable limits. A bag limit restricts the number of fish that one fisher can take during a 24-hour period from midnight to midnight. If three or less people are fishing from a boat, the daily personal bag limit applies to each person. If three or more people are fishing from a boat, the combined boat limit (that is the total number of fish that can be landed onto the boat) is generally set at three times the daily personal bag limit. For further information on the current limits that apply to recreational fishing in the region, refer to Appendices 4 and 8.

PIRSA Fisheries and Aquaculture also periodically reviews recreational bag, boat and size limits. These reviews aim to update the existing limits by taking into account information on the status of fish 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. The reviews seek advice from fisheries scientists, fisheries managers, compliance officers and key recreational fishing stakeholders, and involve community consultation. The latest review will be included as part of the
recreational fishery management plan, due mid 2012. Some existing size, bag and boat limits relevant to recreational fishing in the Lake Eyre Basin may change.

Gaining estimates of the total recreational catch will inform management decisions to constrain future catches taken by the fishery and/or make adjustments to the catch share allocated to the recreational sector in this plan. Such decisions would primarily be made to pursue the ecologically sustainable development objectives of the Act and the goals of this management plan.

Future changes to input and output controls in place for the fishery (including size limits, bag and boat limits and spatial closures) would also be considered in the context of the sustainability provisions of refugia management, and primarily measured through the LEBRA monitoring program.

10.3 Biological performance indicators

10.3.1 The Lake Eyre Basin Rivers Assessment

The LEBRA approach is the primary monitoring strategy used under the auspices of the Lake Eyre Basin Agreement to determine river health across the Agreement area, and to monitor future river health over time. The first Rivers Assessment was reported in 2008 (LEBMF Scientific Advisory Panel, 2008).

Methods for the Rivers Assessment were initially developed by a project team led by Queensland’s Griffith University (Sheldon et al. 2005). For monitoring and assessment purposes river ecosystems were categorised to headwaters, river channels and waterholes, and terminating wetlands.

The approach relies on indicators informed by earlier large scale Lake Eyre Basin river health monitoring approaches. These have since been refined for application to the unique bio-physical characteristics and scale of the Lake Eyre Basin rivers. LEBRA river health indicators are grouped into themes (flood and flow, physical form, riparian and floodplain, and waterholes and wetlands). These themes were developed to recognise the “intricate inter-relationships of climate, hydrology, geomorphology, floodplains and aquatic ecosystems” of the Lake Eyre basin rivers (Sheldon et al, 2005). River reach, waterhole and wetland indicators are focused on macro-invertebrate and fish assemblages, and water quality and waterhole process and function (benthic metabolism, algal biomass and composition and stable isotope analysis).

For the Lake Eyre Basin, fish assemblages have been recognised as a relatively reliable and proven indicator of aquatic system health in the basin (Sheldon et al, 2005; Costelloe et al, 2004; McNeil et al, 2008). Key attributes of the use of fish assemblages as an indicator (or index of biotic integrity) include:

- Longevity of some species (providing long term indicators)
- Mobility of some species (broad spatial coverage)
- Cover a range of trophic levels (ecosystem health)
- Cost effective and proven collection/capture methods
- Generally well established taxonomy and ease of field identification
- Habitat and ecology of species generally understood (Sheldon et al, 2005)
Although some data were already available to support monitoring and further development of the Rivers Assessment approach, the initial report identified the need to conduct further development and testing of some elements via pilot projects. This has since been done (e.g. McNeil et al, 2008). The nature of the indicators to be used both for LEBRA monitoring, and later finer scale fish assemblage monitoring initiatives continue to evolve.

Results from these later projects to refine and test the LEBRA approach for fish assemblages have added substantially to the state of knowledge about arid zone rivers (McNeil and Schmarr, 2009; McNeil et al, 2008). These projects have particular relevance to the SA portion of the major river systems (Neales/Peake, Diamantina/Warburton, and Cooper Creek). They represent the latest detailed understanding of the use of fish assemblages and related indicators to monitor the health of these rivers.

In aggregate, the LEBRA monitoring approach provides a comprehensive catchment scale monitoring and evaluation framework. When complemented with finer scale monitoring initiatives it provides a strong framework to cost effectively monitor river health and aquatic ecosystem function across the South Australian part of the Lake Eyre Basin. Healthy aquatic systems are the primary determinant of the ongoing quality and productivity of recreational and commercial fisheries in the region.

It is also widely accepted that greater community engagement in NRM management activities will pay dividends for Lake Eyre Basin communities and the unique natural environment around them. Whilst the LEBRA program is the central measure of river health, there may also be a role for more localised community based monitoring. Silcock (2009) has proposed a practical and low cost approach to ongoing monitoring of selected permanent water-bodies for the Cooper Creek, Diamantina and Georgina River catchments in Queensland and South Australia. The approach is largely qualitative and well within the capacity of most community members, local conservation groups, or landholders to apply. It uses a condition assessment of both riparian and aquatic waterhole condition to provide a snapshot of water-hole health. It could be used to promote community engagement and river stewardship and may complement the more complex and quantitative LEBRA approach.

Consensus on indicators for aquatic health in Lake Eyre Basin rivers suggests that a healthy refuge water-hole will be dominated by native species with very few alien species. Silcock suggests: "native indicator species common to all major catchments include yellowbelly (*Macquaria* sp.), bony bream (*Nematolosa erebi*), Hyrtl’s tandan (*Neosiluris hyrtlii*) and silver tandan (*Porochilus argenteus*). Healthy, permanent, in-channel waterholes would be expected to have at least three of these species present ± desert rainbowfish (*Melanotaenia splendida tatei*), spangled perch (*Leiopotherapon unicolour*), glassfish (*Ambassis* sp.) and grunters (*Scortum barcoo* and *Bidyanus welchii*). Less permanent waterholes, or those in upper catchments, should not be expected to have as complete a species assemblage” (Silcock, 2009). The presence of alien and/or non-endemic native species (i.e. translocated species) would reduce the condition score of the water-hole being assessed.
This assessment framework (reproduced from Silcock, 2009) showing the five riparian condition parameters and two aquatic condition indicators is provided at Appendix 5.

10.4 Management performance indicators and reference points

In addition to the bio-physical performance indicators used to assess river health under the Lake Eyre Basin Rivers Assessment model, a suite of additional measures have been developed to support performance management against the objectives and enabling strategies for this management plan. These are provided in tables 10 and 11 below.
## Table 10. Objectives, strategies, and performance indicators for the commercial fishery.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Strategy</th>
<th>Addressing Risk</th>
<th>Performance Indicator</th>
<th>Description</th>
<th>Reference Point</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1a Golden Perch catches are ecologically sustainable</strong></td>
<td>1a (i) Lake Hope and Red Lake have naturally disconnected from the Cooper Creek system before fishing commences**(^{11})**</td>
<td>Intra-basin transmission of disease; fishing impacts on spawning population of Lake Eyre Basin Golden Perch</td>
<td>Cooper Creek gauging station data</td>
<td>Cease to flow heights for Lake Hope and Red Lake to be determined with reference to Cooper Creek flows</td>
<td>Fishing may only commence eight months after the last peak of 70,000ML has been recorded at the Culyamurra waterhole</td>
</tr>
<tr>
<td></td>
<td>1a (ii) Fishery independent catch and effort monitoring occurs each time the fishery is active</td>
<td>Monitoring adverse impacts from fishing, including advance warning of adverse impacts</td>
<td>Relevant data collected:</td>
<td>For Golden Perch these data will continue existing time-series from earlier seasons; inform on key sustainability parameters; and improve understanding of environmental factors and disease issues.</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>1a (iii) Effective refugia management**(^{12})**</td>
<td>Maintain Golden Perch recruitment to fishery and broader stock viability</td>
<td>“Normal” population structure in key refugia at any time</td>
<td>Suggests source populations of Lake Eyre Basin Golden Perch will be maintained through all environmental conditions (e.g. serious droughts)</td>
<td>Determined through Lake Eyre Basin fish assemblage monitoring programs (LEBRA and related finer scale monitoring)</td>
</tr>
<tr>
<td><strong>1b Broader ecological impacts of fishing are minimised</strong></td>
<td>1b (i) Fishery independent monitoring occurs each time the fishery is active</td>
<td>Monitoring bycatch composition and quantities; presence/absence of exotic species; possible interactions with TEP species</td>
<td>Relevant data collected</td>
<td>Enable characterisation of the fishery’s impacts on ecologically related species; may identify TEP interactions**(^{13})**</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>1b (ii) Catches are limited to no more than 350 tons in any one fishing</td>
<td>Nutrient transfer from dead fish to terrestrial production, and via flood</td>
<td>Licencsee catch reporting completed; random audits</td>
<td>Current maximum recorded catch is 339 tons (Oct 91-Mar 94). In addition to managing</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

---

**\(^{11}\)** See Miscellaneous Fishery licence conditions for the Mulka Station commercial fishery

**\(^{12}\)** Details are provided in management strategies for key refugia

**\(^{13}\)** Low levels of monitoring may not pick up rare interactions, and extensive monitoring will be prohibitively expensive and is not supported by the fishery’s risk profile.
<table>
<thead>
<tr>
<th>Objective</th>
<th>Strategy</th>
<th>Addressing Risk</th>
<th>Performance Indicator</th>
<th>Description</th>
<th>Reference Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>1b (iii)</td>
<td>Nets and gear used in the fishery are not used in other waters</td>
<td>Disease transmission</td>
<td>Nutrient loss/transfer, this strategy may enable earlier fishing (improve product quality) &amp; reduce OH&amp;S risks for the fishers</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td>1c The Fishery is profitable</td>
<td>1c (i) Fishing to commence as soon as the likelihood of reconnection to the Cooper Creek system is low</td>
<td>Deteriorating fish quality (i.e. strategy reduces urgency to fish before disease/fish kills). Will also improve OH&amp;S outcomes</td>
<td>Cooper Creek gauging station data</td>
<td>Not applicable</td>
<td>Reconnection will only be deemed to have occurred if waters flow past Cullyamurra waterhole at 70,000ML for more than 12 days</td>
</tr>
<tr>
<td>1c (ii) Collect economic data for the fishery</td>
<td>Poor economic performance (i.e. quantify net $ returns to community)</td>
<td>Gross Value of Production (GVP)</td>
<td>A &quot;snapshot&quot; of economic performance of the fishery should be conducted to aid understanding of net public benefit of the fishery.</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>1d Management is cost effective and efficient</td>
<td>1d (i) PIRSA Fisheries and Aquaculture to consult with licencee to determine an appropriate cost recovery model for the fishery</td>
<td>Management is not cost effective or efficient; Community share of costs may be inappropriate</td>
<td>Management expense ratio is acceptable (e.g. less than 15% of GVP)</td>
<td>A benchmark for efficient management. Cost recovery tends to drive accountability and improve efficiency</td>
<td>Not applicable</td>
</tr>
<tr>
<td>1d (ii) An appropriate proportion of research/monitoring costs are recovered from the licencee</td>
<td>Beneficiary of fishing does not pay an appropriate share of research and monitoring costs</td>
<td>Agreed share is recovered within 12 months of costs incurred</td>
<td>Recognises that the fishery operates in a unique natural environment and may incur increased information costs</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>1e Resource access is fair</td>
<td>1e (i) Enable access to recreational fishers consistent with current pastoral lease access arrangements</td>
<td>Unreasonable access limitations to a public fishery resource</td>
<td>Retain current licence condition promoting recreational fishing access</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>1f Precautionary management is applied where warranted</td>
<td>1f (i) Fishing gear not used elsewhere</td>
<td>Disease in unique and relatively pristine environment</td>
<td>Detailed in strategy 1b (iii) above</td>
<td>Detailed above</td>
<td></td>
</tr>
</tbody>
</table>

---

14 Also recognises that the fishery takes place in a listed RAMSAR site (Coongie Lakes Wetlands).
<table>
<thead>
<tr>
<th>Objective</th>
<th>Strategy</th>
<th>Addressing Risk</th>
<th>Performance Indicator</th>
<th>Description</th>
<th>Reference Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>1f (ii)</td>
<td>Lakes disconnected from Cooper Creek system</td>
<td>Disease as above; ensures fishing does not impact on breeding population of Golden Perch or other species caught</td>
<td>Detailed in strategy 1a (i) above</td>
<td>Detailed above</td>
<td>Detailed above</td>
</tr>
<tr>
<td>1f (iii)</td>
<td>350 ton catch limit applied</td>
<td>Recognises previous highest catch and no obvious signs of adverse impacts; addresses concerns about nutrient transfer from dead fish</td>
<td>Detailed in strategy 1b (ii) above</td>
<td>Detailed above</td>
<td>Detailed above</td>
</tr>
<tr>
<td>1f (iv)</td>
<td>Fishery independent monitoring occurs each time the fishery is active</td>
<td>Monitors unforeseen impacts; maintains time-series of catch and effort and broader impacts of fishing</td>
<td>Detailed in strategy 1a (ii) above</td>
<td>Detailed above</td>
<td>Detailed above</td>
</tr>
<tr>
<td>1g</td>
<td>Adverse external impacts on ESD objectives minimised</td>
<td>Introduction and spread of exotic (pest) species (i.e. European carp, cane toad, red-claw crayfish)</td>
<td>Presence/absence of pest species during Lake Eyre Basin RA and finer scale monitoring Eradication where appropriate</td>
<td>PIRSA Fisheries and Aquaculture engaged with development and implementation of biosecurity strategies relevant to aquatic health in the Lake Eyre Basin</td>
<td>As for SA bio-security plan No increase from 2010 LEBRA and related monitoring outcomes</td>
</tr>
<tr>
<td>2e (i)</td>
<td>PIRSA bio-security risk management and response plan</td>
<td>Communications and education strategies implemented</td>
<td>Ongoing internet based education. Brochures/issued as part of SA Desert Parks visitors pass</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>2e (ii)</td>
<td>PIRSA Fisheries and Aquaculture education and compliance programs</td>
<td>Collaborative frameworks established and activities implemented</td>
<td>As used for fisheries management more broadly. Frameworks established and annual programs for information sharing and collaboration agreed</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>2e (iii)</td>
<td>Collaborative compliance, management and education programs across Lake Eyre Basin jurisdictions</td>
<td>Inappropriate water resource development (i.e. flow regulation, extraction)</td>
<td>Lake Eyre Basin aquatic health considerations included in water resource policy development and decisions</td>
<td>PIRSA Fisheries and Aquaculture does not have direct regulatory responsibility however is a key partner in the development of water resource development policy for the Lake Eyre Basin</td>
<td>Not applicable</td>
</tr>
<tr>
<td>2e (iv)</td>
<td>PIRSA Fisheries and Aquaculture formal engagement with relevant SA and other Lake Eyre Basin water resource management agencies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objective</td>
<td>Strategy</td>
<td>Addressing Risk</td>
<td>Performance Indicator</td>
<td>Description</td>
<td>Reference Point</td>
</tr>
<tr>
<td>-----------</td>
<td>----------</td>
<td>----------------</td>
<td>-----------------------</td>
<td>-------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>2e (v)</td>
<td>PIRSA Fisheries and Aquaculture early engagement with infrastructure development authorities. Education and community awareness.</td>
<td>Inappropriate infrastructure development (i.e. barriers to fish passage from dams, culverts, causeways)</td>
<td>Future infrastructure meets guidelines for ensuring fish passage is maintained Key barriers (i.e. Innamincka causeway) are modified to meet guidelines</td>
<td>Guidelines for design and construction of infrastructure that facilitates natural fish migrations are widely available and observed</td>
<td>Not applicable</td>
</tr>
<tr>
<td>2e (vi)</td>
<td>PIRSA Fisheries and Aquaculture engagement with SA’s climate change RD&amp;E and response framework</td>
<td>Climate change impacts on hydrology and bio-physical systems/processes</td>
<td>Climate change response strategies are reflected in fisheries management arrangements for the Lake Eyre Basin</td>
<td>Greater awareness of the risks to ESD objectives from climate change leads to an appropriate management response (i.e. precautionary strategies on water resource development, management responses to increase aquatic system resilience to change)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>2e (vii)</td>
<td>Maximise operational flexibility for licence holder</td>
<td>External economic drivers impact commercial fishery (i.e. fuel price increases)</td>
<td>Licence holder satisfied with management arrangements</td>
<td>Management arrangements enable flexibility to fish, and market product, in ways that minimise the financial impact of external factors like fuel price increases</td>
<td>Not applicable</td>
</tr>
<tr>
<td>2e (viii)</td>
<td>Education and awareness for recreational anglers (incl code of practice) and communities/landholders</td>
<td>Reduced access and/or amenity for recreational fishers</td>
<td>No major conflicts between anglers and landholders over access to fishing areas</td>
<td>Greater awareness for anglers and landholders and an appropriate code of conduct for anglers should minimise tension/conflict.</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Objective</td>
<td>Strategy</td>
<td>Addressing Risk</td>
<td>Performance Indicator</td>
<td>Description</td>
<td>Reference Point</td>
</tr>
<tr>
<td>-----------</td>
<td>----------</td>
<td>-----------------</td>
<td>-----------------------</td>
<td>-------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>2a Recreational fishing catches are ecologically sustainable</td>
<td>2a (i) Manage recreational catch and effort under normal conditions using existing bag and size limits</td>
<td>All high risks except specific measures for Cooper Creek catfish and refugia management</td>
<td>Acceptable compliance performance</td>
<td>As for broader compliance program effectiveness measures</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>2a (ii) Collect additional data on recreational catch and effort in the Lake Eyre Basin region</td>
<td>More accurate estimates of catches and fishing locations or hot spots to inform management of high risk issues or species</td>
<td>Data quality is acceptable to relevant SARDI aquatic science programs</td>
<td>Knowledge of Lake Eyre Basin recreational fishing catch, effort, and broader impacts both spatially and temporally needs improvement.</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>2a (iii) Effective refugia management for Golden Perch</td>
<td>Maintain Golden Perch recruitment/stock viability</td>
<td>“Normal” population structure in key refugia at any time</td>
<td>Critical source populations of Lake Eyre Basin Golden Perch will be maintained through all environmental conditions (e.g. serious droughts)</td>
<td>Lake Eyre Basin fish assemblage monitoring programs (LEBRA) and related finer scale monitoring</td>
</tr>
<tr>
<td></td>
<td>2a (iv) Effective management of Cooper Creek catfish</td>
<td>Endemism, vulnerability to fishing pressure and status as a recreational “target species”.</td>
<td>“Normal” population structure in key refugia at any time</td>
<td>Presence/absence of larger adults in most permanent refugia in the lower Cooper Creek system will be an important indicator</td>
<td>Guided by LEBRA monitoring regime although species specific arrangements are a priority</td>
</tr>
<tr>
<td></td>
<td>2a (v) Targeted community and tourism focussed education campaign</td>
<td>Focused on high risk species (e.g. refugia, Cooper catfish, freshwater mussels) and issues (e.g. refugia management &amp; TEP species)</td>
<td>Dedicated signage in place, updated desert parks pass brochures</td>
<td>Integrated approach amongst key SA and QLD NRM bodies</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>2a (vi) Identify candidate no fishing areas for parts of key refugia on SA river reaches</td>
<td>Risk of major damage to aquatic ecosystem function and productivity in SA regions.</td>
<td>Decision rules developed to trigger recreational fishing closures in high value</td>
<td>Cullyamurra (Cooper Creek just south of Innamincka), &amp; Tirrawarra (Cooper Creek around 70km Northwest of</td>
<td>1. Determined through Lake Eyre Basin fish assemblage monitoring programs.</td>
</tr>
</tbody>
</table>

---

15 Conditions other than severe drought conditions, in which case additional management controls may be appropriate.

16 Adapting the Desert Parks access pass to collect information about intended recreational fishing activities may prove cost effective. It may also enable an appropriate sampling frame for further collection of data in the absence of a recreational fishing licence sampling frame.
### Goal: Recreational Fishing in the SA part of the Lake Eyre Basin meets ESD Requirements defined in the SA Fisheries Management Act 2007

<table>
<thead>
<tr>
<th>Objective</th>
<th>Strategy</th>
<th>Addressing Risk</th>
<th>Performance Indicator</th>
<th>Description</th>
<th>Reference Point</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2a (vii) Contribute to LEBRA monitoring program (and associated finer scale programs where warranted)</td>
<td>Sustainability of fishing; all higher risk ecological issues; including pest species translocation.</td>
<td>As for LEBRA program and related finer scale programs</td>
<td>This is a critically important longer term river health monitoring strategy for Lake Eyre Basin rivers</td>
<td>As for LEBRA program and related finer scale programs</td>
</tr>
<tr>
<td>2b There is an overall community benefit from recreational fishing</td>
<td>2b (i) Maintain productivity and biodiversity of SA river reaches</td>
<td>All high risk issues, species, and areas.</td>
<td>As for LEBRA program and related finer scale programs</td>
<td>As above</td>
<td>Determined through Lake Eyre Basin fish assemblage monitoring programs (LEBRA and related finer scale monitoring)</td>
</tr>
<tr>
<td></td>
<td>2b (ii) Collect economic and “community value” data for the recreational fishery</td>
<td>Socio-economic importance of recreational fishing in the Lake Eyre Basin is understood and quality is maintained</td>
<td>Integrated community based surveys for gauging NRM success are appropriate. Recreational fishing is a key activity for locals and visitors.</td>
<td>A snapshot of economic and other “value” attributed to recreational fishing is obtained to inform management activities and relative NRM priorities. Desert Parks “sampling frame” may assist</td>
<td>Inaugural survey results to be used as a benchmark for future surveys.</td>
</tr>
<tr>
<td></td>
<td>2b (iii) Community engagement in fishing related infrastructure and management projects (e.g. design and build Innamincka causeway fish-way)</td>
<td>Barriers to fish migration; Lack of community engagement and stewardship of aquatic habitat and biodiversity</td>
<td>Innamincka fish-way community group established; community groups established to contribute to protection of key refugia.</td>
<td>Tangible conservation initiatives targeted at genuine priorities could be used as “flagships” for this approach. Cullyamurra and Algebuckina waterholes could be good models for community action plans.</td>
<td>Not applicable</td>
</tr>
<tr>
<td>2c Management, including compliance operations, is effective and efficient</td>
<td>2c (i) Formalise risk based compliance planning and cooperation between SA and QLD compliance teams.</td>
<td>Cross basin risks are not efficiently and effectively managed. Synergies to extract maximum value from available compliance</td>
<td>Annual joint compliance risk planning meeting; annual joint fisheries management forum</td>
<td>These initiatives can offer significant value and should be low cost if combined with other related NRM activities/meetings.</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Objective</td>
<td>Strategy</td>
<td>Addressing Risk</td>
<td>Performance Indicator</td>
<td>Description</td>
<td>Reference Point</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td></td>
<td>2c (ii) Formalise risk based management planning and cooperation between SA and QLD inland fisheries managers.</td>
<td>As above but focussed on fisheries management</td>
<td>As above but focussed on fisheries management</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2c (iii) Promote and enable greater community awareness and support for recreational fisheries management</td>
<td>Remoteness and limited resources available for compliance and management</td>
<td>Fisheries management and compliance attend major community events</td>
<td>Activities to be appropriately integrated across NRM agencies (i.e. integrated catchment management theme for the Lake Eyre Basin).</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>2c (iv) Reflect SA’s Lake Eyre Basin ESD risk assessment results in the next joint QLD/SA Lake Eyre Basin fisheries compliance strategy</td>
<td>All high risks; reflects need to target limited compliance resources carefully</td>
<td>Agreed priorities based on ESD risks for future compliance activities in the SA region of the Lake Eyre Basin</td>
<td>At least for the SA region. Ideally this will be a joint commitment by SA and QLD</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>2c (v) Refugia management strategies involving closures or no take are carefully designed</td>
<td>Unfair access restrictions (i.e. well considered and fair arrangements will reduce compliance risks associated with closures).</td>
<td>Qualitative indications of broad community support; active community engagement in refugia management</td>
<td>Initiatives to be carefully designed including community involvement in initial design, and ongoing monitoring/compliance</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>2d Precautionary management is applied where warranted</td>
<td>Disease in unique and relatively pristine environment; add to ecological resilience of</td>
<td>Detailed in relevant section above. May enable comparison between closed and refugia on private land or with greatly reduced access</td>
<td>Detailed in relevant section above</td>
<td></td>
</tr>
</tbody>
</table>

17 The use of “demonstration reaches” by the MDBA Native Fish Strategy is a useful model for this approach.
<table>
<thead>
<tr>
<th>Objective</th>
<th>Strategy</th>
<th>Addressing Risk</th>
<th>Performance Indicator</th>
<th>Description</th>
<th>Reference Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>2d (ii)</td>
<td>Close critical refugia for each major reach of SA rivers to all fishing during severe drought conditions</td>
<td>Disease transmission as above; ensures fishing (catch and broader disturbance) impacts do not impact on breeding population of Golden Perch or other key species.</td>
<td>Recreational catch and effort is dramatically reduced in these locations. Illegal fishing risks are dramatically reduced.</td>
<td>Must be part of an integrated risk management approach. Management of compliance risks will be challenging. Strong community involvement may assist, as may technology (i.e. monitoring primary access points).</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

2e Adverse external impacts on ESD objectives minimised

2e (i) PIRSA bio-security risk management and response plan

- Introduction and spread of exotic (pest) species (i.e. European carp, cane toad, redclaw crayfish)
- Presence/absence of pest species during LEBRA and finer scale monitoring
- PIRSA Fisheries and Aquaculture is engaged with development and implementation of biosecurity strategies relevant to aquatic health in the Lake Eyre Basin

2e (ii) PIRSA Fisheries and Aquaculture education and compliance programs

- Communications and education strategies implemented
- Ongoing internet based education and fisheries regulations made available. Brochures/information included and issued as part of SA Desert Parks visitors pass

2e (iii) Collaborative compliance, management and education programs across Lake Eyre Basin jurisdictions

- Collaborative frameworks established and activities implemented
- As for fisheries management and compliance more broadly. Frameworks established and annual programs for information sharing and collaboration agreed

2e (iv) PIRSA Fisheries and Aquaculture formal

- Inappropriate water resource development (i.e. Lake Eyre Basin aquatic health)
- PIRSA Fisheries and Aquaculture does not have

1. The annual total freshwater flow volume at the border on the

---

18 Severe needs to be defined from existing hydrological data and fish assemblage monitoring outcomes.
19 Requires further consideration and development.
20 There is little point (effectiveness and fairness) in closing a refugia to all fishing if other risks remain untreated (i.e. localized water extraction continues, or heavy grazing pressure persists)
<table>
<thead>
<tr>
<th>Objective</th>
<th>Strategy</th>
<th>Addressing Risk</th>
<th>Performance Indicator</th>
<th>Description</th>
<th>Reference Point</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>engagement with relevant SA and other Lake Eyre Basin water resource management agencies</td>
<td>flow regulation, extraction)</td>
<td>considerations included in water resource policy development and decisions. Annual total freshwater flow volume into South Australia river systems Cooper Creek and Diamantina</td>
<td>direct regulatory responsibility however is a key partner in the development of water resource development policy for the Lake Eyre Basin</td>
<td>Cooper Creek system falls below 41GL for two consecutive years. 2. The annual total freshwater flow volume at the border on the Diamantina falls below 29GL for two consecutive years.</td>
</tr>
<tr>
<td>2e (v) PIRSA Fisheries and Aquaculture early engagement with infrastructure development authorities. Education and community awareness.</td>
<td>Inappropriate infrastructure development (i.e. barriers to fish passage from dams, culverts, causeways)</td>
<td>Future infrastructure meets guidelines for ensuring fish passage is maintained Key barriers (i.e. Innamincka causeway) are modified to meet guidelines</td>
<td>Guidelines for design and construction of infrastructure that facilitates natural fish migrations are widely available and observed (Appendix 3).</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>2e (vi) PIRSA Fisheries and Aquaculture engagement with SA’s climate change RD&amp;E and response framework</td>
<td>Climate change impacts on hydrology and bio-physical systems/processes</td>
<td>Climate change response strategies are reflected in fisheries management arrangements for the Lake Eyre Basin</td>
<td>Greater awareness of the risks to ESD objectives from climate change leads to an appropriate management response (i.e. precautionary strategies on water resource development, management responses that enable greater aquatic system resilience).</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>2e (vii) Education and awareness for recreational anglers (include code of practice) and communities/landholders</td>
<td>Reduced access and/or amenity for recreational fishers</td>
<td>No major conflicts between anglers and landholders over access to fishing areas</td>
<td>Greater awareness for anglers and landholders and an appropriate code of conduct for anglers should minimise tension/conflict.</td>
<td>Not applicable</td>
<td></td>
</tr>
</tbody>
</table>
11 STOCK ASSESSMENT AND RESEARCH

11.1 Fisheries related research, data collection, and analysis

PIRSA Fisheries and Aquaculture contracts research services for each South Australian fishery as required. SARDI Aquatic Sciences is currently the primary research provider for core research for the Lake Eyre Basin commercial and recreational fisheries.

The Lake Eyre Basin Rivers Assessment is the primary monitoring program for overall health of Lake Eyre Basin rivers, including the South Australian reaches of these rivers. Monitoring of fish assemblages is a key aspect of this overall monitoring. Additional and finer scale complementary projects are also undertaken.

Research collaboration and shared funding between key South Australian Lake Eyre Basin NRM agencies is the preferred approach. A funding model is under development to clarify agency responsibility for key aspects of aquatic resource and fisheries management related research programs.

11.2 Reporting

The Lake Eyre Basin Rivers Assessment is a longer term monitoring program that is used to develop a comprehensive Lake Eyre Basin river health assessment every ten years. To enable this, annual monitoring is conducted at selected river sites and these data are compiled into interim reports. Complementary fisheries and aquatic ecology related research projects are also undertaken as required, and subject to available funding. Reports for these are distributed according to the extension and adoption strategy for those projects.

11.3 Strategic research plan

In keeping with the collaborative approach to Lake Eyre Basin fisheries and aquatic resource management there are a range of research related frameworks in place. The Lake Eyre Basin Ministerial Forum’s Scientific Advisory Panel has developed a comprehensive Knowledge Strategy to underpin information gathering and management in support of the Agreement’s objectives. There is a high level of consistency between the issues identified in the preparation of the Knowledge Strategy and those identified during the PIRSA Fisheries and Aquaculture ESD risk assessment process. These are outlined below (Table 12).


<table>
<thead>
<tr>
<th>Key knowledge areas for effective integrated NRM in the Lake Eyre basin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstraction of water for mining or irrigation developments</td>
</tr>
<tr>
<td>Biodiversity of the aquatic systems, including floodplains that may be impacted by water decisions or contaminants. (Are there biodiversity hot spots that act as important refuges for must be managed in a particular way?)</td>
</tr>
<tr>
<td>Impacts of pastoral activities, tourism and mining</td>
</tr>
<tr>
<td>Management of waterholes – grazing, abstractions of water, groundwater linkages</td>
</tr>
<tr>
<td>Management of floodplains – levees, road/rail links and their impacts on water flow across the floodplain</td>
</tr>
<tr>
<td>Introduction of exotic species, translocation of non endemic species, and appropriate responses</td>
</tr>
<tr>
<td>Impacts of groundwater management on surface water resources</td>
</tr>
<tr>
<td>Management of mound springs</td>
</tr>
<tr>
<td>Health of the rivers and catchments</td>
</tr>
<tr>
<td>Salinity hazards and impacts of vegetation management on shallow groundwater; and impacts of climate change on surface water resources</td>
</tr>
</tbody>
</table>

Recent research about Lake Eyre Basin fish assemblages and their response to varying hydrological conditions has also indicated areas for further research. For example the SAAL NRM Board has recently funded a collaborative project to:

- Identify risks from pests and formulate appropriate management plans for Algebuckina Waterhole (a listed HCVAE\(^2^2\)),
- Understand the connectivity between Great Artesian Basin spring groups (a threatened ecological community) and streams of the western Lake Eyre Basin,
- Decrease wind erosion due to loss of ground cover within Stony Plains, Channel Country, Mulga-lands and Mitchell grass Downs and Simpson Desert bio-regions.

McNeil and Schmarr (2009) suggest that a detailed study of refuge (source) and receiving (sink) habitats to establish relationships between fish assemblages and hydrologically driven connectivity of habitats is highly recommended. The role of Lake Eyre in providing pathways for re-colonisation after localised, or even river catchment level, extinctions of some species following severe drought is also an important area for further consideration.

Other key recommendations (McNeil and Schmarr, 2009) include:

- More recent fish assemblage monitoring has reaffirmed that fish population monitoring provides a strong indication of ecological health of Lake Eyre Basin rivers and should be continued.
- The design of the Innamincka Causeway needs further consideration with recent monitoring above and below the causeway suggesting it acts as a

---

\(^{21}\) Sourced from Lake Eyre Basin MF Scientific Advisory Panel Information papers 2004, and the PIRSA Fisheries Lake Eyre Basin ESD risk assessment process.

\(^{22}\) High Conservation Value Aquatic Ecosystem.
significant barrier to native fish migrations. An appropriate rock ramp fishway allowing passage of both small bodied and more mature larger bodied native fish species should be constructed.

- An assessment of introduced fish species for the Lake Eyre Basin followed by the development of pest species control strategies, and response planning for potential future introductions done in conjunction with PIRSA Fisheries and Aquaculture bio-security unit.

- Community education and liaison programs focussed on protecting native species and habitats and reducing the risks of alien species introduction or expansion.

For research efficiency, and to direct future research to key fisheries and aquatic resource management priorities, consideration should be given to establishing a Lake Eyre Basin aquatic resource management research sub-committee, led by SARDI Aquatic Sciences. This is likely to increase the return on investment from current and future research funding.

\[23\text{ A Co-operative Research Centre (CRC) model may be appropriate, and should recognise the benefits of inter-departmental, and inter-jurisdictional research collaboration.}\]
12 COMPLIANCE AND MONITORING

12.1 Objectives

PIRSA Fisheries and Aquaculture runs a compliance program to:

- Maximise voluntary compliance with fisheries rules\textsuperscript{24}
- To create effective deterrence to breaching fisheries rules

These objectives are consistent with the National Fisheries Compliance Policy.

Voluntary compliance is maximised through ensuring that fishers are aware of the rules that apply to their fishing activities, understand the rules and the purpose of those rules, and operate in a culture of compliance. Effective deterrence is created through the presence of Fisheries Officers and community awareness of compliance operations, as well as through detection and prosecution of illegal activity.\textsuperscript{25}

The Lake Eyre Basin region poses unique compliance challenges. There are vast distances to be covered and many remote locations. The ESD risk assessment process has also identified several high risk issues, many of which will only be effectively addressed through collaborative fisheries management and compliance. This management plan includes strategies to improve the level of community engagement with fisheries issues, and to promote community stewardship of aquatic resources. It also reinforces the need for co-operative compliance and management activities that extend across jurisdictional boundaries.

12.2 Cost recovery

Compliance costs for commercial fishers in South Australia are recovered from licence holders through their licence fees in accordance with the government’s cost recovery policy for fisheries. Compliance costs for non-commercial sectors (i.e. recreational and Aboriginal traditional fisheries) are funded by government from consolidated revenue.

12.3 Planning

Compliance programs are developed on an annual basis to:

- Support fisheries management objectives for each fishery
- Identify emerging compliance risks in each fishery
- Respond to key risks within each three year period
- Have an appropriate mix of tools designed to maximise voluntary compliance and create effective deterrence

\textsuperscript{24} Rules include regulations, licence conditions, closure notices or any other enforceable instrument under the \textit{Fisheries Management Act 2007}.

\textsuperscript{25} Prosecution may include the issuing of a formal caution or an expiation notice, in addition to prosecution through the courts.
• Establish benchmarks against which to measure responses to risks

12.4 Risk assessment

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

This risk assessment is used to inform annual compliance planning processes.

The risk assessment for the recreational fishery in the lake Eyre Basin region involves the analysis of information received from many sources, including interstate fisheries compliance teams. Cross authorisation between interstate authorities is essential for efficiency and to facilitate cross jurisdictional management of key fisheries ESD risks.

12.5 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 maximising voluntary compliance and creating effective deterrence.

Benchmarks are established to measure compliance activities and guide the allocation of compliance resources.

12.6 Compliance plans

Plans for each fishery are developed each year and include activity forecasts for the following two years.

12.7 Compliance status report

Every year a report is to be prepared assessing the compliance status of the recreational fishery and Miscellaneous Fishery. This report will:

• Describe the compliance program for the previous year including an overview of activities and relevant statistics
• Describe how the program has been implemented to achieve both voluntary compliance and create effective deterrence
• Describe the priority risks that were addressed over that period
• Comment on any changes to the risk profile of the fishery during that period
• Analyse the compliance status of the fishery (including information about intelligence reports received)
• Make suggestions for future compliance planning
13 REGULATORY ARRANGEMENTS

13.1 Licensing

The Lake Eyre Basin commercial fishery is authorised under the *Fisheries Management (Miscellaneous Fishery) Regulations 2000* and *Fisheries Management (General) regulations 2007* for licence Y067.

In relation to the licence, the Minister reserves the right to amend licence conditions and entitlements for the Lake Eyre Basin Fishery if required to meet sustainability objectives of the *Fisheries Management Act 2007* and/or in this plan through the term of the plan.

In addition, the Fisheries Council of South Australia is currently undertaking a review of the rules and regulations under the Act (the Rules Review) in order to standardise and simplify the number of rules imposed across all fisheries. The Minister reserves the right to amend licence conditions and entitlements as a result of the outcomes of the Rules Review, including the gear review component.

13.2 Management arrangements

13.2.1 Commercial fishery

Access to the commercial fishery in Lake Hope and Red Lake is provided through a licence for the Miscellaneous Fishery. Miscellaneous Fishery licences are not transferrable. Licences are issued for a period of ten years under this management plan.

Management arrangements for the commercial fishery reflect the licence conditions outlined in Section 10.2.1.

13.2.2 Recreational fishery

Recreational fishing in the South Australian area of the Lake Eyre Basin is managed under a range of input and output based management controls. These include restrictions on the type and amount of specific fishing gears, and species specific bag and size limits (Appendix 4 & 8).

13.3 Fish processing

The Act and the *Fisheries Management (Fish Processor) Regulations 2007* set out the requirements for registration as a fish processor.
14 REVIEW OF PLAN

A review of this management plan may be conducted at any time and a full review of the Lake Eyre Basin Fishery will be conducted in the 12 months prior to the expiry of this plan.

Under the *Fisheries Management Act 2007* management plans are subject to periodic review by the Fisheries Council. Section 49 of the Act outlines the process for reviewing a management plan:

14.1 49—Review of management plans

(1) The Council may review a management plan at any time.

(2) The Council must, as soon as practicable after the fifth anniversary of the commencement of a management plan, conduct a comprehensive review of the plan for the purpose of determining whether the plan should be amended, replaced or reinstated without amendment.

(3) The Council must submit a report on the outcome of a review under this section to the Minister within 12 months after the commencement of the review.

(4) The Minister must, within 12 sitting days after receiving a report under this section, cause copies of the report to be laid before both Houses of Parliament.

(5) If a report under this section recommends that a management plan should be reinstated without amendment on its expiry, the plan may be so reinstated without following the procedures set out in section 44.

(6) If a plan is to be reinstated under this section, the Minister must—

   (a) adopt the plan and
   
   (b) cause notice of that fact to be published in the Gazette and
   
   (c) in the Gazette notice adopting the plan, fix a date on which the plan will take effect.

If future fishing ILUAs are determined in relation to other Native Title claims in the region (including Dieri, The Arabunna Peoples and The Wangkangurru/Yarluyandi), Aboriginal traditional fishing management plans to guide implementation of these ILUAs can be added to this management plan, without the need for a full review of this plan.
15 RESOURCES REQUIRED TO IMPLEMENT THE PLAN

15.1 Cost recovery - overview

South Australian commercial fisheries operate in accordance with the Government’s cost recovery policy whereby management costs for each commercial fishery (including costs of policy development, research, and compliance) are recovered from licence holders. Commercial and recreational fishers, through their representative bodies, are engaged in the development of policy, compliance, and research programs in partnership with PIRSA Fisheries and Aquaculture and its service providers. This is an important facet of co-management in South Australia.

Further details about the process for developing research and compliance programs are set out in sections 11 and 12 of this management plan.

PIRSA collects licence fees from Miscellaneous Fishery licence holders in accordance with the South Australian Government’s cost recovery policy for the management of commercial fisheries and the Fisheries Management (Fees) Regulations 2007.

For recreational fisheries all of the costs associated with management, compliance and research activities are met from consolidated revenue.
PART 2: YANDRUWANDHA YAWARRAWARRKA TRADITIONAL FISHING MANAGEMENT PLAN

This management plan has been prepared by the Fisheries and Aquaculture Division of Primary Industries and Regions South Australia (PIRSA Fisheries and Aquaculture) in association with the parties to the Yandruwandha Yawarrawarrka Fishing ILUA, for the purpose of implementing those parts of the Yandruwandha Yawarrawarrka Fishing Indigenous Land Use Agreement (ILUA) that relate to activities regulated under the Fisheries Management Act 2007.

Disclaimer

This management plan has been prepared for the purposes of implementing the Yandruwandha Yawarrawarrka Fishing ILUA. It is a policy document that guides the use of other instruments under the Fisheries Management Act 2007, including permits issued under that Act. The information contained in this document is current at the time of publication. However, changes to this management plan may occur during the life of the plan, in accordance with the provisions of the Yandruwandha Yawarrawarrka Fishing ILUA and this plan.

This document also contains information in relation to the Fisheries Management Act 2007 and associated regulations. This information has been prepared as a summary of the fisheries management arrangements that are in place at the time of publication, and does not replace the legislation. Legislation may change from time to time. It is the responsibility of each individual to ensure that they are aware of the law that applies and to comply with it.
1 GENERAL PURPOSE OF AN ABORIGINAL TRADITIONAL FISHING MANAGEMENT PLAN

1.1 The Indigenous Land Use Agreement (ILUA) framework

ILUAS are instruments that may be registered under the Native Title Act 1993 (Cth) giving effect to agreements that address native title issues.

1.2 The legislative framework for managing fisheries

Aquatic resources (fish and aquatic plants) are publicly-owned resources that are managed by the State on behalf of the community and future generations. Currently, fisheries are managed in accordance with the Fisheries Management Act 2007.

The objectives of the Fisheries Management Act 2007 are set out in section 7:

1. An object of this Act is to protect, manage, use and develop the aquatic resources of the State in a manner that is consistent with ecologically sustainable development and, to that end, the following principles apply -
   (a) 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
   (b) access to the aquatic resources of the State is to be allocated between users of the resources in a manner that achieves optimum utilisation and equitable distribution of those resources to the benefit of the community
   (c) aquatic habitats are to be protected and conserved, and aquatic ecosystems and genetic diversity are to be maintained and enhanced;
   (d) recreational fishing and commercial fishing activities are to be fostered for the benefit of the whole community
   (e) the participation of users of the aquatic resources of the State, and of the community more generally, in the management of fisheries is to be encouraged.

2. The principle set out in subsection (1) (a) has priority over the other principles.

3. A further object of this Act is that the aquatic resources of the State are to be managed in an efficient and cost effective manner and targets set for the recovery of management costs.

4. The Minister, the Director, the Council, the ERD Court and other persons or bodies involved in the administration of this Act, and any other person or body required to consider the operation or application of this Act (whether acting under this Act or another Act), must—
   (a) act consistently with, and seek to further the objects of, this Act and
   (b) insofar as this Act applies to the Adelaide Dolphin Sanctuary, seek to further the objects and objectives of the Adelaide Dolphin Sanctuary Act 2005 and
(c) insofar as this Act applies to the River Murray, seek to further the objects of the River Murray Act 2003 and the Objectives for a Healthy River Murray under that Act.

5. For the purposes of subsection (1), ecologically sustainable development comprises the use, conservation, development and enhancement of the aquatic resources of the State in a way, and at a rate, that will enable people and communities to provide for their economic social and physical wellbeing while -

(a) sustaining the potential of aquatic resources of the State to meet the reasonably foreseeable needs of future generations and

(b) safeguarding the life-supporting capacity of the aquatic resources of the State and

(c) avoiding, remedying or mitigating adverse effects of activities on the aquatic resources of the State.

(taking into account the principle that if there are threats of serious or irreversible damage to the aquatic resources of the State, lack of full scientific certainty should not be used as a reason for postponing measures to prevent such damage).

The Fisheries Management Act contemplates three types of fishing:

- Commercial
- Recreational
- Aboriginal traditional fishing

Commercial fishing may only be undertaken in accordance with fishery licences issued by the Minister for Agriculture, Food and Fisheries (the Minister). Recreational fishing is not licensed but is subject to a range of regulatory restrictions such as bag and boat limits, size limits, limits on the types of gear that may be used, temporal and spatial closures and the complete protection of some species. The Act recognises Aboriginal traditional fishing as a separate category of fishing.

1.3 Definitions

The definitions included in the ILUA apply to this management plan.

Committee means the Yandruwandha Yawarrawarrika Parks Advisory Committee appointed by the Minister in accordance with clause 7.2 of the Coongie Lakes National Park Co-management Agreement.

Director of Fisheries has the same meaning as in the Fisheries Management Act 2007 and includes his or her representative or delegate.

Director of National Parks and Wildlife means the Director of National Parks and Wildlife for South Australia or any person acting in that position or exercising, pursuant to delegation, any of the powers, authorities, duties or functions of the Director.

DEWNR means the South Australian Department for Environment, Water and Natural Resources and is used to include any future name of this Department having responsibility for administering the National Parks and Wildlife Act 1972.
Permit means a permit issued by the Minister for Agriculture, Food and Fisheries or a delegate pursuant to the *Fisheries Management Act 2007*.

ILUA means the Yandruwandha Yawarrawarrrka Fishing ILUA.

ILUA Area means the area included in the Yandruwandha Yawarrawarrrka Fishing ILUA.

PIRSA Fisheries and Aquaculture means the Fisheries and Aquaculture Division of the Department of Primary Industries and Regions SA.

YYTLOAC means the Yandruwandha Yawarrawarrrka Traditional Lands Organisation (Aboriginal Corporation).

Traditional owners are those Aboriginal people who are part of a society, which in accordance with their traditional laws adhered to and customs observed, are recognised by other Aboriginal people as having ownership of the land and waters of an area occupied by their ancestors, in accordance with those traditional laws and customs, at the time of the assumption of British sovereignty. These traditional rights and interest continue to be asserted except that it is accepted that such traditional rights and interests cannot be recognised today other than in accordance with the laws of Australia.

1.4 Aboriginal Traditional Fishing Management Plans under section 60

The Minister and a native title group that is party to an ILUA may make an Aboriginal traditional fishing management plan under the ILUA for the management of specified Aboriginal traditional fishing activities in a specified area of waters.

An Aboriginal traditional fishing management plan must be consistent with:

- The ILUA
- The objects of the *Fisheries Management Act 2007*
- Any management plans for commercial fishing, recreational fishing or aquatic reserves under Part 5 of the Act that relate to the same area of waters

To achieve this consistency, the Yandruwandha Yawarrawarrrka Traditional Fishing Management Plan was developed with a view to balancing the following general objectives:

a) Recognise that fisheries resources are community-owned resources that are accessed by various user groups with competing interests, and that management of Aboriginal traditional fishing must be integrated into the management of those resources as a whole

b) Ensure that aquatic resources are not overexploited

c) Ensure that fish stocks and ecosystems used by Aboriginal South Australians for traditional fishing purposes are managed sustainably to meet the needs of future generations

d) Maintain and/or enhance Aboriginal South Australians’ ability to practise, protect and preserve their culture as it relates to the use of aquatic resources
e) Maintain and/or enhance Aboriginal individuals’ and communities’ wellbeing through their access to and use of aquatic resources that have traditionally been taken

f) Create partnerships between Aboriginal communities and the wider community

1.5 Relationship between ILUA and Aboriginal Traditional Fishing Management Plan

This management plan is a policy document that is intended to guide the implementation of the Yandruwandha Yawarrawarrrka Fishing ILUA. It sets out how decisions will be made in relation to Aboriginal traditional fishing by the Yandruwandha Yawarrawarrrka People in the area to which the ILUA applies and provides the framework for authorising those fishing activities under the Fisheries Management Act 2007. It is intended to facilitate management of Aboriginal traditional fishing in a way that is consistent with the objectives of the Fisheries Management Act 2007.

This management plan has been developed to implement the State’s commitments relating to Aboriginal Traditional Fishing activities in the Yandruwandha Yawarrawarrrka Fishing ILUA. If this management plan is terminated, in accordance with the process set out in this plan, then the ILUA may also be terminated, as set out in the ILUA. If the ILUA is terminated, this management plan is also automatically terminated.

1.6 Ensuring ecological and cultural sustainability

The Yandruwandha Yawarrawarrrka Fishing ILUA supports the development of an Aboriginal Traditional Fishing Management Plan for the purpose of ensuring that members of the Yandruwandha Yawarrawarrrka People are able to enjoy, exercise and maintain Aboriginal traditional fishing practices in a way that is sustainable. An Aboriginal Traditional Fishing Management Plan will help ensure that the Yandruwandha Yawarrawarrrka People can manage their traditional fishing activities taking into consideration both traditional laws and customs and the laws of the State.
2 YANDRUWANDHA YAWARRAWARRKA ABORIGINAL TRADITIONAL FISHING

2.1 Brief history of fishing by Yandruwandha Yawarrawarrka People

Fishing has always been and continues to be integral to Yandruwandha Yawarrawarrka identity. Yandruwandha Yawarrawarrka People's relationships to the waters of their country are fundamental to the understanding of their country as a whole.

Fishing has been very important to the Yandruwandha Yawarrawarrka sustenance and to their cultural and spiritual lives. Traditional stories of Yandruwandha Yawarrawarrka People and the historical records of European and other explorers and settlers provide a record of widespread use of aquatic resources and the use of a range of technologies in harvesting them.

Yandruwandha Yawarrawarrka People and their ancestors have earned sustenance from the aquatic resources of the ILUA Area's Waters for many years. The Yandruwandha Yawarrawarrka People established a body of laws and customs to govern management and use of the aquatic resources of the ILUA Area, including the trade of such resources with other groups. As such, Yandruwandha Yawarrawarrka People assert rights to all organisms in the waters of the ILUA Area and the right to access such resources. Furthermore, Yandruwandha Yawarrawarrka People also believe that other species, apart from fish and crustaceans etc., and aspects of their aquatic ecosystems are also culturally important and should be protected.

Yandruwandha Yawarrawarrka People have used and continue to use a variety of fishing methods. Methods used and species targeted may be seasonal in nature. For example, netting fish in a variety of ways has been part of Yandruwandha Yawarrawarrka People activities. Netting features in contemporary fishing activities and oral histories of Yandruwandha Yawarrawarrka People. Spear-fishing is another example of a Yandruwandha Yawarrawarrka fishing method widely used and reported.

The collection of crustaceans and shellfish from the ILUA Area Waters has been another important aspect of Yandruwandha Yawarrawarrka fishing activities and is widely evidenced in the faunal remains on archaeological sites.

The above described fishing methods provide a sample of the fishing activities of Yandruwandha Yawarrawarrka People. Such methods should not be considered as static or become over-codified as it is important not to prevent the further development of Yandruwandha Yawarrawarrka fishing traditions.
3 MANAGEMENT OF YANDRUWANDHA YAWARRAWARRKA ABORIGINAL TRADITIONAL FISHING

3.1 Application of the Plan

Term of Plan
This Plan is to apply for an indefinite period. A review of the Plan is to be conducted in accordance with the processes set out in the Plan at least every 5 years.

How is Aboriginal traditional fishing different to other types of fishing?
Aboriginal traditional fishing in the ILUA Area is fishing that is permitted under this Plan. The definition that has been used as a basis for negotiating Aboriginal traditional fishing is provided by section 3 of the Fisheries Management Act 2007 (SA):

_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 in accordance with relevant Aboriginal custom._

There are substantial opportunities for recreational fishing by Yandruwandha Yawarrawarrka People in the ILUA Area which also satisfy these needs. For management purposes, the ILUA and the Management Plan provide that a person who is authorised to undertake Aboriginal traditional fishing in an area does not also undertake other forms of fishing such as recreational fishing on that same day. This principle needs to be incorporated into all instruments that implement this plan to avoid confusion and allow effective management.

Relationship of plan to other fisheries management plans
This traditional fishing management plan is intended to complement the recently developed Lake Eyre Basin Fisheries Management Plan covering commercial and recreational fishing in South Australian waters that are part of the Lake Eyre Basin.

3.2 The area that the Management Plan applies to

A map of the whole area is provided at Schedule 1 to this Plan. The areas of Coongie Lakes National Park, Innamincka Regional Reserve and Strzelecki Regional Reserve may have particular provisions as set out in this Plan.

In Parks and Reserves a range of additional matters need to be dealt with. This Plan needs to be read alongside the requirements of the National Parks and Wildlife Act 1972 (SA) and management plans for Parks and Reserves. Negotiations have been based on achieving agreements which meld together the objectives of all relevant legislation.
3.3 Objectives of this Plan

The objectives of this management plan are to:

a) Ensure, through proper conservation, preservation and fisheries management measures, that the aquatic resources of the Waters to which the plan applies are not endangered or overexploited

b) Provide for the management of Aboriginal traditional fishing activities by the Yandruwandha Yawarrawarrka People in the area to which the plan applies in accordance with the principles of ecologically sustainable development

c) Provide a framework for the continuance and enhancement of the culture of the Yandruwandha Yawarrawarrka People in relation to fishing, taking into account the relationship to land and waters that the Yandruwandha Yawarrawarrka People have with the area to which this plan applies

d) Provide for the protection and enhancement of culturally important habitats within the waters to which the plan applies.

For the purposes of the Yandruwandha Yawarrawarrka Fishing ILUA and this management plan, the definition of ecologically sustainable development is set out in section 7 of the *Fisheries Management Act 2007* (see above).

3.4 Strategies and management tools for pursuing objectives of the plan

The strategies for pursuing the objectives set out above have been agreed through the ILUA negotiation proves and are reflected in the management arrangements set out in this plan.

A number of fundamental fisheries management principles have underpinned those negotiations and the development of this management plan as follows:

1. Biological sustainability of fish stocks is the primary concern in all fisheries management arrangements.

2. Any issues associated with allocation of access to fisheries resources are best dealt with explicitly.

3. Aboriginal traditional fishing that allows fishing over and above recreational limits should be closely regulated to ensure that catch and effort information can be collected so that PIRSA Fisheries and Aquaculture and other fishing sectors have confidence in the arrangements.

4. Regulatory arrangements for Aboriginal Traditional fishing activities should be as practical as possible.

5. Fisheries management arrangements need to be based on provisions for issuing approved gear tags or permits or similar mechanisms to make the fishing activities easily identifiable where they differ from recreational fishing limits or restrictions.

6. Regulatory arrangements should be designed so that a Fisheries officer in the field does not have to know who is a Yandruwandha Yawarrawarrka person and who is not. Likewise, a Yandruwandha Yawarrawarrka person should not have to prove their membership of the Yandruwandha Yawarrawarrka People on the spot.
In this plan, where permits or approved gear tags are required, these permits or approved gear tags will be issued to persons authorised to fish under the plan by YYTLOAC. Where the fishing activity is taking place in areas set aside for Aboriginal traditional fishing and the persons present have the relevant permits or approved gear tags then fisheries officers will, unless exceptional circumstances exist, assume that authorised people are undertaking the fishing. Fisheries Officers will be entitled to request people’s names to check with YYTLOAC. YYTLOAC will need to know who is undertaking fishing in order to manage the requirements for reporting fish effort and take.

Equipment with approved gear tags can be held by State officers in Innamincka to assist in monitoring.

There is scope for reviewing or changing the management arrangements implemented under this plan. The processes and rules for review are set out in this plan. In conducting any review the above principles will be applied.

3.5 Who can fish under the plan?

The persons who can undertake Aboriginal traditional fishing activities in accordance with this plan or the instruments that implement this plan are the members of the Yandruwandha Yawarrawarrka People identified in the Yandruwandha Yawarrawarrka Fishing ILUA (This includes spouses and invited guests, as set out in the ILUA).

3.6 What fishing activities does the plan provide for?

The Yandruwandha Yawarrawarrka Fishing ILUA states that the Aboriginal traditional fishing rights of the Yandruwandha Yawarrawarrka People are set out in clause 14.1 of the ILUA as reproduced below:

**14. Aboriginal Traditional Fishing Rights**

Subject to regulation in accordance with clause 15.4 of this ILUA, the Aboriginal Traditional Fishing Rights of the Yandruwandha Yawarrawarrka People are -

a) the right to Take Fish with nets of a type and at times and places and subject to conditions set out in the Management Plan (or otherwise approved by the Minister in the ILUA Area and the Director of National Parks (in respect to a reserve under the National Parks and Wildlife Act 1972 (SA)) and

b) the right to use traditional spears (that is unpowered spears) as equipment to Take Fish subject to any restrictions set out in the Management Plan

c) the right to Take Cooper Creek turtles (Emydura macquarii) at times and places and subject to conditions set out in the Management Plan or otherwise approved by the Director of National Parks (in respect to a reserve under the National Parks and Wildlife Act 1972 (SA))

d) such additional rights as set out from time to time in the Management Plan or agreed to by the Minister in the ILUA Area and the Director of National
Parks (in respect to a reserve under the National Parks and Wildlife Act 1972 (SA)).

The arrangements for implementing these Aboriginal traditional Fishing Rights are set out below.

### 3.7 Coongie Lakes National Park

Subject to this clause and any other applicable restrictions, taking of all fish (which includes shell fish, yabbies and other crustaceans) may occur in the area set aside for taking of fish with nets - (see Schedule 2 to this plan, Location A and area of operation in section 3.12).

Nets described in section 3.12, unpowered spears and any equipment allowed for taking of fish by recreational fishers elsewhere in the ILUA Area are permitted to be used in the area described above. No other equipment may be used unless permission has been given by the Minister and the Director of National Parks.

No restrictions on take (i.e. daily bag or boat limits) apply except that legal minimum size limits that apply from time to time elsewhere in the ILUA Area apply (currently 33 cm for Lake Eyre callop) and female yabbies carrying eggs are not to be taken. Undersize fish and female yabbies carrying eggs must be returned to the water immediately with as little injury or damage as possible.

Taking of fish elsewhere in Coongie Lakes National Park is not permitted and penalties apply.

### 3.8 Innamincka Regional Reserve

Subject to this clause and any other applicable restrictions, taking of all fish (which includes shell fish, yabbies and other crustaceans) may occur in the area set aside for taking of fish with nets - (see Schedule 2 to this plan, Location B and area of operation in section 3.12).

Nets described in section 3.12, un-powered spears and any equipment allowed for taking of fish by recreational fishers elsewhere in the ILUA Area are permitted to be used in the area described in section 16. No other equipment may be used unless permission has been given by the Minister and the Director of National Parks.

No restrictions on Take (i.e. daily bag or boat limits) apply except that legal minimum size limits that apply from time to time elsewhere in the ILUA Area apply (currently 33 cm for Lake Eyre callop) and female yabbies carrying eggs are not to be taken. Undersize fish and female yabbies carrying eggs must be returned to the water immediately with as little injury or damage as possible.

### 3.9 General fishing restrictions

Apart from the rights set out above for Location A in Coongie Lakes National Park and Location B in Innamincka Regional Reserve, taking of fish elsewhere in the ILUA Area, including the remainder of Innamincka Regional Reserve and the relevant part of Strzelecki Regional Reserve is permitted but is subject to all
relevant laws for recreational fishers in terms of minimum sizes, equipment, daily bag and boat limits the like and the usual penalties apply for breaches.

3.10 Cooper Creek Turtles (Emydura macquarii)

The taking of Cooper Creek turtles with the drag/seine nets approved for taking fish under this management plan is to only occur in the areas of operation approved for use of the nets to take fish.

The use of other devices or equipment to take turtles in the ILUA Area is restricted to devices or equipment which is allowed for use by recreational fishers in the relevant area.

Taking of Cooper Creek turtles may occur throughout the ILUA Area except that in the Coongie Lakes National Park, taking is restricted to the area set aside for taking of fish with nets - (see Schedule 2 to this Plan, Location A).

3.11 Reporting by YYTLOAC

A report is to be provided to PIRSA Fisheries and Aquaculture and DEWNR by YYTLOAC for each calendar year providing an estimate of the effort and harvest of fish for the year in Location A in the Coongie Lakes National Park and Location B in Innamincka Regional Reserve and effort and harvest of Cooper Creek turtles for the year.

3.12 Net fishing

The Yandruwandha Yawarrawarrka People may use the following nets:

<table>
<thead>
<tr>
<th>Period</th>
<th>Method</th>
<th>Max No. of Nets</th>
<th>Time Restrictions</th>
<th>Area Of Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>All year</td>
<td>Drag/Seine net</td>
<td>3</td>
<td>20 days in total during any calendar year.</td>
<td>Location A - waters of Coongie Lake adjacent to the Living and Camping Zone as</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Could be varied to protect reproduction, based on further</td>
<td>shown in Schedule 2 to this Plan, from the waters edge into the lake to a</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>information on sensitive times of the year or at time of</td>
<td>distance of 100 metres,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>very low water levels</td>
<td>Location B - waters of Cullyamurra Waterhole on the northern side of the waterhole</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>adjacent the Living and Camping Zone as shown in schedule 2 to this Plan (or</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>otherwise agreed with DEWNR), from the waters edge into the waterhole to a</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>distance of 50 metres</td>
</tr>
</tbody>
</table>

Net Specifications

| Mesh type: | Not specified |
| Minimum mesh size: | 110 mm mesh |
| Maximum mesh size: | Not specified |
Maximum length: 50 metres
Mesh panel: No more than two metres in depth
All nets: Must have an approved PIRSA Yandruwandha Yawarrawarra fishing tag attached

### 3.13 Implementation of netting arrangements

To implement these netting arrangements a permit is to be provided. The conditions of this permit may include requirements in relation to:

a) A system for tagging nets. (The Minister will provide YYTLOAC with a tag for each net. Provision will be made to issue a replacement in the event of a lost tag).

b) The marking of nets when in the water.

c) The specified waters in which the nets may be used.

d) The maximum length and allowable configuration and material of the nets.

e) The minimum and maximum mesh size which will apply to the nets.

f) Catch and effort information which must be provided to PIRSA Fisheries and Aquaculture in relation to fish taken by net.

g) Reporting the use of particular nets to PIRSA Fisheries and Aquaculture prior to using the nets.

A responsible member of Yandruwandha Yawarrawarra People must be in attendance at all times when an approved net is being used.

PIRSA Fisheries and Aquaculture, SARDI or DEWNR officers may for recording and scientific purposes accompany Yandruwandha Yawarrawarra fishers undertaking net fishing. This will be by prior agreement with the Yandruwandha Yawarrawarra People.

### 3.14 Net Permits

The principles to be applied in developing the permit are:

a) Aquatic resources must be protected from overexploitation

b) The arrangements must be designed taking into account the specified cultural needs of the Yandruwandha Yawarrawarra People. For example, fishing directed to education within the community should be facilitated to the extent possible in the arrangements.

c) Consideration must be given to issues relating to allocation of access to the resource and the impact of any allocation on other fishing sectors.

d) The arrangements must be able to be implemented in the field in a way that Aboriginal traditional fishing activities are easily identifiable (for example, through the use of approved tags and buoys).

### 3.15 Other restrictions

The ILUA also provides that catch and effort may only be restricted further than the limits set out above in limited circumstances. For example, further restrictions may
be imposed in response to sustainability concerns, changes in circumstances of the Yandruwandha Yawarrawarrka People (as listed below) or related to park management requirements.

If members of the Yandruwandha Yawarrawarrka People who are authorised to fish under this Management Plan also become the holder of a commercial fishing authority under the *Fisheries Management Act 2007* for the same species, further monitoring and compliance arrangements may need to be implemented.

### 3.16 Use of traditional equipment to take Fish

The use of un-powered spears for taking fish as provided for in clause 14.1.(b) of the ILUA is restricted to the same areas as set out above for net fishing, i.e. waters of Coongie Lake adjacent to the Living and Camping Zone, from the water’s edge into the lake to a distance of 100 metres as shown in Schedule 2 to this plan, Location A and waters of Cullyamurra Waterhole on the northern side of the waterhole adjacent the Living and Camping Zone shown in Schedule 2 to this plan, Location B, from the water’s edge into the waterhole to a distance of 50 metres; or otherwise as agreed by the Minister and Director of National Parks (in respect to a reserve under the *National Parks and Wildlife Act 1972*).

The use generally of traditional Yandruwandha Yawarrawarrka methods of taking fish and the places where this is allowed will be subject to further consideration as part of ongoing review of this plan. Additional traditional Yandruwandha Yawarrawarrka methods of taking fish, and places where any such traditional methods of taking fish occur, are subject to agreement by the Minister and Director of National Parks (in respect to a reserve under the *National Parks and Wildlife Act 1972*).

### 3.17 Commercial Quantity limits

Commercial quantity limits are an important fisheries management tool for separating commercial and non-commercial fishing activities. A commercial quantity limit may be applied to provide that, if a person has a prescribed amount of fish, then they must be able to demonstrate that the fish were taken legally. This effectively ‘reverses the onus of proof’. The type of commercial quantity limit that can be implemented depends on the legislation that applies at the time.

Commercial quantity limits are therefore a tool for legitimising the possession of quantities of fish within those limits.

In relation to this management plan, commercial quantity limits may be applied in some circumstances. The commercial quantity limits would be applied to reverse the onus of proof, and not as strict possession limits. The following guidelines are to apply for formulating commercial quantity limits:

a) to apply only to high value species and

b) to apply anywhere in the State.

Currently there are no commercial quantity limits on the fish species commonly taken in the ILUA Area. These fish can be transported outside the ILUA Area. If commercial quantity limits are applied through the *Fisheries Management Act* in the...
future then such limits would also apply to the Yandruwandha Yawarrawarrka People, subject to any variation agreed pursuant to this Plan.

In relation to the take of Cooper Creek turtles as allowed under this plan, no commercial quantity limits are incorporated in the initial management plan. This will be reviewed by DEWNR when information is available to assess the use of Cooper Creek turtles by Yandruwandha Yawarrawarrka People.

3.18 Future modifications to these management arrangements

The ILUA also provides that catch and effort may only be restricted further than the limits set out above in limited circumstances (see ILUA clause 14.4). These are:

a) by consent of the Yandruwandha Yawarrawarrka People
b) if it can be demonstrated through scientific data that a fish stock is over-exploited or is at risk of becoming over-exploited
c) at times of very low water levels or
d) if a species becomes a protected species.

4 PROTECTION OF CULTURALLY IMPORTANT SPECIES AND AREAS

4.1 Species

Culturally important fish species may be listed. The importance of these species to the Yandruwandha Yawarrawarrka People should be taken into account in the development of any future policy that affects these species or their habitat.

4.2 Areas

All of the waters to which this plan applies are important to the Yandruwandha Yawarrawarrka People who are the traditional owners of those waters. There are, however, some areas that have special significance to the Yandruwandha Yawarrawarrka People in relation to fishing which may be specified in this management plan.

The importance of these areas as well as any other relevant fishing areas to the Yandruwandha Yawarrawarrka People should be taken into account in the development of any future policy that affects fishing or fish habitat in these waters.

4.3 Access to aquatic reserves

Not applicable at present.
5 RESEARCH STRATEGY

5.1 Priorities

The priorities for research to support the implementation of this management plan are:

a) The development of an appropriate method for collecting catch and effort information for Aboriginal Traditional Fishing by the Yandruwandha Yawarrawarrka People.

b) Analysis of the impact of Aboriginal traditional fishing by the Yandruwandha Yawarrawarrka People on key species.

c) The integration of the management of Aboriginal traditional fishing with the management of the recreational sector.

5.2 Research funding opportunities

PIRSA Fisheries and Aquaculture and DEWNR may seek funding to pursue research opportunities. Where research is conducted in accordance with these priorities, the outcomes of that research will be used in developing arrangements under this management plan. When this management plan is reviewed, more sophisticated research priorities may be developed, as appropriate.

All research should be undertaken taking into account the Guidelines for Ethical Research in Indigenous Studies (2000) produced by the Australian Institute of Aboriginal and Torres Strait Islander Studies.
6 EDUCATION AND AWARENESS

6.1 Awareness of Yandruwandha Yawarrawarrka People about the Management Plan

The YYTLOAC have a role in educating members of the Yandruwandha Yawarrawarrka People about the arrangements that apply under this Management Plan.

YYTLOAC will pursue the following strategies for maintaining the awareness of Yandruwandha Yawarrawarrka People of their entitlements and responsibilities:

   a) establish a committee that is responsible for fishing matters within the community and
   b) prepare (with PIRSA Fisheries and Aquaculture) and distribute a plain English guide about fishing limits and requirements.

6.2 Awareness of non-Aboriginal community about the Plan

PIRSA Fisheries and Aquaculture and DEWNR in respect of reserves under the National Parks And Wildlife Act 1972 have a role in ensuring that other fishing sectors and the wider community are aware of the arrangements that apply under this management plan. Other fishing sectors and the wider community should be aware that the Yandruwandha Yawarrawarrka People have traditional fishing rights that may be exercised under this plan and that they also have corresponding responsibilities in terms of catch reporting and other regulations.

PIRSA Fisheries and Aquaculture will pursue the following strategies for maintaining the community’s awareness of the arrangements under this management plan:

   a) Ensure that reference to the Yandruwandha Yawarrawarrka Traditional Fishing Management Plan is incorporated into any other relevant fishery management plans as those plans are developed or updated
   b) Ensure that all relevant fishing management plans and policies integrate the management of Yandruwandha Yawarrawarrka Aboriginal traditional fishing activities with the management of other fishing activities. In particular, arrangements in relation to allocation of access to aquatic resources must take into account the access that the Yandruwandha Yawarrawarrka People have under this plan
   c) Work with DEWNR in developing awareness of issues, brochures, signs or other means related to fishing in reserves under the National Parks And Wildlife Act 1972 (SA), including recreational fishers in reserves.
7 PART G - ONGOING ADMINISTRATION OF PLAN

7.1 Funding

The ILUA provides that the State will fund the administration and implementation of management arrangements under this Management Plan.

7.2 Consultative arrangements

YYTLOAC will be the contact point for consultation with the Yandruwandha Yawarrawarrka People on fisheries management issues.

7.3 Monitoring and compliance

If a person undertakes fishing activity within the waters to which the plan applies they will either be fishing as an individual or for community purposes, in accordance with arrangements established under this Plan.

The plan (and the instruments that implement the plan) may set out the ways that YYTLOAC can authorise a person to undertake traditional fishing activities.

If a person is found to be fishing in excess of Aboriginal traditional fishing limits or fishing without authority but the person does not have any way of showing that they have permission from YYTLOAC to undertake community fishing, then the following steps must be followed:

a) Contact YYTLOAC and enquire about whether the person is approved to undertake Aboriginal traditional fishing in accordance with the plan;
   i. if the answer is no, compliance action may be taken against the person as an individual, if appropriate or
   ii. if the answer is yes, or no answer is provided, then YYTLOAC must meet with the Director of Fisheries to discuss the monitoring and compliance arrangements under the plan

b) Following these discussions, the Minister may determine that compliance action should be taken against YYTLOAC or may determine that no compliance action be taken. If no compliance action is taken, the Minister may ask YYTLOAC to provide a report outlining how monitoring and compliance with the plan can be improved. Steps may be taken to implement these or other changes to improve compliance arrangements.

7.4 Review of management plan

This Management Plan is to be reviewed to measure the effectiveness of the plan in achieving the objectives of the plan and the objectives of the Fisheries Management Act 2007. The review will occur no later than 5 years after the commencement of the ILUA and subsequently no later than 5 years after the commencement of the previous review.

The review is to be conducted by the Minister and Director of National Parks (in relation to reserves under the National Parks And Wildlife Act 1972) in collaboration...
with YYTLOAC. The review must provide a report to the Minister administering the *Fisheries Management Act 2007* in relation to:

a) Whether the objectives of the plan are being achieved  
b) How this is measured  
c) Any recommendations for changes that will further pursue the objectives of the Plan.

### 8 TERMINATION OR SUSPENSION OF MANAGEMENT PLAN

#### 8.1 ILUA terms

Section 16 of the Yandruwandha Yawarrawarcka Fishing ILUA provides that this management plan must include provisions relating to the termination or suspension of the plan. These are reproduced below:

**Termination and Suspension of the Management Plan**

16.1 The Management Plan may only be terminated by agreement between the State and the Yandruwandha Yawarrawarcka People or where there has been a fundamental breach of the Plan or otherwise as provided for in this ILUA. For the purpose of this clause:

(a) a fundamental breach is where there has been a failure by the Yandruwandha Yawarrawarcka People to comply with the monitoring and enforcement requirements of the Management Plan or a part of it and any related management regime implemented under the *Fisheries Management Act 2007* (SA) such that the Management Plan cannot be effectively administered either in whole or in part.

(b) a fundamental breach is not constituted by a breach by an individual Yandruwandha Yawarrawarcka person who is prosecuted under the *Fisheries Management Act* but may be constituted by breaches involving a significant number of Yandruwandha Yawarrawarcka People acting in combination.

16.2 Where there is a fundamental breach of the Management Plan or part of it, the State may elect to suspend the operation of the whole or part of the Management Plan.

16.3 If the State elects to suspend the operation of the whole or part of the Management Plan it must only do so after consultation with the Yandruwandha Yawarrawarcka People about the matters that have lead to a fundamental breach in accordance with the process contained in the Management Plan and after giving notice to the Yandruwandha Yawarrawarcka People as provided in the Management Plan.

16.4 If the State suspends the operation of the whole or part of the Management Plan the period of suspension shall be for a period of 6 months from the time the notice is served upon the Yandruwandha Yawarrawarcka People.

16.5 During the period of the suspension of the Management Plan or part thereof -
(a) the Yandruwandha Yawarrawarka People shall not exercise any Aboriginal Traditional Fishing rights relating to the suspension; and

(b) an action group comprising not more than 2 representatives from each of the relevant Parties will be convened, will meet on a regular basis and use all reasonable endeavours to address the issues that have lead to a fundamental breach of the Management Plan.

16.6 At the end of the suspension period the action group may recommend to the State that either -

(a) Aboriginal Traditional Fishing be resumed in accordance with Management Plan; or

(b) the operation of the Management Plan be terminated and this ILUA terminated; or

(c) the Management Plan be suspended for a further period of 6 months during which time the action group will make a further attempt to resolve the issues.

16.7 If the action group recommends that the operation of the Management Plan be terminated and this ILUA be terminated, then all Parties must cooperate to implement the recommendation.

16.8 If there is no agreement to resolve the issues which led to the suspension of the whole or part of the Management Plan by the end of a suspension period then any Party can give one month’s written notice to terminate the Management Plan.

8.2 Process to be followed

A decision to suspend or terminate this management plan may only be made by the Minister administering the *Fisheries Management Act 2007*. If the Minister is considering suspending or terminating this Management Plan and the instruments that implement the plan, the Director of Fisheries (on the Minister’s behalf) will conduct a process to ensure that the Minister has all available information before him or her before making a decision. This process must include the following:

a) formal notice to YYTLOAC that the Minister is considering suspending or terminating the Management Plan or part of the management plan

b) a written explanation of all of the reasons that the Minister is considering this action

c) a reasonable opportunity for YYTLOAC and any other members of the Yandruwandha Yawarrawarka People to provide a written response to these reasons

d) an opportunity for YYTLOAC to meet with the Minister (or his or her representative) to discuss the issues

e) an opportunity for all parties to the Yandruwandha Yawarrawarka Fishing ILUA to provide information in relation to the issues raised for the Minister’s consideration and

f) where the proposed suspension relates to areas involving Parks or Reserves then the Minister for Environment and Conservation or a representative of that Minister must be consulted as part of the process.
8.3 **Principles to be applied**

The principles to be applied in conducting this process, considering the issues and making a decision are:

a) the management plan should only be suspended or terminated if there is a fundamental breach of the Management Plan;

b) what constitutes a fundamental breach is to be determined in the circumstances (taking into account clause 15 of the ILUA);

c) the collection of reliable catch and effort information is a requirement for the management of the fishery.

Aquatic resources taken pursuant to this Plan must not be used for commercial purposes. This is a priority issue and if this is of concern:

a) YYTLOAC must be able to demonstrate that reasonable steps have been taken to ensure that the use of aquatic resources taken pursuant to this Plan is not for commercial purposes; and

b) YYTLOAC must have co-operated with PIRSA Fisheries and Aquaculture in the investigation of suspected illegal fishing activity by a member of the Yandruwandha Yawarrawarrka People.

9 **CONSULTATION ABOUT MANAGEMENT PLAN MATTERS**

9.1 **Consultation about approvals which could affect Aboriginal Traditional Fishing Rights**

Clause 14 of the ILUA requires that the management plan must contain provisions providing for consultation with the Yandruwandha Yawarrawarrka People before the State approves any project or activity which could have an impact on the ability of the Yandruwandha Yawarrawarrka People to exercise their Aboriginal traditional fishing Rights.

If the State is considering an approval for any project or activity which could have an impact on the ability of the Yandruwandha Yawarrawarrka People to exercise their Aboriginal Traditional Fishing Rights then the State will:

a) give written notice to YYTLOAC about the proposal in sufficient detail for YYTLOAC to understand the implications of the proposal

b) provide a reasonable opportunity for YYTLOAC and any other members of the Yandruwandha Yawarrawarrka People to provide a written response to these reasons

c) ensure that any submissions made by YYTLOAC and members of the Yandruwandha Yawarrawarrka People are forwarded to the relevant decision maker and taken into account in making a decision on the proposal.
9.2 Consultation about Management Plan

The Committee established to manage consultation as part of the Coongie Lakes National Park Co-management Agreement may be a forum for discussion of matters pertinent to this management plan and the ILUA until an alternative forum is agreed by the parties.

Where any consultation meeting occurs the Director of Fisheries or a representative of the Director will be present along with other relevant persons representing PIRSA. The parties may also meet by means of remote communications, particularly where urgent. The Director of Fisheries (in consultation with DEWNR as required) will be responsible for administrative arrangements required for consultation meetings related to this management plan.

The consultation process set out in this plan will also be used for consultation during development of a management plan for other sectors in the ILUA Area.
Yandruwanda / Yawarrawarrika
Aboriginal Traditional Fishing Management Plan

Legend
- Aboriginal Traditional Fishing Location A
- Aboriginal Traditional Fishing Location B
- Vallecuma
- Lata
- Valleeucma
- National Park and Regional Reserve

SCHEDULE 1- NETTING AREAS
REFERENCES


Fisheries Management Act 2007 (SA)


ACRONYMS

CAC          Community Advisory Committee
CPUE         Catch per unit effort
DEH          Former Department of Environment and Heritage (South Australia)
DENR         Former Department of Environment and Natural Resources (South Australia)
DEWNR        Department of Environment, Water and Natural Resources (South Australia)
DFW          Department for Water
DWLBC        Department for Water, Land and Biodiversity Conservation (South Australia)
ESD          Ecologically sustainable development
EPBC Act     Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
ILUA         Indigenous Land Use Agreement
LEBA         Lake Eyre Basin Agreement
LEBMF        Lake Eyre Basin Ministerial Forum
MDBA         Murray Darling Basin Authority
NRIFS        National Recreational and Indigenous Fishing Survey
NRM          Natural Resource Management
PIRSA        Department of Primary Industries and Regions South Australia
SAAL         South Australian Arid Lands
SAP          Scientific advisory panel
SARDI        South Australian Research and Development Institute
DSEWPaC      Department of Sustainability, Environment, Water, Population and Communities
TEPS         Threatened, endangered and protected species
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.

Adaptive management - Management involving active responses to new information or the deliberate manipulation of fishing intensity or other aspects in order to learn something of their effects. Within a stock, several sub-stocks can be regarded as experimental units in which alternative strategies are applied.

Age structure - A breakdown of the different age groups within an individual population, or population sample.

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 a species that can be legally taken by a recreational fisher per day or per fishing trip, as specified.

Benthic - Describes animals that live on, in or near the substrate.

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 reference point - An indicator of the status of an exploited stock and a standard for comparison between years. Two types are often used when sufficient biological data are available: those based on fishing mortality and those based on the sustainability of recruitment. In data poor fisheries, other BPIs related to estimates of relative biomass may be used (i.e. total catch and catch per unit effort). Reference points can be either desirable targets (target reference points) or minimum biologically acceptable limits (limit reference points).

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

Boat Business Profit Defined as Gross Operating Surplus less Depreciation less Owner-operator and Unpaid Family Labour. Boat Business Profit represents a more
complete picture of the actual financial status of an individual firm, compared with GOS, which represents the cash in-cash out situation only.

**Boat Capital** - Capital items that are required by the licence holder to earn the boat income. It includes boat hull, engine, electronics and other permanent fixtures and tender boats. Other capital items such as motor vehicles, sheds, cold-rooms, and jetty/moorings can be included to the extent that they are used in the fishing business. The fishing licence/permit value is included in total boat capital.

**Boat Cash Income** - Defined as Gross Operating Surplus less imputed wages for owner-operator and unpaid family labour.

**Boat Gross Margin** - Total Boat Income less Total Boat Variable Costs. This is a basic measure of profit which assumes that capital has no alternative use and that as fishing activity (days fished) varies there is no change in capital or fixed costs.

**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.

**Bycatch** - 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 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.

**By-product** - Non-targeted catch that is commercially valuable and retained by fishers.

**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 weight or number of a species caught by a specified amount of effort. Typically, effort units are defined using a combination of the following factors: gear type; gear size; the amount of gear; the amount of time the gear is used; and the number of people operating the gear. CPUE is often used as an index of relative abundance in fisheries stock assessment. In modern assessments, CPUE is standardised to account for the diverse range of factors that can affect CPUE.

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

**Cohort** - A group of fish spawned during a specified period, usually within a year. A cohort is also referred to as an age class.

**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.
**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.

**Cost of management services** - Commercial fishery management services will generally include biological monitoring and reporting; policy, regulation and legislation development; compliance and enforcement services; licensing services; and research. Where a commercial fishery operates under full cost recovery, licence fees will be set to cover the cost of managing the fishery or at least the commercial sector’s share of the resource. In fisheries where there is full cost recovery, it can be assumed that the cost of providing these management services to the commercial sector will be equal to the gross receipts from licence fees in the fishery. With information on licence fee receipts, GVP, catch and the number of commercial fishers in the fishery, the following indicators can be readily calculated:

- aggregate licence fee receipts for the fishery ($)
- licence fee/GVP (%)
- licence fee/catch ($/kg)
- licence fee/licence holder ($/licence holder)

**Critical habitats** - Habitats that are crucial in at least part of the life cycle of a species, which typically includes nurseries such as estuaries, mangroves, seagrass beds, reefs and defined spawning areas.

**Data poor fishery** - A fishery where limited data are available to inform management. For example, fisheries for species where baseline biological data such as size at maturity, fishing mortality and growth rates are unknown.

**Depreciation** - Depreciation refers to the annual reduction in the value of boat capital due to general wear and tear or the reduction in value of an item over time.

**Ecologically Sustainable Development** - 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.

**Economic efficiency** - The maximisation of the value of the net benefits derived from fishery resources.

**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'.

**Effective fishing effort** - Measures of fishing effort (such as hooks per day of fishing) that have been standardised so that the measure is proportional to the fishing mortality rate that the gear(s) impose on the stock of fish. Management measures to limit effective effort imply that the fishing mortality rate is to be limited.
Exploitation rate - Ratio of annual legal sized catch (tonnes) divided by exploitable biomass (tonnes).

Fecundity - Number of eggs an animal produces each reproductive cycle; the potential reproductive capacity of an organism or population.

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, eg. 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, eg. scientific surveys, observer reports.

Fishing capacity - The amount of fishing effort that a fishing boat, or a fleet of fishing boats, could exert if utilised to its/their full potential.

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

Fully exploited - This describes a fish stock for which current catches and fishing pressure are close to optimum (the definition of which may vary between fisheries; for example, catches are close to maximum sustainable yield). Categorising a species as 'fully fished' suggests that increasing fishing pressure or catches above optimum (allowing for annual variability) may lead to overfishing.

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 Operating Surplus - (GOS) is defined as Total Boat Income less Total Boat Cash Costs and is expressed in current dollar terms. GOS may be used interchangeably with the term Gross Boat Profit. A GOS value of zero represents a break-even position for the business, where Total Boat Cash Costs equals Total Boat Income. If GOS is a negative value the firm is operating at a cash loss and if positive the firm is making a cash profit. GOS does not include a value for owner/operator wages, unpaid family work, or depreciation.

Gross value of production (GVP) - Value of the total annual catch for individual fisheries, fishing sectors or the fishing industry as a whole, and 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 prices.

Growth overfishing - A level of fishing pressure beyond that required to maximise the yield (or value) per recruit; a level of fishing where young recruits entering the fishery are caught before they reach an optimum marketable size.

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.

**Indicator species** - A species whose presence or absence is indicative of a particular habitat, community or set of environmental conditions.

**Individually transferable quota** - A management tool by which portions of the total allowable catch are allocated among licence holders (individual fishers or companies) as units of quota. Quota entitlements can be made to be temporarily or permanently transferable between these licence holders.

**Input controls** - Limitations on the amount of fishing effort; restrictions on the number, type, and size of fishing vessels or fishing gear, or on the fishing areas or fishing times in a fishery.

**Latent effort** - The potential for effective effort within a fishery to increase over time (i.e. inactive fishing licences that may be used in the future).

**Length Frequency** - An arrangement of recorded lengths of a species of fish, which indicates the number of times each length or length interval occurs in a population or sample.

**Limited entry** - Fishing effort is controlled by restricting the number of operators. It usually requires controlling the number of licences in a fishery. It can also include restrictions on the number and size of vessels, the transfer of fishing rights, and the replacement of vessels.

**Logbook** - An official record (statutory declaration) of catch and effort data made by commercial fishers.

**Minimum mesh size** - The smallest size of mesh permitted in nets and traps; imposed on the basis that smaller individuals will escape unharmed.

**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 caused by predation, pollution, senility, etc., but not fishing and (ii) Fishing Mortality - deaths in a fish stock caused by fishing.

**Nominal fishing effort** - ‘Nominal’ means quantities as they are reported, before any analyses or transformations. Nominal effort refers to measures of fishing effort or vessel carrying capacity that have not been standardised.

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

Over-exploited or overfished - A fish stock in which the amount of fishing is excessive or for which the catch depletes the biomass too much; or a stock that still reflects the effects of previous excessive fishing.

Owner-operator and Unpaid Family Labour - In many fishing businesses there is a component of labour that does not draw a direct wage or salary from the business. This will generally include owner/operator labour and often also include some unpaid family labour. The value of this labour needs to be accounted which involves imputing a labour cost based on the amount of time and equivalent wages rate. In the above calculations this labour cost can be included simply as another cost so that Gross Operating Surplus takes account of this cost. Alternatively, it can be deducted from GOS to give a separate indicator called Boat Cash Income. Owner-operator and unpaid family labour is separated into variable labour (fishing and repairs and maintenance) and overhead labour (management and administration).

Parameter - A ‘constant’ or numerical description of some property of a population.

Parental stock - The weight of the adult population of a species.

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

Possession limit - A possession limit under the Fisheries Management Act 2007 is the maximum number of fish that a person is allowed to have in their possession in certain circumstances. Possession limits can provide a useful tool to constrain recreational fishers from 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.

Profit at Full Equity - Calculated as Boat Business Profit plus rent, interest and lease payments. Profit at Full Equity represents the profitability of an individual licence holder, assuming the licence holder has full equity in the operation, i.e. there is no outstanding associated with the investment in boat capital. Profit at Full Equity is a useful absolute measure of the economic performance of fishing firms.

Quota - A limit on the weight or number of fish that may be caught of a particular stock or from specified waters.

Quota entitlement - The proportion of a quota that is allocated to a particular licence, which limits the total amount of a species that is permitted to be taken pursuant to that licence.
Rate of Return to Capital - Calculated as Profit at Full Equity divided by Boat Capital multiplied by 100. This measure is expressed in percentage terms and is calculated for an individual licence holder. It refers to the economic return to the total investment in capital items, and is a useful relative measure of the performance of individual firms. Rate of return to capital is useful to compare the performance of various licence holders, and to compare the performance of other types of operators, and with other industries.

Recreational fishing - Fishing other than commercial fishing or Aboriginal traditional fishing, where the catch is released or used for personal consumption or taken for sport.

Recruitment - The addition of new individuals to a stock.

Recruitment overfishing - Occurs when excessive fishing effort or catch reduces recruitment to the extent that the stock biomass falls below the pre-defined limit reference point.

Reference point - Provide a reference against which the performance of the indicator can be assessed.

Refugia - Habitats where fish are able to survive the impacts of climate (e.g. drought and flooding) and from which they can recolonise to re-establish viable populations.

Relative abundance - An index of fish population abundance used to compare fish populations from year to year. This does not measure the actual numbers of fish, but shows changes in the population over time.

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 - The closure of a fishing ground for a defined period of time, usually used to protect a stock during a spawning season.

Selectivity - The ability of a type of gear to target and catch a certain size or species of fish.

Socio-economic - Relating to both social and economic considerations.

Spatial - Of or relating to space.

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 size limit determines the legal size at which a given species can be retained.
**Size of maturity** - Length or weight of the fish when it attains reproductive maturity.

**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/fishery.

**Target species** - The most highly sought component of the catch taken by fishers.

**Target effort** - Effort that is directed at a particular species.

**Total Boat Cash Costs (TBCC)** - Defined as *Total Boat Variable Costs* plus *Total Boat Fixed Costs*.

**Total Boat Fixed Costs** - Costs that remain fixed regardless of the level of catch or the amount of time spent fishing. As such these costs, measured in current dollar terms, are likely to remain relatively constant from one year to the next. Examples of fixed cost include:
- insurance
- licence and industry fees
- office and business administration (communication, stationery, accountancy fees)
- interest on loan repayments and overdraft
- leasing

**Total Boat Income (TBI)** - Term refers to the cash receipts received by an individual firm and is expressed in dollar terms. Total boat income is calculated as catch (kg) multiplied by 'beach price' ($/kg). Total boat income is the contribution of an individual licence holder to the GVP of a fishing sector or fishery.

**Total Boat Variable Costs** - Costs which are dependent upon the level of catch or, more commonly, the amount of time spent fishing. As catch or fishing time increases, variable costs also increase. Variable costs are measured in current dollar terms and include the following individual cost items:
- fuel, oil and grease for the boat (net of diesel fuel rebate)
- bait
- ice
- provisions
- crew payments
- fishing equipment, purchase and repairs (nets, pots, lines, etc)
- repairs and maintenance: ongoing (slipping, painting, overhaul motor)

**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 indigenous custom.

**Temporal** - Of or relating to time.

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

**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.

**Trigger points** - Events or measures that, if they occur or if they reach specified levels, are used to determine when a response should be made. Not usually used as a criterion for overfishing, but to indicate the need for review of management.

**Uncertain** - A fish stock that may be underfished, fully fished or overfished, but for which there is inadequate or inappropriate information to make a reliable assessment of its status.

**Under-exploited or underfished** - A fish stock that has potential to sustain catches higher than those currently taken.

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

**Yield** - Total weight of fish harvested from a fishery.

**Yield per recruit** - Analysis of how growth and natural mortality interact to determine the best size of animals for harvest.
APPENDICES

Appendix 1 - Methodology for ESD risk assessment

The current series of PIRSA ESD performance reports have been prepared to ensure that South Australian fisheries management is both effective and efficient in the context of achieving ESD outcomes. In addition to meeting the statutory requirements of the *Fisheries Management Act 2007*, and national environmental legislation, this approach will also provide the fishing industry, key stakeholders and the broader community with an ongoing opportunity to contribute to and influence fisheries management outcomes.

The reports will also provide the basis for the development of statutory management plans required under the *Fisheries Management Act 2007*. On behalf of the Fisheries Council of South Australia, PIRSA Fisheries and Aquaculture has used the comprehensive issue identification and subsequent risk assessment and priority setting process to collaboratively develop more effective management arrangements under the new Act. Where necessary this may include development of fishery specific harvest strategies, and related research and monitoring programs for each of the fisheries assessed.

The issue identification, risk assessment, and reporting process described in detail below, as well as the final report format, is closely based on the National ESD Framework *How To Guide* (see [www.fisheries-esd.com](http://www.fisheries-esd.com)), as well as the Department of Fisheries, Western Australia ESD performance reports pioneered by Dr Rick Fletcher and other WA Fisheries staff.

**Scope**

The ESD risk assessment report for the Lake Eyre Basin fisheries describes the contribution of the South Australian Lake Eyre Basin fisheries to ESD in the context of South Australian Fisheries legislation and policy. The report is based on preliminary scoping and issue identification work by PIRSA Fisheries and Aquaculture staff in conjunction with Lake Eyre Basin fisheries stakeholders. This initial scoping was then refined and validated through a broader stakeholder workshop in Adelaide on 9 July 2009.

The assessment process examined an extensive range of issues, risks and opportunities identified during preliminary scoping work and at the July workshop. The identification of issues was informed by the generic ESD component tree approach with each fishery component tree refined specifically for the Lake Eyre Basin issues.

Each major component tree reflects the primary components of ESD, and the ESD report assesses the performance of the fishery for each of the relevant ecological, economic, social and governance issues facing the fishery. The process also identifies where additional (or reduced) management or research attention is needed, and identifies strategies and performance criteria to achieve management objectives to the required standard.
Primary ESD Components

Retained Species
Non-Retained Species
General Ecosystem Impacts
Community
Aboriginal Community
Governance
External Factors Affecting Performance of the Fishery

Ecological Wellbeing
Human Wellbeing
Ability to Achieve

Overview

The steps followed to complete the ESD Risk Assessment Report for the Lake Eyre Basin fisheries are detailed below:

1. A set of “Generic ESD Component Trees” were modified through an iterative process with stakeholders into a set of trees specific to the fishery. This process identified the issues relevant to ESD performance of the fishery under the categories described in Table 1 above.

2. A risk assessment of the identified issues (or components) was completed based on the likelihood and consequence of identified events that may undermine or alternatively contribute to ESD objectives. This was an iterative process involving managers, scientists, industry and key stakeholders.

3. Risks were then prioritised according to their severity. For higher level risks - where an increase in management or research attention was considered necessary - a detailed analysis of the issue, associated risks, and preferred risk management strategies was completed. For low risk issues, the reasons for assigning low risk and/or priority were recorded.

4. For higher level risks a more detailed ESD performance report was prepared in the context of specific management objectives; including operational objectives, indicators and performance measures.

5. A background report providing context and necessary supporting information about the fisheries was prepared by PIRSA Fisheries and Aquaculture to guide the identification of issues, risks and management strategies. This report includes the history of the fishery and its management, the areas of operation and their biological and physical characteristics, target species and by-product and bycatch species, and other relevant information.

The process is illustrated in Figure 1 below.
Issue Identification (component trees)

The Lake Eyre Basin fisheries ESD reporting component trees provided in the Lake Eyre Basin risk assessment report are a refined version of the generic trees suggested in the National ESD Reporting Framework. The generic trees and the issues that they encompass were the result of extensive consideration and refinement during the initial development of the National Fisheries ESD approach. The trees were designed to be very comprehensive to ensure that all of the conceivable issues facing a fishery would be considered during the workshop process. The fishery specific component trees developed after expert and stakeholder consideration provide a more realistic and practical illustration of the issues facing a particular fishery.

The generic component trees have been used as the starting point to ensure thorough, consistent, and rigorous identification and evaluation of ESD issues across all of the South Australian Fisheries being assessed. When developing each of the major fishery specific component trees, each primary component is broken down into more specific sub-components for which operational objectives can then be developed.

For example, the component tree identifying general ecosystem impacts of fishing that was refined during the stakeholder workshop for the Lake Eyre Basin Fishery is reproduced in figure 2 below.
Risk Assessment and Prioritisation of Issues

Once the fishery specific component trees were developed and reviewed by stakeholders, the focus moved to the assessment and prioritisation of risks and opportunities facing the fishery. These were considered in the context of the specific management objectives for each fishery being assessed. The higher level management objectives and desired ESD outcomes are those described in the Fisheries Management Act 2007. Risks and opportunities are also evaluated against more detailed fishery specific objectives - such as those articulated in the Lake Eyre Basin fisheries management plan.

The risk assessment of issues identified for the Lake Eyre Basin fisheries has been done on the basis of existing management which is currently managing risks to the fishery. Hence the risk assessment conducted during stakeholder workshops considered the residual risk after the existing risk treatments were taken into account. For example, PIRSA’s current compliance program for the Lake Eyre Basin fisheries is itself based on a separate compliance risk assessment process. This process identifies compliance risks in the context of the fishery’s management objectives, and then develops and applies strategies to mitigate those risks. The ESD assessment and reporting process works across the full suite of fishery ESD objectives in a similar way.
Risk assessment applied under the national ESD framework has been designed to be consistent with the Australian Standard (AS/NZS 4360:1999) for Risk Management. Subject matter experts and key fishery stakeholders consider the range of potential consequences of an issue, activity, or event (identified during the component tree development process) and how likely those consequences are to occur. The estimated consequence of an event is multiplied by the likelihood of that event occurring to produce an estimated level of risk.

ESD workshop participants worked methodically through each component tree from the top down and conducted a qualitative risk assessment of each issue. An estimate of the consequence level for each issue was made and scored from 0-5, with 0 being negligible and 5 being catastrophic/irreversible (see Appendix 1 for details of the risk consequence tables). The consequence estimate was based upon the combined judgement of workshop participants who had considerable expertise in the issues being assessed.

The level of consequence was estimated at the appropriate scale and context for the issue in question. For the target species (e.g. Lake Eyre Basin Golden Perch) the consequence assessment was based at the population not the individual level. Killing one fish is catastrophic for the individual but not the population. Similarly, when assessing possible ecosystem impacts this was done at the level of the whole ecosystem or at least in terms of the entire extent of the habitat, not at the level of an individual patch or individuals of non-target species.

The likelihood of that consequence occurring was assigned to one of six levels from remote (1) to likely (6). This was based on a judgement about the probability of the events occurring that could result in a particular adverse consequence. This judgement was based on the collective experience and knowledge of workshop participants. From the consequence and likelihood scores, the overall risk value (Risk = Consequence x Likelihood), was calculated. On the basis of this risk value each issue was assigned a Risk Ranking within one of five categories.

Table 2: risk ranking definitions for ESD risk assessment.

<table>
<thead>
<tr>
<th>RISK</th>
<th>Rank</th>
<th>Likely Management Response</th>
<th>Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible</td>
<td>0</td>
<td>Nil</td>
<td>Short Justification Only</td>
</tr>
<tr>
<td>Low</td>
<td>1</td>
<td>None Specific</td>
<td>Full Justification needed</td>
</tr>
<tr>
<td>Moderate</td>
<td>2</td>
<td>Specific Management Needed</td>
<td>Full Performance Report</td>
</tr>
<tr>
<td>High</td>
<td>3</td>
<td>Possible increases to management activities needed</td>
<td>Full Performance Report</td>
</tr>
<tr>
<td>Extreme</td>
<td>4</td>
<td>Likely additional management activities needed</td>
<td>Full Performance Report</td>
</tr>
</tbody>
</table>

26 These descriptions, and detailed guidance about developing consequence and likelihood scores for fishery issues are provided in the ESD How To Guide at www.fisheries-esd.com.
Where a more detailed and/or quantitative risk assessment and management process was in place for the fishery - such as a robust quantitative stock assessment for a target species - the resultant risk score could be expected to be moderate to low. The risk score in this example reflects the fact that the risk is effectively being managed through existing arrangements.

The national ESD reporting framework suggests that only those issues scored at moderate, high and extreme risk, which require additional management attention, need to have full ESD performance reports completed. This is the approach that has been used in the PIRSA Fisheries and Aquaculture ESD reports. The rationale for scoring other issues as low or negligible risk has also been documented and form part of these reports. This encourages transparency and should help stakeholders to understand the basis for risk scores and the justification for no further management, or for additional management action if necessary. The process is summarised earlier in this section.

**Performance Reports for Higher Risk Issues**

As noted above, a comprehensive ESD performance report has only been prepared for higher risk/priority issues that require additional management attention (Section 4 of the Lake Eyre Basin ESD Risk Assessment Report). The content of these reports is based on the standard subject headings recommended in the ESD Framework’s *How To Guide*.

The more detailed *performance report* for the Lake Eyre Basin fisheries was developed by PIRSA Fisheries and Aquaculture, informed by consultation with industry and then broader stakeholders at PIRSA’s Adelaide ESD workshop on 9 July 2009. A preliminary draft ESD report was sent to industry members and other stakeholders for review and relevant considerations were then reflected in the final report.
## Appendix 2 - Overview of the ESD risk assessment for Lake Eyre Basin fisheries

Table 1: ESD risk assessment overview for Lake Eyre Basin fisheries.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Risk / Priority</th>
<th>Objective Developed</th>
<th>Indicator Measured</th>
<th>Performance Measure</th>
<th>Current Performance</th>
<th>Robustness</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Eyre Golden Perch - commercial fishery</td>
<td>L</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Medium</td>
<td>*</td>
</tr>
<tr>
<td>Lake Eyre Golden Perch</td>
<td>L</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Medium</td>
<td>*</td>
</tr>
<tr>
<td>Yabby</td>
<td>L</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Medium</td>
<td>*</td>
</tr>
<tr>
<td>Cooper catfish</td>
<td>H</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Medium</td>
<td>*</td>
</tr>
<tr>
<td>Mussels</td>
<td>M</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Medium</td>
<td>*</td>
</tr>
<tr>
<td>Shrimp</td>
<td>N</td>
<td>Yes but negligible risk</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>**</td>
</tr>
<tr>
<td>Grunter species</td>
<td>N</td>
<td>Yes but negligible risk</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>**</td>
</tr>
<tr>
<td>Desert goby</td>
<td>L</td>
<td>Yes but low risk</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>**</td>
</tr>
<tr>
<td>Lake Eyre hardyhead</td>
<td>N</td>
<td>Yes but negligible risk</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>**</td>
</tr>
<tr>
<td>Desert rainbowfish</td>
<td>L</td>
<td>Yes but low risk</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>**</td>
</tr>
</tbody>
</table>

* = Review under current management plan.
** = Review at first major management plan assessment in 5 years.
### Non-Retained Species (captured in gear\textsuperscript{27})

<table>
<thead>
<tr>
<th>Species</th>
<th>Risk (L/T)</th>
<th>Gear Interaction</th>
<th>Risk (N/A – negligible risk)</th>
<th>Community Impact</th>
<th>Acceptable</th>
<th>Medium</th>
<th>**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Rats (listed/protected)</td>
<td>L</td>
<td>Yes - low risk but TEP</td>
<td>N/A</td>
<td>N/A</td>
<td>Acceptable</td>
<td>N/A</td>
<td>**</td>
</tr>
<tr>
<td>Turtles (listed/protected)</td>
<td>L</td>
<td>Yes - low risk but TEP</td>
<td>N/A</td>
<td>N/A</td>
<td>Acceptable</td>
<td>N/A</td>
<td>**</td>
</tr>
<tr>
<td>Waterbirds (listed/protected)</td>
<td>N</td>
<td>Yes - TEP but negligible risk</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>**</td>
</tr>
<tr>
<td>Frogs (listed/protected)</td>
<td>N</td>
<td>Yes - TEP but negligible risk</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>**</td>
</tr>
</tbody>
</table>

### General Ecosystem Impacts of Fishing\textsuperscript{28}

<table>
<thead>
<tr>
<th>Impact</th>
<th>Risk (L/T)</th>
<th>Gear Interaction</th>
<th>Risk (N/A – negligible risk)</th>
<th>Community Impact</th>
<th>Acceptable</th>
<th>Medium</th>
<th>**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lost gear</td>
<td>N</td>
<td>N/A – negligible risk</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>**</td>
</tr>
<tr>
<td>Translocation - inter basin</td>
<td>E</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Medium</td>
<td>*</td>
</tr>
<tr>
<td>Translocation - intra basin</td>
<td>M</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Medium</td>
<td>*</td>
</tr>
<tr>
<td>Ecological disturbance - Camping</td>
<td>L</td>
<td>N/A – low risk</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>**</td>
</tr>
<tr>
<td>Greenhouse gas / carbon emissions</td>
<td>N</td>
<td>N/A – negligible risk</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>**</td>
</tr>
</tbody>
</table>

### Community

<table>
<thead>
<tr>
<th>Impact</th>
<th>Risk (L/T)</th>
<th>Gear Interaction</th>
<th>Community Value</th>
<th>Acceptable</th>
<th>Medium</th>
<th>**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Fishery - contribution to licence holder wellbeing</td>
<td>M</td>
<td>Yes</td>
<td>Profit at full equity</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Medium</td>
</tr>
<tr>
<td>Regional social value</td>
<td>M</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

\textsuperscript{27} Non-retained species with direct gear interaction but \textbf{not captured} were all classed as negligible for risk.

\textsuperscript{28} The summary table for risks associated with removals from Refugia are provided in Section 3.7.
<table>
<thead>
<tr>
<th>City centres social value</th>
<th>L</th>
<th>Yes but low risk</th>
<th>N/A</th>
<th>N/A</th>
<th>N/A</th>
<th>**</th>
</tr>
</thead>
</table>

### Governance

<table>
<thead>
<tr>
<th>Policy and Management effectiveness</th>
<th>M</th>
<th>Yes</th>
<th>Yes</th>
<th>No</th>
<th>Acceptable</th>
<th>Medium</th>
<th>**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research/information</td>
<td>M</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Medium</td>
<td>*</td>
</tr>
<tr>
<td>Compliance - organised illegal fishing</td>
<td>M</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Medium</td>
<td>*</td>
</tr>
<tr>
<td>Compliance - accidental illegal fishing</td>
<td>M</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Medium</td>
<td>*</td>
</tr>
</tbody>
</table>

### External factors affecting performance of the fishery

<table>
<thead>
<tr>
<th>Water quality</th>
<th>M</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>Acceptable</th>
<th>Low</th>
<th>*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction of pest species</td>
<td>E</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Medium</td>
<td>*</td>
</tr>
<tr>
<td>Infrastructure Development</td>
<td>M</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Medium</td>
<td>*</td>
</tr>
<tr>
<td>Climate Change Impacts</td>
<td>M</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Acceptable</td>
<td>Low</td>
<td>*</td>
</tr>
<tr>
<td>External (economic) drivers</td>
<td>M</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Acceptable</td>
<td>Medium</td>
<td>*</td>
</tr>
<tr>
<td>Access</td>
<td>M</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Acceptable</td>
<td>Low</td>
<td>*</td>
</tr>
</tbody>
</table>

### Overview of risks for Refugia

<table>
<thead>
<tr>
<th>Lake Eyre Basin Golden Perch 29</th>
<th>E</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>Acceptable</th>
<th>Medium</th>
<th>*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yabbie</td>
<td>M</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Medium</td>
<td>*</td>
</tr>
</tbody>
</table>

---

29 Risk assessment applies to recreational fishing unless otherwise described.
<table>
<thead>
<tr>
<th>Species</th>
<th>Listed/Protected</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>Acceptable</th>
<th>Low</th>
<th>Medium</th>
<th>*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooper Creek Catfish</td>
<td>M</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Medium</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Mussels</td>
<td>M</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Medium</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Shrimp</td>
<td>M</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Low</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Grunter species</td>
<td>M</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Low</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><strong>Non-Retained Species (captured in gear(^{30}))</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waterbirds (listed/protected)</td>
<td>N</td>
<td>Yes - TEP but negligible risk</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Frogs (listed/protected)</td>
<td>N</td>
<td>Yes - TEP but negligible risk</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Water Rats (listed/protected)</td>
<td>L</td>
<td>Yes - TEP but low risk</td>
<td>N/A</td>
<td>N/A</td>
<td>Acceptable</td>
<td>N/A</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Turtles (listed/protected)</td>
<td>L</td>
<td>Yes - TEP but low risk</td>
<td>N/A</td>
<td>N/A</td>
<td>Acceptable</td>
<td>N/A</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><strong>General Ecosystem Impacts of Fishing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lost gear</td>
<td>M</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Acceptable</td>
<td>N/A</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Translocation - inter basin</td>
<td>E</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Acceptable</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Translocation - intra basin</td>
<td>M</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Acceptable</td>
<td>Acceptable</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

\(^{30}\) Non-retained species with direct gear interaction but not captured were all classed as negligible for risk.
## Appendix 3 - Infrastructure design guidelines for enabling fish passage

**Table 1: infrastructure design guidelines to enable fish passage**

<table>
<thead>
<tr>
<th>Prior to works</th>
<th>Contact PIRSA Fisheries and Aquaculture inland fisheries manager to discuss works</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Have fish passage requirements been considered in choosing crossing design?</td>
</tr>
<tr>
<td></td>
<td>Have the likely species and their migratory requirements been identified?</td>
</tr>
<tr>
<td></td>
<td>Does the construction timing minimise likely impacts on fish passage?</td>
</tr>
<tr>
<td></td>
<td>Is the site a known high conservation value site ie spawning location, aggregation or staging area, nursery area?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>During Works</th>
<th>Is vegetation removal and stream bank and streambed disturbance being minimised</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Are banks being hand cleared to minimise disturbance – are tree guards being used if machinery is clearing banks</td>
</tr>
<tr>
<td></td>
<td>Is disturbance to the outside of bends minimised</td>
</tr>
<tr>
<td></td>
<td>Is vegetation rather than revetment being used to stabilise banks</td>
</tr>
<tr>
<td></td>
<td>Will works be undertaken in dry season to avoid siltation at site, are flotation siltation curtains etc being used if necessary</td>
</tr>
<tr>
<td></td>
<td>Are erosion and sediment control devices being maintained regularly</td>
</tr>
<tr>
<td></td>
<td>Are the morphological features of the watercourse being maintained, will the new channel design simulate a natural watercourse</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Completion of Works</th>
<th>Have the disturbed areas been returned to their original profiles and conditions?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Has the area been stabilised to resist erosion by planting native vegetation (where natural cover has been removed/damaged)?</td>
</tr>
<tr>
<td></td>
<td>Has a maintenance program been developed for the structure?</td>
</tr>
<tr>
<td></td>
<td>Are fish able to move through the crossing under various flow regimes? (if not modify/redesign structure).</td>
</tr>
</tbody>
</table>

Source: Adapted from Cotterell, 1998.
Appendix 4 - Summary of authorised recreational fishing equipment for Cooper Creek, South Australia

Permitted devices
Each person can use:

- up to two rods, or two handlines, or one of each.

Each line can have:

- up to three hooks attached, or
- up to five hooks joined eye to shank or threaded together (this will be considered as one hook).

In addition to the rod and handline anglers may use up to two kinds of devices from group A (below) and one kind of device from group B (below):

<table>
<thead>
<tr>
<th>Group</th>
<th>Device</th>
<th>Maximum number permitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Hand net</td>
<td>1</td>
</tr>
<tr>
<td>A</td>
<td>Shrimp trap</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>Yabbie pot</td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td>Hoop net</td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td>Drop net</td>
<td>3</td>
</tr>
</tbody>
</table>

If you are only using a rod and line, you can use up to a maximum of 10 hoop nets.

Marking of devices
All permitted devices (other than those designed to be held in the hand, for example rod and line or handlines) which are left unattended must be marked with a tag and, in some cases, a buoy.

Tags
All registered devices must be marked with a tag showing the registered owner’s name and registration number.

Devices designed to be held in the hand, or drop nets and yabbie pots set from the shore do not need a tag if the person responsible is in attendance. This means that the person responsible for the device is no more than 50 metres away from any part of it at all times.

If a permitted device is left unattended at any time it must be marked with a tag showing the name and address of the owner of the device.

Tags must:

- show the name and address of the owner of the device
- be made of a material that is durable in water
- be 10 cm x 5 cm in size.

31 The use of any device other than rod and handline, hand net, hoop net, drop net, yabbie pot or shrimp net is prohibited when fishing from Cooper Creek and Diamantina River. In addition, any of the above devices that do not conform to the legal dimensions and requirements are considered to be illegal. The use of mesh nets, gill nets, drum nets or set lines is strictly prohibited in any inland waters.
A buoy with a name and address correctly inscribed is considered to be a tag.

**Buoys**
Many devices must be marked with buoys. Buoys must:
- be durable
- have a volume not less than two litres (15 to 20 cm diameter) when used in the waters of the River Murray
- be of the correct colour for a particular permitted device and particular water.

**Device specifications**
Check that any device you already have, or that you intend buying or constructing, conforms to legal specifications. Devices that do not conform might be seized and subsequently forfeited. Remember that there might be further restrictions on the number of devices that can be used at any one time if you are also using other permitted devices at the same time. If you have any questions about the number of devices you can use, call FISHWATCH on 1800 065 522 (freecall, 24 hours).

**Drop net**
A drop net consists of two hoops joined by a cylindrical or cone-shaped net bag. Note that drop nets are not the same as hoop nets and regulations vary. Drop nets do not need to be registered.

**Specifications**

<table>
<thead>
<tr>
<th>Maximum hoop diameter:</th>
<th>107 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum depth:</td>
<td>92 cm</td>
</tr>
<tr>
<td>Maximum number allowed:</td>
<td>3 drop nets per person</td>
</tr>
<tr>
<td>Marking required:</td>
<td>1 white buoy, 2 litres in volume</td>
</tr>
<tr>
<td></td>
<td>1 tag with name and address of owner if unattended</td>
</tr>
</tbody>
</table>
Hand net
A hand net consists of conical-shaped netting joined to a hoop that is attached to a rigid handle. It can be a dab net, dip net or shrimp net. Only one hand net per person can be used. Hand nets do not need to be registered.

Specifications
Maximum hoop diameter: 100 cm (1 metre)
Maximum depth of net: 100 cm (1 metre)

Hoop net
This consists of one hoop holding a cone-shaped net bag. Note that hoop nets are not the same as drop nets and regulations vary. Hoop nets do not need to be registered but must be buoyed and tagged correctly.

Specifications
Maximum hoop diameter: 107 cm
Maximum depth of net bag: 92 cm

Maximum number permitted:
Up to 10 hoop nets if no other device is being used
Up to 3 hoop nets if other fishing gear

Marking:
1 white buoy, 2 litres in volume
1 tag with name and address of owner if unattended

Note:
The use of hoop nets is prohibited in the main stream section of commercial fishing reaches of the River Murray.
Shrimp trap

**Specifications**
- Maximum dimension: 40 cm
- Maximum height: 20 cm
- Minimum mesh hole size: 5 mm
- Maximum number permitted: 1 per person
- Marking: 1 white buoy (if not set from shore)
  1 tag with name and address of owner

Yabbie pot (including Opera House)
Yabby pots do not need to be registered, but do need to be buoyed (if not set from shore) and tagged.

**Specifications**
- Maximum dimension: 100 cm (1 metre)
- Maximum funnel diameter: 7.5 cm
- Maximum number permitted: 3 per person
- Structure: No more than 2 fixed entrance funnels allowed
- Marking: 1 white buoy (if not set from shore)
  1 tag with name and address of owner
## Appendix 5 - Waterhole health assessment framework

Table 1: waterhole health assessment framework (from Silcock, 2009)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Condition Description</th>
<th>Score A</th>
<th>Score B</th>
<th>Score C</th>
<th>Score D</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Bank stability</td>
<td>Stable banks with good vegetation cover and no accelerated erosion or stock pads</td>
<td>Isolated patches of erosion or disturbance, generally restricted to pads</td>
<td>Moderate bank erosion with many pads and trampling</td>
<td>Extreme erosion and bank instability; deeply-incised pads + much trampling</td>
<td></td>
</tr>
<tr>
<td>(ii) Groundcover</td>
<td>Perennial grasses dominate bank above 'shear zone' (Figure 29) and area adjacent to waterhole (except Mulligan River)</td>
<td>Perennial grasses and forbs common, providing good coverage of bank despite some grazing pressure</td>
<td>Groundcover obviously denuded around waterhole, but perennial grasses still present</td>
<td>No perennial grasses present in vicinity of waterhole; overall groundcover very low</td>
<td></td>
</tr>
<tr>
<td>(iii) Woody species health (existing species + regeneration)</td>
<td>Minimal grazing of trees and shrubs + abundant and healthy regeneration of both canopy and mid-storey species</td>
<td>Some grazing of trees/shrubs; regeneration present, but young plants showing signs of stress</td>
<td>Most individual trees and shrubs grazed; limited regeneration evident OR seedlings heavily grazed</td>
<td>Ring-barking of trees ± palatable trees and shrubs heavily grazed; no regeneration of dominant riparian species</td>
<td></td>
</tr>
<tr>
<td>(iv) Terrestrial woody debris and litter</td>
<td>Fallen timber, dead logs and litter abundant understanding trees; dead branches remain on trees; hollow-bearing trees present</td>
<td>Fallen timber, dead logs and litter present; some standing dead trees</td>
<td>Little fallen timber, dead logs or leaf litter; often obvious signs of firewood harvesting</td>
<td>No fallen timber in area; few old dead branches; signs of firewood collection often obvious</td>
<td></td>
</tr>
<tr>
<td>(v) Introduced species</td>
<td>No introduced species present at site</td>
<td>Some introduced plants present amongst riparian vegetation, but scattered</td>
<td>Introduced species common OR dominant in under-storey but with healthy native over-storey</td>
<td>Introduced species dominate both under-storey &amp; over-storey, with few natives persisting</td>
<td></td>
</tr>
</tbody>
</table>

**OVERALL RIPARIAN CONDITION** (average of above five scores)

**AQUATIC CONDITION**

<table>
<thead>
<tr>
<th>Aquatic Fauna Assemblage</th>
<th>3 out of 4 native indicator species present if permanent in-channel WH</th>
<th>3 out of 4 native indicator species present if permanent in-channel WH</th>
<th>Few native species</th>
<th>No or few native species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exotic species</td>
<td>No exotics detected</td>
<td>Presence of exotics detected but &lt;10% of catch</td>
<td>Abundant exotics (&gt;10% of individuals caught)</td>
<td>Exotics dominant (&gt;50% of catch)</td>
</tr>
</tbody>
</table>

**OVERALL AQUATIC CONDITION** (average of above two scores)

**OVERALL WATERHOLE CONDITION** (average of riparian and aquatic scores)
## Appendix 6 - Lake Eyre Basin fish species

### Table 1: Lake Eyre Basin fish species

<table>
<thead>
<tr>
<th>Family</th>
<th>Common name</th>
<th>Taxon</th>
<th>SA Endemic</th>
<th>EPBC rating</th>
<th>2007 Action Plan</th>
<th>Established alien species</th>
<th>Introduced, not yet established</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Native species</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plotosidae</td>
<td>Cooper catfish</td>
<td>Neosiluroides cooperensis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Restricted to large pools on Cooper Creek</td>
</tr>
<tr>
<td>Plotosidae</td>
<td>Dalhousie catfish</td>
<td>Neosilurus gloveri</td>
<td>x</td>
<td>TEC</td>
<td>VU</td>
<td></td>
<td></td>
<td>Spring pools at Dalhousie Springs only</td>
</tr>
<tr>
<td>Plotosidae</td>
<td>Hyrtl's catfish</td>
<td>Neosilurus hyrtlitii</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plotosidae</td>
<td>Silver catfish</td>
<td>Porochilus argenteus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clupeidae</td>
<td>Bony herring</td>
<td>Nematalosa erebi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retropinnidae</td>
<td>Smelt</td>
<td>Retropinna semoni</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Undescribed species endemic to Lake Eyre Basin</td>
</tr>
<tr>
<td>Melanotaeniidae</td>
<td>Desert rainbowfish</td>
<td>Melanotaenia splendidida tatei</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atherinidae</td>
<td>Dalhousie hardyhead</td>
<td>Craterocephalus dalhousiensis</td>
<td>x</td>
<td>TEC</td>
<td>VU</td>
<td></td>
<td></td>
<td>Spring pools at Dalhousie Springs only</td>
</tr>
<tr>
<td>Atherinidae</td>
<td>Lake Eyre hardyhead</td>
<td>Craterocephalus eyresii</td>
<td>x</td>
<td>TEC</td>
<td></td>
<td></td>
<td></td>
<td>Lake Eyre and Lake Torrens drainages</td>
</tr>
<tr>
<td>Atherinidae</td>
<td>Glover's hardyhead</td>
<td>Craterocephalus gloveri</td>
<td>x</td>
<td>TEC</td>
<td>VU</td>
<td></td>
<td></td>
<td>Spring pools at Dalhousie Springs only</td>
</tr>
<tr>
<td>Atherinidae</td>
<td>Flyspecked hardyhead</td>
<td>Craterocephalus stercusmuscarum</td>
<td></td>
<td>TEC</td>
<td>E</td>
<td></td>
<td></td>
<td>Large pools on MacDonnell Creek, Nth Flinders only</td>
</tr>
<tr>
<td>Ambassidae</td>
<td>Northwest glassfish</td>
<td>Ambassis sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cooper Creek and Diamantina</td>
</tr>
<tr>
<td>Percichthyidae</td>
<td>Lake Eyre Golden Perch</td>
<td>Macquaria sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Undescribed species endemic to Lake Eyre Basin</td>
</tr>
<tr>
<td>Terapontidae</td>
<td>Banded grunter</td>
<td>Amniataba percoides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terapontidae</td>
<td>Welch's grunter</td>
<td>Bidyamus welchi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terapontidae</td>
<td>Spangled grunter</td>
<td>Leiopotherapon unicolor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terapontidae</td>
<td>Barcoo grunter</td>
<td>Scortum barco</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eleotridae</td>
<td>Western carp gudgeon</td>
<td>Hypseleotris klunzingeri</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eleotridae</td>
<td>Midgley’s carp gudgeon</td>
<td>Hypseleotris sp. 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eleotridae</td>
<td>Hybrid forms (e.g. Lake’s carp gudgeon)</td>
<td>Hypseleotris spp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td>Species Name</td>
<td>Status</td>
<td>Introduced To</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>---------------------------------------</td>
<td>--------</td>
<td>--------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eleotridae</td>
<td>Eleotridae Dalhousie purple-spotted gudgeon</td>
<td>x VU E</td>
<td>Restricted to small stream section of Balacnoona Creek</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gobiidae</td>
<td>Gobiidae Desert goby</td>
<td>x TEC VU</td>
<td>Mound springs and desert rivers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gobiidae</td>
<td>Gobiidae Dalhousie goby</td>
<td>x TEC VU</td>
<td>Restricted to large pools on Cooper Creek</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exotic species</td>
<td>Cyprinidae Goldfish</td>
<td>x</td>
<td>Cooper Creek and Coongie Lakes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyprinidae</td>
<td>Cyprinidae Common carp</td>
<td></td>
<td>Leigh Creek retention dam (still persist)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salmonidae</td>
<td>Salmonidae Rainbow trout</td>
<td></td>
<td>Reports of stocking into isolated dams</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poeciliidae</td>
<td>Poeciliidae Eastern gambusia</td>
<td>x</td>
<td>Widespread</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percidae</td>
<td>Percidae Redfin perch</td>
<td>x</td>
<td>Historic introduction to eastern Flinders Ranges stream</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Translocated Australian native species</td>
<td>Percichthyidae Murray cod</td>
<td>x</td>
<td>Historic (and ongoing?) introduction to Cooper Creek</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percichthyida</td>
<td>Percichthyida Murray-Darling Golden Perch</td>
<td>x</td>
<td>Various introductions to dams</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terapontidae</td>
<td>Terapontidae Silver perch</td>
<td>x</td>
<td>Various introductions to dams</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: M Hammer, Native Fish Australia (SA).
Appendix 7 - Location of permanent & semi-permanent waterholes for the Georgina, Diamantina and Cooper catchments

Source: SAAL NRM Board (Silcock, 2009)
Appendix 8 - Summary of bag, boat and size limits for recreational fishing for Cooper Creek and Diamantina, South Australia.

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
<th>Minimum legal length</th>
<th>Personal daily bag limit</th>
<th>Daily boat limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bony Bream - <em>Fluvialosa richardsoni</em></td>
<td></td>
<td>No minimum legal length</td>
<td>Take only what you need</td>
<td>No Boat Limit</td>
</tr>
<tr>
<td>Catfish - Family <em>Plotosidae</em></td>
<td></td>
<td>No minimum legal length</td>
<td>For catfish up to 33 cm in length, measured from the tip of the snout to the tip of the tail</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>For catfish over 33 cm in length, measured from the tip of the snout to the tip of the tail</td>
<td>2</td>
</tr>
<tr>
<td>Golden Perch (Callop, Yellow belly) Lake Eyre - Genus <em>Macquaria</em></td>
<td></td>
<td>33 cm from tip of snout to tip of tail</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Grunters - Family <em>Terapontidae</em></td>
<td></td>
<td>No minimum legal length</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Yabbie - Genus <em>Cherax</em></td>
<td></td>
<td>There are no size limits for yabbies</td>
<td>200</td>
<td>Female yabbies carrying eggs are totally protected and must be returned to the water immediately.</td>
</tr>
</tbody>
</table>