Not Relevant

108 EC05/0084CS The South Australian Marine Planning Framework
APPROVED

108

CABINET COVER SHEET

RELEASED

1.	**TITLE:**	The South Australian Marine Planning Framework
2.	**MINISTER:**	Hon John Hill MP Minister for Environment and Conservation
3.	**PURPOSE:**	To seek Cabinet approval for: • the *South Australian Marine Planning Framework* and the accompanying *Performance Assessment System* as the guiding document for the establishment of marine plans in State waters (Attachment 1); and • the public release of the *South Australian Marine Planning Framework.*
4.	**IDENTIFY THE RELEVANT GOVERNMENT POLICY AND/OR SA's STRATEGIC PLAN TARGET:**	This proposal is a major commitment of the Government's *Living Coast Strategy*, to develop an integrated framework for the management and protection of the marine environment. It will also provide linkages with the *Planning Strategy for South Australia* and the proposed State Natural Resources Management (NRM) Plan. The *Framework* will provide the structure to fulfil the commitment in South Australia's Strategic Plan to manage, in an ecologically sustainable way, natural resources across the broader seascape in areas that are not part of the protected area system.
5.	**RESOURCES REQUIRED FOR IMPLEMENTATION:**	All costs associated with the development, printing and promotion of the *Framework* will be met from within approved Budget allocations. The costs for development of marine plans have been factored into current forward estimates. Costs for implementation of actions associated with each marine plan will be subject to normal budget negotiations and Cabinet approval. The Department of Treasury and Finance has been consulted on this submission.
6.	**COMMUNITY AND ENVIRONMENTAL IMPACT:**	The proposal will provide for the long-term protection and conservation of South Australia's marine ecosystems and environment. This has a number of positive benefits including:

- a whole of Government approach to management and monitoring of activities in the marine environment,
- a linkage and tool for the *State of the Environment* reporting system, and
- improved lifestyles for families and the community through clean healthy seas.

7. RISKS:

The development of the *Framework* and marine plans is one of a number of Government initiatives designed to mitigate the risk of unsustainable development and use of South Australia's marine environment.

There is considerable community and industry support within regional South Australia for the policy as proposed within the *Framework.* Continued public consultations and local community input into the development of marine plans should minimise community concerns about the purpose and intent of marine planning.

To not proceed with the adoption of the policy directions outlined within the *Framework* would have significant consequences arising from erosion of support and goodwill from both community and commercial sectors, which have given open support to the proposal.

8. CONSULTATION:

Guidance and direction has been provided by the Marine Protected Area and Marine Planning Steering Committee.

Additional consultation has occurred through the Marine and Coastal Managers' Forum. Details of membership of both groups are included in the Cabinet submission.

Other agencies consulted regarding impact statements include:

- Department of Trade and Economic Development;
- Office of Regional Affairs;
- Department of the Premier and Cabinet;
- Department for Families and Communities;
- Department of Treasury and Finance
- Department of Water, Land and Biodiversity Conservation;
- Department for Environment and Heritage; and
- Environment Protection Authority.

A Scientific Working Group consisting of a number of scientists provided peer review and advice on the model.

9. COMMUNICATION STRATEGY:

The *Framework* will be launched by a Ministerial media release. Copies of an abridged promotional version of the *Framework* will be distributed to key stakeholders (including coastal councils, industry associations, conservation groups, NRM Boards and interested members of the public), and will be made available on the Department for Environment and Heritage's website.

10. URGENCY:

Within the ten-day rule.

112. RECOMMENDATIONS: It is recommended that Cabinet:

4.1 approve the *South Australian Marine Planning Framework* and the accompanying *Performance Assessment System* as the guiding policy for the establishment of marine plans in State waters (Attachment 1);

4.2 approve the public release of the *South Australian Marine Planning Framework*;

4.3 note the associated *Performance Assessment System* will not be released for public comment, but will be made available for interested stakeholders to view; and

4.4 note that the implementation of individual marine plans will be subject to separate Cabinet approvals.

I declare that I have no actual or potential conflict of interest in relation to the proposals contained in this submission.

Signature of Minister: **JOHN HILL**

Date: 1.12.05

MINUTES *forming* **ENCLOSURE** *to* EC05/0084CS

TO: **THE PREMIER FOR CABINET**

RE: **THE SOUTH AUSTRALIAN MARINE PLANNING FRAMEWORK**

1. PROPOSAL

That Cabinet:

1.1 approve the *South Australian Marine Planning Framework* and the accompanying *Performance Assessment System* as the guiding document for the establishment of marine plans in State waters (Attachment 1);

1.2 approve the release of the *South Australian Marine Planning Framework*;

1.3 note the associated *Performance Assessment System* will not be released for public comment, but will be made available for interested stakeholders to view; and

1.4 note that the implementation of each marine plan will be subject to separate Cabinet approvals.

2. BACKGROUND

2.1 With their high environmental, economic and social values, the State's coastal, estuarine and marine environments are extremely significant to the South Australian community. However, with a large proportion of the population living near the coast and an increasing number of industries relying on marine resources, these environments are under significant pressure from development and use, pollution and other impacts.

2.2 As part of its election commitments, the Government undertook to develop a *'Living Coast Strategy to bring together the management and protection of our marine environment, coastal areas and estuaries'.*

2.3 The *Living Coast Strategy* was released in 2004 and its first objective is *'to provide for the development of an integrated legislative and policy framework for ecologically sustainable development and use of our coastal, estuarine and marine environments'.*

2.4 The Premier's Round Table on Sustainability in its *Three, Four, Five: Challenges, Principles and Actions for a Sustainable Future* report recommended *'resource decisions to be based on environmental capability assessments'.* The *South Australian Marine Planning Framework* (herein the *Framework*) delivers a mechanism by which this can be achieved in the management of coastal, marine, and estuarine ecosystems.

2.5 The *Framework* articulates the methodology and process for developing a series of marine plans across State waters to guide the management of current and future activities within the ecological capability of the marine environment.

2.6 Marine planning is a new concept and there are no existing models that could be reasonably applied to South Australia's marine environment. As such, this is a world-leading initiative, which demonstrates South Australia's innovative approach to managing ecologically sustainable development, use

and conservation of its marine jurisdiction. The Australian Government, a number of State jurisdictions and other countries have expressed interest in the proposed South Australian model.

2.7 It is important to note that marine planning is a separate initiative from the Government's commitment to establish 19 marine parks by 2010 (Target 3.5, South Australia's Strategic Plan). Marine plans are designed to guide the ecologically sustainable development and use of coastal, marine and estuarine environments within the capability of the ecosystem whereas marine parks are designed to ensure that representative samples of the environment are protected for the benefit of current and future generations (similar to the terrestrial based national parks system).

3. DISCUSSION

Current management arrangements

3.1 The management of coastal, marine and estuarine environments has historically been based on 'sectoral' interests, characterised by Government agencies/statutory bodies executing their roles and responsibilities without full consideration of the consequential impacts on the environment and/or other existing or potential uses.

3.2 In particular, current management arrangements with regard to coastal, marine and estuarine environments include:

- the regulation of marine resource use through:
  - *Aquaculture Act 2001;*
  - *Fisheries Act 1982;*
  - *Mining Act 1971;*
  - *National Parks and Wildlife Act 1972;*
  - *Offshore Minerals Act 2000;*
  - *Petroleum Act 2000; and*
  - *Petroleum (Submerged Lands) Act 1982.*
- the protection of seagrass through the *Native Vegetation Act 1991;*
- regulation of land-based pollution and water quality through the *Environment Protection Act 1993*;
- the regulation of use and development through:
  - *Aboriginal Heritage Act 1988;*
  - *Coast Protection Act 1972;*
  - *Development Act 1993;*
  - *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth);
  - *Harbors and Navigation Act 1993;*
  - *Heritage Places Act 1993;*
  - *Local Government Act 1999* and council bylaws; and
  - *Natural Resources Management Act 2004*; and
- specific legislation designed to protect a designated area, such as the *Adelaide Dolphin Sanctuary Act 2005.*

3.3 Administration of the range of laws that apply to coastal, marine and estuarine environments is dispersed between a number of Government agencies and other statutory bodies including:

- the Coast Protection Board under the Coast *Protection Act 1972;*
- the Aquaculture Advisory Committee under the *Aquaculture Act 2001;*
- the Development Assessment Commission under the *Development Act 1993;* and
- the Regional Natural Resources Management Boards under the *Natural* Resources *Management Act 2004.*

3.4 In order to provide for the long-term conservation, development and productivity of these environments, an integrated approach to strategic planning and management, based on contemporary and robust scientific knowledge and information, is required.

The South Australian Marine Planning Framework

3.5 The *Framework* is a high-level document that articulates the Government's commitment to a whole-of-government approach to guide the management of current and future activities within the ecological capability of the marine environment.

3.6 Based on the principles of ecologically sustainable development, ecosystem-based management and adaptive management, the *Framework* seeks to:

- provide the basis for the integrated and ecologically sustainable development and use of South Australia's marine environments;
- facilitate the conservation and protection of ecological processes, biodiversity and intrinsic values of the marine environment;
- promote effective partnerships between community, industry and governments;
- facilitate adaptive management, addressing the dynamic nature of the marine environment and the uses of it;
- identify and facilitate the reduction of threatening processes to the marine environment; and
- facilitate informed decision-making based on continually improving knowledge and understanding of the ecological processes of the marine environment.

3.7 The *Framework* provides the structure, direction and processes for the development of six marine plans and associated Performance Assessment Systems (PAS) covering State waters in South Australia's eight marine bioregions.

3.8 In particular, the *Framework* outlines the goal, principles, and objectives of marine plans whilst recognising the critical role of the community, industry and other stakeholders in developing these plans.

Marine Plans

3.9 Marine plans are a tool designed to guide State and Local Government planners and natural resource managers in the development of subordinate legislation, strategies, plans, policies and guidelines on issues related to the sustainable development and use of South Australia's coastal, marine and estuarine resources, by providing essential information on the ecosystem's capability to sustain such activities and uses.

3.10 Fundamental to marine plans is an ecologically rated zoning model, which defines areas according to coastal, marine and estuarine habitats and species that have been identified as suitable indicators of ecosystem integrity.

3.11 It is proposed to develop six marine plans, covering the eight defined bioregions (regions with distinctive patterns of biodiversity) that are distributed across State waters: Far West (covering the Eucla Bioregion), West Coast (covering the Murat Bioregion), Lower Spencer (covering the Eyre Bioregion), Spencer Gulf (covering the Spencer Gulf and Northern Spencer Gulf Bioregions), Gulf St Vincent/Kangaroo Island (covering the St Vincent Gulf Bioregion) and South East (covering the Coorong and Otway Bioregions).

3.12 These marine plans will set the broad context within which existing management agencies will enact their statutory obligations in each region, they will provide guidance to Natural Resources Management Boards in consideration of land-based impacts on the marine environment and will broaden the guidance and information available to planners and proponents of development to include and address issues potentially affecting the States waters.

Performance **A**ssessment System (P**A**S)

3.13 Currently, there is no robust way of measuring whether the management of the development and use of the marine environment is delivering ecological sustainability in that environment.

3.14 A PAS has been developed for the *Framework*, in consultation with South Australian Government agencies and non-government organisations, to evaluate the success of marine plans by reporting on the maintenance of ecosystem condition. Accordingly, the PAS is a key mechanism for assessing and reporting on cumulative impacts in South Australia's marine environment and its capability to support current and future use.

3.15 Monitoring in the marine environment is currently undertaken by single agencies and is often influenced by specific industry needs. The PAS provides an integrating mechanism enabling all agencies to contribute to a statewide, collaborative approach to data collection, analysis and reporting on marine ecosystem conditions. It will enable the collection and integration of existing research and management programs that currently provide valuable information on the marine environment. In addition, the PAS may identify current information / knowledge gaps and assist to prioritise future research needs.

3.16 The PAS will also identify responsibilities for agencies involved in the management and monitoring of the marine, estuarine and coastal environments.

Future Management Arrangements

3.17 The *Framework* and marine plans will not, in isolation, address the challenge for ecologically sustainable use of the State's marine environment. Rather, they complement and seek to influence outcomes in the *Planning Strategy for South Australia* and *Natural Resources Management (NRM) Plans*[1] related to the conservation, protection and management of coastal, marine and estuarine environments.

3.18 Importantly, neither the *Framework* nor marine plans seek to control the ongoing, day-to-day management of marine, coastal and estuarine activities. Management and control of activities in, and uses of, the marine environment (such as fishing, boating, pollution and aquaculture to name a few) will still continue under the existing relevant legislation.

3.19 Marine plans will guide those agencies and statutory bodies responsible for the development of subordinate legislation, strategies, plans, policies or guidelines under relevant legislation and facilitate the delivery of long-term protection of coastal, marine and estuarine environments whilst enabling a broad range of activities to occur in an ecologically sustainable manner.

3.20 It is proposed that integrated planning, management and sustainable use of coastal, estuarine and marine environments and the statutory basis for each of the marine plans developed under the *Framework* will be provided through the Bill to amend the *Coast Protection Act 1972*.

Community engagement

3.21 The community plays an integral role in the marine planning process outlined in the *Framework*, as the sustainability of the marine environment will only be achieved through well-informed and aware citizens, industries and non-government organisations acting as custodians and ambassadors for coastal, marine and estuarine environments.

3.22 Accordingly, there is a clear commitment within this initiative to involve industry, the community and other marine users in the development of marine plans. In particular, the incorporation of community issues is critical for effective implementation of each marine plan.

3.23 To facilitate this outcome, the *Framework* outlines a process for establishing a marine plan, including:

- notification of intent to develop a marine plan;
- establishment of regional consultative committees to facilitate the development of draft marine plans;
- three-months public consultation on draft marine plans to provide for broad community engagement;
- education; and

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1 Regional NRM plans apply to all coastal waters. Marine plans will provide a sound basis for Regional NRM Boards to meet their responsibilities in developing integrated natural resource management plans.

- involvement of Friends Groups, volunteers and other community-based groups in monitoring and other activities to encourage community stewardship.

3.24 Short-term non-statutory regional consultative committees will be appointed to contribute technical expertise, advice and local knowledge to the development of marine plans

3.25 The Minister for Environment and Conservation will appoint the membership of these regional consultative committees. Members will be selected on the basis of expertise, drawn from the local community, including industry and local government, to ensure an adequate range of skills and knowledge is present to cover the geographic distribution and the economic, social and environmental values of the area.

3.26 The regional consultative committees will have a close working relationship with the Department for Environment and Heritage (DEH) and the existing Marine Advisory Committee, which has an overarching state role to provide independent advice to Government on marine conservation initiatives.

3.27 The regional consultative committees will be dissolved upon completion of the marine plans.

3.28 Economic, Financial and Budget Impacts

3.28.1 Required Resources

All costs associated with the development, printing and promotion of the *Framework* will be met from within existing Budget allocations approved as part of the *Living Coast Strategy.*
The costs for development of marine plans have been factored into current forward estimates for DEH. Costs for implementation of actions associated with each marine plan will be subject to normal budget negotiations and Cabinet approval.

3.28.2 Staffing Implications

DEH has established a small marine planning group to support the development of marine plans.

There may be a requirement to provide additional resources for the implementation of each marine plan however, this issue will be addressed in the appropriate Cabinet submissions seeking approval to finalise those marine plans.

3.29 Impact on the community and the environment

3.29.1 Regulatory impact

There is no regulatory impact arising from the development and approval of the *Framework*, as it is a high-level document articulating the process for developing a series of marine plans.

The subsequent implementation of marine plans may have regulatory impacts, as they are proposed to be given statutory effect under the amended *Coast Protection Act 1972*. However, these

impacts will be addressed as part of the Cabinet submission seeking approval to introduce the Bill to amend the Coast Protection Act.

It should be noted that the regulation of activities within the marine environment would continue to be managed under the appropriate, existing legislation.

3.29.2 Small business impact

The approval of the *Framework* will have a number of positive implications for State development and small business, as it will:

- clearly articulate the Government's process for developing and consulting on marine plans, alleviating some industry uncertainty regarding this matter;
- provide assurance for the long-term viability of resource industries by endeavouring to ensure that all use and activities remain within the ecological capacity of the marine environment; and
- provide more certainty for the sustainable development, use and conservation of highly valued sections of the marine environment.

3.29.3 Impact on the environment

This proposal will contribute to the long-term protection and conservation of South Australia's marine environments. This proposal, which is consistent with the *South Australia's Strategic Plan* and *Living Coast Strategy*, will contribute to the Government's responsibility to provide for the management of natural resources in an ecologically sustainable way.

The key impacts on the environment will be:

- long term protection of the coast and marine environment;
- provision of a framework for a broad range of activities to occur in an ecologically sustainable manner;
- increased certainty of marine resources;
- protection of significant areas of vegetation and /or marine habitat;
- provision of guidelines for development to occur in an ecologically sustainable manner;
- providing for integrated coast and marine management; and
- improving the level of knowledge about coastal, marine and estuarine ecosystems.

3.25.4 Impact on families and society

There should be a positive impact for society as the *Framework* and marine plans seek to balance the interests of all marine users for the greater benefit of the community and for the long-term protection and sustainability of South Australia's marine environment.

The long-term protection of the South Australian marine environment will promote healthy lifestyles for families and the community through clean, healthy seas and marine produce.

Community consultation throughout the development of each marine plan and the engagement of regional consultative committees will provide the community with significant custodianship of this initiative.

3.25.5 Regional impact

There are no regional impacts arising from the development and approval of the *Framework* as it is a high-level document articulating the process for developing a series of marine plans.

Considerable consultation has occurred throughout the Spencer Gulf region between 2002 and 2005 during the development of a pilot marine plan to test the methodology and processes outlined in the *Framework*.

The engagement of regional consultative committees and community consultation as part of the development of each marine plan aims to ensure regional communities are actively engaged in this initiative. The subsequent implementation of marine plans may have regional impacts, which will be addressed when seeking approval of each marine plan.

3.30 Relevant Government **P**olicy and / or S**A** Strategic **P**lan

3.30.1 In February 2001, the former Government endorsed a proposal for the development of a Marine **P**lanning Framework for South Australian marine waters in response to the recommendations contained in the *South Australian Marine & Estuarine Strategy*.

3.30.2 In October 2003, the Australian, States and Territory Governments through the Natural Resource Management Ministerial Council endorsed A Framework for a National Cooperative Approach to Integrated Coastal Zone Management. The Integrated Coastal Zone Management (ICZM) framework highlights all Australian Governments' commitment to a national approach to the management of coastal issues.

3.30.3 As part of its election commitments, the Government undertook to develop a *'Living Coast Strategy to bring together the management and protection of our marine environment, coastal areas and estuaries'*. The *Living Coast Strategy* was released in 2004 and its first objective is *'to provide for the development of an integrated legislative and policy framework for ecologically sustainable development and use of our coastal, estuarine and marine environments'*.

3.30.4 The need for this framework was also recognised in *South Australia's Strategic Plan* as a commitment to *'manage, in an ecologically sustainable way natural resources across the broader seascape in areas that are not parts of the protected area system'*.

3.30.5 The **P**remier's Round Table on Sustainability further highlighted the need for *'resource decisions to be based on environmental capability assessments'* as part of the *Three, Four, Five: Challenges, Principles and Actions for a Sustainable Future* report. The Government accepted this recommendation in its response to the report.

3.30.6 This world leading *Framework* demonstrates South Australia's innovative approach to the sustainable planning and conservation of its marine jurisdiction, and aligns with South Australia's Strategic Plan Objective 4: *Fostering Creativity.*

3.31 Risk Management Strategy

The development of the *Framework* and marine plans is one of a number of Government initiatives designed to mitigate the risk of unsustainable development and use of South Australia's marine environment.

There is considerable community and industry support within regional South Australia for guidelines proposed within the *Framework.* Continued public consultations and local community input into the development of marine plans should minimise community concerns about the purpose and intent of marine planning, highlighting that it is not another layer of bureaucracy on industry and the community.

To not proceed with the adoption of the directions outlined within the *Framework* would have significant consequences arising from erosion of support and goodwill from both community and commercial sectors, which have given open support to the proposal.

In addition, the pilot Spencer Gulf Marine Plan has been developed to test the *Framework.* It is anticipated that the Spencer Gulf Marine Plan will be released for public consultation late 2005 or early 2006. If the Spencer Gulf Marine Plan is successful, the remaining five marine plans will be developed.

3.32 Consultation

3.32.1 This proposal is coordinated by DEH and has been developed in partnership with the Department of Primary Industries and Resources South Australia (PIRSA).

3.32.2 The development of the *Framework* has been progressed through the Marine Planning and Marine Protected Areas Steering Committee. This Steering Committee was established as a cross-agency forum to discuss and resolve key issues relating to the establishment of Marine Plans and Marine Parks and is Chaired by DEH and comprises senior representatives from:

- Department of Water, Land and Biodiversity Conservation (DWLBC);
- PIRSA – Aquaculture, Fisheries, Planning SA and Minerals and Energy; and
- South Australian Tourism Commission.

3.32.3 Consultation on the *Framework* has also occurred through the Marine and Coastal Managers' Forum, comprising senior officers from:

- DEH;
- DWLBC;
- Environment Protection Authority;
- Department of Transport, Energy and Infrastructure – Transport SA;

- PIRSA (SARDI, Aquaculture, Planning SA & Fisheries);
- Department of the Premier and Cabinet; and
- South Australian Tourism Commission.

3.32.4 The draft Cabinet submission and supporting documents have been forwarded to all Chief Executives to ensure all agencies had the opportunity to consider and provide comment on the *Framework*. The following agencies commented during the development of this Cabinet submission:

- Department of Treasury and Finance advised that a costing comment is not required as there are no revenue or expense impacts arising from this submission.
- Department of the Premier and Cabinet (National Competition Unit) advised that it agrees with the assessment of regulatory impacts associated with this submission.
- The Office of Regional Affairs discussed opportunities for additional regional consultation, including presentations to the Regional Communities Consultative Committee, to facilitate improved understanding of the Government's marine initiatives.
- The Department for Families and Communities advised that the current statement on family impact is appropriate for this submission.
- The Office of Small Business advised that it has no comment on this submission.
- The Department of Water, Land and Biodiversity Conservation advised that it has been consulted during the development of the Marine Planning Framework at various times and that the Environmental Impact Statement is appropriate.
- Primary Industries and Resources SA advised that it supported the Framework but raised some concerns in relation to the legislative basis. These concerns have been addressed through the recent Cabinet Submission seeking approval to amend the Coast Protection Act 1972 and have been further clarified in paras 3.9, 3.17 and 3.18 of this submission.
- The Department for Administrative and Information Services advised that it has no comment on this submission.
- The Environment Protection Authority advised it is supportive of the submission.
- The Department of Health advised of its support for all documentation.
- The Department of Further Education, Employment, Science and Technology advised of its support and has suggested it become involved with regional consultative committees for future marine plans.

3.33 Implementation Plan

The *Framework* will be implemented through the establishment of six marine plans. It is proposed to progressively develop Marine plans between 2005-06 and 2008-09, commencing with the pilot Spencer Gulf Marine Plan, which is expected to be released for public consultation late 2005 or early 2006. If the Pilot Spencer Gulf Marine Plan is successful, the remaining five marine plans will be developed. Each marine plan will be subject to community and industry consultation as well as Cabinet approval.

3.34 **Communication Strategy**

The *Framework* will be launched by a Ministerial media release. Copies of an abridged promotional *Framework* will be distributed to key stakeholders (including coastal councils, industry associations, conservation groups, NRM Boards and interested members of the public), and will be made available on DEH's website.

3.35 **Executive Council**

This submission does not require the approval of Her Excellency the Governor in Executive Council.

4. RECOMMENDATIONS

It is recommended that Cabinet:

4.1 approve the *South Australian Marine Planning Framework* and the accompanying *Performance Assessment System* as the guiding document for the establishment of marine plans in State waters (Attachment 1);

4.2 approve the release of the *South Australian Marine Planning Framework*;

4.3 note the associated *Performance Assessment System* will not be released for public comment, but will be made available for interested stakeholders to view; and

4.4 note that the implementation of individual marine plans will be subject to separate Cabinet approvals.

JOHN HILL
MINISTER FOR ENVIRONMENT AND CONSERVATION

Date: 1/12/05

RECEIVED
-2 DEC 2005
Premier's Dept.

In Cabinet

- 5 DEC 2005

APPROVED
PREMIER

SOUTH AUSTRALIAN MARINE PLANNING FRAMEWORK

November 2005

Government of South Australia
Department for Environment and Heritage

For further information please contact:

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Cite As:

Department for Environment and Heritage, 2005. *South Australian Marine Planning Framework.* Coast and Marine Conservation Branch, Natural and Cultural Heritage, Department for Environment and Heritage, Adelaide.

ISBN – 07590 1078 1

A companion document, the "Performance Assessment System for the South Australian Marine Planning Framework" is also available on request.

Acknowledgements

Department for Environment and Heritage (DEH) would like to acknowledge the many people and organisations who have contributed to the development of the Marine Planning Framework.

Foreword

South Australia's marine and coastal environments are a precious resource. If used and managed judiciously, they will be a valued legacy for future generations of South Australians. Traditionally, these environments have been treated as a vast sink that is both robust to disturbance and uniform in response to use. However, it is now becoming increasingly clear that the cumulation of impacts arising from our use and misuse is now degrading and devaluing this wonderful asset.

The Government of South Australia has, through its *Living Coast Strategy*, outlined its commitment to protect and manage our marine and coastal environment through 'innovative management, effective conservation and ecological sustainable use'.

In February 2001, the Government approved the development of a South Australian Marine Planning Framework, with a 'pilot' Marine Plan for the Spencer Gulf region to establish innovative planning approaches appropriate for our coastal and marine environments. This is a whole-of-government approach to guide the management of current and future activities within the ecological capability of these environments. The aim is to sustain activity by recognising the holistic nature of the marine ecosystem; no part functions in isolation from its neighbouring part.

This Marine Planning Framework has been developed in partnership with the local community, industry and Government agencies. It is imperative that all South Australians who value these environments for cultural, recreational and/or economic reasons take on a stewardship role in understanding and managing them for the benefit of both current and future generations.

John Hill
Minister for Environment and Conservation

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Executive Summary

South Australia's marine environment spans over 60,000 square kilometres of State waters bounded by approximately 4,000 kilometres of coastline. It is both physically and biologically diverse with many endemic species of flora and fauna and a wide range of habitats maintained by a multitude of complex and interrelated processes. This environment has evolved in response to a unique set of circumstances and environmental conditions.

The abundance and diversity of our marine flora and fauna have supported the establishment of industries that are based on the harvesting or use of these resources. These industries add considerable value to the South Australian economy and are major sources of employment in rural areas.

Historically, towns grew around industrial initiatives and the siting of development was influenced by the need to access deeper waters for transport and their abundant resources. In many cases, developments and uses were established without consideration or understanding of the potential impacts on the surrounding habitats. The legacy of this has been that many of our most important marine, estuarine and coastal habitats are, or have been, experiencing high levels of pollution, declining water quality, loss of productive habitat, the introduction of marine pest species, and levels of resource use that are unsustainable.

The challenge faced by government, industry and the community is to plan for, and manage the use of, our marine environment in an ecologically sustainable manner. The Marine Planning Framework (the "Framework") is an important tool for achieving the State Government's commitment, outlined in the *South Australia Strategic Plan*, (SA Government 2004) to sustainability in the marine environment. The *Living Coast Strategy* (Department for Environment and Heritage, 2004) outlines the need to identify areas of ecological significance through the development of Marine Plans based on marine bioregions, and to test the concept of marine planning through the release of a pilot *Spencer Gulf Marine Plan* for public consultation.

The Framework provides for the development of six Marine Plans and associated Performance Assessment Systems (PAS) covering State waters in South Australia's eight marine bioregions. Based on the principles of ecologically sustainable development, ecosystem-based management and adaptive management, these Marine Plans establish an overarching strategic planning framework to guide State and local government planners and natural resource managers in the development and use of the marine environment.

Fundamental to these Marine Plans is an ecologically-based zoning model which defines areas according to marine, coastal and estuarine habitats and species identified as suitable indicators of ecosystem integrity. Each zone is supported by goals, objectives and strategies for use and development in order to protect the integrity of these ecosystems.

An accompanying PAS also will be developed to monitor and evaluate the effectiveness of each Marine Plan. In particular, the PAS will highlight appropriate monitoring protocols, as well as existing research and management programs that currently provide valuable information on the marine environment. Importantly, the PAS also indicates responsibilities for the implementation of, and reporting on, strategies and actions under each Marine Plan.

Marine Plans will not in isolation address the challenge for ecologically sustainable use of our marine environment. Rather they complement and seek to influence outcomes related to the conservation, protection and management of marine, coastal and estuarine environments in the State's *Planning Strategy for South Australia* and Natural Resources Management Plans.

Whilst management and control of activities in the marine and coastal environment such as fishing, boating, pollution and aquaculture to name but a few will still continue under existing relevant legislation, Marine Plans will guide those agencies responsible for administering this legislation, and may influence policy, for example, in Development Plans.

The community also plays an integral role in this process, as the protection of the marine environment will only be achieved through well-informed and aware citizens, industries and non-government organisations acting as custodians and ambassadors for the marine environment. Therefore community consultation has been identified as a critical component of each Marine Plan's development.

Regional consultative committees will be appointed to assist in the development of each regional Marine Plan. Membership will be based upon a spread of skills and knowledge to cover the geographic distribution and the economic, social and ecological values of the area.

This Framework provides the structure, tools and responsibilities to map the way forward for South Australia's marine environment into an ecologically sustainable future.

1. Policy Commitments

International

Our Common Future, the Report of the World Commission on Environment and Development (WCED) 1987, defined *sustainable development* as:

> 'Development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.

National

Ecologically Sustainable Development

The Commonwealth Government adopted the WCED international view of sustainable development as *Ecologically Sustainable Development* (ESD). In 1992, Heads of Government endorsed the *National Strategy for Ecologically Sustainable Development* (NSESD). A challenge that now faces all Australian governments is how to manage 'use' of marine, coastal and estuarine resources in order to achieve ESD.

Commonwealth Initiatives for Integration in the Marine Environment

Australia's Oceans Policy, released in 1998, is central to the ecologically sustainable use of the marine environment. Regional marine planning is the key delivery mechanism for the Commonwealth Government to implement the *Australia's Oceans Policy*. Regional Marine Plans enable the integration of management to ensure ecologically sustainable use, and the conservation of ecologically important areas, whilst maintaining, economic, social and cultural values.

Commonwealth Regional Marine Plans primarily focus on Commonwealth waters but by agreement can extend to State waters. The *South-east Regional Marine Plan* encompasses Commonwealth waters from southern New South Wales, including Victoria and Tasmania, to Kangaroo Island in South Australia.

The South-west Regional Marine Plan, which is in the initial stages of development, will encompass Commonwealth waters from Kangaroo Island across the Great Australian Bight and up the south-west coast of Western Australia. This plan will complete the marine planning for all Commonwealth waters adjacent to South Australia.

Other national initiatives include *Integrated Coastal Zone Management* (ICZM) and *Integrated Oceans Management* (IOM). The South Australian Government is a partner in developing these programs and the framework for cooperation.

Interim Marine and Coastal Regionalisation for Australia (IMCRA)

In 1998, the Australian and New Zealand Environment and Conservation Council (ANZECC) released the *Interim Marine and Coastal Regionalisation for Australia* (IMCRA) (IMCRA Technical Group 1998). IMCRA describes an ecosystem-based series of classifications, which divides the marine environment of Australia into different biogeographical regions, or bioregions, eight of which cover South Australian waters.

South Australian Commitments

South Australia's Strategic Plan

The Government of South Australia is committed to the conservation of the marine environment and the ecologically sustainable use of our natural resources, both now and in the future. This commitment is outlined in the objectives of *South Australia's Strategic Plan* for achieving sustainability in the marine environment. The

Marine Planning Framework will provide the structure to fulfil the commitment to "manage, in an ecologically sustainable way, natural resources across the broader seascape in areas that are not part of the protected area system."

Living Coast Strategy

The *Living Coast Strategy for South Australia* outlines the need to identify areas of ecological significance through the development of Marine Plans based on marine bioregions, and to test the concept of marine planning through the release of a pilot Spencer Gulf Marine Plan for public consultation.

Other Government Initiatives

The Marine Planning Framework is just one of a number of tools used by the Government of South Australia to protect and conserve the State's marine environment.

The Framework must work closely with the *Natural Resources Management Act 2004* and the Natural Resources Management Plans developed under this legislation. The Natural Resources Management Act seeks to promote the sustainable and integrated management of the State's natural resources and also provides for their protection. Marine Plans will provide guidance to Natural Resources Management Boards in the consideration of land-based impacts on the marine environment as well as the need to manage and conserve aquatic resources.

The Government's *Living Coast Strategy* has identified the need for the establishment of a South Australian Representative System of Marine Protected Areas (SARSMPA). This system, outlined in the *Blueprint for the South Australian Representative System of Marine Protected Areas* (MPAs) 2004, will develop a series of MPAs to protect and conserve representative samples of the diversity and complexity of South Australia's marine and estuarine environments. In essence, MPAs will provide protection throughout the State's bioregions, similar to the role National Parks play on the land. The Marine Planning Framework and the development of MPAs are complementary initiatives but are not synonymous. The Framework provides for environmental capability planning, whereas MPAs are designed primarily for biodiversity conservation purposes.

Marine Plans developed as part of this Framework seek to complement land-based Development Plans and other mechanisms under the *Development Act 1993*. The primary goals of the *Development Act* are to provide for the planning and regulation of development, use and management of land and buildings, design and construction of buildings, and the maintenance and conservation of land and buildings in the State. As such, Marine Plans will broaden the guidance and information available to planners and proponents of development to include and address issues potentially affecting the State's waters.

2. The Framework

Marine planning is a new concept for managing ecologically sustainable development and use in South Australia. The Framework provides the structure and direction for the planning and management of activities in South Australia's marine environment. This section outlines the rationale, objectives and principles for marine planning and provides guidance for the delivery of this wide-ranging policy initiative.

The Framework provides for the development of six Marine Plans, based on ecological zoning arrangements, and associated Performance Assessment Systems (PAS) covering State waters in South Australia's eight marine bioregions. These Marine Plans establish an overarching strategic planning framework to guide State and local government planners and natural resource managers in the development and use of the marine environment. The Framework aims to ensure a healthy, diverse and productive marine environment, for both current and future generations.

The Framework is underpinned by three key principles: Ecologically Sustainable Development (ESD), Ecosystem-Based Management and Adaptive Management (see page 15).

Objectives of the Framework

1. Provide for integrated, and ecologically sustainable development and use of South Australia's marine environments.
2. Further the conservation and protection of the ecological processes, biodiversity and intrinsic values of the marine environment.
3. Promote effective partnerships between community, industry and government.
4. Facilitate adaptive management, addressing the dynamic nature of the marine environment and uses of it.
5. Identify and facilitate the reduction of threatening processes in the marine environment.
6. Facilitate informed decision-making based on continually improving knowledge and understanding of the ecological processes of the South Australian marine environment.

Benefits of the Framework

The key benefits arising from the Framework include:

- increased certainty for management of development and resource use;
- long term protection of the coast and marine environment;
- a broad range of activities can occur in an ecologically sustainable manner;
- strategic integrated planning in the marine and coastal environment across Government Agencies;
- implementation of the Performance Assessment System provides an integrated monitoring and assessment system for the coast and marine environment linked to State of the Environment reporting.

Marine Plans

A Marine Plan is a tool that guides the management of development and use of the marine environment, within the ecological capability of the ecosystem.

Marine plan boundaries are based on ecological bioregions (see Table 1), overlaid with a system of zones integrating available ecosystem information. Development and use in the zones are guided by goals, objectives and strategies, which are outlined in each Marine Plan.

Marine Bioregions and Marine Plan Boundaries

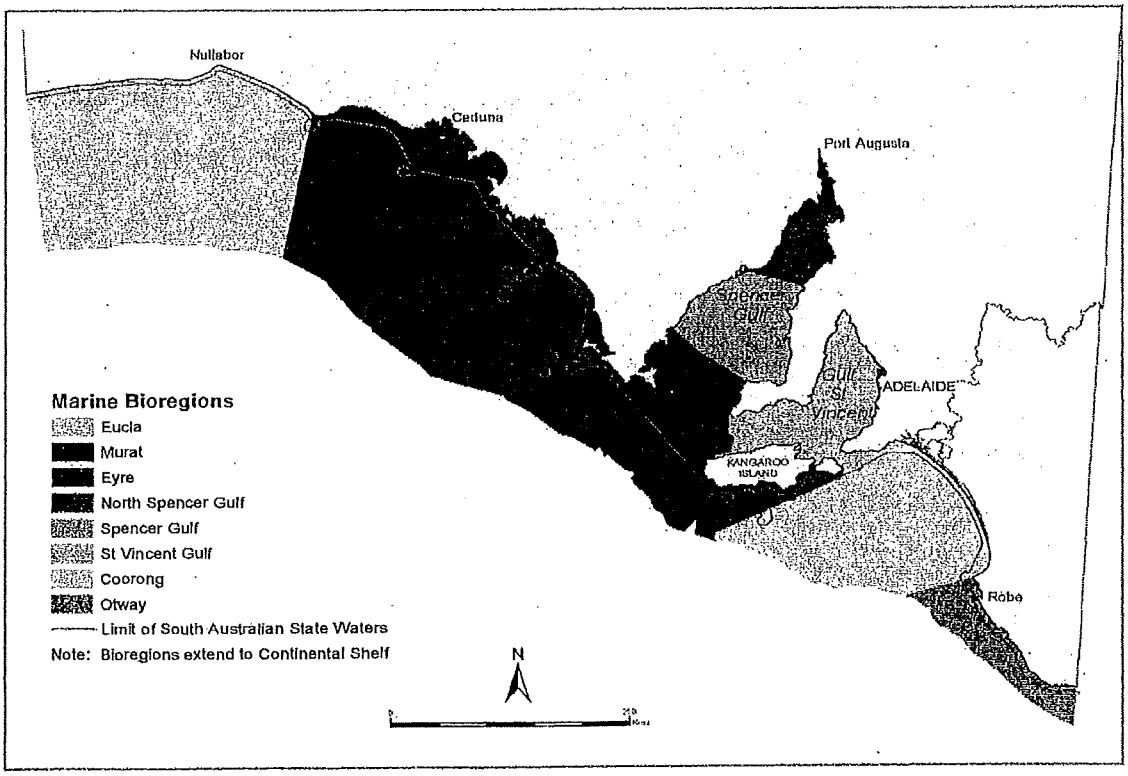
In South Australia, there are eight defined marine bioregions, or regions with distinctive patterns of biodiversity, that are distributed across State waters.

The IMCRA mapping of bioregions identified the physical and biogeographical attributes of coastal and marine regions around the State at a scale of 1,000 km² (see Figure 1) and these have been identified as offering the most appropriate 'planning areas' for the development of Marine Plans.

Table 1: Descriptions of South Australia's Bioregions

Bioregion	Location	Size to continental shelf
Eucla	Cape Adieu to Western Australian border (extends westwards to Israelite Bay)	111 115 km^2
Murat	Cape Adieu to Point Brown	32 490 km^2
Eyre	Point Brown to Cape Torrens, to West Cape, to Port Neill and Cape Willoughby	70 185 km^2
Spencer Gulf	West Cape to Port Neill, Point Riley to Shoalwater Point	11 540 km^2
Northern Spencer Gulf	Point Riley to Port Augusta to Shoalwater Point	5 210 km^2
Gulf St Vincent	Cape Torrens to West Cape, Port Elliot to Cape Willoughby	13 165 km^2
Coorong	Port Elliot to Cape Jaffa	29 830 km^2
Otway	Cape Jaffa to Victorian border (extends eastwards to slightly north of Apollo Bay and including King Island environs)	37 330 km^2

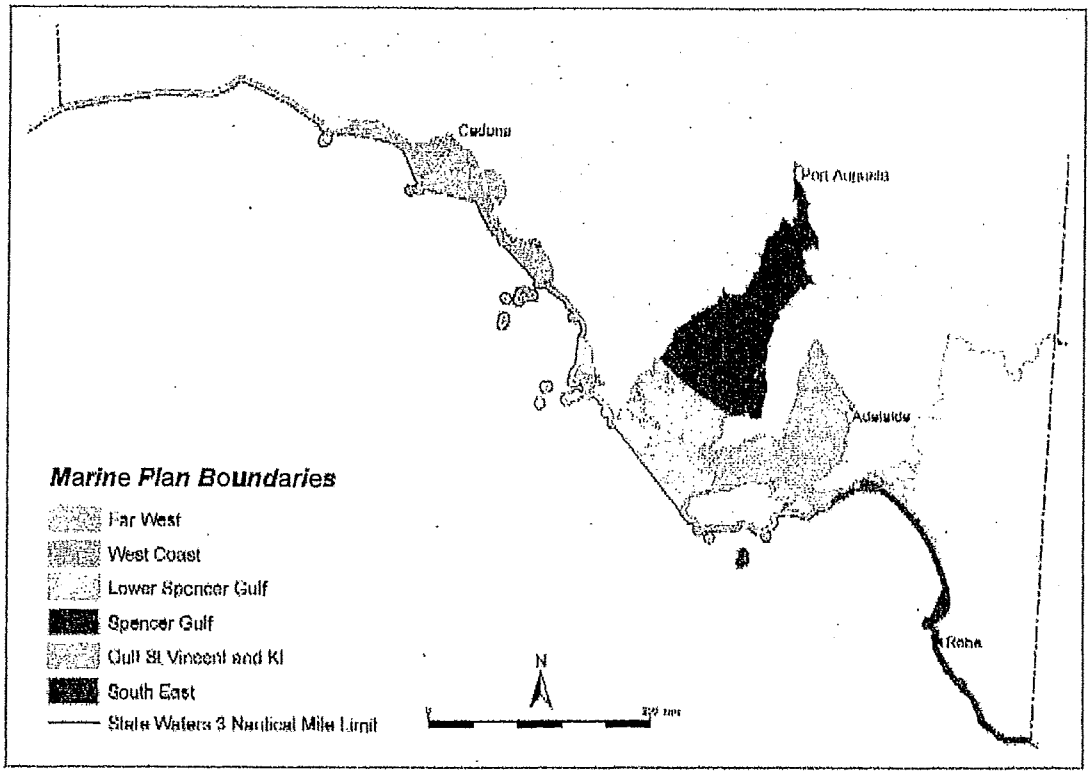
Figure 1: South Australia's Marine Bioregions



The Framework, which applies across South Australia's eight bioregions, identifies six regional marine planning areas (Figure 2) as follows:

1. Far West
2. West Coast
3. Lower Spencer Gulf
4. Spencer Gulf
5. Gulf St Vincent / Kangaroo Island
6. South East

Figure 2: Marine Planning Areas



Ecologically Rated Zoning

Zones, termed Ecologically Rated (ER), seek to:

- establish boundaries defined on ecological criteria rather than administrative or jurisdictional boundaries;
- recognise the complex interactions between ecological levels including interactions across varying scales such as habitats and regions; and
- focus management on the maintenance of ecosystem integrity.

The zoning system consists of four ER zones, distinguished by the highest diversity of marine, coastal and estuarine habitats and species that occur within a marine planning area. The ER zones are graded as follows:

- ER1 Zone
  Containing the highest diversity of marine, coastal and estuarine habitats and species.

- ER2 Zone
  Containing a high diversity of marine, coastal and estuarine habitats and species.

- ER3 Zone
  Containing a moderate diversity of marine, coastal and estuarine habitats and species.

- ER4 Zone
  Consisting of areas for which the available scientific data is inadequate to identify their importance to the maintenance of biodiversity, ecological health and productivity of the ecosystem.

Principles underpinning the Framework

Ecologically Sustainable Development

The National Strategy for Ecologically Sustainable Development (ESD) 1992 defines ESD as:

> *'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'.*

The guiding principles for the National Strategy for ESD are:

- Decision-making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations.
- The global dimension of environmental impacts of actions and policies should be recognised and considered.
- The need to develop a strong, growing and diversified economy, which can enhance the capacity for environmental protection, should be recognised.
- The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised.
- Cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms.
- Decisions and actions should provide for broad community involvement on issues, which affect them.

In addition to the above, the National Strategy for ESD also incorporates the Precautionary Principle:

> *'Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation'.*

Application of the Precautionary Principle, to both public and private decisions should be guided by:

- careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and
- an assessment of the risk-weighted consequences of various options.

Ecosystem-Based Management

Ecosystem-based Management (EBM) means:

> *'Management of ecosystem values and uses recognising the interactions with the environment and responding to signals from the ecosystem to control anthropogenic activities and uses'.*

Australia's Ocean Policy (Environment Australia 1998) states that:

'Ecosystem-based Management is a management approach that recognises that maintaining the structure and function of ecosystems is vital and that human uses and ecosystem health are interdependent'.

The key goals of EBM as outlined in *'Australia's Ocean's Policy* are to:

- maintain, throughout the ocean realm, viable populations of all native marine species in functioning biological communities.
- accommodate human uses of the oceans and the economic, social and cultural aspirations of people within these constraints.
- include, within a spectrum of protected areas, representatives of all marine habitat types across their natural range of variation.
- maintain ecological processes in all ocean areas, including water and nutrient flows, community and trophic structures, ecosystem linkages and their annual and longer term natural cycles, and the movement of broad-ranging and migratory species.
- ensure recognition that ecosystems are dynamic and that management must be at spatial and temporal scales that maintains the evolutionary potential of marine biological diversity.

In order to be effective, management at an ecosystem level must be integrated and strategic, and recognise ecosystem structures and functions as well as their responses to multiple resource uses.

Adaptive Management

Adaptive management can be described as:

'A systematic process for continually improving management policies and practices by learning from the outcomes of operational programs'.

The concept of adaptive management is fundamental to the Framework to ensure that it is regularly reviewed to embrace new information as scientific and other research reveals more about the little known marine environment. The Performance Assessment System will provide the mechanism to deliver this outcome.

3. Developing the Framework

The Marine Planning Framework has been developed on a collaborative basis between a number of South Australian Government agencies, local government, industry and community representatives to ensure relevant views were taken into consideration.

The application of the Framework was 'tested' through the concurrent development of the draft Spencer Gulf Marine Plan. This enabled the Framework to both guide the process and to consider issues and concerns raised through the consultation process on the draft Spencer Gulf Marine Plan.

Regional Consultative Committees

To assist in the development of each Marine Plan, a Regional Consultative Committee will be established. Members of these committees will be sought from a diverse range of community interests with broad expertise in issues relevant to the marine environment including, but not limited to:

- marine conservation;
- marine ecology or biology;
- natural resource management or environmental protection;
- local government or urban and regional planning;
- indigenous heritage and / or culture or native title;
- aquaculture production;
- commercial fisheries;
- industry;
- recreational fishing.

Regional Consultative Committees are expected to contribute technical expertise, advice and local knowledge to the development of a Marine Plan. Interaction with members and the broader community for the purpose of exchanging ideas will be a key function of the group throughout the marine planning process.

A *'Focus'* document will be produced for each future Marine Plan to guide the regional consultative committee assisting with its development. For example, the document *'Focus' – A Regional Perspective of Spencer Gulf* (Department for Environment and Heritage 2003) outlining the range of values in the Spencer Gulf planning area, helped guide the Spencer Gulf Regional Consultative Committee in making sound decisions during the marine planning process. These focus documents outline the biological, social, cultural and economic values of the region.

The Marine Planning Model

Bioregional marine planning is a relatively new concept worldwide. Consequently, there are no existing models of marine planning that could be reasonably applied to the South Australian marine environment. Assumptions behind the marine planning model are based on managing activities within the capability of the ecosystem.

The key assumptions behind the model are that the data available reasonably reflect:

- the ecological parameters fundamental to the function of the ecosystem and its biological diversity; and
- the spatial distribution of the ecological parameters of the ecosystem.

The aims of the model are to:

- zone the planning area based on ecological criteria;
- identify and define the spatial boundaries of the zones.

Methodology

Steps in the development of a Marine Plan using Spencer Gulf as the pilot: a detailed methodology is available upon request.

1. Collect, create and collate spatial data for the planning area. Data are collected from a variety of sources including, published literature, information from the community and Internet, private businesses and government agencies, including the:

- South Australian Research and Development Institute (SARDI);
- Department of Primary Industries and Resources, South Australia (PIRSA);
- Department of Aboriginal Affairs and Reconciliation (DAARE);
- Australian Maritime Safety Authority (AMSA); and
- Department of the Environment and Heritage (Commonwealth).

2. Sort spatial data into appropriate resource use categories of social, economic, environmental and cultural and heritage. The environmental data is used for the development of the marine-planning model with the social, economic and cultural and heritage data used to support it.

3. Create GIS layers from the environmental data collected, with each layer created referred to as an 'ecological variable' (for example: seagrass is one of the 18 ecological variables used for the Spencer Gulf planning area).

4. Create planning unit spatial layers (Figure 3a and 3b) for the planning area to allow for the spatial summary of data into 5x5 km units.

5. Link the planning unit spatial layers to the ecological variables.

6. Group into 'ecologically rated' zones using GIS software.

7. Undertake impact analysis using spatial data and/or surrogates for example, to determine areas of high concentrations of use.

8. Graphically display analysis results.

Figure 3a: Entire Planning Area

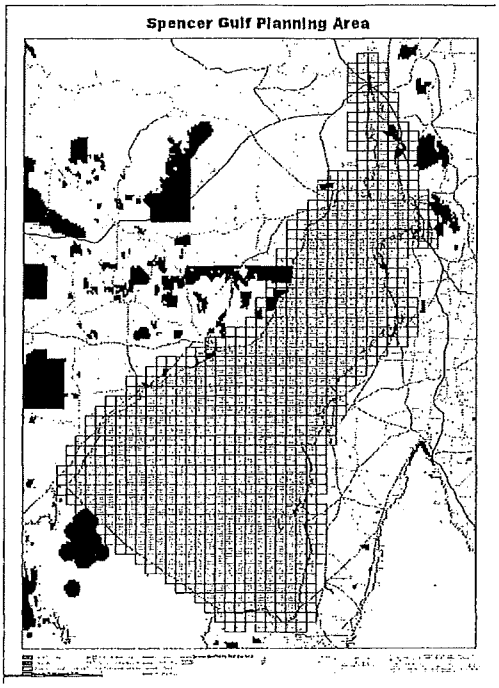
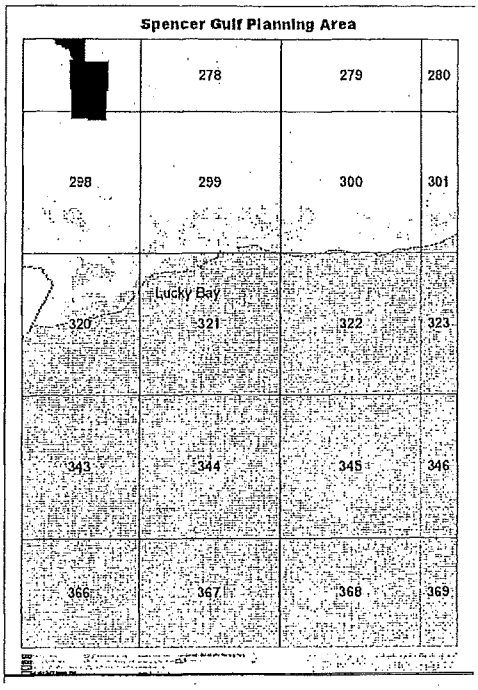


Figure 3b: Individual Planning Units



Data Analysis

Planning units are examined according to the ecological variables representative of the relevant planning area marine environment (see Appendix 2 for the ecological variables used in the Spencer Gulf Marine Plan). Variables will include but are not limited to:

- major habitats for particular species;
- internationally recognised Wetlands of Importance;
- endangered marine species;
- migratory waders and shorebirds;
- breeding, spawning and nursery grounds;
- key biodiversity areas.

Grouping of the data into the four zones is performed using GIS. The GIS system provides several approaches to grouping data, including the use of a natural breaks method, frequency and cumulative distribution, quartile and standard deviation methods. The "natural breaks" method was selected for the marine planning model. This is a well-accepted and robust scheme of grouping variables. It is important to note that all ecological variables are considered to be of equal value and zones are created dependent on the number of variables within each planning unit.

To identify potentially impacted areas within the planning area, analysis is undertaken in GIS using known variables. Each variable represents an activity that has a discernible impact on any marine habitat, flora or fauna. It is important to note that each variable is assigned a value of one. All activities are viewed as having the same degree of impact, even though this may not always be the case. Data are presented to reflect areas of the highest concentration of use and not the degree of impact that each variable may have independently or cumulatively.

The variables used in each particular Marine Plan are specific to the region to which it applies, and may change in future revisions. The basis for the model, however, will remain the same. Data will be analysed and reviewed every two-and-a-half years, to consider new information, refine zoning and ensure that changes can be detected early enough for managers to adapt to changing circumstances. Each Marine Plan will be reviewed every five years.

4. Performance Assessment System

Purpose

The Performance Assessment System (PAS) for the Framework will evaluate the success of each Marine Plan by assessing and reporting on the maintenance of ecosystem conditions. In particular, the PAS will review the effectiveness of Marine Plans in providing guidance for the regulatory functions of management agencies in accordance with marine planning goals and objectives. The PAS is, therefore, the primary mechanism for assessing and reporting on cumulative impacts in South Australia's marine environment.

The PAS also has been developed in consultation with State Government agencies and non-government organisations involved in management and monitoring of the marine, estuarine and coastal environments. It establishes an agreed approach to the monitoring of selected indicators to detect change, both natural and human induced, in the condition of South Australia's marine, estuarine and coastal ecosystems, biodiversity, habitats and species. When applied to the ER zone objectives, the results of monitoring will reveal the adequacy of management measures in conserving and facilitating responsible use of marine, estuarine and coastal resources.

In accordance with the *Living Coast Strategy*, the PAS will provide an integrating mechanism enabling all agencies to contribute to a statewide, collaborative approach to data collection, analysis and reporting on marine ecosystem conditions. This is a necessary prerequisite for constructing a best practice, adaptive approach to management and reporting.

Description

The PAS was developed from the Marine Plan goals and objectives set for each ER Zone. These are expressed as outcomes in the PAS for each ecological variable (used to develop the marine plan; for example, seagrass), which are linked to criteria, performance indicators, benchmarks and monitoring protocols (see Figure 4, page 24).

For each of the ER zones, the criteria (see Table 2, page 20 for definitions) are:

- ER1 zone - not to exceed negligible impact;
- ER2 zone - not to exceed minor impact;
- ER3 zone - not to exceed moderate impact;
- ER4 zone – not to exceed minor impact (treated as an ER2 zone until research determines ultimate zoning).

Monitoring of the performance indicators in relation to the benchmarks is designed to be able to distinguish between natural variability (such as seasonal changes) and changes caused by human activities. The emphasis in each Marine Plan is on indicators that can be developed and applied in the current five-year cycle. Therefore, existing monitoring programs are incorporated into and form the basis of the PAS, with clear guidance provided for the development of more comprehensive monitoring as agency and/or regional Natural Resources Management (NRM) resources permit.

Wide-ranging activities and the sustainable use of resources will generate a set of pressures and potential impacts on marine, estuarine and coastal systems. In order to establish the context and possible causal agents for any changes that may be observed over time, the level of specific pressures (potentially impacting activities or pollution sources) that may be related to changes in ecological conditions are assessed and reported within the context of the Marine Plan performance. Assessment of the pressure indicators in each Marine Plan is not intended to replace the role of other agencies in regulating and managing sustainable uses, but will provide a consistent and broader context for policy decisions and responses.

Table 2: Definition of Habitat or Population Impact Levels

Criterion	Ecological Impact (Habitat or Population)
Negligible	Not to exceed negligible impacts to habitats or populations. Unlikely to be measurable against background variability. Habitat and Ecosystem: Interactions may be occurring but it is unlikely that there would be any change outside of natural variation. *Recovery measured in days.*
Minor	Not to exceed minor impacts to habitats or populations, measurable against background variability. *Recovery measured in months.*
Moderate	Not to exceed moderate impacts to habitat or populations. Measurable changes to ecosystem components but not a major change in function (that is, no loss of components). *Recovery measured in years.*

Information Collection and Management

The PAS provides an opportunity to review the status of marine, estuarine and coastal monitoring in South Australia and develop an integrated, systematic, whole-of-government approach to data collection, analysis and public reporting. In developing the PAS, opportunities were identified to facilitate cooperative, cost effective, research and monitoring projects that would satisfy the reporting requirements of a number of agencies, including regional NRM Boards. The Department for Environment and Heritage (DEH) will work closely with other agencies to develop these opportunities.

Collaborative, statewide monitoring and Marine Plan reporting on the condition of the marine environment brings with it the requirement to develop an integrated system for agency-based data collection, storage, analysis and reporting. The Government's *Living Coast Strategy* recognises this need and DEH will work closely with all relevant agencies and groups to ensure the development of data collection and analysis protocols for Marine Plan reporting and an integrated data storage and management system.

The PAS and the monitoring data for Marine Plans will be reviewed on an ongoing basis and summarised in a technical report. These reports will form the basis for the five-yearly review of each Marine Plan in South Australia and will contribute to the *State of the Environment* Report.

Decision System

The PAS operationalises the objectives underpinning marine planning ER zones by first prescribing performance indicators and benchmarks for guiding agency decision-making in conservation, development and use of the marine environment, and second, by establishing an assessment system that reports on the effectiveness of a Marine Plan (refer Figure 4, page 21). These benchmarks apply to all management agencies, including State and local government, and regional NRM Boards, for regulating the activities of user groups within government, industry and the community.

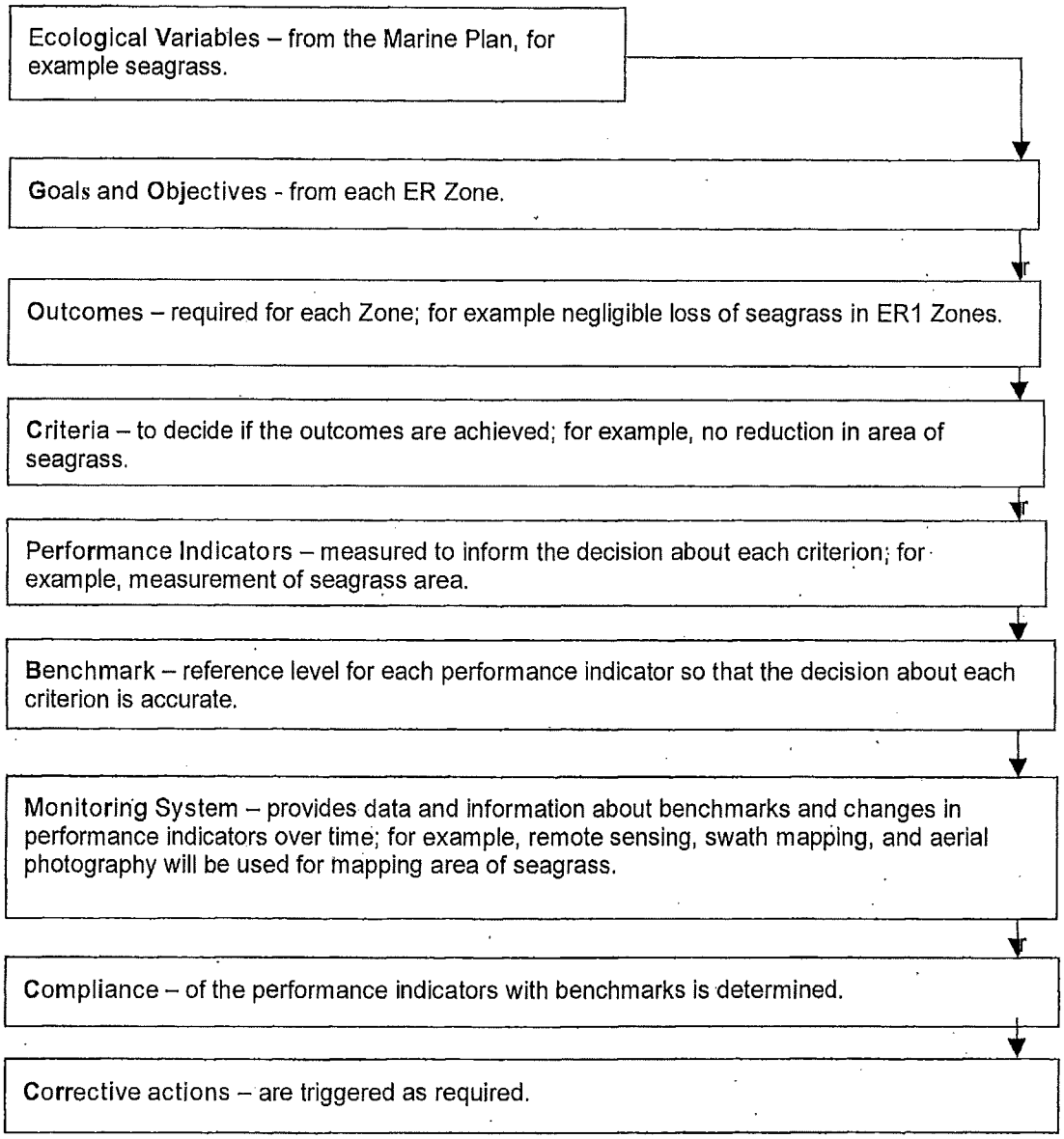
Marine Plans do not prohibit any type of development or use from a particular ER zone. Rather, decision-making processes related to development assessment and /or regulation of use are guided by the benchmarks for each ER zone.

In an ER1 zone, for example, acceptable development or use is that which will not exceed a negligible level of impact to the biodiversity, habitats and ecological processes of the zone. For some forms of development, this may be achieved by applying appropriate conditions to a development approval (such as monitoring

requirements or amendments to a proposal). If this is not practical or feasible, locating the development within an ER2 or ER3 zone may be more appropriate.

Marine Plans recognise that in some areas, particularly those adjacent to major industrial centres, impacts to the marine, coastal and estuarine environment already exceed the benchmarks required to meet the ER zone objectives. They also recognise that some areas are governed by indenture Acts developed to support the activities of specific industries. In each of these cases, the Marine Plan objectives may be used to minimise current impacts and plan for future management decisions in a manner consistent with the relevant ER zone objectives. Over time, these actions will assist to facilitate the restoration, where possible, of acceptable ecosystem conditions.

Figure 4: Flow of Decisions in the South Australian Marine Planning Framework Performance Assessment System



Implementation of the Framework will occur through established institutional arrangements and responsibilities, and via effective reporting from the PAS. The setting of criteria, benchmarks and performance indicators will be developed to detect change; both natural and human induced, in the condition of South Australia's marine, estuarine and coastal ecosystems. Collaborative arrangements between government agencies, local governments, key stakeholders and communities will facilitate the preparation of reports.

5. Implementation

This Framework will be implemented as government policy through a coordinated and strategic approach in collaboration with government agencies, local governments, key stakeholders and communities.

The overarching goals, objectives and strategies from the marine planning zones will be incorporated into the *Planning Strategy for South Australia* under the *Development Act 1993*. Where necessary, amendment of Development Plans under the *Development Act 1993* will occur through the Plan Amendment Report (PAR) process to incorporate the development related policies from the Framework.

In particular, the Better Development Plans project currently being undertaken by Planning SA will strengthen the linkages between the *Planning Strategy for South Australia*, Marine Plans and Development Plans. This will assist in ensuring that the strategies and objectives of Marine Plans are incorporated into the relevant Development Plans.

Control of activities not defined as 'development' under the *Development Act 1993* (eg fishing, boating, discharges etc) will still occur under other resource management legislation. Consistency will be achieved by ensuring that resource management legislation (such as the *Fisheries Act 1982* and the *Petroleum Act 2000*) is amended where necessary, to address the implementation of relevant parts of the Marine Plans.

The Government is committed to providing improved management and protection for the coast and marine environment and is preparing a public consultation package to review and update coastal and marine legislation and administrative structures in South Australia with a view to establishing a single, coastal and marine agency or board. The review of current legislation would aim to reinforce integrated, multiple use planning, management and sustainable use of coastal, estuarine and marine environments. It is anticipated that there will be a need for legislation to provide the statutory basis for marine plans under the Marine Planning Framework. This revised legislation would be required to interact with, and inform, strategies, plans and policies under the *Development Act 1993* the *Natural Resources Management Act 2004*, and other coast and marine resource use legislation.

The *Natural Resources Management Act 2004* establishes the NRM Council and Regional NRM Boards. Importantly, the scope of the *Natural Resources Management Act 2004* extends to all of the State, including to the limit of State waters. NRM Boards will therefore have a key role in assessing and addressing land-based impacts on the marine environment.

Accordingly, Marine Plans will provide a sound basis for NRM Boards to meet their responsibilities in developing integrated natural resource management plans and strategies. Marine plans will also provide clear guidance for the development of more comprehensive monitoring and assessment as regional NRM resources permit. It is envisaged that the goals, objectives and strategies from Marine Plans would be reflected in the State NRM Plan in a similar fashion to the *Planning Strategy for South Australia*.

The Department for Environment and Heritage will lead a co-ordinated, whole-of-government approach to the implementation of each Marine Plan. Existing responsibilities and jurisdictions of management agencies will remain, but the resource management policies, strategies and plans will be progressively amended to manage development and use consistent with the objectives applied to relevant zones.

Close collaboration will be sought with local government, key stakeholders and communities. Authorities managing land-based activities that impact on the marine environment also will be involved in the implementation of each Marine Plan action (see Table 3, page 24, for the list of actions and responsible agencies).

Coordination and Partnerships

To achieve effective integration and ensure that Marine Plans guide ecosystem based planning and management, the implementation of each Marine Plan will be the joint responsibility of all sectors, including government, industry, the community, State and regional NRM bodies.

Amendments to relevant resource management legislation will ensure that plans, policies, actions and decisions taken under these Acts are consistent with this Framework; however, it is the on-ground implementation that will require the many agencies to adopt a collaborative, coordinated approach.

Performance assessment and adaptive management principles at all levels are integral to the smooth delivery of such wide-reaching policy change. It is anticipated that this process will increase resource sharing and communication between and within government agencies, local governments, key stakeholders and communities. It is also anticipated that this process will increase awareness of the concepts of integrated ecosystem-based management, aid in fulfilling ecologically sustainable development requirements and widen understanding of the new concepts of planning for the marine environment.

Table 3: Implementation Actions for Marine Plans

Action No.	Implementation Actions for Marine Plans	Lead agency
1.	Consult with agencies on PAS monitoring responsibilities.	DEH
2.	Implementation of PAS for each Marine Plan.	All agencies
3.	Consult with Regional NRM Boards to assist coordination of NRM responsibilities and ensure linkages with NRM Plans.	DWLBC and DEH
4.	Develop a Ministerial PAR for each Marine Plan to ensure linkages with the *Planning Strategy for South Australia.*	DEH and PLANNING SA
5.	Ensure environmental management of existing aquaculture developments in the marine environment has regard to the marine planning goals and objectives.	PIRSA
6.	Ensure protection of fish breeding grounds by applying marine planning goals and objectives to resource use in the marine environment.	PIRSA
7.	Consult with Coast Protection Board on coastal issues in each Marine Plan.	DEH
8.	Consult with local government and Regional Development Boards regarding their responsibilities for each Marine Plan.	DEH
9.	Consult with industries regarding their responsibilities for each Marine Plan.	DEH
10.	Ensure linkages between Marine Plans and the *State of the Environment* reporting system.	DEH and EPA
11.	Review available zoning information for each Marine Plan every two and a half years and rezone according to any new data.	DEH
12.	Review each Marine Plan every five years.	DEH
13.	Review and update PAS every two-and-a-half years.	DEH
14.	Provide any new data for rezoning.	All agencies
15.	Rehabilitate degraded habitat areas as per available funding	NRM Boards and All agencies
16.	Develop an education brochure and program for recreational fishers, in consultation with SARFAC, regarding their responsibilities in the marine environment.	DEH

Review, Monitoring and Reporting

The success of this Framework is dependent upon improving the current condition of the marine environment with a view to the future rehabilitation where practicable of degraded areas. The successful implementation of the Framework will be measured through an ongoing review process coupled with monitoring via the PAS to provide a reporting mechanism of ecosystem condition. This will also address the reporting requirement of the South Australian *State of the Environment Report.*

All users of the marine coastal and estuarine environment must share accountability for the impacts arising from its use. As our knowledge increases, the effectiveness of goals and objectives can be assessed and this information will help in determining what future actions are needed. Hence, our approach to marine planning needs to be continuously reviewed to ensure that decisions are based on the most current available information.

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Glossary

Adaptive Management - A systematic process for continually improving management policies and practices by learning from the outcomes of operational programs.

Biodiversity - the variability among living organisms from all sources, including, inter alia, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part. This includes diversity within species, between species and of ecosystems.

Bioregion - An area defined by a combination of biological, social and geographic data, rather than by geopolitical considerations. Generally, a system of related, interconnected ecosystems.

Biounit - Biophysical Units (hundreds of km^2, microscale), which identify functional ecosystem based management units (for example: rocky shores, dune barrier systems, archipelagos, shoals or reef systems, coastal peninsula, etc), defined primarily on the basis of coastal physiography, topography and major marine physical habitat or seascape features and habitat distributions.

Breeding area - A site providing the conditions required by a particular species to enable breeding to occur.

Consequences - See 'ecological consequences', below.

Conserve - To keep in existence, areas of the natural environment from potential degradation arising from human use.

Conservation - Action(s) resulting in the preservation of the natural environment.

Critical - Refers to biodiversity, habitats and ecological processes without which the functioning capacity of the ecosystem would likely collapse.

Contribute - Refers to biodiversity, habitats and ecological processes without which the functioning capacity of the ecosystem would be impaired.

Cumulative - Created by successive additions (for example: of impacts).

Degradation - Action(s) causing a state of reduced environmental quality.

Development - Definition as per *Development Act 1993*.

Ecological consequences - Results of impacts (either positive or negative) on the biodiversity, habitats and ecological processes arising from development and use of the marine, coastal and estuarine environment.

Ecological processes - Dynamic biological and physical processes; for example: natural cycles, currents, sediment movements, nutrient cycling, community and trophic structures and migratory species movements.

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.

Ecologically sustainable use - Use of living things or areas within their capacity to sustain natural processes while maintaining the life support systems of nature and ensuring that the benefit to present generations of the use does not diminish the potential to meet the needs and aspirations of future generations.

Ecosystem - A dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit.

Ecosystem-based management - Management of ecosystem values and uses recognising the interactions with the environment and responding to signals from the ecosystem to control anthropogenic activities and uses.

Ecosystem integrity - is the maintenance of the structure and function of a particular ecosystem.

Endemic - A species that is unique or restricted to a specific region or site.

Environmental capability - the ability of an ecosystem to sustain itself, in a healthy and productive manner, despite human interference and pressure. A healthy and productive marine environment is measurable by using natural variability measures as the reference point.

Essential - Refers to biodiversity, habitats and ecological processes without which the functioning capacity of the ecosystem would be severely impaired.

Estuaries - a partially enclosed coastal body of water, including its ecosystem processes and associated biodiversity, which is either permanently, periodically, intermittently or occasionally open to the ocean within which there is a measurable variation in salinity due to the mixture of seawater with water derived from on or under the land.

Eutrophication - A process of enrichment of nutrients, especially nitrogen and phosphorous.

Feeding area - An area of particular importance to one or more species in providing a source of food (for example: tidal flats exposed during low tides are important feeding areas for shorebirds).

GIS - Geographical Information Systems. Computer-based mapping and modelling systems based on software designed to handle complex spatial information. Essentially a set of tools for collecting, storing, retrieving, transforming and displaying spatial data.

Goal - The overarching long-term outcome desired of a plan, zone or strategy.

Habitat - a characteristic biological assemblage (for example: seagrass meadow) and/or physical structure (for example: intertidal rocky platform).

Haul-out site - A non-breeding location used by pinnipeds (sea lions and seals) to rest.

Impact - A change in the composition, abundance or distribution of a population or assemblage arising from either human disturbance or natural events. Impacts may produce effects that are either positive or negative. Examples of impacts include the possible negative effects of waste discharge on seagrass meadows and the possible positive effects of establishing a marine protected area.

Key biodiversity area - An area supporting significant levels of biological diversity representative of the region identified by the MPA process.

Marine mammal - A species of mammal whose natural habitat is the marine environment.

Nursery area - Habitats providing shelter and food to marine fauna during the vulnerable, juvenile stages of life (for example: mangroves and associated seagrass communities are nurseries for many species of fish).

Objective - Components of a goal that, if met, would ensure that the goal is achieved; clear statements of what management is to achieve.

Precautionary principle - Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Propeller scouring - Damage caused to the sea bed and/or benthic communities (seagrass, reef etc) resulting from boat propeller action.

Protect - To shield from harm.

Reef - Intertidal to partly submerged rocks occurring off the coast. In South Australia often formed of calcarenite and may parallel the coast along submerged barriers.

Resting area - An area of particular importance to one or more species for enabling rest and recuperation (for example: haul-out sites for sea lions).

Saltmarsh - Coastal wetland plant community dominated by herbs and low shrubs and located in the upper intertidal and supratidal zones of the coast (often on the landward side of mangroves). Saltmarsh areas are usually waterlogged and frequently flooded with saltwater by the tide.

Seabird - Aerial birds (such as shearwaters) and swimming birds (such as penguins) usually seen at sea.

Shorebird - Also known as 'waders' or 'wading birds', shorebirds include both resident and migratory species often seen feeding along the shorelines of beaches and in the tidal pools and mudflats of estuarine areas.

Soft-sediment communities - Plant and/or animal communities that inhabit the sand bed and/or muddy sediments in aquatic environments.

Spawning area - Area or habitat critical to the spawning stage of a species' reproductive cycle. Spawning areas are often geographically distinct from nursery areas; for example, King George Whiting spawn in deeper waters but their larvae drift into sheltered coastal areas such as mangroves, which perform the nursery function.

Strategy - A plan of action intended to accomplish specific goals and objectives.

Threatening processes - Processes and activities that threaten the health and productivity of the marine, coastal and estuarine environment (usually of human origin).

Use - Economic, recreational, social or cultural activities in the marine, coastal and estuarine environment that may not be directly associated with development and as such may not be subject to regulation via the development assessment process. Many uses, such as commercial and recreational fishing, are regulated and managed by either a State or Local Government authority.

Waders/wading birds – See 'shorebirds', above.

Appendix 1

Ecologically Rated Zones – Definitions, Goals, Objectives and Strategies

Ecologically Rated Zone 1 (ER1)

Definition

Zones classified as ER1 contain the highest diversity of marine, coastal and estuarine habitats and species identified as suitable indicators of ecosystem capability. These include:

- habitats and ecological processes critical to ecosystem function;
- unique ecological communities;
- species of conservation concern, including protected, threatened, rare and endemic species;
- habitats critical to the life cycle of species (eg breeding, nursery and feeding areas).

Arrangements for managing development and use in ER1 Zones will be primarily concerned with conservation and protection of the marine, coastal and estuarine environment (species, habitats and ecological processes), as described under the Goal, Objectives and Strategies below.

Goal: Development and use of the marine, coastal and estuarine environment is managed such that it will cause negligible impacts on the biodiversity, habitats and ecological processes important to the health and productivity of the ecosystem.

"Negligible impacts on habitats, negligible impediment to ecological processes"

Negligible: Insignificant impacts to habitat or populations. Unlikely to be measurable against background variability. Habitat and Ecosystem interactions may be occurring but it is unlikely that there would be any change outside of natural variation. Recovery measured in days.

Objectives - ER1 Zone	
1	Ecologically sustainable development and use, both existing and future, of the marine, coastal and estuarine environment will not exceed negligible: • loss of biodiversity; • impediment of ecological processes; • degradation to seagrass, reef, mangrove, saltmarsh and soft-sediment habitats; • loading of sediments with heavy metals, persistent organic pollutants and other contaminants; and • change in water quality beyond the benchmark established by the performance assessment system for each Marine Plan.
2	Environmental management of existing and future development and use will adopt performance measures consistent with the Marine Plan objectives and develop strategies to ensure compliance.
3	Environmental impacts of past, existing and future development and use will be ameliorated actively, through targeted rehabilitation, and passively, as natural regeneration becomes an outcome of improved development and use.
4	Ecological processes underpinning economic, environmental, social and cultural values, including Indigenous cultural heritage, will be protected.
5	Monitoring, evaluation and research will be publicly available and aimed at increasing our understanding of the biodiversity, habitats and ecological processes of the marine, coastal and estuarine environment and the cumulative impacts of development and use.

Key Habitat Standards

Samphire, mangroves, seagrass beds, reef habitats, and defined spawning areas are the conspicuously critical habitat types for marine ecosystems in South Australian waters. Where any of these key habitats are recognised to occur in ER3 Zones, the South Australian Marine Planning Framework requires that these habitats be managed by the goals and objectives set for a ER2 Zone. This may occur where habitat information is limited or the particular habitat type was restricted. These areas may be rezoned as more information becomes available. Other key habitat types may be determined in conjunction with stakeholders and agencies, and these will be added to the list of key habitats after due consideration by the agencies.

'The following strategies should be applied by all management agencies with jurisdiction over the marine, coastal and estuarine environment, all operators of development and use and all individual users of these environments.

Strategies to Achieve Objectives of ER1 Zone	
1	Adopt mechanisms to conserve and protect marine, coastal and estuarine: • biodiversity; • habitats; • key spawning, breeding and nursery areas; • key feeding and resting areas; • endemic species; • species of conservation concern; and • ecological processes.
2	Protect cultural and heritage values, (including Indigenous cultural heritage) associated with the marine, coastal and estuarine environment.
3	Adopt performance measures derived from the Objectives (ER1 Zone) and manage existing and future economic, recreational, social and cultural development and use, both catchment and marine-based, to reduce and remove threats to achieving the objectives.
4	Plan for future development and use consistent with the Objectives (ER1 Zone) and with consideration of the cumulative impacts of development and use.
5	Adopt mechanisms for the rehabilitation of degraded areas that may include relocation of existing uses that do not comply with the goal and objectives (ER1 Zone).
6	Respond to any change in water quality where a trend away from an established benchmark is detected. Maintain water quality at the recommended benchmark given in the Marine Plan Performance Assessment system.
7	Contribute to both site specific and ecosystem-level research and monitoring.

Ecologically Rated Zone 2 (ER2)

Definition

Zones classified as ER2 contain a high diversity of marine, coastal and estuarine habitats and species identified as suitable indicators of ecosystem capability. This includes the interconnectivity between:

- seagrass and/or sand beds;
- soft-sediment ecological communities;
- intertidal and subtidal reefs; and
- mangrove and saltmarsh areas.

Management of development and use in ER2 Zones will be cautious and primarily concerned with protecting and maintaining the integrity of the marine, coastal and estuarine environment (species, habitats and ecological processes), as described under the Goal, Objectives and Strategies below.

Goal: Development and use is managed to ensure minor impacts on the marine, coastal and estuarine biodiversity, habitats and ecological processes of the ecosystem.

"Minor impacts on habitats, minor impediment to ecological processes"

Minor: Noticeable impact to habitats or populations measurable against background variability. Recovery measured in months.

Objectives—ER2 Zone	
1	Ecologically sustainable development and use, both existing and future, of the marine, coastal and estuarine environment will not exceed minor: • loss of biodiversity; • impediment of ecological processes; • degradation to seagrass, reef, mangrove, saltmarsh and soft-sediment habitats; • loading of sediments with heavy metals, persistent organic pollutants and other contaminants; and • change in water quality beyond the benchmark established by the performance assessment system for each Marine Plan.
2	Environmental management of existing and future development and use will adopt performance measures consistent with the Marine Plan objectives and develop strategies to ensure compliance.
3	Environmental impacts of past, existing and future development and use will be ameliorated actively, through targeted rehabilitation, and passively, as natural regeneration becomes an outcome of improved development and use.
4	Ecological processes underpinning economic, environmental, social and cultural values, including Indigenous cultural heritage, will be protected.
5	Monitoring, evaluation and research will be publicly available and aimed at increasing our understanding of the biodiversity, habitats and ecological processes of the marine, coastal and estuarine environment and the cumulative impacts of development and use.

The following strategies should be applied by all management agencies with jurisdiction over the marine, coastal and estuarine environment, all operators of development and use and all individual users of these environments.

Strategies to Achieve Objectives of ER2 Zone	
1	Adopt mechanisms to conserve and protect marine, coastal and estuarine: • endemic species; • species of conservation concern; • key spawning, breeding and nursery areas; and • key feeding and resting areas.
2	Adopt mechanisms to protect marine, coastal and estuarine: • biodiversity; • habitats; and • ecological processes.
3	Protect cultural and heritage values, (including Indigenous cultural heritage) associated with the marine, coastal and estuarine environment.
4	Adopt performance measures derived from the Objectives (ER2 Zone) and manage existing and future economic, recreational, social and cultural development and use, both catchment and marine-based, to reduce and remove threats to achieving the objectives.
5	Plan for future development and use consistent with the Objectives (ER2 Zone) and with consideration of the cumulative impacts of development and use.
6	Adopt mechanisms for the rehabilitation of degraded areas that may involve relocation of existing uses that do not comply with the Goal and Objectives (ER2 Zone).
7	Respond to any change in water quality where a trend away from an established benchmark is detected. Maintain water quality at the recommended benchmark given in the Marine Plan Performance Assessment System.
8	Contribute to both site specific and ecosystem-level research and monitoring.

Ecologically Rated Zone 3 (ER3)

Definition

Zones classified as ER3 contain a moderate diversity of marine, coastal and estuarine habitats and species identified as suitable indicators of ecosystem capability.

Management of development and use will provide for ecologically sustainable use and ecologically sustainable development, underpinned by the precautionary principle, as described under the Goal, Objectives and Strategies below.

Goal: Development and use is managed to ensure that moderate environmental impacts to the biodiversity, habitats and ecological processes of ER3 Zones do not jeopardise the health and productivity of the ecosystem.

"Moderate impacts on habitats whilst safeguarding ecological processes"

Moderate: Moderate impact to habitat or populations. Measurable changes to ecosystem components without there being a major change in function (i.e. no loss of components). Recovery measured in years.

Objectives – ER3 Zone	
1	Ecologically sustainable development and use, both current and future, of the marine, coastal and estuarine environment will not exceed moderate: • loss of biodiversity; • degradation to soft-sediment habitats (where seagrass, reef, mangrove, saltmarsh habitats occur, refer to the objectives of ER2 Zones); and • loading of sediments with heavy metals, persistent organic pollutants and other contaminants.
2	Degradation of habitats resulting from development or use will not compromise the ability of ecological processes to sustain ecosystems naturally.
3	Development and use will maintain water quality in accordance with the benchmark established by the performance assessment system for each Marine Plan.
4	Environmental management of existing and future development and use will adopt performance measures consistent with the Marine Plan objectives and develop strategies to ensure compliance.
5	Environmental impacts of past, existing and future development and use will be ameliorated actively, through targeted rehabilitation, and passively, as natural regeneration becomes an outcome of improved development and use.
6	Ecological processes underpinning economic, environmental, social and cultural values, including Indigenous cultural heritage, will be protected.
7	Monitoring, evaluation and research will be publicly available and aimed at increasing our understanding of the biodiversity, habitats and ecological processes of the marine, coastal and estuarine environment and the cumulative impacts of development and use.

The following strategies should be applied by all management agencies with jurisdiction over the marine, coastal and estuarine environment, all operators of development and use and all individual users of these environments.

Strategies to Achieve Objectives of ER3 Zones	
1.	Adopt mechanisms to conserve and protect marine, coastal and estuarine: • endemic species; • species of conservation concern; • key spawning, breeding and nursery areas; and • key feeding and resting areas.
2.	Adopt mechanisms to protect marine, coastal and estuarine: • biodiversity; • habitats; and • ecological processes.
3.	Protect cultural and heritage values, (including Indigenous cultural heritage) associated with the marine, coastal and estuarine environment.
4.	Adopt performance measures derived from the Objectives (ER3 Zone) and manage existing and future economic, recreational, social and cultural development and use, both catchment and marine-based, to reduce and remove threats to achieving the objectives.
5.	Plan for future development and use consistent with the Objectives (ER3 Zone) and with consideration of the cumulative impacts of development and use.
6.	Adopt mechanisms for the rehabilitation of degraded areas.
7.	Respond to any change in water quality where a trend away from an established benchmark is detected. Maintain water quality at the recommended benchmark given in the Marine Plan Performance Assessment System.
8.	Contribute to both site specific and ecosystem-level research and monitoring.

Ecologically Rated Zone 4 (ER4)

Definition

Zones classified as ER4 Zones include those marine, coastal and estuarine areas for which the available scientific data are inadequate to identify their importance to the maintenance of biodiversity, ecological health and productivity of the ecosystem.

Until appropriate research suggests otherwise, management agencies will adopt a precautionary stance, applying the environmental impact criteria of 'minor' to the management of development and use.

Research will ultimately enable the reclassification of this zone to ER1, ER2 or ER3.

Goal: Development and use of the marine, coastal and estuarine environment is preceded by research to improve knowledge of the biodiversity, habitats and ecological processes of ER4 Zones.

"Research will determine allowable consequences to habitats"

Objectives – ER4 Zone (to be applied pending reclassification of an area following research)	
1	Future development and use will be contingent on an appropriate level of scientifically based knowledge.
2	Until research suggests otherwise, ecologically sustainable development and use, (both existing and future), of the marine, coastal and estuarine environment will not exceed minor: • loss of biodiversity; • impediment of ecological processes; • degradation to seagrass, reef, mangrove, saltmarsh and soft-sediment habitats; • loading of sediments with heavy metals, persistent organic pollutants and other contaminants; and • change in water quality beyond the benchmark established by the performance assessment system for each Marine Plan.
3	Environmental management of existing and future development and use adopts performance measures consistent with the Marine Plan Objectives and develop strategies to ensure compliances.
4	Environmental impacts of past, existing and future development and use will be ameliorated actively, through targeted rehabilitation, and passively, as natural regeneration becomes an outcome of improved development and use.
5	Ecological processes underpinning economic, environmental, social and cultural values, including Indigenous cultural heritage, will be protected.
6	Monitoring, evaluation and research will be publicly available and aimed at increasing our understanding of the biodiversity, habitats and ecological processes of the marine, coastal and estuarine environment and the cumulative impacts of development and use.
7	Improved understanding of the ecology of areas within ER4 Zones will result in their reclassification to ER1, ER2 or ER3, as appropriate.

The following strategies should be applied by all management agencies with jurisdiction over the marine, coastal and estuarine environment, all operators of development and use and all individual users of these environments.

Strategies to Achieve Objectives of ER4 Zone	
1	Ensure development or use is preceded by appropriate research to identify ecological risks and the vulnerability of the receiving environment.
2	Protect cultural and heritage values, (including Indigenous cultural heritage) associated with the marine, coastal and estuarine environment.
3	Ensure that as new knowledge is gained, zoning and management of use is revised, according to the Goals, Objectives, and Strategies for ER1, ER2 or ER3 Zones, as appropriate.
4	Review classification of zoning every two and a half years, incorporating the latest research.

Criteria	Ecological Impact (Habitat/Ecosystem)
Negligible	Insignificant impacts to habitat or populations. Unlikely to be measurable against background variability. Habitat and Ecosystem: Interactions may be occurring but it is unlikely that there would be any change outside of natural variation. Recovery measured in days.
Minor	Noticeable impact to habitats of populations measurable against background variability. Recovery measured in months.
Moderate	Moderate impact to habitat or populations. Measurable changes to ecosystem components without there being a major change in function (but no loss of components). Recovery measured in years.
Adapted from: Fletcher *et al* 2002.	

Appendix 2

Ecological Variables used in the Spencer Gulf Marine Plan

No.	Layer
1.	Seagrass
2.	Reef
3.	Sand and soft sediment
4.	Mangrove
5.	Saltmarsh
6.	Wetlands of Importance
7.	All other wetlands
8.	*Zostera mucronata* seagrass protected under the *National Parks and Wildlife Act 1972*
9.	*Rhodoliths* – type of marine sponge found in Spencer Gulf
10.	Endangered marine macro-algae (COSEMA Database)
11.	Key Biodiversity Area (Focus Area for Marine Protected Areas)
12.	Spawning
13.	Nursery
14.	Breeding
15.	Wader bird feeding grounds
16.	Seabird nesting locations
17.	Seabird nesting locations (Vulnerable)
18.	Australian Sea lion breeding/haul out sites

PERFORMANCE ASSESSMENT SYSTEM

South Australian Marine Planning Framework

November 2005

Government of South Australia
Department for Environment and Heritage

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Cite As:

Department for Environment and Heritage, 2005. *Performance Assessment System – South Australian Marine Planning Framework.* Coast and Marine Conservation Branch, Department for Environment and Heritage, South Australia.

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1. Introduction

The Performance Assessment System (PAS) for the South Australian Marine Planning Framework (henceforth referred to as the Framework) will evaluate the effectiveness of Marine Plans by reporting on the maintenance of ecosystem condition. The PAS will also provide a mechanism for assessing cumulative impacts in marine waters.

Monitoring in the marine environment is currently undertaken by single agencies and is often influenced by specific industry needs. The Framework PAS will provide an integrating mechanism to enable all agencies to contribute to a collaborative approach to reporting on marine ecosystem condition. The PAS has been developed in consultation with South Australian Government agencies and non-government organisations. It establishes a consistent approach to the monitoring of indicators that detect change, both natural and human induced, in South Australia's marine environment.

Monitoring and performance assessment are key components underpinning a best practice and adaptive approach to management (Figure 1). Adaptive management recognises the need to refine management policies through improved knowledge of ecosystems. The PAS will provide a source of information feedback, triggering the necessary management responses to ensure delivery of marine planning goals, and objectives.

2. Institutional Context

The Framework will be implemented in a coordinated, whole-of-government manner by all existing marine, estuarine and coastal management agencies and authorities. Responsibilities and jurisdictions of management agencies will remain, but the resource management policies, strategies, plans and actions will be amended to incorporate the goals, objectives, and strategies applied to marine planning zones.

All agencies and user groups share responsibility for implementing Marine Plans, a key component of which is determining the effectiveness of management policies, strategies and actions through performance assessment. The Department for Environment and Heritage (DEH) will form the lead agency in developing a collaborative, partnership-based approach to Marine Plan implementation, involving all relevant sectors and groups, including, wherever possible, industry and the community.

The development phase of the PAS provided an opportunity to review the status of marine, estuarine and coastal monitoring in South Australia. The review of monitoring clearly revealed few routine, long-term monitoring programs and, in many cases, monitoring information is not coordinated or shared among agencies. Considerable financial inefficiencies are inherent in such an approach and the data collected is often unsuited to answering broader questions about the condition of ecosystems and biodiversity.

In developing the PAS, opportunities were identified to facilitate cooperative, cost-effective, research and development projects that would simultaneously satisfy the reporting requirements of a number of agencies, including regional Natural Resources Management (NRM) Boards. The Department for Environment and Heritage will work closely with other agencies and research organisations to develop these opportunities.

Collaborative, state wide monitoring and reporting on the condition of the marine, estuarine and coastal environment brings with it the requirement to develop an integrated system for data collection, storage, analysis and reporting. The Government's *Living Coast Strategy* explicitly requires this and DEH will work closely with all relevant agencies and groups to ensure the development of data collection and analysis protocols and an integrated data storage and management system.

> *"Identify indicators and assessment methodologies to enable effective monitoring and reporting of the ecological, social and economic changes in the coastal, estuarine and marine environment for State of the Environment (SoE) reporting".*

The monitoring data for the Marine Plans will be internally reviewed each two and half years, and summarised in a State of Marine Planning areas Technical Report. These reports will form the basis for the five-yearly review of each Marine Plan in South Australian State waters and, as required by the *Living Coast Strategy*, will contribute to SoE reporting every five years.

3. Assessing the Performance of Marine Planning

Marine planning is designed to deal with the large-scale, long-term issues related to the conservation and sustainable use of marine resources. In assessing the performance of the Marine Plans, the intent is to consider broadly the condition of marine ecosystems without being focused on the fine-scale issues. Marine Plans set the broad context within which existing management agencies will enact their statutory obligations.

The Marine Plans set comprehensive management goals and objectives for a system of ecologically rated zones (ER zones). Management of development and use in each of the marine planning zones must adhere to these goals and objectives to ensure the success of each Marine Plan.

PAS and Marine Planning ER Zones

The PAS addresses the Marine Plan goals and objectives set for each ER zone. These are expressed as outcomes in the PAS for each ecological variable used to develop the Marine Plan (such as seagrass), which are linked to criteria, performance indicators, benchmarks and monitoring protocols. For each of the ER zones, the criteria are:

- ER1 zone - not to exceed negligible impact;
- ER2 zone - not to exceed minor impact;
- ER3 zone - not to exceed moderate impact;
- ER4 zone – not to exceed minor impact (treated as an ER2 zone until research determines ultimate zoning).

Monitoring of the performance indicators in relation to the Benchmarks is designed to be able to distinguish between natural variability (such as seasonal changes) and changes caused by human activities.

The performance indicators in each Marine Plan are selected to reflect the importance of the variables in each planning area. Since measuring many of these indicators will involve considerable further effort, the emphasis in each Marine Plan has been placed on indicators that can be developed and applied in the current five-year cycle. This involves the review and adaptation of existing programs, as well as the commitment of additional resources, to develop a practical and feasible monitoring program that will be able to report on the achievements of each Marine Plan in their first five-yearly review. Therefore, existing monitoring programs are incorporated into, and form the basis of the PAS, with clear guidance provided for the development of a more comprehensive approach to monitoring as agency and regional Natural Resources Management Board (NRM) resources permit.

4. Key Habitat Standards

Saltmarsh, mangroves, seagrass beds, reef habitats, and defined spawning areas are critical habitats for marine ecosystems in South Australia waters. In some sub-tidal areas these habitats may not yet have been identified or accurately mapped because of limitations in the resolution of survey/sampling tools and because some areas are simply too remote for detailed survey. It is therefore likely that there will be areas throughout each planning area where these habitats occur but are not properly mapped or recognised.

Where any of these key habitats are recognised to occur in ER3 zones, the Framework requires that these habitats be managed to the goals and objectives of an ER2 zone. In the interim, they are classified here as key habitats, and are prescribed for management to the same standard, as they would be if they were already mapped and classified as ER2 zones.

Other key habitat types may be determined in conjunction with stakeholders and agencies, and these will be added to the list of key habitats after due consideration by the agencies.

5. PAS and Climate Change

The potential impacts of climate change on the marine coastal and estuarine environment of South Australia are many, including likely changes in sea surface temperature and sea level rise. These changes may correspondingly cause changes in flora and faunal assemblages in the marine environment. There is no specific intent in the PAS to measure the impacts of climate change on the marine environment. Because the PAS is scientifically based however, the potential impacts of climate change will be considered in the analysis of monitoring data.

6. Decision System – How The PAS Works

The PAS assesses the objectives of the Marine Plan zones in terms of outcomes. Firstly it prescribes benchmarks, which will direct decision making; and secondly it establishes an assessment system that reports on the effectiveness of the Marine Plan. The goals and objectives established in the planning zones apply to all management agencies, including State and local government, and regional NRM bodies, for regulating the activities of user groups within government, industry and the community.

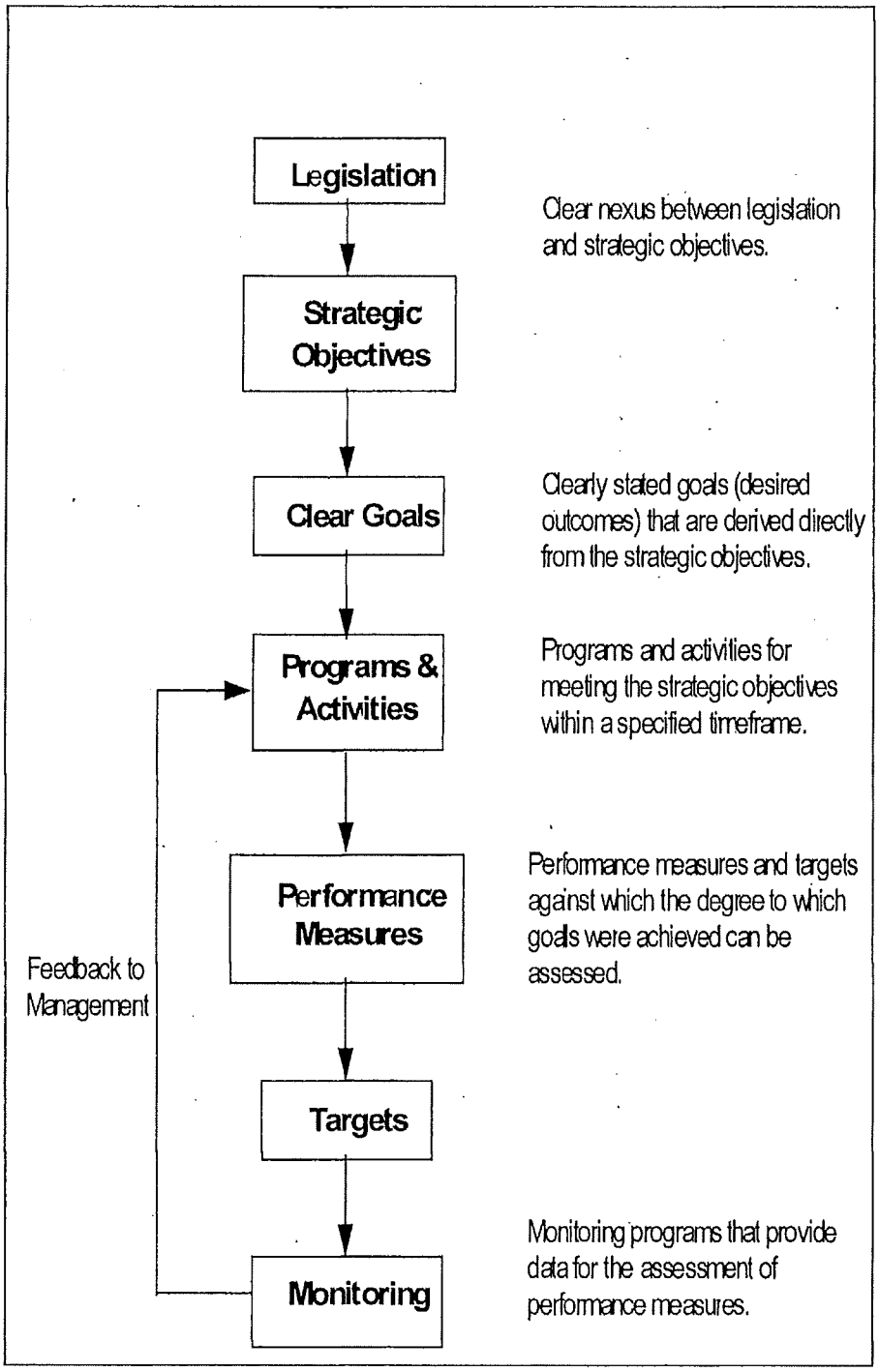
Marine Plans do not intend to proscribe any type of development or use from a particular zone. Rather, the zone goals and objectives and the PAS criteria and performance indicators direct decision-making relating to development assessment and regulation of use.

In an ER1 zone, for example, acceptable development or use is that which will not exceed a negligible level of impact to the biodiversity, habitats and ecological processes of the zone. For some forms of development, this may be achieved by applying appropriate conditions to a development approval (for example, monitoring requirements or amendments to a proposal). If this is not practical or feasible, locating the development within an ER2 or ER3 zone may be more appropriate. Consequently developments and/or uses that are expected to have an impact on the marine environment are more likely to gain approval and have less stringent environmental controls in ER3 zones than in ER1 or ER2 zones.

The Marine Planning Framework recognises that in some areas, particularly those adjacent to major industrial centres, degradation of the marine, coastal and estuarine environment already exceeds the standards required to meet the zone objectives. It recognises that some areas are governed by indenture Acts developed to support the activities of specific industries and these Acts will be unaffected by this plan.

In each of these cases however, regulatory agencies, industries and other users of the environment are provided with objective targets to assist in identifying remedies for past and current impacts. These targets will help plan for future development and use in a manner consistent with the zone objectives. Over time, these actions will facilitate the restoration of acceptable ecosystem conditions.

Figure 1: Best Practice Performance Reporting Model



Source: ANZECC 1997

7. Definitions of Terms Used in the PAS

Ecological Variable

The ecological variables are the data used to develop the Marine Plan; for example, seagrass as listed in Table 1 (Appendix 1). The variables formed the basis of the ecological rating given to the ER zones in each planning area. The variables are determined by the collation of current available data, review of the scientific literature relating to the region of interest and through consultation with local stakeholders, to identify species, habitats and processes important for maintaining the biodiversity, health and productivity of the marine systems. The variables established for each biounit in a planning area are summarised in the maps and summary zoning tables within each Marine Plan.

Zone Outcome

The outcomes (see Table 1 Appendix) are based on the objectives for each of the variables through the implementation of each Marine Plan. Each outcome relates to one or more of the ecological variables of each planning area, and to the performance expectations for each ER zone. These outcomes are specified as performance requirements for any development or activity proposed for or likely to affect these areas. The required outcomes are scaled so that the areas that contain the most ecological variables are maintained at the highest standards, and the areas with the fewest ecological variables are maintained in good and ecologically viable condition, although recognising that they may be changed by various sustainable uses.

Zone Criteria

The criteria (see Table 1 Appendix 1) express the important aspects of each planning area in specific ecological terms so that decisions are correctly based on the ecological characteristics of the region. The criteria enable decisions about the performance of each Marine Plan to be made on the ecological grounds of maintaining the biodiversity, health and productivity of the marine systems throughout each ER zone. Each criterion prescribes the required condition, or the relationship to the defined benchmark, in which each variable should be maintained within each ER zone. Taken together, the criteria express the range of different and measurable ecological characteristics of each variable that need to be maintained. Where habitats are degraded, the criteria provide guidance for recovery and rehabilitation, which may be assessed using the relevant performance indicators.

Performance Indicator

The performance indicator (see Table 1 Appendix 1) is the quantitative variable that is measured by the monitoring program as the basis for decisions about each criterion. The performance indicator is (or may be) a surrogate for the direct measurement of each criterion. This is chosen to take account of the availability of technical capacity in South Australia, the cost-effectiveness and achievability of measurement systems, and, overall, the relative achievability of a measurement system that relates to the criterion.

The basis for decisions about whether the level of a performance indicator is determined to be an increase (or a decrease or no change) is established within the Synthesis and Assessment process (see section 8: Synthesis and Assessment). These decisions about levels of change are determined by a statistical comparison with the benchmark, and by the technical observations about rate and direction of change, the specific environmental circumstances relating to the measurement data, and experience from other regions and reporting systems.

The performance indicators are surrogates for the direct measurement of the criteria, and the relationship between the performance of the indicator and the performance of the criteria is established as part of the assessment process. Over time, as the Marine Plans mature, the specific performance indicators may be improved (or in some circumstances they may change entirely) to take account of improvements in knowledge, technology, funding for Marine Plan implementation, or changes to agency and community partnerships and or collaborations.

Benchmark

The benchmark for each performance indicator is the reference level that is to be maintained by the operation of the Marine Plan. The benchmark is used as the basis for determining if any subsequent

set of measures is in compliance with a zone's goal and objectives. All benchmarks will be based on a reference condition that includes the variability related to climate or other forms of natural variability, such as tidal cycles. The specific level of a benchmark for each performance indicator will be established by reference to historic conditions that may be considered unimpacted, by inference from statistical models, or by determination of the benchmark as the current (2005) set of conditions. In all cases, where a lack of compliance with a benchmark is detected, a response will be triggered (see Section 9: Determining Compliance).

The benchmarks are expressed in terms of numeric variables with, where possible, estimates of uncertainty that encompass the natural dynamics and the measurement errors. These will normally be in the form of a median estimate and dispersion expressed as percentiles. Where estimates of uncertainty are not available in a benchmark, a graded sequence of acceptable impacts may not be able to be statistically operationalised across the ER zones, and the benchmark for each zone will be set in a cautious manner. This will take account of likely levels of natural dynamics and measurement errors inherent in the measurement/monitoring tools that are likely to be used in estimating both the benchmark and the variables of the performance indicator.

Pressures

The use of resources and marine activities in each planning area will generate a set of pressures and potential impacts on marine systems. Each Marine Plan is designed to ensure that the cumulative total of all such impacts does not result in an overall degradation of the marine ecosystems that it is designed to protect. This is confirmed (for agencies and the public) through assessment of the level of achievement of the Marine Plan objectives.

Pressure indicators are assessed as a basis for determining possible long-term broad-scale causes for changes in condition that may be observed in the measurement of the other performance indicators. Assessment of the pressure indicators in each Marine Plan is not intended to replace the role of other agencies in regulating and managing sustainable uses, but will provide the broader context for policy decisions and responses. Therefore, benchmarks are not established for variables considered to be pressures. Similarly, reporting on pressures does not necessarily imply that the level of individual activities is unacceptable or does not meet sustainability objectives. The role of the Marine Plans is to ensure that the cumulative impacts of such uses are not of such magnitude that they detrimentally affect the ecological variables and condition that are established for the ER zones. The pressure indicators are not included in this document however they may be included in future performance assessments of each Marine Plan.

8. Synthesis and Assessment

For each performance indicator, the synthesis and assessment of data and knowledge will be a two-step process. First, each two and a half years, an internal agency review will prepare a Technical Report (the State of Marine Planning areas Technical Report) for each Marine Plan. Second, on the five-yearly cycle of review of each Marine Plan, the Technical Reports will be used as the basis for determining if the outcomes for each Marine Plan have been achieved.

The process of synthesis and assessment of data will involve securing copies of data relating to each performance indicator from the owners/custodians of the data, conducting the statistical analyses of each data set to determine if they comply with the benchmarks, and interpreting/reporting on any trends that may be observed in the data.

Data on performance indicators will be included within the synthesis and assessment process if it complies with the requirements of the Standard Monitoring Protocol for each performance indicator.

9. Determining Compliance

For each performance indicator, a statistical comparison with the benchmark will determine if a set of replicated observations will be considered to be in compliance with the goals and objectives set by the

Marine Plan. Where data are available for each biounit, such as at index sites, compliance will be determined by inference to the biounit scale.

The observed variables of a performance indicator, such as data derived from a monitoring program adjacent to a development site, will be determined to be in compliance with the objectives of the Marine Plan (unless specified otherwise in the benchmark) if, for the respective ER zones, the median estimate lies within the following ranges:

- ER1= between the 30th and 70th percentiles of benchmark data;
- ER2= between the 20th and 80th percentiles of benchmark data;
- ER3= between the 10th and 90th percentiles of the benchmark data.

For example: in an ER1 zone where the benchmark for ammonia may be set at 0.02 mg/L (representing the 70th percentile of ammonia levels in a background/reference condition) and the dataset of 18 samples showed the median of the 18 samples is 0.16 mg/L, then this figure falls above the upper limit for the PAS and this situation would not be in compliance with an ER1 zone.

For example: in an ER2 zone where the benchmark for ammonia may be set at 0.03 mg/L (representing the 80th percentile of ammonia levels in a background/reference condition) and the dataset of 18 samples showed the median of the 18 samples is 0.02 mg/L, then this figure would be in compliance with an ER2 zone.

For example: in an ER3 zone where the benchmark for ammonia may be set at 0.05 mg/L, (representing the 90th percentile of ammonia levels in a background/reference condition) and the dataset of 18 samples showed the median of the 18 samples is 0.045 mg/L, then this figure would be in compliance with an ER3 zone.

These compliance ranges are applied at the site scale (tens to hundreds of metres), and will be synthesised and inferred to the biounit scale using statistical techniques. These statistical methods are unique to each measurement situation (and possibly to each planning area) and will be determined as part of the Standard Monitoring Protocol for each performance indicator (see Monitoring below).

10. Triggered Responses

Where a set of observations from any monitoring in the planning area are assessed to not be in compliance with the benchmark (that is the median of the observations on the performance indicator falls outside the specified range for the benchmark) then the following actions will be triggered:

1. An internal agency administrative review of the data and the situation, to confirm that proper procedures have been followed.
2. An internal agency technical review to confirm that proper sampling and reporting procedures have been followed.
3. If these two steps confirm that a series of observations constitutes (or would constitute) a compliance failure, then the responsible agency will initiate a full review of the situation to determine what consequential corrective action is required, which agencies need to be notified of the compliance failure, what program of follow-up research investigation is required by what agency, and what priority/urgency has to be determined for any corrective actions, mitigation or change in management or reporting procedures.

11. Monitoring

Monitoring is defined as the long-term routine measurement of an established variable for the purposes of reporting on performance of the Marine Plans and the planning framework. Monitoring does not include time-limited research projects, although the development of cost-effective monitoring systems may require such research and development to determine design and sampling parameters for specific tools and approaches.

The monitoring programs for the Marine Plan performance indicators (generally) will be undertaken by collaboration and partnership with government agencies, NRM boards, councils, the private sector and community as appropriate. These joint activities will include field measurement programs, research and development to design and improve existing monitoring tools, design of robust sampling programs, and archiving and assessment of data.

Monitoring of the performance indicators will be used, amongst the other statutory systems, as compliance measures for existing and new uses in the Marine Planning areas.

The overall design of the monitoring program will use the performance indicators and benchmarks established in the relevant performance assessment system for each Marine Plan.

The monitoring program will require measurements at unimpacted 'control' sites to establish reference benchmarks (see Index Sites below) as well as measurements at high-risk areas (such as near point sources, or sites of local activities) and 'non-control' sites.

The cost of such measurement programs will be allocated within the normal agency regulatory system, and coordination and integration of such compliance activities amongst users, agencies and the community will be encouraged.

The time and space scales on which monitoring data will be required will be established within the standard monitoring protocols for each performance indicator. These scales will be designed so that inferences can be made about ecologically relevant levels of change across each biounit and amongst years. This may require frequent (such as daily/weekly) collection of data for 'fast' variables (such as oxidised nitrogen in water at stormwater outfalls), but five-yearly mapping of 'slow' variables (such as area of *Posidonia* seagrass species habitat in a biounit).

The design of monitoring would normally include:

1. Systematic (annual) samples taken at index sites, designed to assess fine scale changes in background levels at representative sites in the planning area.
2. Sampling near areas of risk, such as near development sites, to confirm compliance with the benchmarks.
3. Sampling across the region to infer regional compliance with the benchmarks, such as a randomly allocated set of samples within appropriate habitat strata in each biounit.

These design principles will guide the development of monitoring systems for each performance indicator.

Data collected by agencies and collaborative arrangements for the purpose of reporting on the performance of the Marine Plans will be retained by the original owners/custodians. The synthesised and aggregated data and information that may be derived from such data will be made available for public scrutiny as part of the review of each Marine Plan on the five-yearly cycle.

Index Sites

Assessing the relevance and importance of any changes that are observed in monitoring data for the performance indicators will require comprehensively established benchmarks. For many, if not all, of the performance indicators, the currently available benchmarks are likely to be limited by a lack of resolution in space and time. Also, typically, the research data available to establish such benchmarks are derived from situations of impact or intensive use, and may be of limited relevance as a reference (or target) condition.

The interpretation of monitoring data and the decision to trigger a response will be critically dependent on two characteristics of the monitoring system:

1. The resolving power of the sampling program to detect changes that are ecologically meaningful.
2. The interpretation of such detected changes and the inference of risks to the ecological variables of the biounits and planning areas based on comparison with the benchmarks.

If the benchmarks are too generous, then ecological impacts may occur but pass undetected by the PAS. Conversely, if benchmarks are too narrow, then there will be many 'false positives' where the PAS falsely detects results above that of the benchmark and infers ecological degradation where none actually exists. Setting the benchmarks correctly, and correctly establishing the gradient across ER zones, is crucial to ensuring that Marine Planning is an effective and efficient planning tool.

In South Australia there is little quantitative knowledge of the background (unimpacted) conditions of marine ecosystems. It will therefore be important to develop and implement a series of sites that broadly represent the range of unimpacted conditions in each planning area. These sites (index sites) will be used as the locations where systematic low-level monitoring can establish the normal range and variability of each performance indicator for use in comparison with other site-specific measures that will be required to assess the impact of current or potential uses.

The index sites will be chosen to provide, in order of priority:

1. Adequate replication and representation of variables within each marine planning area.
2. Locations reasonably isolated from current impacts or stresses or, where this is not possible, where these are minimised.
3. Locations that optimise the variable of any historic data/knowledge that may be derived from earlier site sampling projects.
4. Locations that will be assured of long-term protection and management that will prevent adverse impacts from activities and uses, including impacts from adjacent or upstream areas.
5. Locations that optimise the potential for interaction and collaboration with partners.
6. Locations that allow for sampling programs to be implemented in the most cost-effective manner in the long term.

The index sites will be best located within Marine Protected Areas (MPA), and in areas that are specifically designated as sites of high protection for nature conservation purposes. However, monitoring of performance indicators for marine planning purposes may require small amounts of destructive sampling, and such sampling activities may not be consistent with MPA objectives for high-level nature conservation. Therefore the monitoring of the performance indicators in MPAs, which may also assist to assess the performance of the MPAs in achieving their objectives for nature conservation, will be best conducted in MPA areas designated for scientific monitoring and research but otherwise fully protected.

Standard Monitoring Protocols

Each performance indicator will be measured using a Standard Monitoring Protocol. This protocol will define the basic characteristics of the sampling design, the field sampling methodology, the laboratory analysis procedures, the data analysis, assessment and statistical procedures, the levels of detectable change, the data archiving and management procedures, and standard reporting products.

Each Standard Monitoring Protocol (SMP) will be defined in sufficient detail so that the procedures are publishable in a high-quality scientific journal, and so that the protocol can be used as the basis for task requirements in a contract for third-party tender process to implement the measurement program for a performance indicator. The complete set of SMPs will be prepared as a series of technical reports that are available for broad distribution.

Each SMP will apply across all South Australian marine planning areas, and will be established as the primary vehicle for assessment and reporting of progress of the marine planning framework. Specific variations may be developed for biounits or marine planning areas, but they will be coherent with the statewide SMP, and data will be able to be compared for validation purposes.

Each Standard Monitoring Protocol should include:

1. The variable to be measured.
2. The field sampling tools and procedures to be used.
3. Field documentation of procedures.
4. The level of replication and spatial/temporal sample design (recognising the sampling design principles described above).
5. The location boundaries (grid coordinates) where appropriate.

6. The level of resolution required in the analysis (taxonomic resolution, limits of detection)
7. The quantitative level of detectable change (including sampling errors and natural dynamics and uncertainties)
8. Spatial and temporal inference systems (for site-based data).

Monitoring systems in place for the PAS must define institutional and organisational arrangements (if available) and use the following:

1. Operator management systems.
2. OHS & W requirements.
3. Quality control procedures for field, laboratory and data handling.
4. Quality assurance measures and compliance reporting procedures.
5. Reporting products, including data formats, and availability.
6. Timing of reporting products.
7. Data management and archiving arrangements.
8. Risk assessment.
9. Upgrades/improvement pathway, including research and development issues.
10. Technical basis/linkages in previously published material.

Implementation

Each Marine Plan will have a set of criteria and associated performance indicators. As part of agency commitments to report on the condition of marine ecosystems, the implementation of the performance assessment process will require a long-term commitment to implementing continuous monitoring, assessment and reporting. The key elements of this monitoring system are:

- an inter-agency technical design phase that focuses on the long-term system of measurement and reporting for each performance indicator;
- the establishment of the SMP for each performance indicator;
- project-based research to refine and assess the range of sampling and measurement tools that may be used to report on each criterion;
- a set of index sites in each region, where the background levels and natural variability of each performance indicator are determined and monitored;
- a sampling design that is cost-effective and will detect levels of change in space and time scales that can acceptably infer achievement of the Marine Plan objectives for each performance indicator.

A full set of generic performance indicators is provided for the MPF (see Table 1 Appendix 1) with no benchmarks or monitoring protocols attached. The more detailed performance indicators and benchmarks are provided for in each region's Marine Plan performance assessment system. In each Marine Plan, the performance indicators are to be classified into two types:

1. Those that are feasible and achievable within presently available technical capacity and modest additional resources for design and implementation, and likely to be achievable within one to three years.
2. Those that are important but that will require a longer period of development and testing, and possibly more substantive levels of resourcing for routine implementation.

The feasible and achievable performance indicators (#1 above) are planned as the basis for performance assessment in the first five-year period of each Marine Plan. The latter set of indicators (#2 above), which may be considered to be more aspirational, are provided for each Marine Plan as a comprehensive set of indicators which may be adopted and implemented beyond the first five-year cycle of planning and implementation.

In establishing the full range of potential performance indicators, the PAS has highlighted key gaps in current knowledge and understanding of marine, estuarine and coastal ecosystems and ecological processes. Addressing these gaps through carefully targeted research will be critical to expanding the range of performance indicators available for use by the marine planning PAS. The Government's *Living Coast Strategy* acknowledges this critical need – "*Develop a mechanism to build the State's marine conservation-specific research programs and to fund programs that assess the current status and integrated function of South Australia's marine biodiversity.*"

12. Scientific Working Group

The provisions of the South Australian Marine Planning Framework and the component Marine Plans are based on robust science and technical analysis, to ensure optimum credibility. For the Framework to be implemented, maintained, and continuously improved, the Scientific Working Group will provide advice and support to the Framework. The Scientific Working Group will comprise high-level South Australian marine science experts providing whole-of-government strategic technical advice for the implementation of Marine Plans through at least one full five-year Marine Plan cycle. A key role for the Scientific Working Group will include identification of linkages and opportunities for enhanced coordination of research and monitoring and performance assessment and review of Marine Plans.

References

ANZECC, 1997, *Best Practice Performance Reporting in Natural Resource Management*, Australia and New Zealand Environment and Conservation Council, Working Group on National Parks and Marine Protected Area Management, Canberra.

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South Australian Government, 2004. *The Living Coast Strategy*. Website: www.environment.sa.gov.au/coasts/planning.html.

Glossary

Algae: aquatic plants that range in size from microalgae (phytoplankton) to macroalgae (large branching seaweeds).

Benchmark: the benchmark for each performance indicator is the reference level (the standard) that is to be maintained by the operation of the Marine Plan.

Benthic species / benthos: the flora and fauna found on, or attached to, the sea bed.

Biodiversity: the variability among living organisms from all sources, including, inter alia, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part. This includes diversity within species, between species and of ecosystems.

Biounit: biophysical units (microscale, 100s of sqkm), which identify functional ecosystem-based management units (for example: rocky shores, dune barrier systems, archipelagos, shoals or reef systems, coastal peninsula, etc), defined primarily on the basis of coastal physiography, topography and major marine physical habitat or seascape features and habitat distributions.

Breeding area: a site providing the conditions required by a particular species to enable breeding to occur.

Criteria: expression of important aspects of the Planning Area in specific ecological terms so that decisions are correctly based on the ecological characteristics of the region.

Cumulative: created by successive additions (of impacts).

Degradation: a state of reduced environmental quality.

Development: definition as per *Development Act 1993.*

Ecological processes: dynamic biological and physical processes; for example: natural cycles, currents, sediment movements, nutrient cycling, community and trophic structures and migratory species movements.

Ecologically-rated zones (**ER Zones**): a system comprising four different zones, derived from ecological criteria, which express the relative importance of the contribution made by the species, habitats and ecological processes of an area to the biodiversity, ecological health and productivity of a whole marine planning area (that is, the ecosystem).

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.

Ecologically sustainable use: use of living things or areas within their capacity to sustain natural processes while maintaining the life support systems of nature and ensuring that the benefit to present generations of the use does not diminish the potential to meet the needs and aspirations of future generations.

Ecological variable: the biophysical elements of marine, estuarine and coastal ecosystems that are the basis for establishing the ecological rating for each **ER Zone** in the Planning Area.

Ecosystem: a dynamic complex of plant, animal and micro-organism communities and their non-living environment, interacting as a functional unit.

Ecosystem-based management: management of ecosystem variables and uses recognising the interactions with the environment and responding to signals from the ecosystem to control anthropogenic activities and uses.

Epifauna: fauna living on the surface of the ocean floor.

Estuary: a partially enclosed coastal body of water, including its ecosystem processes and associated biodiversity, which is either permanently, periodically, intermittently or occasionally open to the ocean within which there is a measurable variation in salinity due to the mixture of seawater with water derived from on or under the land.

Eutrophication: a process of enrichment of nutrients, especially nitrogen and phosphorous.

Fauna: the animals peculiar to an area at a given time.

Feeding area: an area of particular importance to one or more species in providing a source of food (for example: tidal flats

exposed during low tides are important feeding areas for shorebirds).

Fishing: as defined in the South Australian *Fisheries Act 1982* and also includes collecting.

Flora: all plant life of a given place.

Goal: the overarching, long-term outcome desired of a plan, zone or strategy.

Habitat: the physical place or type of site where an organism, species or population naturally occurs together with the characteristics and conditions which render it suitable to meet the lifecycle needs of that organism, species or population.

Impact: a change in the composition, abundance or distribution of a population or assemblage arising from either human disturbance or natural events. Impacts may produce effects that are either positive or negative. Examples of impacts include the possible negative effects of waste discharge on seagrass meadows and the possible positive effects of establishing a Marine Protected Area.

Intertidal: the zone of coast between the mean high water level and mean low water level.

Inverse (reverse) estuary: estuary that becomes more saline in its upper reaches due to limited freshwater inflow and high evaporation.

Macroalgae: large algae, often referred to as seaweeds, but also include some freshwater species.

Mangroves: salt and inundation tolerant vegetation; primarily trees that grow intertidally. Solely represented by the Grey Mangrove species *Avecinnia marina* in South Australia.

Micro-phytobenthos: microscopic, photosynthetic eukayotic algae and cyanobacteria that grow in marine habitats ranging from wave swept beaches to detritus-laden backwater lagoons. Intertidal microphytobenthos include motile benthic diatoms (mainly pinnate forms) that migrate vertically upward to the sediment surface at the beginning of the day and downward at the end of the day.

Nursery area: area or habitat providing shelter and food to marine fauna during the vulnerable, juvenile stages of life (for example: estuaries with associated mangroves and/or seagrass are nurseries for many species of fish).

Objective: components of a goal that, if met, would ensure that the goal is achieved; clear statements of what management is to achieve

Off-road vehicle: any motorised vehicle (car, tractor, buggy or motorbike), whether registered or not, which is being operated off of a registered road or track.

Offshore: the zone between the shoreline and the edge of the continental shelf. More precisely, the zone seaward of the nearshore

Outcomes: (in relation to MP Performance Assessment System) expression of the objectives that will be achieved for each of the variables through the implementation of a Marine Plan.

Pelagic species: species that live within the water column.

Performance indicator: (in relation to MP Performance Assessment System) a quantitative variable that is measured by a monitoring program as the basis for decisions about each criteria.

Phytoplankton: aquatic microscopic single celled algae, which obtain their energy from light (phyto). Can be either planktonic or benthic.

Plankton: aquatic, free drifting, suspended organisms (plants: phytoplankton, animals: zooplankton).

Precautionary principle: where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Productivity: the rate at which radiant energy is used by producers to form organic substances as food for consumers.

Propeller scouring: damage caused to the sea bed and/or benthic communities (seagrass, reef etc) resulting from boat propeller action.

Protect: to shield from harm; to prevent degradation.

Reef: intertidal to partly submerged rocks occurring off the coast. In South Australia often

formed of calcarenite and may parallel the coast along submerged barriers.

Reef habitat: subtidal and intertidal rocky outcrops supporting diverse assemblages of marine flora and fauna.

Replication: the principle that if more than one sample of an ecosystem is reserved across its geographic range this will decrease the likelihood that chance events will cause the ecosystem decline.

Salinity: the amount of dissolved salts in a volume of water.

Saltmarsh: coastal wetland plant community dominated by herbs and low shrubs and located in the upper intertidal and supratidal zones of the coast (often on the landward side of mangroves). Saltmarsh areas are low-lying usually waterlogged and occasionally flooded by the tide.

Seabird: aerial birds (such as shearwaters) and swimming birds (such as penguins) usually seen at sea.

Seagrass: flowering marine plants found growing in intertidal and subtidal soft sediments.

Shorebird: also known as 'waders' or 'wading birds', shorebirds include both resident and migratory species often seen feeding along the shorelines of beaches and in the tidal pools and mudflats of estuarine areas.

Soft-sediment communities: plant and/or animal communities that inhabit the sand bed and/or muddy sediments in aquatic environments.

Spatial: pertaining to the arrangement of forms and events in space; on coasts, particularly to arrangement, alongshore or along a coastline.

Spawning area: area or habitat critical to the spawning stage of a species' reproductive cycle. Spawning areas are often geographically distinct from nursery areas. For example, King George Whiting spawn in deeper waters but their larvae drift into sheltered coastal areas such as mangroves, which provide the nursery for this species.

Subtidal: benthic zone from the low tide line to the seaward edge of the continental slope.

Supratidal: low lying land dominated by samphire vegetation which is elevated above the range of normal tide action but low enough to be flooded by abnormally high tides and storm surge events.

Threatening processes: (in relation to marine planning) processes and activities that threaten the health and productivity of the marine, coastal and estuarine environment (usually of human origin).

Tidal flat: an area of intertidal sand or mud usually composed of fine sediments and/or sand.

Use: economic, recreational, social or cultural activities in the marine, coastal and estuarine environment that may not be directly associated with development and as such may not be subject to regulation via the development assessment process. Many uses, such as commercial and recreational fishing, are regulated and managed by either a State or local government authority.

Variable: (in relation to MP Performance Assessment System) the biophysical elements of marine, estuarine and coastal ecosystems that are the basis for establishing the ecological rating for each ER Zone in the Planning Area.

Waders/wading birds: see 'Shorebirds', above.

Wetlands: areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres.

Appendix 1

Table 1: Full set of Performance Indicators selected for the South Australian Marine Planning Framework Performance Assessment System

Variable: Seagrass (includes dense, medium, sparse and patches)			
ER zone	Outcome	Criteria	Performance Indicator
All ER zones.	Negligible (ER1 zone), and Minor (ER2 and 3 zones) degradation to the biodiversity, habitats and ecological processes of importance to the health and productivity of the Planning Area.	Negligible (ER1 zone), and Minor (ER2 and 3 zones): Reduction in area of seagrass.	Area of seagrass meadow at scales of point (1sqkm) and planning area.
		Impediment to primary productivity.	Carbon and nitrogen flux.
		Degradation in demography of seagrass populations.	Population structure and density.
		Impediment to recruitment function.	Recruitment of commercial species.
		Loss of faunal diversity (epifauna).	Abundance and diversity of small fish and crustaceans (including obligate and temporary species).
		Loss of faunal diversity (infauna).	Abundance and diversity of major polychaete worm species
		Loss of floral diversity.	Epiflora on seagrass (ie leaf epiphytes).

Variable: Reef (all types)			
ER Zone	Outcome	Criteria	Performance Indicator
All ER zones	Negligible (ER1 zone), and Minor (ER2 and 3 zones) degradation to the biodiversity, habitats and ecological processes of importance to the health and productivity of the Planning Area.	Negligible (ER1 zone), and Minor (ER2 and 3 zones): Change in reef area.	 Area of reef.
		Impediment to recruitment function.	Recruitment of commercial species.
		Loss of faunal diversity.	Resident or temporary faunal diversity.
		Loss of macro algal abundance and diversity.	Macro algal abundance and diversity.
		Impediment to primary productivity.	Primary productivity of the dominant species.
		Degradation of macro algal demography.	Community and population structure and density of the dominant macro algal species.
		Change in local rock type.	Area of local rock type.

Variable: Mangrove Forest			
ER Zone	Outcome	Criteria	Performance Indicator
All ER Zones	Negligible (ER1 Zone), and Minor (ER2 and 3 Zones) impact to the biodiversity, habitats and ecological processes of importance to the health and productivity of the Planning Area.	Negligible (ER1 Zone), and Minor (ER2 and 3 Zones): Impact to demography of mangrove populations.	Population structure and density of Avicenna marina.
		Loss of faunal diversity (epifauna).	Epifauna diversity and abundance.
		Loss of faunal diversity (infauna).	Infauna diversity and abundance.
		Loss of faunal diversity (birds).	Bird diversity and abundance.
		Impediment to recruitment function.	Recruitment of commercial species.
		Loss of floral diversity (epiflora).	Epifloral diversity.
		Loss of floral diversity (micro-phyto-benthos).	Micro-phyto-benthos diversity.
		Impediment to primary productivity.	Carbon and nitrogen flux.

Variable: Saltmarsh			
ER Zone	Outcome	Criteria	Performance Indicator
All ER Zones	Negligible (ER1 Zone), and Minor (ER2 and 3 Zones) impact to the biodiversity, habitats and ecological processes of importance to the health and productivity of the Planning Area.	Negligible (ER1 Zone), and Minor (ER2 and 3 Zones): Reduction in area of saltmarsh communities.	Area of saltmarsh communities.
		Impact to demography of saltmarsh populations.	Community and population structure and density of the dominant species.
		Loss of faunal diversity.	Faunal diversity (eg fish, birds, epifauna and infauna).
		Impediment to recruitment function	Recruitment of commercial species.
		Loss of algal diversity	Micro-phyto-benthos diversity.
		Impediment to primary productivity.	Carbon and nitrogen flux.

Variable: Unvegetated Soft Sediment - Beaches			
ER Zone	Outcome	Criteria	Performance Indicator
All ER Zones.	Negligible (ER1 Zone), Minor (ER2 Zone) or Moderate (ER3 Zone) impact to the biodiversity, habitats and ecological processes of importance to the health and productivity of the Planning Area.	Negligible (ER1 Zone), Minor (ER2 Zone) or Moderate (ER3 Zone): Loss of faunal diversity (infauna).	Abundance and diversity of major polychaete worm species.
		Loss of faunal diversity (epifauna).	Epifauna diversity and abundance.
		Loss of faunal diversity (birds).	Bird diversity and abundance.
		Reduction in wrack deposits.	Volume of wrack deposits.
		Change in beach structure.	No performance indicator presently identified.
		Change in coastal stability.	No performance indicator presently identified.

Variable: Unvegetated Soft Sediment - Mudflats (Intertidal)			
ER Zone	Outcome	Criteria	Performance Indicator
All ER zones.	Negligible (ER1 Zone), Minor (ER2 Zone) or Moderate (ER3 Zone) degradation to the biodiversity, habitats and ecological processes of importance to the health and productivity of the Planning Area.	Negligible (ER1 Zone), Minor (ER2 Zone) or Moderate (ER3 Zone): Loss of faunal diversity (infauna).	Abundance and diversity of major polychaete worm species.
		Loss of faunal diversity (epifauna).	Epifauna diversity and abundance.
		Loss of faunal diversity (birds).	Bird diversity and abundance.
		Loss of algal diversity.	Macro and micro algae including *m*icro-phyto-benthos.
		Impediment to recruitment.	Recruitment of commercial species.
		Impediment to primary productivity.	Carbon and nitrogen flux and micro-phyto-benthos production.

Variable: Unvegetated Soft Sediment – Channels to Subtidal			
ER zone	Outcome	Criteria	Performance Indicator
All ER zones.	Negligible (ER1 Zone), Minor (ER2 Zone) or Moderate (ER3 Zone) degradation to the biodiversity, habitats and ecological processes of importance to the health and productivity of the Planning Area.	Negligible (ER1 Zone), Minor (ER2 Zone) or Moderate (ER3 Zone): Loss of faunal diversity (epifauna).	Epifauna diversity and abundance.
		Loss of faunal diversity (infauna).	Abundance and diversity of major polychaete worm species.
		Loss of floral diversity (epiflora).	Epiflora diversity, abundance.
		Impediment to recruitment.	Recruitment of commercial species.
		Impediment to primary productivity.	Carbon and nitrogen flux and micro-phyto-benthos production.

Variable: Seabirds and Shorebirds (resident and migratory)			
ER Zone	Outcome	Criteria	Performance Indicator
All ER zones	Negligible (ER1 Zone), Minor (ER2 Zone) or Moderate (ER3 Zone) degradation to the biodiversity, habitats and ecological processes of importance to the health and productivity of the Planning Area.	Negligible (ER1 Zone), Minor (ER2 Zone) or Moderate (ER3 Zone): Loss of breeding, feeding or roosting locations.	Number or relative importance of, breeding, feeding and roosting locations of shorebirds.
		Degradation in the demography of seabird and wading bird populations.	Seabird and shorebird population structure and abundance. *(Migratory species and/or species with a conservation status rating are to be monitored individually:)*
		Reduction in reproductive success.	Reproductive success of seabirds and shorebirds.
		Reduction in range.	Range of seabirds and shorebirds.

Variable: Spawning Habitats			
ER Zone	Outcome	Criteria	Performance Indicator
All ER zones	Negligible (ER1 zone), and Minor (ER2 and 3 zones) degradation to the biodiversity, habitats and ecological processes of importance to the health and productivity of the Planning Area.	Negligible (ER1 zone), and Minor (ER2 and 3 zones) reduction in spawning success of selected marine organisms.	Spawning success of Giant Cuttlefish, Snapper, Western King Prawn or King George Whiting at the defined locations.

Variable: Nursery Habitat			
ER Zone	Outcome	Criteria	Performance Indicator
All ER zones	Negligible (ER1 zone), and Minor (ER2 and 3 zones) degradation to the biodiversity, habitats and ecological processes of importance to the health and productivity of the Planning Area.	Negligible (ER1 zone), and Minor (ER2 and 3 zones) reduction in recruitment to nursery areas.	Recruitment of defined species to nursery areas.

Variable: Wetlands of National Importance (other coastal wetlands are covered in other habitat types)			
ER zone	Outcome	Criteria	Performance Indicator
All ER zones	Negligible (ER1 zone), and Minor (ER2 and 3 zones) degradation to the biodiversity, habitats and ecological processes of critical importance to the health and productivity of the Planning Area.	Negligible (ER1 zone), and Minor (ER2 and 3 zones): Reduction in area of Wetlands of National Importance.	Area extent of defined Wetland area.
		Degradation in inundation of wetlands.	Extent, frequency and level of inundation of wetland.
		Degradation in demography of endangered species.	Population structure and abundance of endangered species.

Variable: Endangered Marine Algae			
ER Zone	Outcome	Criteria	Performance Indicator
All ER zones	Negligible (All Zones) degradation to the biodiversity, habitats and ecological processes of critical importance to the health and productivity of the Planning Area.	Negligible (All Zones) reduction in the distribution and abundance of species of endangered marine algae.	Distribution and abundance of endangered marine algae (species by species).

Variable: Water Quality			
ER Zone	Outcome	Criteria	Performance Indicator
Will vary across ER zones.	Negligible (ER1 Zone), Minor (ER2 Zone) or Moderate (ER3 Zone) degradation to the biodiversity, habitats and ecological processes of importance to the health and productivity of the Planning Area.	Negligible (ER1 Zone), Minor (ER2 Zone) or Moderate (ER3 Zone): Change in nutrient levels, suspended solids or dissolved organic material.	Nitrogen TKN Ammonia Oxidised N Suspended solids Dissolved organic material Total P
		Change in light attenuation.	Turbidity.
		Change in phytoplankton biomass.	Chlorophyll a levels.
		Change in phytoplankton dynamics.	Phytoplankton species composition, distribution and abundance (algal bloom frequency).
		Change in physico-chemical parameters.	Dissolved oxygen, pH, temperature and salinity.

Variable: Sediment Quality			
ER Zone	Outcome	Criteria	Performance Indicator
Will vary across ER zones.	Negligible (ER1 Zone), Minor (ER2 Zone) or Moderate (ER3 Zone) degradation to the biodiversity, habitats and ecological processes of importance to the health and productivity of the Planning Area.	Negligible (ER1 Zone), Minor (ER2 Zone) or Moderate (ER3 Zone): Change in nutrient cycling in sediments.	Nitrogen TOC Phosphorus
		Change in productivity.	Carbon and nitrogen flux and micro-phyto-benthos production.
		Change in epifauna diversity, distribution and abundance (on *Pinna bicolour).*	Epifauna diversity, distribution and abundance on *Pinna bicolour.*
		Change in infauna diversity and abundance.	Abundance and diversity of major polychaete worm species.
		Change in particle size/distribution for fine sediments.	Particle size distribution.
		Increase in toxicants in sediments (heavy metals, herbicides, pesticides, petrochemicals, POPS, TBT and other antifoulants).	Levels of heavy metal levels, herbicides/pesticides, petrochemical contamination, persistent organic pollutants, organometals ie TBT and other antifoulants.