



Government
of South Australia

NATURAL RESOURCE MANAGEMENT

STATE AND CONDITION

REPORTING FRAMEWORK
SOUTH AUSTRALIA 2012

Version released for implementation trial



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How to reference this document

Government of South Australia (2012). *Natural Resource Management
State and Condition Reporting Framework SA 2012*, Adelaide



Commonly used acronyms

<i>DEWNR</i>	<i>Department of Environment, Water and Natural Resources</i>
<i>DPC</i>	<i>Department of the Premier and Cabinet</i>
<i>DPTI</i>	<i>Department of Planning, Transport and Infrastructure</i>
<i>EPA</i>	<i>Environment Protection Authority</i>
<i>NGO</i>	<i>Non-government Organisations</i>
<i>NRM</i>	<i>Natural Resource(s) Management</i>
<i>NRMB</i>	<i>Natural Resources Management Board</i>
<i>NRMC</i>	<i>Natural Resources Management Council</i>
<i>PIRSA</i>	<i>Primary Industries and Regions SA</i>

SECTION 1: EXECUTIVE SUMMARY

THE NRM STATE AND CONDITION REPORTING FRAMEWORK HAS THE POTENTIAL TO INFORM SEVERAL STAGES OF THE PLANNING AND EVALUATION CYCLE.

The Government of South Australia (SA) works in partnership with the community to manage the State's natural resources. One of the ways the Government of SA is improving the management of natural resources is through the development of an integrated Natural Resource Management (NRM) State and Condition Reporting Framework. The development of this framework was identified as a priority of the State NRM Plan (Government of SA 2012a).

Implementation of the NRM State and Condition Reporting Framework will provide regional and state-wide managers of natural resources with timely and accurate information on the status of natural resources to inform their planning, management and investment decisions. This will also inform managers about knowledge gaps that require consideration and ensure improvements to NRM reporting are institutionalised.

The NRM State and Condition Reporting Framework outlines a process to:

- define priority natural resources and develop indicators to measure their status and identify trends
- make better use of existing information on natural resources and build on existing programs
- develop new indicators and reporting methods that are required to address key knowledge gaps at regional and state-wide scales
- ensure that NRM reporting is underpinned by science and clearly articulates the basis for status assessments
- improve communication on the status of natural resources through the development of report cards
- adopt a scaled approach to NRM reporting which recognises that there are different requirements for reporting at the regional, state-wide and national scales
- align relevant NRM reporting to allow the same information to be used for multiple NRM reporting processes.

Implementation of the NRM State and Condition Reporting Framework will provide a common set of guidelines to allow indicators to be defined, and integrated where necessary, for social, economic and environment reporting. This will help decision making about management of natural resources and will bring the different levels of natural resource reporting to a similar standard.

In particular, this first trial version of the NRM State and Condition Reporting Framework focuses on how physical and biological natural resources can be measured and reported on. The framework also begins to define how social and economic pressures can be identified in relation to their impact on the status of natural resources. Further development of the NRM State and Condition Reporting Framework and its implementation will include development of more sophisticated social and economic indicators and greater understanding of their relationship with natural resources and their management.

The NRM State and Condition Reporting Framework has the potential to inform several stages of the planning and evaluation cycle.

SECTION 2: INTRODUCTION

The Government of South Australia (SA) works in partnership with the community to manage the State's natural resources. Under the *Natural Resources Management Act 2004*, the Minister for Sustainability, Environment and Conservation is required to keep the status of natural resources under review and to compile, maintain and update information in relation to the State's natural resources (see Box 1). Similarly, the Natural Resources Management (NRM) Council is required to audit, monitor and evaluate the status of natural resources across the State and to keep under review the extent to which regional NRM plans are consistent with the State NRM Plan. The NRM Council is also responsible for developing the State NRM Plan, which provides guidance for monitoring and reporting on natural resources, and for ensuring that natural resource management issues are considered when reports on the state of the environment are being prepared at State level. The regional NRM Boards are required to report on the status of natural resources in their region and to provide advice to the NRM Council and the Minister on any matter relating to the status of natural resources (see Box 1).

The State NRM Plan identified ten priorities for strengthening the NRM management system. One of these priorities was to develop an integrated NRM State and Condition Reporting Framework (referred to in this report as the framework) to improve the understanding of the status of natural

resources (Priority 7, Government of SA 2012a). The framework will operate in tandem with the NRM Standard (Priority 6) to improve the way natural resources are managed. The framework will support the effective achievement of the Guiding Targets, which are defined in the State NRM Plan. The framework allows for regional differences and encourages innovation that is best suited to each region's circumstances.

The purpose of this document is to outline the framework, including the key elements, the interface with NRM planning and project and program planning, how existing information will be used and, where there are information gaps, how new indicators and reports will be developed.

Implementation of the framework will provide a common set of guidelines to guide how indicators are to be defined, and integrated where necessary, for social, economic and environment reporting. In particular, this first version of the framework focuses on how physical and biological natural resources can be measured and reported on. The framework also begins to define how social and economic pressures can be identified in relation to their impact on the status of natural resources. Further development of the framework and its implementation will include development of more sophisticated social and economic indicators and greater understanding of their relationship with natural resources and their management.

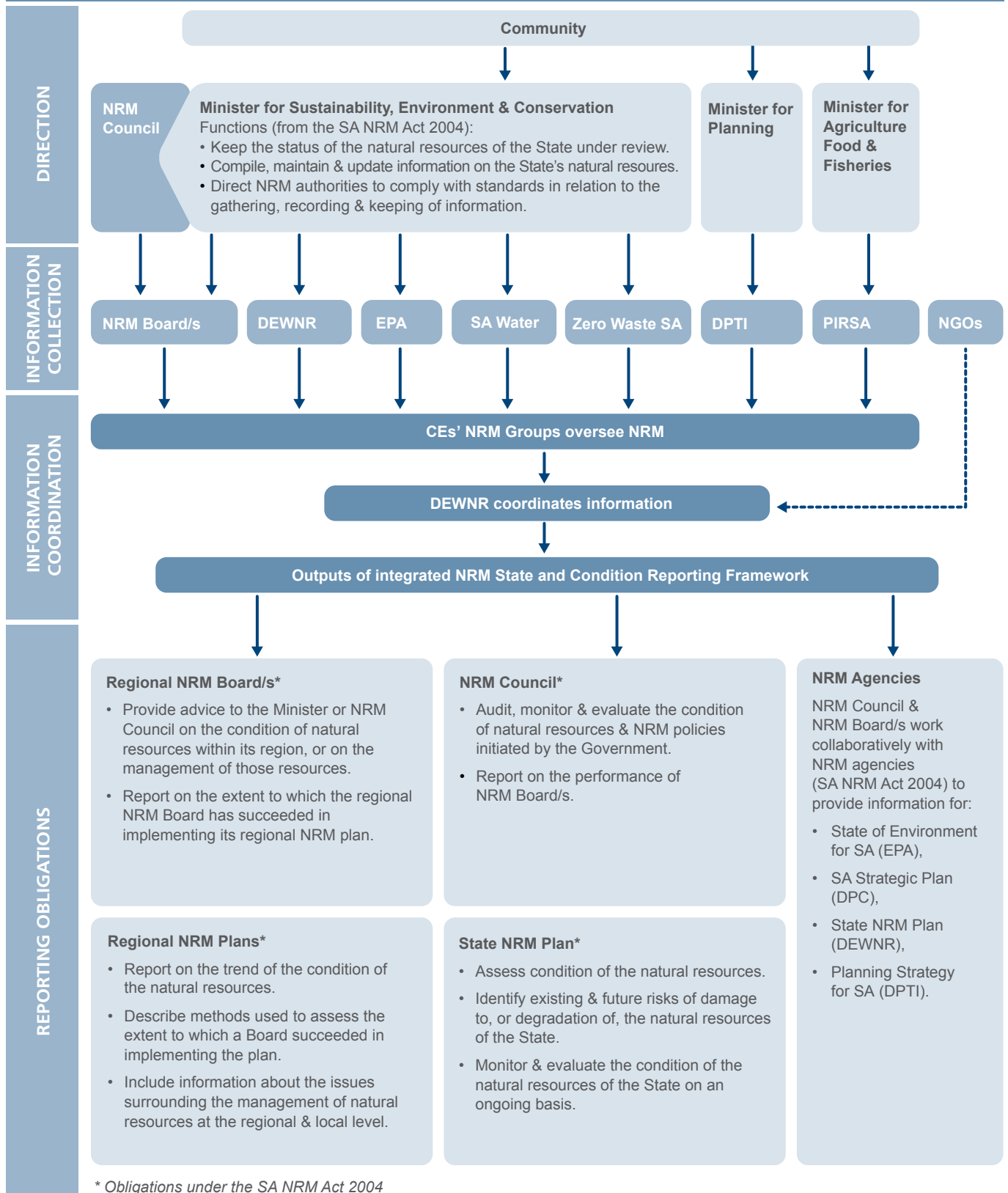
Implementation of the framework will build on existing monitoring programs and develop new programs in line with management priorities. It will also provide natural resource managers with the ability to integrate information to inform decisions on how to manage natural resources. The framework will assist this broader NRM reporting and evaluation by:

- bringing the different types of reporting to a similar level of consistency
- addressing gaps in the available information
- ensuring improvements to NRM reporting are institutionalised (see Box 1).

Reporting on natural resources and trends in their status is required at regional, state-wide and national scales. This guides priorities for investment and/or management, assists in the identification of future risks to natural resources, and contributes to the review of how effective management actions and investments have been. It also allows gaps in knowledge to be identified. Importantly, this reporting provides the government and community with the same information on the status of natural resources and allows informed discussion and decisions about priorities to occur.

Throughout this document, case studies are included in boxes to clarify aspects of the framework.

BOX 1: STRUCTURE FOR THE FLOW OF NRM INFORMATION IN SA



SECTION 3: **OBJECTIVES AND PRINCIPLES OF THE FRAMEWORK**

NRM COUNCIL, NRM BOARDS AND NRM AGENCIES WORK TOGETHER TO ENSURE THE PROCESSES FOR NRM REPORTING ARE PRACTICAL AND EFFICIENT

3.1 OBJECTIVES

Implementation of the framework will provide regional and state-wide managers of natural resources with timely information on the status of natural resources. This will be used to identify trends in the status of resources and help inform planning, management and investment decisions. The framework will also alert managers to knowledge gaps that require consideration.

3.2 PRINCIPLES

The following principles underpin the framework. These principles have been adapted from the draft Environmental Reporting Framework for SA (Government of SA 2006) and apply to regional and state-wide NRM reporting, both now and in the future.

- 1 NRM Council, NRM Boards and NRM agencies* work together to ensure the processes for NRM reporting are practical and efficient which leads to:
 - reporting by regional NRM Boards, NRM Council and state-wide NRM agencies that is as accurate and relevant as possible
 - best possible use of existing information to determine trends in the status of natural resources
 - least possible duplication of information and effort to produce regional and state-wide NRM reports
 - least possible duplication of requests to and by Government agencies for information on the status of natural resources
 - development of processes to manage, coordinate and make accessible information to meet the needs of the NRM agencies, NRM Council and NRM Boards.
- 2 Consideration is given to both the approach and the information requirements of the framework when regional and state-wide NRM strategies, plans and legislation are reviewed or developed.

* Department of Environment, Water and Natural Resources.
Department of Planning, Transport and Infrastructure.
Department of Premier and Cabinet.
Department of Primary Industries and Regions of SA.
Environment Protection Authority.
Zero Waste SA.

SECTION 4: **NRM STATE AND CONDITION REPORTING FRAMEWORK**

THE FRAMEWORK WILL GUIDE THE DEVELOPMENT OF NEW INDICATORS AND A COMMON REPORTING METHOD

4.1 KEY ELEMENTS

Implementation of the framework will facilitate NRM reporting for priority natural resources at state-wide and regional scales. A series of integrated reports will be prepared annually for priority resources, with a focus on reporting on trends of the status of natural resources and contextual information that assists in understanding the status of natural resources. These reports will be underpinned by conceptual models that identify and justify the indicators that are to be measured.

The framework will guide the development of new indicators and a common reporting method to meet the needs of state-wide and regional NRM reporting, and the development of new monitoring programs where information is lacking.

Reports will be based on the best available scientific information. The science base for reports will be clearly described and documented, and highlight the relative reliability of the information to indicate the level of confidence that users can place in the information. Where information is not available for a priority resource, other processes, such as expert advice, will be investigated to inform reports.

At the state-wide scale, NRM reporting will be undertaken for priority resources in a way that is informed by, and supports, reporting by regional NRM Boards. Methods will be developed to aggregate reporting and align reporting of information for multiple purposes.

Implementing the framework will build on existing monitoring programs and NRM reporting and facilitate the development of new monitoring programs where required.

In summary, the NRM State and Condition Reporting Framework outlines a process to:

- define priority natural resources and develop indicators to measure their status and identify trends
- make better use of existing information on natural resources and build on existing programs
- develop new indicators and reporting methods that are required to address key knowledge gaps at regional and state-wide scales
- ensure that NRM reporting is underpinned by science and clearly articulates the basis for status assessments
- improve communication on the status of natural resources through the development of report cards
- adopt a scaled approach to NRM reporting which recognises that there are different requirements for reporting at the regional, state-wide and national scales
- align relevant NRM reporting to allow the same information to be used for multiple NRM reporting processes.

4.2 RELATIONSHIP TO THE STATE NRM PLAN

To determine the NRM priorities, the State NRM Plan included an assessment of the status of natural resources and community capacity in each region. These and other assessments are being used to inform target setting at regional and state-wide scales and to determine on-ground actions and evaluate the effectiveness of NRM.

The State NRM Plan outlines an NRM planning cycle, which is shown in Figure 1. Natural resource managers use this planning cycle to continually improve on-ground actions to get the best outcomes for natural resources. Several phases of the planning cycle can be informed by reports on the status of natural resources.

The actions undertaken in the stages of the planning cycle will be influenced by the framework in the following ways:

- **Assess status:** The framework requires the development of report cards that assess the status of natural resources.
- **State-level and regional specific resource targets:** The framework provides information regarding the status of natural resources to inform targets.
- **Monitor and measure:** The framework provides guidance to programs that monitor and measure the status of natural resources. Other monitoring and project reporting will be required to assess the performance and effectiveness, efficiency, impact and appropriateness of NRM activities.
- **Plan, invest, on-ground action:** The framework provides one of the inputs to investment plans, priorities and decisions. In particular, the conceptual models that describe pressures and expected responses will assist in understanding anticipated outcomes from particular management activities or interventions.

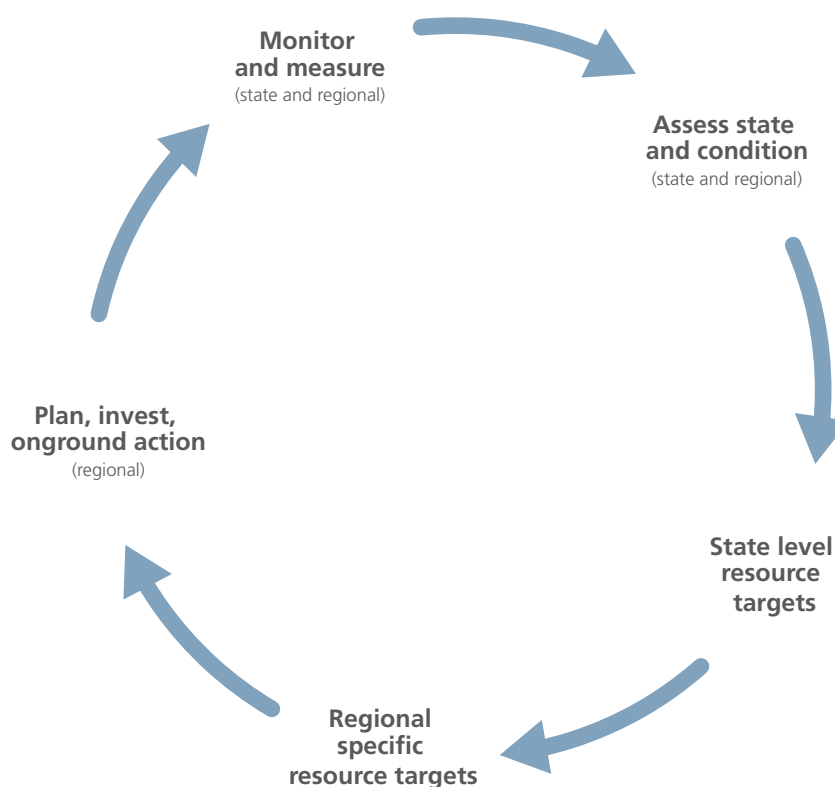


Figure 1. The planning cycle which natural resource managers use to continually improve on-ground actions to get the best outcomes for natural resources. Several phases of the planning cycle can be informed by reports on the status of natural resources.

4.3 RELATIONSHIP TO THE PROJECT AND PROGRAM PLANNING CYCLE

The framework provides an approach to measuring the status of natural resources at regional and state-wide scales. This is termed *asset monitoring* in the national monitoring framework (Commonwealth of Australia 2009). The NRM State and Condition Reporting Framework does not provide methods to meet the monitoring requirements of period-defined projects. This distinction is depicted in Figure 2, which shows how the project and program planning cycle uses project reports in conjunction with reports on the status of natural resources to set priorities, evaluate performance and inform management. The project and program planning cycle aims to continually improve NRM projects by evaluating their success relative to their objectives and is often defined by specific management objectives. Such projects may include pest control, revegetation and community engagement activities.

The framework integrates social and economic information with information on the status of the priority natural resources at local, regional and state-wide scales. The project and program planning cycle reports on the activities of projects relative to the desired outcomes. The framework does not replace the need for project-or program-specific monitoring projects and the associated reporting to guide management.

Both the framework and the project and program planning cycle are continuous cycles, which are based on management objectives for priority natural resources and use regular reports to guide management. The project and program planning cycle and the framework link when the framework informs management by providing information on whether pressures and management changed the status of natural resources (refer to case study 1 in Box 2, and section 4.2).

By tracking changes in the status of natural resources and identifying potential causes of change, the framework has the potential to influence investment priorities. The project and program planning cycle and the framework also link when project activities and the status of specific natural resources are reported. This contributes to reporting on the status of resources at a broader level (refer to case study 2 in Box 2).

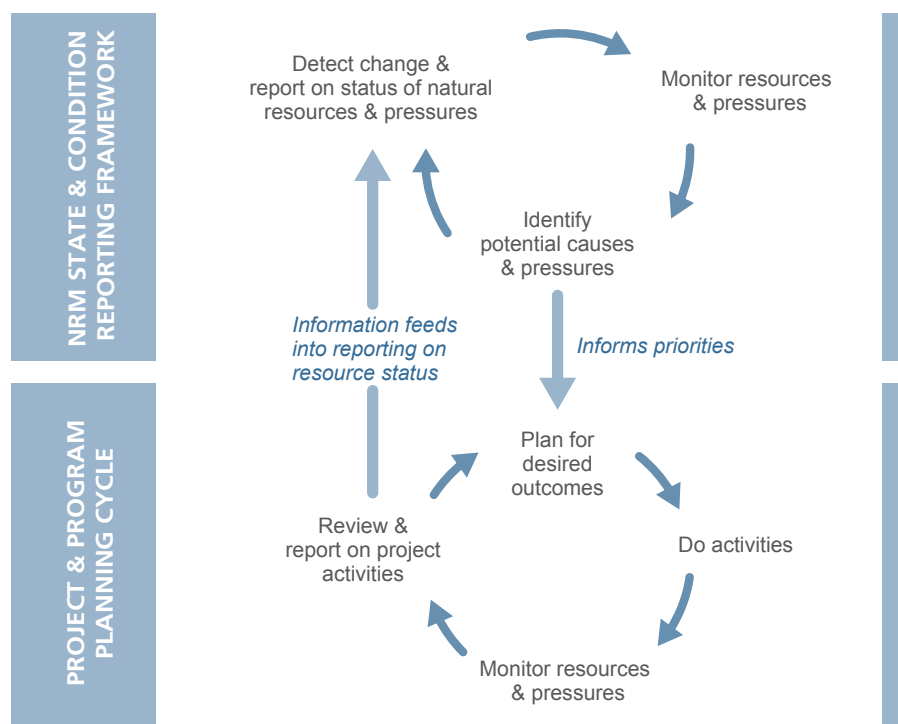


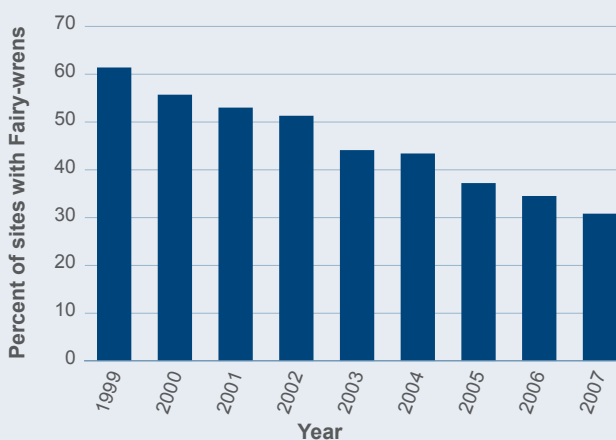
Figure 2. The relationship between the framework and the project and program planning cycle.

BOX 2: CASE STUDIES SHOWING THE RELATIONSHIP BETWEEN THE FRAMEWORK AND THE PROJECT AND PROGRAM PLANNING CYCLE

Case study 1

Monitoring the status of natural resources informs regional priorities

Woodland-dependent birds are iconic species in the Mount Lofty Ranges. Researchers and community members have monitored these birds since 1999, detecting and reporting population declines in some birds, such as superb fairy wrens (graph below, Szabo et al. 2011).



Up to 90% of woodlands in the Mount Lofty Ranges have been cleared, modified or fragmented since 1950 (Westphal et al. 2003). These changes have been identified as the potential cause of the bird population declines.

This monitoring informed the regional priorities, which led to a project to test whether habitat restoration would improve the status of woodland-dependent birds. The project plan included research into different activities to restore the woodland landscape.

Monitoring the status of birds and their habitat will be used to assess the effectiveness of these activities. Monitoring information will feed into the NRM Reporting Framework by providing information on the status of bird populations and their habitats. The outputs from this process will be used for regional planning and reporting and for state-level reporting.

Case study 2

Information from project reporting is used to report on the status of natural resources

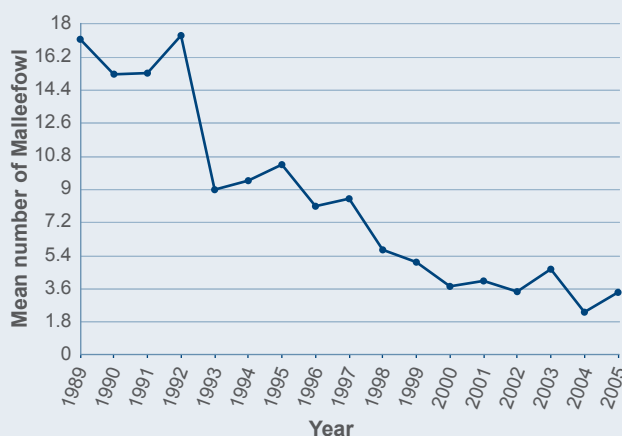
Malleefowl are iconic ground-dwelling birds from southern Australia and they are threatened.

There are numerous projects that monitor the number of Malleefowl mounds as an indicator of population status. The graph below shows Malleefowl population declines across SA.

Individual projects have different plans for desired outcomes. In Gluepot Reserve, a project monitored predators visiting Malleefowl mounds. The activities included setting up motion sensor cameras at Malleefowl mounds, as well as counting mounds.

Monitoring data is then fed into the NRM Reporting Framework process to report on changes in the status of Malleefowl and the pressures on their populations across SA.

Mean number of Malleefowl breeding at monitoring sites in SA



4.4 USING EXISTING INFORMATION

In South Australia there is already effective reporting on the status of some natural resources, particularly for those of State significance. For example, the Environment Protection Authority (EPA) regularly reports on the status of aquatic ecosystems across the State, using measures of animal and plant life and water chemistry. DEWNR monitors, investigates and prepares reports on water resources across the State (Government of SA 2009). To measure the status of commercial and recreational fisheries, the Department of Primary Industries and Regions of SA (PIRSA) measures the effort and catches of commercial fishers and measures the stocks of some commercially harvested species (e.g. Knight & Tsoles 2012). DEWNR also monitors and reports on trends in the status of soil in the agricultural areas of South Australia (refer to Box 3).

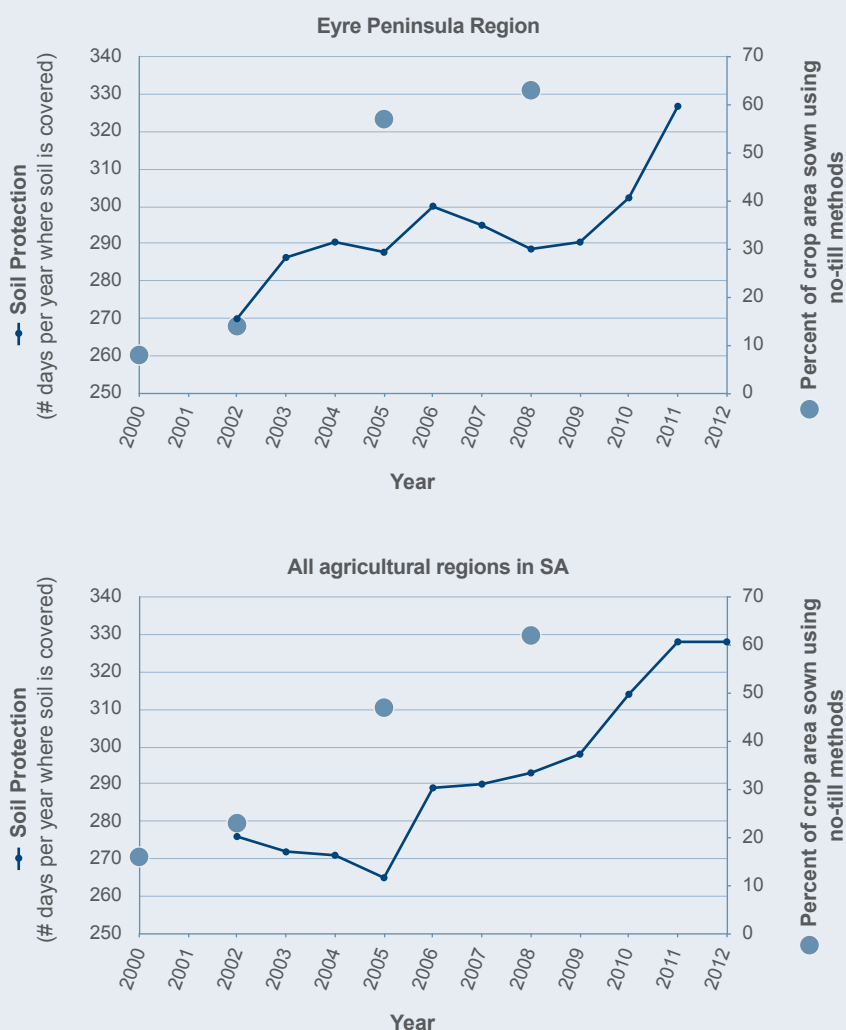
The framework allows for existing indicators and information to be adapted for NRM reporting. In most cases, indicators will continue to be measured in the same way and the reporting mechanism is all that will change.

BOX 3: SOIL EROSION RISK AT STATE-WIDE AND REGIONAL SCALES

Erosion of soil is a natural process, but it has been intensified by vegetation clearance and agriculture. Preventing soil erosion is a priority for managing soil in South Australia (Government of SA 2012b).

About 6 million hectares (58%) of agricultural land is susceptible to wind erosion and 3 million hectares (31%) is susceptible to water erosion. Loss of topsoil is mostly attributed to cropping practices such as tillage and stubble burning.

The graphs below show the increasing number of days per year when soil is covered and therefore protected from erosion. This information is shown for a region (top graph) and for the State (bottom graph) (data from Forward 2008). Through education, more land managers now use no-till methods to sow. This involves sowing seeds in a narrow slot in the soil to minimise soil disturbance and maximise protection. The adoption of these practices has improved the protection of soil. The graphs show that the increased adoption of no-till methods corresponds to increased soil protection (Forward 2008).



4.5 THE SIX-STEP PROCESS FOR DEVELOPING NEW INDICATORS AND A COMMON REPORTING METHOD

Where current reporting is not meeting the needs of NRM managers, the framework outlines a process for developing an effective monitoring program to support NRM reporting (see Box 4). This process is adapted from the *Accounting for Nature* model, which has been developed by the Wentworth Group of Concerned Scientists (Wentworth Group of Concerned Scientists 2008) (see Box 5).

The process follows six steps:

- Step 1** Prioritise natural resources that need to be managed and monitored.
- Step 2** For each of these resources, an understanding of the way it functions is communicated in a conceptual diagram.
- Step 3** The conceptual diagram guides the choice of indicators to be monitored.
- Step 4** To allow measurements of different indicators from different natural resources to be compared, reference benchmarks for each indicator are set.
- Step 5** The current status of the natural resource is then measured against the benchmark.
- Step 6** Finally, the results are communicated using report cards.

This process highlights the importance of sampling design, information quality and linking information to the needs of resource managers. A conceptual approach to aggregate information is outlined in Appendix 2. Information is coordinated and formatted so information is available at the appropriate scale (e.g. site, regional or state-wide).

It is important to note that, while not all indicators will be developed by following all of these steps, the final step of developing report cards, will always be required for guiding and reporting against regional and State NRM plans.

4.5.1 Prioritise natural resources (Step 1)

Investments in the monitoring of different natural resources need to be prioritised based on ecological, social, cultural and economic values. Priorities will be identified according to State NRM Plan priorities, regional NRM priorities, targets and other community and political priorities. These natural resources are then also prioritised for management, to prevent them from degrading. There are a number of research tools and different NRM plans that are used to prioritise natural resources for management and monitoring. Where there is not enough information to prioritise natural resources, a risk-based approach and/or targeted research can assist to prioritise natural resources for management, monitoring and reporting.

4.5.2 Create a conceptual diagram (Step 2)

To highlight the links between social, economic and environmental priorities, conceptual diagrams (see Box 4) are developed to describe the processes that affect natural resources. Conceptual diagrams can be developed for a natural resource at any spatial scale, from a single resource, a landscape, an entire NRM region or state-wide. Conceptual diagrams must have clearly defined spatial or ecological boundaries and show the pathways between the important components of biodiversity (e.g. natural resources and communities), processes (e.g. energy flows) and stressors (e.g. human and natural disturbance). It is these pathways that help identify indicators that are specific to the natural resource and to the objective. The conceptual diagrams will be supported by published information where possible, and regularly reviewed and updated when new information becomes available.

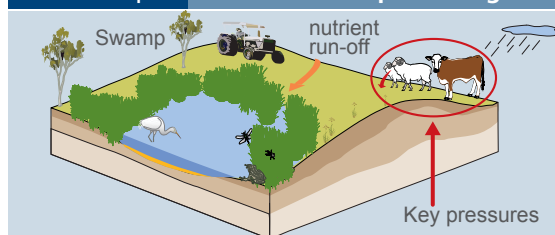
BOX 4: DEVELOPING INDICATORS AND REPORT CARDS

Step 1 Prioritise natural resources



NRM managers prioritise natural resources that define their regions and are important for their region to function. The status of these priority resources must be measured and monitored to inform management of investment and decisions. Priorities may be any natural resource at any scale, such as a single swamp (see left) or all wetlands in a region. Numerous research tools are available to prioritise natural resources for management.

Step 2 Create a conceptual diagram



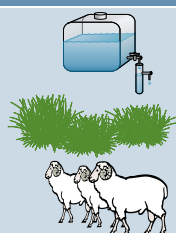
A conceptual diagram is developed to incorporate the components that define and drive change in each priority natural resource. In this conceptual diagram, the natural resources are the swamp and the native vegetation. The pressures (nutrient input and grazing by stock) are represented by orange and red arrows.

Step 3 Choose indicators & measures

Resource Status
Water quality & volume

Resource Status
Vegetation status

Pressure
Herbivore stock rate



Indicators are tailored to reflect the pressures and the status of the natural resources. For example (left), turbidity and depth are indicators of water quality/volume. Similarly, riparian width, weeds, and diversity and health of trees and understorey are indicators of vegetation status. Stocking rate is an indicator of grazing pressure on native vegetation (i.e. higher stocking rates are likely to have greater impacts on the status of native vegetation when compared with lower stocking rates).

Step 4 Define reference benchmark for indicators of resource status

Resource Status
Benchmark water quality & volume:

Turbidity = 2NTU
Depth = 1.5m

Resource Status
Benchmark vegetation status:

Diversity = 21spp

For natural resources, reference benchmark values are benchmarks against which the current status values are compared, to create the indices of current status. In the example (left) it is defined to represent: best-on-offer water quality and quantity and best diversity of vegetation.

Step 5 Calculate indices of current status for indicators of resource status

Resource Status
Water quality & volume



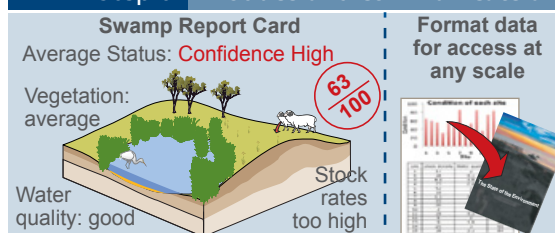
Resource Status
Vegetation status



For natural resources, indicator values are measured and standardised using a simple formula, which makes each index of current status a value out of 100.

$$\text{Index of current status} = \frac{\text{Current status value}}{\text{Reference benchmark value}} \times 100$$

Step 6 Produce and communicate annual report cards



Report cards are used to communicate results (e.g. the stocking rates required to maintain native vegetation in a desired condition). Measures of confidence in the indices are included. Information at the finest appropriate scale (e.g. site level or region or State) will be available for use in NRM related reporting. Report cards will be produced annually.

4.5.3 Choose indicators and measures (Step 3)

As part of the implementation of the framework, a list of indicators to be measured for NRM reporting will be developed. These will be defined at the regional or state-wide scales. Individual regions may define different indicators depending on their priorities. This is because different regions have different blends of natural resources, management priorities and funding. It follows that these will attract different levels of management attention and require monitoring of different indicators. Priority natural resources will therefore be relevant to each region and will be drawn initially from regional NRM plans, state-wide plans and priorities, and the findings of targeted research.

The State NRM Plan's Guiding Targets, high level indicators and representative measures (Table 3 in the plan) will be translated into regionally relevant targets, indicators and measures in regional plans. The process outlined in the framework will guide the development of targets, indicators and measures for regional priorities and monitoring needs, while allowing for consistent regional and state-wide reporting.

Indicators are defined as measurable quantities related to a variable of interest for a particular natural resource. The choice of indicators and measures considers existing monitoring projects, appropriate spatial and temporal scales, objectives of management plans and stakeholders' input. Measures must be feasible in terms of sampling logistics, project costs, training required and commitment to ongoing monitoring. The information gained from an indicator must be weighed up against the costs of collecting the information relevant to it. The process does not specify whether an indicator is simple or complex in its definition nor how costly it will be to measure. Finally, indicators must be informative (in terms of their purpose), sensitive to changes in status or abundance of the natural resource of interest, practical to assess, meaningful (for their purpose) and able to be clearly linked to management activities.

As part of the implementation of the framework, a central library of information will be developed to include the types of indicators used, the types of information they draw upon, any limitations in their use and the conceptual diagrams used to define them. Potentially, this will enable information to be shared across monitoring programs, assist in rationalising the design of sampling programs, and provide a centralised location where information can be accessed to help design and underpin monitoring programs.

4.5.4 Define reference benchmarks for indicators (Step 4)

The framework adopts the methods of *Accounting for Nature* to aggregate information by calculating indices (common measures) to summarise changes in the status of natural resources. Indices are calculated to determine the amount of change from a benchmark value (see Box 4). In *Accounting for Nature*, the benchmark value is termed the "reference condition", which is estimated to reflect the pre-European status of each natural resource (see Box 5). The framework has established a broader definition by using values that describe either the best-on-offer status, the sustainable status or the pre-European status. The reference benchmark value will never be the target, but rather a value expressed as an index of current status, as outlined in section 4.5.5.

Benchmark values can be updated if new information becomes available. If they are updated, all status indices need to be recalculated using the new benchmark values, so that indices can be compared through time.

4.5.5 Calculate indices of current status for indicators (Step 5)

The indices of current status are calculated using this equation:

$$\text{Index of current status} = \frac{\text{Current status value}}{\text{Reference benchmark value}} \times 100$$

Because the reference benchmark values are consistent through time, all indices of current status will be between 0 and 100. An index close to 100 means the natural resource is close to the benchmark status, whereas an index close to 0 implies the resource is a long way from its benchmark status.

BOX 5: ACCOUNTING FOR NATURE

The approach that the NRM Reporting Framework has adopted is the *Accounting for Nature* model, which has been developed by the Wentworth Group of Concerned Scientists (Wentworth Group of Concerned Scientists 2008). *Accounting for Nature* takes a functional, efficient and pragmatic approach to gathering and synthesising scientific information on resource status. The objective is for regional, state-wide and national managers of natural resources to have better information to make informed decisions on the management of natural resources.

Accounting for Nature provides a method for integrating scientific information. *Accounting for Nature* is gaining widespread acceptance among regional, state-wide and national NRM agencies in Australia, and by the Australian Bureau of Statistics and the United Nations.

Accounting for Nature was tailored to suit the regionally-based management system for natural resources in Australia. This was necessary because different regions have different natural resources and specific pressures that need to be managed (Cosier & McDonald 2010). As a consequence, indicators of the status of ecological communities and the intensity of monitoring need to vary from region to region.

More than 20 experts from academic and policy backgrounds are supporting the Wentworth Group with the implementation of *Accounting for Nature*.

Central to the *Accounting for Nature* model is the use of a common, non-monetary, unit of measure of the status of any natural resource, using any appropriate indicator, at any scale - enabling apples to be compared with oranges.

Accounting for Nature relies on the creation of a common unit of measurement to describe the status of any natural resource, including indicators of ecological community health, at any location, at any scale. By using a common unit of measurement, which places diverse scientific information into an accounting framework, *Accounting for Nature* links the status of natural resources to social and economic decision making.

Creating a common unit of measurement for the status of natural resources addresses a number of challenges:

- No two natural resources are the same (e.g. rivers, bushland patches or coastlines).
- Different indicators are often used to measure the same natural resource in different locations.
- The cost of monitoring creates variation in the quality and frequency of information produced.
- Single indicators cannot provide a complete picture of the health of any ecological community.

Accounting for Nature uses the science of “reference condition benchmarking” to measure the status of natural resources. A reference condition benchmark performs the function of allowing different landscapes to be measured with indicators that are tailored to a particular location. An index of current status is created by comparing the current status value for a natural resource to the reference condition benchmark. The index of current status is then a number between 0 and 100, where 100 is the reference condition of a natural resource and 0 means the resource is relatively degraded.

The reference benchmark can either be a direct measure of an indicator at a site that is not degraded, or it can use scientific modelling to estimate the condition, or it can be an estimate at fixed point in time (for example, an estimate prior to industrial development).

Because the index of current status for each natural resource is between 0 and 100, different indices can be averaged across NRM regions, habitats or taxonomic groups. In this way, the reference condition facilitates the aggregation and disaggregation of indices that are derived from different measurement units.

Using this method, different indicators, which are measured in different units, can be averaged across spatial scales and ecological units (see Box 6 and Appendix 2).

This avoids having to use the same set of indicators in different landscapes, which is often not practical. It also allows the adoption of a method that society is familiar with, whereby common units of measurement are based on monetary values or benchmarks (e.g. Gross Domestic Product and Consumer Price Index).

For example, the area of habitat can be a surrogate for biodiversity. One generic indicator of the status of a terrestrial ecological community is the extent of native vegetation cover. The change in percentage of native vegetation can be directly related to a change in biodiversity. If there has been a decline in native vegetation in a region by 72% against a reference condition, the index of current status would be 28.

The use of a reference condition does not imply that natural resources should be returned to the reference condition.

This approach is simply used to standardise information so it can be aggregated. A conceptual approach to aggregate information is outlined in Appendix 2.

4.5.6 Produce and communicate annual report cards (Step 6)

The framework will produce annual updates using available information, but not all information will be updated each year. Monitoring programs need to be relevant to the rate of change expected in each natural resource. Some information might be updated only every two, five or ten years, which would be apparent in the graphs that track change across time.

The report cards will make use of simple graphs and maps as the principal tools to display information (e.g. see Boxes 6 and 7). Where the information is available, it will be presented at different spatial scales. For example, Box 6 shows the relative status of different vegetation communities on Eyre Peninsula at several scales: individual sites, different vegetation communities and all vegetation for several regions.

At each scale, the horizontal axis shows the relative extent of coverage in the landscape (i.e. hectares), which is used to weight the status scores of the different vegetation communities (Box 6). This approach allows for annual updates, with an expectation that explanatory text is minimised in report cards. This reduces the duplication of information and allows greater alignment of information between reports.

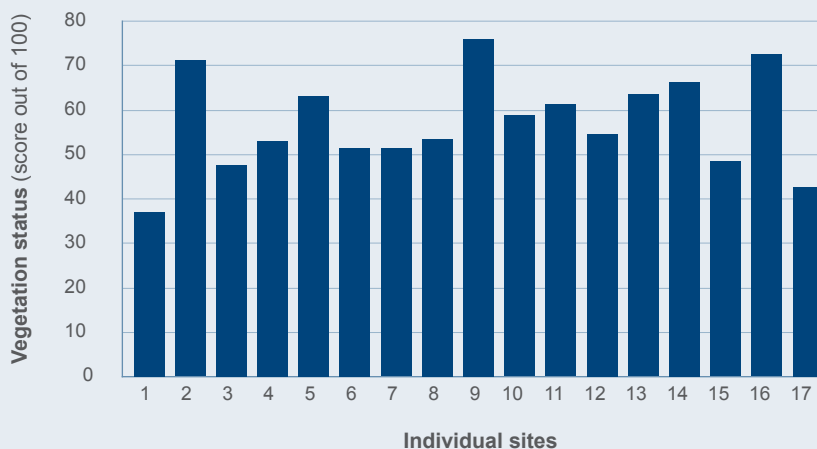
Indices of current status will be calculated and reported only for natural resources. The indicators that summarise pressures and social and economic factors will be included as contextual information, but will not be scored.

4.6 PROVIDING CONFIDENCE IN THE INDICATORS THAT ARE USED

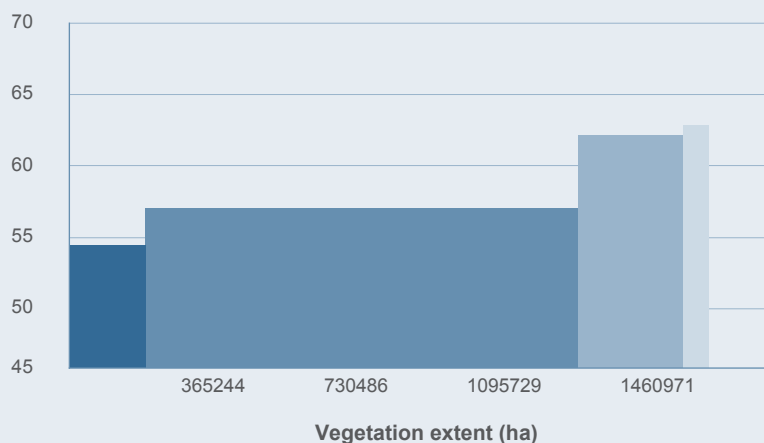
For the framework to be useful and accepted by the community and resource managers, all stakeholders must have confidence that the selected indicators and the resulting status assessments reflect the status of the natural resources. The framework will provide measures of reliability for each index of current status. Quantifying measures of reliability relies on assessment and scoring of the sampling methods used. A measure of reliability describes the level of confidence that users should place in the information.

To increase confidence in the framework outputs (including indicators, sampling design and information), a process to provide objective expert oversight will be developed in agreement with State NRM agencies.

BOX 6: NATIVE VEGETATION EXAMPLE

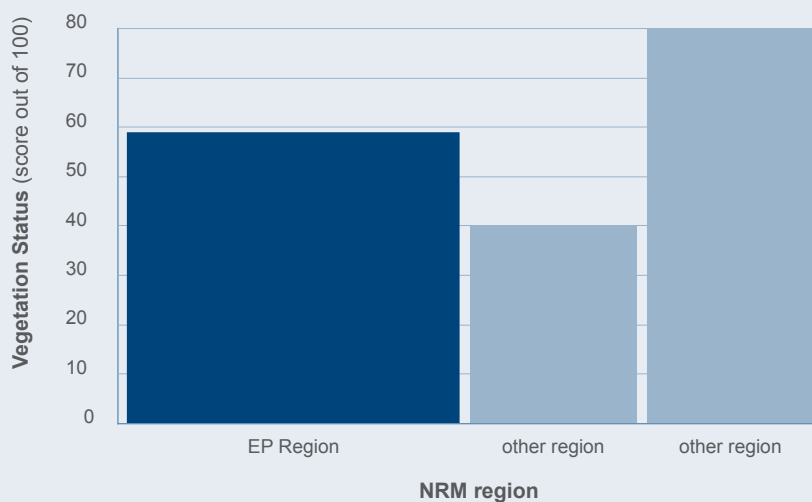


The status of individual natural resources (patches of mallee on Eyre Peninsula) can be displayed in a simple histogram.



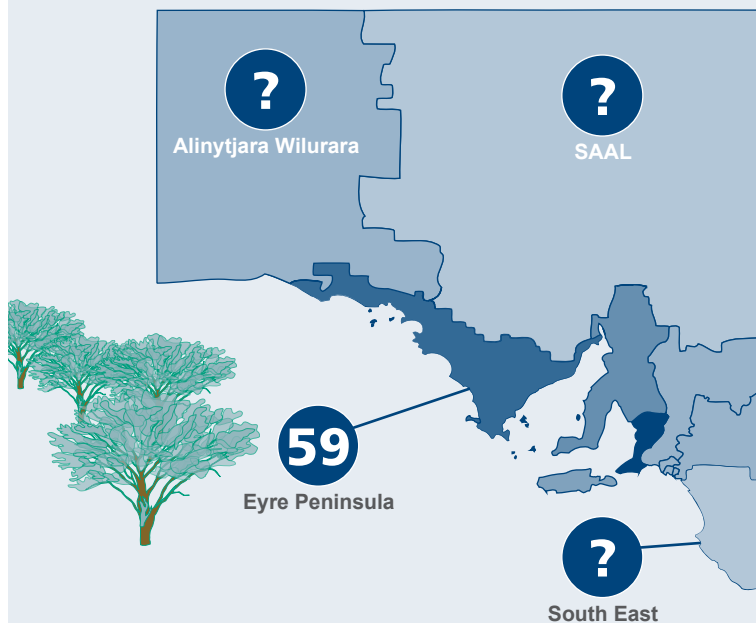
The above information can be aggregated alongside status scores for other mallee communities across Eyre Peninsula. This graph shows that the mallee heath and shrublands community has the largest extent, but a lower status score than two of the other mallee communities.

- Mallee with tussock grass understorey
- Mallee with hummock grass
- Mallee heath & shrublands
- Mallee with an open shrubby understorey



The status scores of all vegetation communities in a region can be aggregated to a single score for native vegetation in each region. This information is appropriate for resource managers at the state-wide scale.

BOX 7: EXAMPLE OF PILOT REPORT CARDS

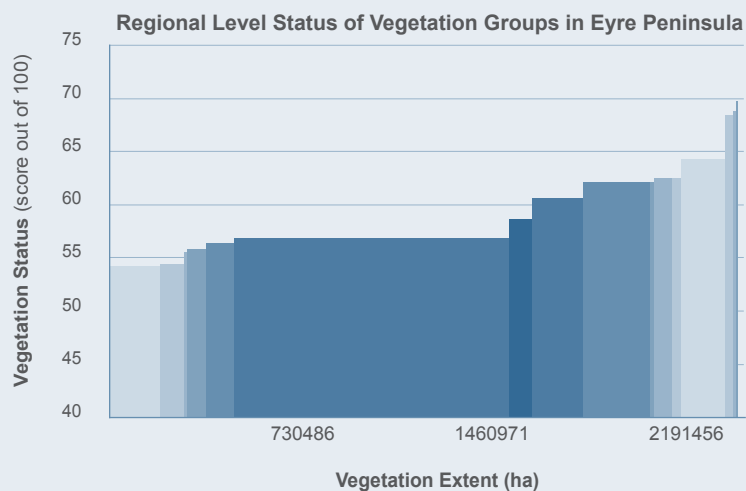
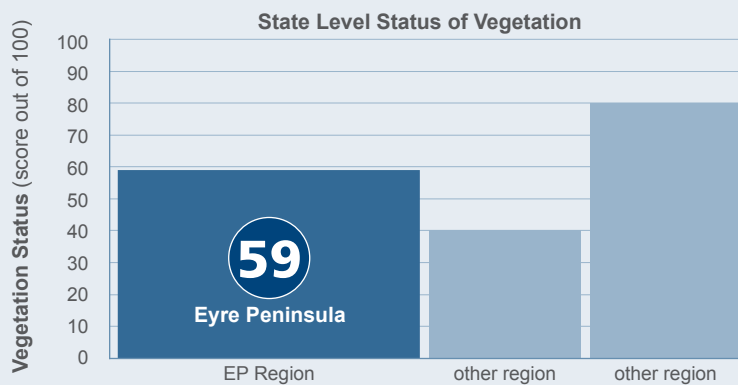


NATIVE VEGETATION

The status of native vegetation varies between NRM regions.

On ground surveys in 2012 provided baseline information for all vegetation subgroups across Eyre Peninsula. The systems with the largest extents were mallee systems. The status of the largest system (mallee heath & shrublands) was 57 out of 100.

Data source: DEWNR



SECTION 5: **IMPLEMENTATION OF THE FRAMEWORK**

THE IMPLEMENTATION PLAN WILL OUTLINE HOW NRM AGENCIES WILL MANAGE AND COORDINATE INFORMATION FOR THE FRAMEWORK.

The framework will be implemented in partnership with NRM Boards and NRM agencies.

To guide the implementation, a plan will be developed in consultation with partner agencies and organisations.

Initial activity is expected to focus in the following areas:

- 1 Communicating the purpose and approach of the framework to NRM Boards, and staff from NRM regions and other NRM agencies.
- 2 Establishing priority natural resources for state-wide and regional reporting and compiling pilot reports on the status of these resources.
- 3 Ensuring social and economic information is incorporated.
- 4 Consulting with key NRM managers, including regional staff and staff from other NRM agencies, to establish the scope of pilot reports and the technical approach to reporting.
- 5 Providing technical support for regional NRM staff and staff from other NRM agencies to establish NRM reporting under the framework.

6 Establishing a process for managing and coordinating information for the framework.

7 Identifying opportunities for improving the alignment of NRM reporting.

8 Establishing a schedule for NRM reporting in the longer term.

9 Establishing partnership arrangements for NRM reporting.

As indicated above, the implementation plan will outline how NRM agencies will manage and coordinate information for the framework. This will involve the use and further development of existing corporate information systems to meet the reporting requirements of the framework.

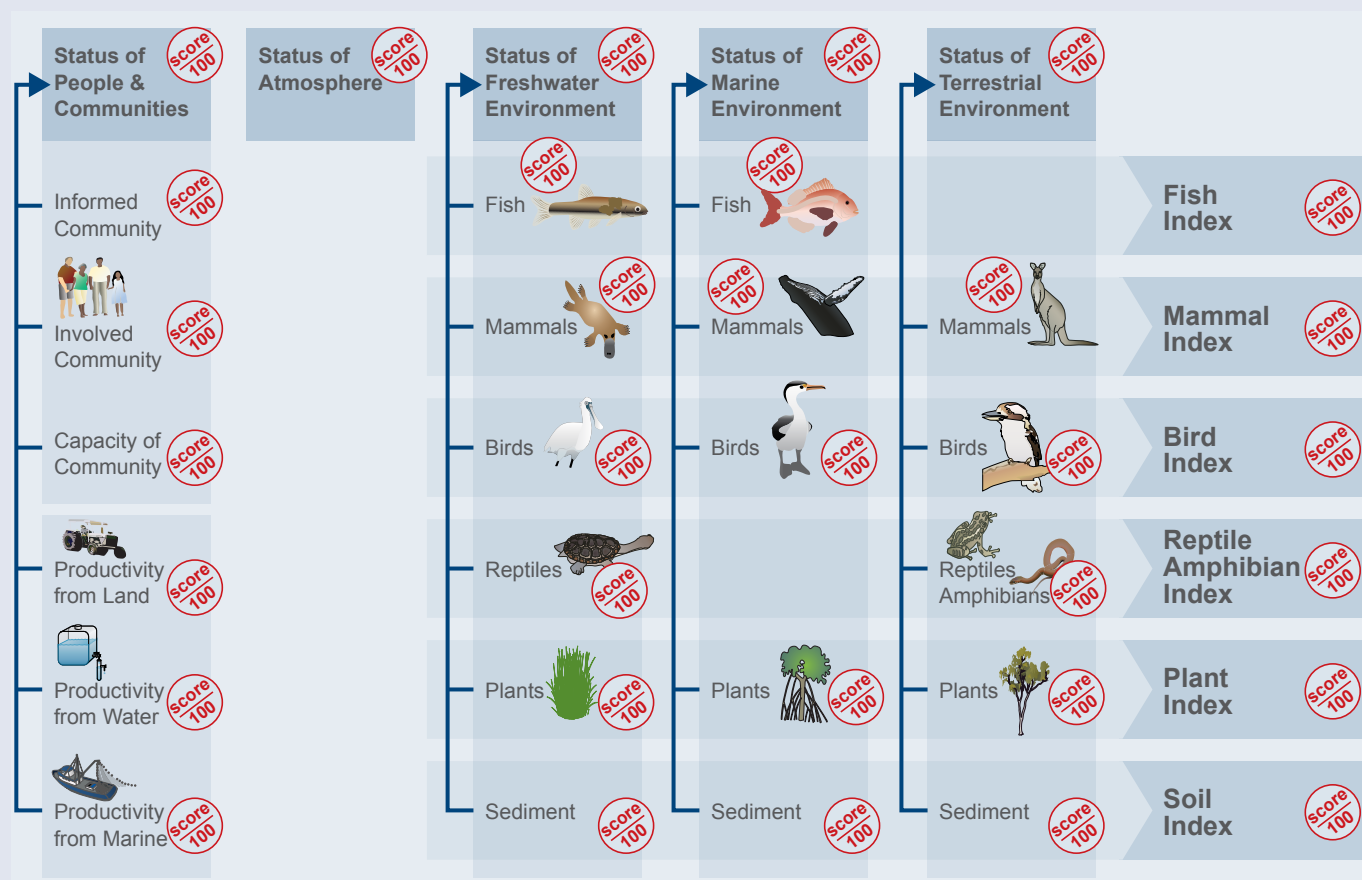
The NRM state and condition reporting framework will be reviewed, evaluated and updated following a one year trial which ends in December 2013.

APPENDIX 1: GLOSSARY

TERMS	DEFINITIONS
<i>Accounting for Nature</i>	Developed by the Wentworth Group of Concerned Scientists (2008) to provide a framework for regional, state-wide and national environmental accounts which all make use of the same information on the status of natural resources.
Best-on-offer status	A measure of the status of a natural resource that has not been modified.
Conceptual diagram	A model that illustrates the important biodiversity components of an ecosystem. The model depicts pathways between the important natural resources, processes (e.g. energy flows) and pressures (e.g. human or natural disturbance).
Environmental accounts	Reports that integrate social and economic information to inform managers about natural resources and the broader NRM community.
Framework	The Natural Resource Management State and Condition Reporting Framework. The framework focuses on providing information on the status of natural resources.
Index of current status	An index of the current status of a natural resource relative to its reference benchmark value.
Indicator	Measurable quantity that is related to a variable of interest for a particular natural resource. Indicators are derived from components of an ecosystem to reflect the drivers of change and the status of the ecosystem components.
Index / indices	A compilation of indicators that provides a single value, which represents the status of a natural resource.
Measure of reliability	By ranking the quality of the monitoring information using a formal scientific accreditation process, this measure indicates the level of confidence that users can place in the information.
Natural resources	Includes soil, water and marine resources, geological features and landscapes, native vegetation, native animals and other native organisms and ecosystems. These natural resources may be used by people/or have a benefit for people.
Natural Resource Management	Caring for our natural resources – balancing people's needs with those of nature.

TERMS	DEFINITIONS
NRM region	Natural resource management regions are spatial management units based on catchments and bioregions. In South Australia they are: Alinytjara Wilurara, Eyre Peninsula, Kangaroo Island, Adelaide and Mount Lofty Ranges, South Australian Murray-Darling Basin, Northern and Yorke, South Australian Arid Lands and South East.
Pre-European status	The estimated status of a natural resource as it occurred before European settlement.
Pressure	Environmental or anthropogenic impacts that have the potential to change the status of a natural resource.
Project and program planning cycle	Focuses on reporting project and program activities and outcomes and evaluating the success of projects and programs relative to objectives.
Reference benchmark value	The estimated status of a natural resource in the absence of significant human alteration. This value may be estimated based on either the: 1) best-on-offer status of the natural resource in the same region, 2) a sustainable status or 3) the pre-European status. Reference benchmarks can be updated if better information becomes available. The reference benchmark value is not a target but, rather, a value for standardising measurements of natural resources using the index of current status.
Reference condition	Used in <i>Accounting for Nature</i> and is similar to the reference benchmark value. The reference condition is an estimate of the natural or potential status of a natural resource in the absence of human alteration.
Status	Describes the state and condition of natural resources together with contextual information that describes social and economic factors.
Sustainable status	A measure of the status of natural resources that have the capacity to: 1) maintain processes such as capturing energy, retaining water and cycling nutrients, 2) provide food and shelter for sustaining populations of native plants, animals and other organisms at appropriate scales in time and space and 3) provide cultural, spiritual, aesthetic and livelihood needs of people.

APPENDIX 2: CONCEPTUAL APPROACH FOR AGGREGATING INFORMATION



It is not possible to forecast all of the information needs of policy makers and managers. As a result, some of their decisions are made using the best information at hand.

The NRM State and Condition Reporting Framework will improve the availability of information by synthesising and communicating information across different taxonomic and ecological units.

The diagram above shows examples of taxonomic and ecological units that can be aggregated (summed up), vertically to give indices of status for atmospheric, freshwater, terrestrial or marine environments, and horizontally to provide an index of status for fish, mammals, birds, etc.

Aggregated indices represent the best available summaries and provide information to communicate broad priorities and inform the community about ecological processes and environmental impacts.

The use of indices to report on the status of natural resources enables trends from any taxonomic or ecological units to be compared and tracked through time.

For example, indices of freshwater and terrestrial environments can be compared to help set management priorities.

This method will also help to identify and quantify the extent to which information is lacking for particular taxonomic or ecological units.

This approach enables indices of current status to be summarised in several dimensions, such as across spatial scales (e.g. NRM regions or National Parks or the entire State) or across ecological units (refer to: Scholes & Biggs 2005, Certain & Skarpaas 2011).

Ecological units may include taxonomic groups (e.g. species of birds) or habitats (e.g. terrestrial environments). To aggregate information across different indices, each index is weighted by the dominance or importance of the natural resource in the landscape (e.g. hectares of land, volumes of lakes, lengths of rivers, sizes of fish stocks). Indices are weighted in this way to ensure each natural resource is appropriately represented in aggregated indices (Certain & Skarpaas 2011).

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