

# UNDERSTANDING AND APPLYING THE PRINCIPLES OF COMPREHENSIVENESS, ADEQUACY AND REPRESENTATIVENESS FOR THE NRSMPA

Version 3.1, November 1999

Report prepared for the Australian and New Zealand Environment and Conservation Council (ANZECC) Task Force on Marine Protected Areas (TFMPA), in satisfaction of Actions 1, 2 and 3 of the Strategic Plan of Action for the National Representative System of Marine Protected Areas (ANZECC TFMPA 1999).

**PLEASE NOTE:**

This report is a working document that will be reviewed in 12 months, after jurisdictions have had an opportunity to test its application. Interested persons are welcome to comment on the content of the report and its usefulness in contributing to the discussion of the principles of comprehensiveness, adequacy and representativeness.

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## 1. INTRODUCTION

In July 1999, ANZECC endorsed the *Strategic Plan of Action for the National Representative System of Marine Protected Areas: a Guide for Action by Australian Governments*. The Strategic Plan was developed cooperatively by all relevant marine management agencies in each jurisdiction, through the ANZECC Task Force on Marine Protected Areas (TFMPA).

The Strategic Plan lists thirty-four actions to be undertaken by the Commonwealth, the States and the Northern Territory to advance marine protected area establishment in Australia. The Strategic Plan complements the *Interim Marine and Coastal Regionalisation for Australia* and the *Guidelines for Establishing the National Representative System of Marine Protected Areas*, which were endorsed by ANZECC in June and December 1998.

The Strategic Plan identified the need to establish consistent and agreed understanding of key principles and processes for the National Representative System of Marine Protected Areas (NRSMPA). The first three of the thirty-four actions relate to understanding three key principles – comprehensiveness, adequacy and representativeness.

The primary goal of the NRSMPA commits jurisdictions to establishing and managing a comprehensive, adequate and representative system of MPAs (ANZECC TFMPA 1998). The Strategic Plan describes the three principles, also referred to as the CAR principles, as follows:

- **Comprehensiveness:** The NRSMPA will include the full range of ecosystems recognised at an appropriate scale within and across each bioregion.
- **Adequacy:** The NRSMPA will have the required level of reservation to ensure the ecological viability and integrity of populations, species and communities.
- **Representativeness:** Those marine areas that are selected for inclusion in MPAs should reasonably reflect the biotic diversity of the marine ecosystems from which they derive.

(Source: ANZECC TFMPA 1999, pp 15-16)

For the purposes of the NRSMPA, jurisdictions will apply the agreed CAR principles in the way described in this report. By all jurisdictions agreeing on procedures for applying and reporting on the CAR principles, it will be possible to describe and report on progress of the NRSMPA. Combined with the agreed bioregional framework, the Interim Marine and Coastal Regionalisation for Australia (IMCRA), transparent reporting on progress against the agreed principles will allow better understanding of the NRSMPA.

The NRSMPA is being progressively established. Current work on identifying threatening processes and vulnerable ecosystems will help establish priority areas for MPA establishment. Limited information on biodiversity and ecosystems will effect progress against CAR principles, particularly in deeper water, for example the Commonwealth jurisdiction (excluding the Great Barrier Reef Marine Park). The regional assessment process for the South East Regional Marine Plan, to be conducted by the National Oceans Office under the Oceans Policy, may provide an opportunity for the Commonwealth to trial the application of the CAR principles.

The NRSMPA is one of the mechanisms used in Australia to achieve biodiversity conservation and assist in the sustainable use of marine resources. The NRSMPA should be understood in the context of the suite of options that are available to Australian governments including the direct regulation and management of marine resource use.

## 2. PROCESS

TFMPA agreed to a process involving the use of small action teams to progress each of the thirty-four actions in the Strategic Plan. An action team, known as the CAR Action Team, was formed to progress Actions 1, 2 and 3 – Understanding comprehensiveness, adequacy and representativeness. A three-stage process was used by the CAR Action Team to progress these actions. The three stages involved a literature review, a questionnaire and a national workshop all of which provided input for this report.

### *Literature review*

A literature review was carried out to ascertain:

- the application of CAR principles by jurisdictions; and
- any obvious differences between the way marine protected area (MPA) management agencies used the CAR principles, and the more widely used and accepted application of the CAR principles in the terrestrial domain.

### *Questionnaire*

The CAR Action Team developed a questionnaire to define the levels of understanding, acceptance and implementation of the CAR principles by jurisdictions. Information provided by the respondents was analysed and presented to the national workshop.

### *National workshop*

The national workshop was convened on 1 July 1999 and was attended by members of the CAR Action Team. The workshop aims were to:

- resolve any differing interpretation/application of the CAR principles; and
- develop agreed operational definitions for the CAR principles for use in planning and reporting on the NRSMPA.

## 3. APPLYING COMPREHENSIVENESS, ADEQUACY AND REPRESENTATIVENESS IN THE NRSMPA

### 3.1 Overview

Nationally and internationally there has been considerable work done on application of the CAR principles in the terrestrial environment. There are differences between marine and terrestrial ecosystems and consequently it is not a simple transfer of the terrestrial model/s to the marine context.

Scale is an important consideration for the application of the CAR principles. For the NRSMPA, the adopted hierarchy of biodiversity, against which the principles are applied, is:

*bioregion*

*ecosystem*

*habitat*

*community/population*

*species/individual*

For the NRSMPA comprehensiveness and adequacy are understood and applied at the scales of bioregions, ecosystems and habitats. Representativeness is applied at the finer scales of communities and individuals/species.

The following sections set out procedures for applying the CAR principles. The procedures have been derived from a number of sources including the questionnaire, literature review, comments received at the national workshop and subsequent input from the Action Team. Each CAR principle is treated individually with procedures designed to assist managers and stakeholders to understand and apply the principles. The procedures are intended as a guide rather than a prescriptive set of actions.

Each procedure is set out using four elements:

- Principle: The principle presented in the Strategic Plan.
- Interpretation: An operational definition.
- Purpose: The desired outcome/s.
- Understanding/Application: Actions and steps needed to achieve the outcome/s.

The application of these principles and the associated data and information requirements will be further developed by jurisdictions and through other Strategic Plan actions. The columns headed Establishment of MPAs, Context for Management, and Performance Assessment deal with the application of the principles at three significant stages of the NRSMPA.

Context for Management describes what the MPA manager needs to do to understand an MPA's contribution to the National System. It does not establish a reporting requirement.

The Performance Assessment column provides an early interpretation of the process. There is a set of three actions (actions 32, 33 & 34) within the Strategic Plan that deal specifically with performance assessment. These actions will provide substantial input on how to measure the effectiveness of MPAs. Reporting on performance assessment will be at MPA, bioregion and NRSMPA levels for representativeness and adequacy. For comprehensiveness reporting on performance assessment is at bioregion and NRSMPA levels only.

**Figure 1: Comprehensive and representative MPAs within an IMCRA bioregion.**

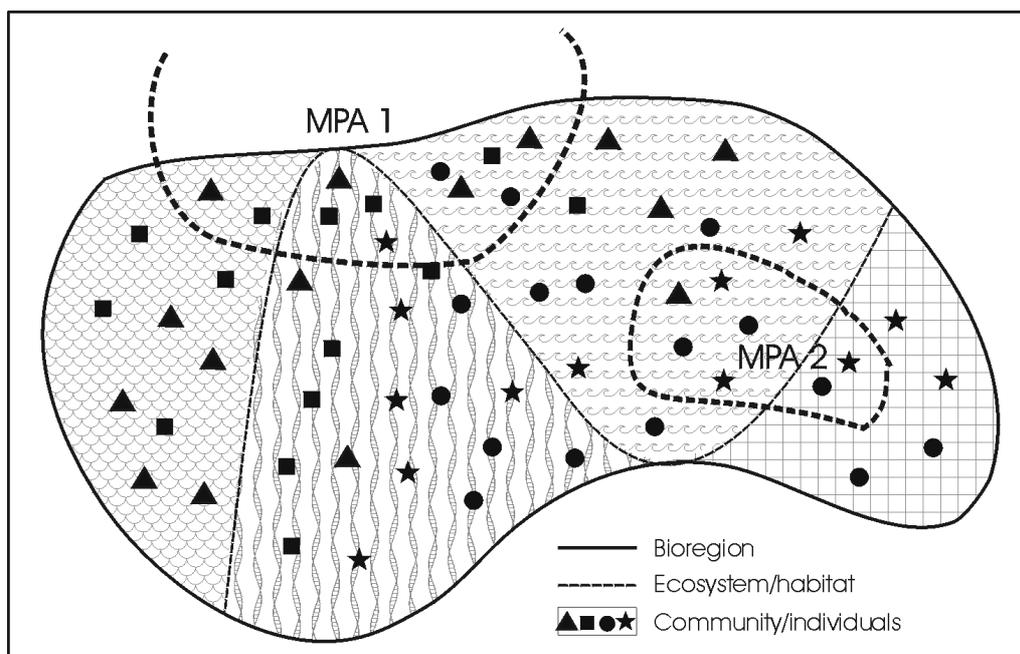


Figure 1 illustrates the relationship between the three CAR principles.

The two MPAs, in combination, illustrate the application of comprehensiveness and representativeness in a theoretical model. For this bioregion, comprehensiveness is applied at the scale of ecosystems/habitats, and between them the two MPAs sample each of the four ecosystems/habitats. Representativeness is achieved through each of the communities/individuals being sampled by one or other of the two MPAs.

The adequacy of the MPAs will depend on several factors, including:

- the level of management within the MPA and outside the MPA;
- the size and shape of the MPA; and
- the natural/anthropogenic threats within or adjacent to the MPA.

### 3.2 Procedure for Assessing Comprehensiveness

Principle: The NRSMPA will include the full range of ecosystems recognised at an appropriate scale within and across each bioregion.

Interpretation: The full range of marine ecosystems and habitats across the marine environment should be identified at an appropriate scale and included in the NRSMPA. For the purpose of this report, marine ecosystems are defined as mappable units encompassing a community of associated organisms and their surrounding environments.

	<u>Establishment of MPAs</u>	<u>Context for Management</u>	<u>Performance Assessment</u>
Purpose:	To ensure that samples of the full range of marine ecosystems are included in the NRSMPA.	To develop a knowledge base for the range of ecosystems within and surrounding an MPA.	To develop measures for reporting on the system of MPAs, with reference to the range of ecosystems that are included in MPAs.
Understanding and Application:	<ul style="list-style-type: none"> <li>Define and map the type, extent and location of marine ecosystems, habitats and communities at a suitable scale.</li> <li>Select an example of each ecosystem, habitat and community (ie. a comprehensive set) to be included in the NRSMPA.</li> </ul>	<ul style="list-style-type: none"> <li>Build up knowledge of the type, extent and location of ecosystems within and around a MPA.</li> <li>Increase ability to recognise and define ecosystems.</li> </ul>	<ul style="list-style-type: none"> <li>Identify the number and type of known ecosystems protected by MPAs in the IMCRA region/s and the NRSMPA.</li> </ul>

### 3.3 Procedure for Assessing Adequacy

Principle: The maintenance of the ecological viability and integrity of populations, species and communities.

Interpretation: Maintain ecological viability and integrity of natural processes within an MPA or system of MPAs. Factors such as long term viability of local communities, natural and human-induced temporal and spatial disturbances, specific conservation objectives and the design of individual MPAs will need to be addressed. Given the lack of understanding of the spatial scales of key ecological processes, adequacy of MPAs should be considered in the context of other mechanisms for the integrated management of marine areas.

	<u>Establishment of MPAs</u>	<u>Context for Management</u>	<u>Performance Assessment</u>
Purpose:	To contribute to the protection and continuance of natural processes in parts of the ecosystem that are included in MPAs.	To manage the MPA and ensure maintenance of biodiversity through time.	To assess and report on trends in the quality and condition of natural components in MPAs.
Understanding and Application	<ul style="list-style-type: none"> <li>Determine whether the 'proportion' of the ecosystem selected for the MPA is going to be <i>adequate</i> to ensure that the natural processes will persist through time. That is, how much of each ecosystem should be included in a protected area system in order to provide ecological viability and integrity of population, communities and species.</li> <li>Factors to consider include reserve shape and size, population dynamics, reserve type or level of protection within the MPA as well as the management regimes in the surrounding area, replication of the ecosystem type and natural heterogeneity of the ecosystem.</li> </ul>	<ul style="list-style-type: none"> <li>Develop understanding of the threatening processes within and surrounding an MPA (actual and potential).</li> <li>Develop understanding of the response of the ecosystems to threats eg. pollution, disruption to breeding colonies.</li> <li>Develop understanding of the dynamic of natural systems eg. species migrations, cyclical events (potential/actual), and species habitat requirements eg. breeding, feeding and migration.</li> <li>Provide required resources for management.</li> </ul>	<ul style="list-style-type: none"> <li>Assess if the size and shape of the MPA contributes to adequacy with reference to features such as:               <ul style="list-style-type: none"> <li>dispersal patterns /connectivity</li> <li>migratory species (seasonal)</li> <li>juvenile &amp; adult dispersal routes</li> <li>spawning sites</li> </ul> </li> <li>Assess the viability of populations of rare and threatened species and ecological communities within the MPA.</li> <li>Assess the level of management within the MPA and outside the MPA.</li> <li>Determine the natural/anthropogenic threats within or adjacent to the MPA.</li> <li>Determine what level of replication or redundancy exists in the MPA network.</li> </ul>

### 3.4 Procedure for Assessing Representativeness

**Principle:** Those marine areas that are selected for inclusion in MPAs should reasonably reflect the biotic diversity of the marine ecosystems from which they derive.

**Interpretation:** To identify those areas which are typical of their surroundings at a chosen scale. Wherever possible, the final selection of these typical areas should also take into consideration any communities/species that are rare, vulnerable or endangered or considered to be unique, distinct or atypical. In the absence of data to determine areas 'typical' of their surroundings, the selection of MPAs may initially be based on data on atypical or threatened species because these data are often more readily available.

	<u>Establishment of MPAs</u>	<u>Context for Management</u>	<u>Performance Assessment</u>
<b>Purpose:</b>	To select a sample of the variety of the different types of natural components (eg. species and ecosystems) as well as identify unique, distinct or 'atypical' areas in each IMCRA bioregion.	To develop an understanding of the complexity of ecosystem response to environmental conditions, natural processes and other threatening processes.	To measure and report on whether the diversity within ecosystems is found in the NRSMPA.
<b>Understanding and Application</b>	<ul style="list-style-type: none"> <li>• Include examples of the variety of marine biodiversity at all levels within ecosystems (for example genetic, species, habitat diversity), as well as rare and threatened ecological communities/species and atypical areas (eg. Spawning areas, nursery sites or breeding locations).</li> </ul>	<ul style="list-style-type: none"> <li>• Compile a knowledge base of the complexity of ecosystems and how they interact with their environment eg. temperature, water depth, nutrients, latitude, currents.</li> <li>• Develop the ability to identify the building blocks of ecosystem structure and function (eg. species, communities, habitats, and ecosystems).</li> </ul>	<ul style="list-style-type: none"> <li>• Assess whether the known diversity is included within MPAs.</li> <li>• Where necessary analyse specific data that can be used to indicate the extent of ecosystems eg coral and fish distribution.</li> <li>• Assess the viability of populations of rare and threatened species and ecological communities where these data are used as the basis for the MPA.</li> </ul>

## **4. CONCLUSION**

ANZECC has recognised that the NRSMPA is underpinned by the principles of comprehensiveness, adequacy and representativeness. As all jurisdictions are now committed to the principles, this report reflects their agreement to applying the principles in a consistent fashion. Also, jurisdictions are committed to reporting on the application on each of the CAR principles to enable national reports to be produced on the performance of the NRSMPA.

While there has been some confusion in the use of the terms representative and comprehensive at a theoretical level it is apparent that these issues are addressed as jurisdictions continue to establish, manage and assess the NRSMPA.

The primary benefit of applying the CAR principles in designing the NRSMPA is that all components of biodiversity are considered, and subsequently these components are assessed, when jurisdictions report on the establishment and maintenance of the NRSMPA.

The Strategic Plan identifies that to achieve the most rapid gains in developing the NRSMPA, the initial emphasis is on comprehensiveness, as comprehensiveness can be assessed with broader scale information than is required for representativeness and adequacy.

There are significant linkages between the CAR actions and other Strategic Plan actions. TFMPA will continue the process for integration and efficient delivery of all the actions. The availability of data on biodiversity at different scales, means that the Strategic Plan actions on ecosystem mapping and vulnerable ecosystems will be significant in reporting the application of the CAR principles.

The purpose of the report is to encapsulate national agreement on the application of the CAR principles. The report marks an advance in the ability to consistently report on the application of CAR principles for the NRSMPA.

This report is a working document that will be reviewed in 12 months, after jurisdictions have had an opportunity to test its application. Interested persons are welcome to comment on the content of the report and its usefulness in contributing to the discussion of the principles of comprehensiveness, adequacy and representativeness.

## **ACKNOWLEDGMENT**

This project was coordinated by Marine Group, Environment Australia.

## GLOSSARY

<i>Adequacy</i>	The maintenance of the ecological viability and integrity of populations, species and communities.
<i>Biodiversity/ Biological diversity</i>	The variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes the diversity within species, between species and of ecosystems (UNEP 1994).
<i>Bioregion</i>	An area defined by a combination of biological, social and geographic criteria, rather than by geopolitical considerations. Generally, a system of related, interconnected ecosystems (Commonwealth of Australia 1996).
<i>Comprehensiveness</i>	Includes the full range of ecosystems recognised at an appropriate scale within and across each bioregion.
<i>Community</i>	A group of organisms, both animals and plants, living together in an ecologically related fashion in a defined area or habitat.
<i>Ecosystem</i>	A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit (UNEP 1994).
<i>Habitat</i>	The place or type of site where an organism or population naturally occurs (UNEP 1994).
<i>Interim Marine and Coastal Regionalisation for Australia (IMCRA)</i>	An ecosystem-based classification for marine and coastal environments. It provides ecologically based regionalisations at the meso-scale (100–1000 km) and at a provincial scale (greater than 1000 km).  <i>IMCRA</i> is the bioregional framework for the planning and management of the NRSMPA.
<i>Marine protected area (MPA) /protected area</i>	An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means (IUCN 1994).
<i>Representativeness</i>	Those marine areas that are selected for inclusion in reserves should reasonably reflect the biotic diversity of the marine ecosystems from which they derive.

## REFERENCES

- ANZECC TFMPA (1998). *Guidelines for Establishing the National Representative System of Marine Protected Areas*. Australian and New Zealand Environment and Conservation Council Task Force on Marine Protected Areas. Environment Australia, Canberra.
- ANZECC TFMPA (1999). *Strategic Plan of Action for the National Representative System of Marine Protected Areas: A Guide for Action by Australian Governments*. Australian and New Zealand Environment and Conservation Council Task Force on Marine Protected Areas. Environment Australia, Canberra.