



Breen, D.A., Avery, R.P. and Otway, N. M. (2004).  
Broad-scale biodiversity assessment of the Manning  
Shelf marine bioregion. NSW Marine Parks Authority.

The summary and conclusion chapters of the report are  
below. Please refer to the full document for further  
information (available at [www.mpa.nsw.gov.au](http://www.mpa.nsw.gov.au) )

## Summary

The Manning Shelf Bioregion extends from north of the Hunter River at Stockton (32°54'S) to north of Nambucca Heads (30°39'S) and includes all estuarine, coastal and offshore waters to the edge of the continental shelf (approximately the 200m depth contour). The bioregion is one of 65 Australian marine bioregions and provinces that together provide a national framework for consistent, ecologically based planning of marine protected areas (MPAs).

This report describes the broad range of biodiversity found within the bioregion and identifies ecological options for MPAs using available broad-scale ecological information.

Information used in this report was derived from:

- national criteria for identification of MPAs
- a broad-scale atlas of NSW marine ecosystems and habitats
- existing broad-scale scientific surveys of habitats, communities and species
- existing data, maps, aerial photographs, literature and conservation assessments
- new data coverages and analyses generated for this study
- ecological guidelines for reserve design
- preliminary discussions with scientists, managers and the community.

Broad-scale (100's km<sup>2</sup>) and fine-scale (1km<sup>2</sup>) planning units were used to assess potential locations for MPAs against more than 50 specific criteria derived from state and national guidelines. Assessments were assisted by mapped displays in a Geographic Information System (GIS), irreplaceability analysis in C-Plan reserve selection software, and multiple criteria decision analysis.

This assessment identifies one possible candidate location for a large, multiple-use marine park. It also identifies other areas with important conservation values that might be included in a state-wide network of MPAs. The criteria, methods and information from this report aim to provide a basis for more detailed assessment, consultation and management of these areas.

**1. A candidate marine park at the southern end of the bioregion, within the area between Stockton Beach and Forster.**

This area was identified for the many outstanding ecosystems, habitats and species occurring within one region. It meets criteria for comprehensiveness and representativeness for all mapped ecosystem and habitat units. It has a high degree of naturalness and catchment protection. It includes areas recommended from previous conservation assessments and consistently scores highest in quantitative analyses for a range of criteria. The area also complements existing MPAs and other conservation management strategies.

While no specific boundaries are proposed, some of the features that could be incorporated within the marine park are:

- *Port Stephens and the Karuah River estuary*, including the largest area of mangrove and saltmarsh in New South Wales and the only tide-dominated drowned river valley in the bioregion
- *Myall Lakes*, the largest system of coastal brackish lakes in the state and the only major example of this ecosystem type in the bioregion
- *Smiths Lake*, the largest intermittent lagoon in the state
- *Wallis Lake*, including the largest area of seagrass in the state and the largest example of a wave dominated estuary in the bioregion
- *the adjacent exposed coast and ocean to at least 3 nm offshore* which includes a range of ocean depth zones and the greatest area, number and diversity of mapped island, subtidal reef, intertidal rocky shore and beach habitats in the bioregion.

**2. Other areas of high conservation value**

Other locations within the bioregion also have high conservation values. These locations (listed under various categories below) could be used to develop MPA proposals to represent geographic variation in biodiversity throughout the bioregion, and assist in fulfilling the principles of comprehensiveness, adequacy and representativeness. Where possible, these options should aim to include neighbouring habitats to increase the range of biodiversity represented and accommodate the movement of organisms among these areas.

**a) Small, relatively unimpacted estuaries;**

- *Khappinghat Creek* and adjacent ocean areas as the largest intermittent creek in the bioregion and one of the few estuaries with relatively unimpacted waters and catchment
- *Lakes Innes and Lake Cathie*, including the largest single area of saltmarsh in the bioregion and a high degree of catchment protection
- *Camden Haven* estuary including the third largest area of seagrass in the bioregion (after Wallis Lake and Port Stephens) and a high degree of catchment protection
- *Korogoro Creek* and adjacent beach and rocky shores for its connection with extensive freshwater wetlands and coastal dune habitats and extensive catchment protection
- *South West Rocks Creek* for the high proportion of this small creek occupied by mangrove, saltmarsh and seagrass within close proximity to built up areas
- *Saltwater Creek and Saltwater Lagoon* for their high natural sensitivity, surrounding wetlands and proximity to built up areas.

Each of these estuaries adjoins a national park or nature reserve, represents geographic variation in biodiversity and may help maintain connectivity among a range of coastal habitats.

**b) The least impacted subcatchments of the major estuaries;**

- *Limeburners Creek* and *Saltwater Lake* in the Hastings River for the low degree of disturbance and high level of subcatchment protection in an estuary otherwise disturbed by flood mitigation works and adjoining land use
- *Kooragang Island* and *Fullerton Cove* in the Hunter River for their large areas of mangrove and saltmarsh, importance to migratory wading birds, and the wetlands remaining despite significant modifications to the area
- *Macleay River delta* and the *Macleay Arm* in the Macleay River for the large areas of mangrove, saltmarsh and seagrass, adjacent wetlands and importance to migratory waders and other bird life
- *Warrell Creek* in the Nambucca River for the adjacent wetlands, importance to bird fauna (including the threatened Little Tern) and the low degree of disturbance to this arm of the estuary
- *Farquhar Inlet* and the *Manning River Channel* in the Manning River for the remaining estuarine vegetation and nesting areas for Little Tern.

These estuarine areas remain in a reasonable condition within large catchments disturbed by land use, flood mitigation, and urban and industrial development.

**c) Intertidal rocky shores, beaches, and inshore reefs;**

Initial surveys (Otway and Morrison *in prep.*) have mapped 52 shores and scored the number of 'community' types (platform, boulder, cobble, pool, crevice) present on each shore. Twenty one shores included all five community types, 15 shores included four community types and 15 shores included three community types.

The National Trust Headland and Rock Platform survey in 1982 identified only one rock platform, Bald Head, for protection in the Manning Shelf Bioregion. Another survey carried out by the Total Environment Centre in 1995, identified 19 rock platforms in the Manning Shelf Bioregion for protection.

**d) Offshore reefs, islands and Grey Nurse Shark aggregations at;**

- Fish Rock and Green Island near South West Rocks
- the Cod Grounds near Laurieton
- the Pinnacles and Latitude Rock near Forster
- Big Seal and Little Seal Rocks near Sugar Loaf Point
- Broughton Island near Port Stephens.

These sites were identified for:

- conservation of the threatened Grey Nurse Shark (Environment Australia 2000, Otway and Parker 2000)
- sightings of other threatened species
- their high productivity
- their potential as sources of larvae for areas downstream
- a high diversity and abundance of fish and invertebrates

- the influence of the East Australian Current
- their vulnerability to existing and future levels of use.

Extensive areas of subtidal reef were also mapped offshore of the coast between:

- Crowdy Head and Diamond Head
- Hallidays Point, Khappinghat Creek and the Manning River.

Many other offshore areas of reef and sediment on the NSW shelf have not been mapped in detail and little is known of broad-scale patterns in the distribution of many offshore biota. There may be many areas in deeper water with significant conservation values and these require further investigation.

## ***Conclusion***

This study provides basic information to help plan a representative system of marine protected areas in the Manning Shelf Bioregion and methods to systematically examine options for the Manning Shelf and other areas of NSW. Even at the broad scale of this study, a number of patterns were evident. Clearly the current system of marine protected areas for the Manning Shelf does not provide comprehensive, adequate or representative protection for biodiversity or ecological processes.

There are no marine parks in the bioregion and only one aquatic reserve protecting just 0.8 km<sup>2</sup> of estuarine reef, beach, subtidal sediments and rocky shore at Fly Point/Halifax Park, Port Stephens. This represents the total area in the bioregion where fish and marine invertebrates are protected within MPAs from fishing. As a percentage, this translates to 0.03% of the marine bioregion within NSW waters, or to 0.008% of the bioregion's waters if Commonwealth waters beyond 3 nm of the coast are considered.

Large areas of fringing saltmarsh, mangrove and open water in several estuaries are included in nature reserves or national parks, but these areas do not on their own, provide direct protection for fish or marine invertebrates from fishing. A few, small areas of intertidal ocean beach and rocky shore are also included in National Parks estate, but ocean areas beyond the shore are virtually unrepresented.

While nature reserves and national parks include a reasonably comprehensive selection of estuarine areas, this selection is biased towards the terrestrial and freshwater fringes of estuaries. The area of ocean ecosystems and habitats represented in MPAs is almost negligible and the potential for improvement is considerable, given rapid increases in population and coastal development in the region.

A number of different areas of high conservation value were identified using currently available information. These areas were those that tended to best meet criteria for representing a range of ecosystems, habitats and species in locations with protected foreshores and catchments with waters relatively unaffected by human impacts.

The options for exactly where and how MPAs are established are relatively flexible for all but a few criteria. There is, therefore, the potential to apply reserve design criteria to achieve more effective management, and to accommodate, and even promote, a range of sustainable human activities while still meeting conservation objectives. It is hoped that the information and techniques from this study prove useful in assessing these alternatives, and in providing a basis for more detailed research, management and consultation.