# Tasmanian Marine Protected Areas Strategy
# Background Report


Department of Primary Industries, Water and Environment

April 2000

Published by: Department of Primary Industries, Water and Environment, Tasmania.


Citation: Department of Primary Industries, Water and Environment, Tasmania 2000. *Tasmanian Marine Protected Areas Strategy: Background Report.*

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## Acknowledgements

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The report was edited by Vivienne Mawson with final production by Sylvia Outridge. Administrative support was also provided by Sam Parkinson and Mark Johnson. Research and collection of information presented in this report was assisted with funding provided by Environment Australia under the Marine Protected Areas Program.

**ISBN No: 0 7246 21148**

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# PREFACE

This Background Report has been prepared by the Department of Primary Industries, Water and Environment in consultation with the Marine and Marine Industries Council to provide background material for the development of a Tasmanian Marine Protected Areas Strategy.

The report describes the marine ecosystems and biodiversity and the marine management systems in Tasmania and then outlines the National Representative System of Marine Protected Areas which has been endorsed by all States and Territories as well as the Commonwealth.

The fundamental concept of a comprehensive, adequate and representative system of Marine Protected Areas is explored before the status of marine conservation in Tasmania is described.

The latter part of the report then identifies possible goals, outcomes and principles for a Representative Marine Protected Areas System in Tasmania, proposed guidelines for identifying and selecting a system and how it would be established and managed.

Reference throughout the report is made where relevant to other State, Territory, national and international approaches and experiences.

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# CHAPTER 1

# MARINE ECOSYSTEMS & BIODIVERSITY OF TASMANIA

## 1.1 EVOLUTION OF TASMANIA'S MARINE ECOSYSTEMS

Marine environments of southern temperate Australia have globally significant levels of marine biodiversity and endemism for many of the same reasons that Australia's terrestrial fauna and flora are unique and biologically diverse, namely the long period of geological isolation; the large continental landmass of Australia, particularly the extensive continental shelf; the long east–west; and the ice-free extent of the south–facing coastline (the longest in the Southern Hemisphere) (Edyvane 1996). In addition, Australia's coastal waters are low in nutrients, a factor that generally promotes biological diversity and co-evolutionary strategies to rapidly harvest, use and recycle the nutrients. The high level of endemism in temperate Australian waters is largely attributable to its geological isolation. While the marine flora and fauna of tropical Australia and the Indo–Pacific mixed some 20 million years ago (when the continental plates of Australia and South East Asia collided), southern temperate Australian plants and animals have remained isolated for over 65 million years — resulting in some of the highest levels of endemism in the world (Poore 1995).

The drowning of Bass Strait and the effects of the winds, seas, swells and tides on Tasmania have generated a number of strikingly different marine biomes (major ecological communities occupying large areas). The Bass Strait islands, and the northern, north-eastern, eastern and western coasts of the main island all display markedly different marine habitats, largely as a response to the differing physical conditions experienced on each coastline (Edgar 1984a, 1999, Edgar *et al.* 1997).

Tasmania's marine environments contain some of the most distinctive flora and fauna in the world in terms of composition and diversity. This is mainly due to the long coastline (relative to the landmass), the variety of coastal and marine habitats and oceanographic conditions, and Tasmania's geographical location at the southernmost extremity of Australia. Tasmania's diversity and uniqueness are enhanced by sub-Antarctic influences in the biota, the effect of oceanographic barriers in Bass Strait, and the isolation of large drowned river valleys and estuaries (e.g. Bathurst Harbour–Port Davey, Derwent, Huon, Tamar, Macquarie Harbour).

## 1.2 PHYSICAL SETTING

### 1.2.1 Climate

Tasmania has a temperate climate; however, the island can be affected by storms emanating from the polar region at any time of the year. Mean sea water temperatures range from around 10-12$^{o}$C in winter to around 18-20$^{o}$C in summer, although in sheltered or enclosed water bodies temperatures may fluctuate outside these upper and lower ranges.

The dominant climatic processes affecting the Tasmanian coast are successive high and low-pressure systems in the zone of the Roaring Forties. The storms resulting from these pressure fronts occur principally during winter, and are associated with predominantly south-westerly swells. Another important climatic process is the El Niño – Southern Oscillation, which affects the ocean currents off the east coast (Harris *et al.* 1987).

Less frequently, subtropical low-pressure systems move down Australia's eastern seaboard and bring storms and heavy seas to the east coast of Tasmania. Storms and swells affect the surface mixing of waters, water temperature, the supply of nutrients, the duration and intensity of sunlight at sea-level, and the clarity of the water.
The tidal range in Tasmania is affected by both location and latitude: the range is around 3-4m in the Tamar estuary and less than 1 m in the south of the State.

### 1.2.2 Bathymetry (water depth)

Mainland Tasmania and the Bass Strait islands belong to the same continental landmass as mainland Australia (the Indo–Australian tectonic plate) (Harris 1995). The continental shelf is narrow along the east coast of Tasmania but a little wider along the west coast. The shelf broadens in the north of the State, underlying Bass Strait and encompassing the Otway and Gippsland basins. The central portion of Bass Strait contains a depression that exchanges water with the ocean to the north of King Island. Tasmania became separated from the mainland—probably around 12,000 years ago— at the end of the last ice age when global sea-levels rose and submerged much of the continental shelf (Jennings 1961, Harris 1995).

The Bassian Plain is the main seafloor feature of Bass Strait (Jennings 1959). It is about 400 m by 200 km in extent, and has a low relief, dipping to about 85 m below sea-level in the central region. The plain is traversed across its east and west margins by two low-relief ridges which rise above the plain and form islands in places. The western ridge extends from King Island to northwest Tasmania. The eastern ridge extends from Wilsons Promontory through a chain of small islands and Flinders Island to northeast Tasmania. Along the coast either side of the Bassian Plain, the edge of the continental shelf (at about 200 m depth) lies 30 to 60 km offshore. The cross-sectional area of Bass Strait is small, greatly affecting tides, waves and ocean currents (Land Conservation Council 1993).

### 1.2.3 Ocean Currents

Tasmania is affected by a complex array of ocean currents that vary between summer and winter. The three most significant of these currents are the Antarctic Circumpolar Current, which originates in the Southern Ocean, the East Australian Current, which flows south through the Tasman Sea, and the Zeehan Current, which moves south along the Tasmanian west coast (Crawford *et al. in press*). The former originates from regular atmospheric circulation patterns, which produce a pattern of westerly winds and westward circulation of waters in the high latitudes. These waters are nutrient-rich and support profuse marine life. Where the Antarctic Circumpolar Current converges with more northerly currents is an area of downwelling known as the Subtropical Convergence that oscillates seasonally at about the latitude of Tasmania (40–45°S). Along the southern margin of the Antarctic Circumpolar Current is the Antarctic Convergence (50–55°S).

The eastern seaboard of Tasmania is affected by the East Australian Current, an eastern boundary current which brings warm, saline, nutrient-poor equatorial water down the east coast of Australia. At its southern extremity, the East Australian Current pinches off warm-core anticlockwise eddies which drift south near the margin of the continental shelf through the colder waters of the Southern Ocean (Nilsson & Cresswell 1981). These eddies, up to several hundred kilometres across, reach as far south as the central east coast of Tasmania.

The west coast of Tasmania is primarily affected by the Zeehan Current, which flows southwards along the continental shelf and is most intense during winter. The Zeehan Current is a continuation of the surface-flowing Leeuwin Current, which is derived from warm, saline equatorial waters and flows down the western seaboard of Australia, around Cape Leeuwin (Western Australia), and westwards across the Great Australian Bight. Because of the seasonal strength of this current, waters around King Island are significantly warmer than elsewhere off Tasmania during the winter months.

Within Bass Strait, complex mixing of tidal and oceanic currents occurs and varies with climatic conditions. In winter, cool water predominantly flows eastward through Bass Strait, northeast of the Kent Group. Bass Strait occasionally receives waters from the Zeehan Current, which contribute to the eastward-flowing Bass Strait Cascade, a deep saline water outflow that cascades from eastern Bass Strait westwards off the continental shelf along the Victorian coastline. This cascade is thought to influence the migrations of some fish species such as gemfish(Godfrey *et al.* 1980). During summer, East Australian Current waters flow weakly westwards through Bass Strait and onto the shelf of the Great Australian Bight. Permanent tidal standing waves near the Kent Group and King Island restrict surface water flow through the entrances to Bass Strait (Pollock 1971). The strength and position of the East Australian Current varies with the El Niño–Southern Oscillation cycle, which controls the latitude of the Subtropical Convergence. In summer, the atmospheric high-pressure zone over Australia increases the strength of the East Australian Current and causes the Subtropical Convergence to move south. These variations affect the biological communities off Tasmania's coast through changes in water temperature and nutrient availability (Harris *et al.* 1987). These physical factors in turn underpin the community dynamics of an area and influence the distribution,

diversity and composition of species (Harris *et al.* 1991). Currents also significantly affect important processes such as the larval recruitment of species.

### 1.2.4 Wave Energy

The western coast of Tasmania and the western entrance to Bass Strait face southwesterly swells generated over thousands of kilometres of open ocean in the southern Indian and Atlantic Oceans. Offshore of the exposed western coast of Tasmania, the seabed slopes steeply, so little wave energy is lost to the effects of seabed friction and wave refraction. These conditions result in some of the highest wave swell energies in the world. Median offshore wave power is calculated to be in the order of 46kW per metre of wave front—exceptionally high by world standards. Maximum recorded wave heights exceed 19 metres from peak to trough, while median wave height is about 2.8 metres. Swells rarely drop below 1 metre.

The central zone of Bass Strait has much lower wave energy than elsewhere around Tasmania because maximum fetch rarely exceeds 200 km and waters are comparatively shallow, resulting in energy loss through seabed friction. The eastern zone of Bass Strait (east of Wilsons Promontory) is protected by the land masses of Wilsons Promontory, Tasmania and the Bass Strait islands, which shelter it from waves originating in the Southern Ocean. The main waves in this region, therefore, are generated by predominantly west to southwest winds, resulting in a wave energy of the order of 13kW per metre of wave font. Extreme wave conditions most often result from 'East Coast Lows' – intense small-scale 'cut-off' low-pressure systems that form along the southeast coast of Australia. These pressure systems can produce very strong south to southeast winds.

### 1.2.5 Productivity

Marine productivity tends to be high where cold water upwells from the deep ocean. The Antarctic Circumpolar Current—a zone of divergence and upwelling with high marine productivity—flows between Tasmania and Macquarie Island. Consequently, while Australia's waters are typically low in nutrients, concentrations around Tasmania are generally higher, especially on the south coast (Rochford 1979). In contrast, central Bass Strait waters are very low in nutrients.

Waters along the margins of continents can also be very productive because of the productivity of seaweeds and seagrasses in addition to plankton. Seagrasses colonise the more sheltered, shallow, sand substrates along the coast and can stabilise large volumes of sediment in inshore waters. In contrast, nearly all species of seaweed require a firm substrate for successful colonisation. Seaweeds and seagrasses provide refuge for other organisms and act as settlement sites for epiphytic algae (plants that grow upon another organism), and these smaller plants, in turn, provide a source of food for many species.

The productivity of the State's surrounding seas is the basis for commercial and recreational fisheries; the different ecosystems— particularly open water, seagrass meadows and kelp forests—support distinct fisheries. For example, several Tasmanian

fisheries are based on species that feed at some stage in their lives on open-water plankton, e.g. rock lobster and stripey trumpeter, while others live on sandy sediments (e.g. flounder) or on reefs (abalone).

## 1.3 MARINE BIODIVERSITY

### 1.3.1 Flora

#### Macroalgae (Seaweeds)

The diversity and endemism of the marine macroflora in the temperate regions of Australia, including Tasmania, are among the highest in the world with about 125 species of Chlorophyta (green algae), 225 of Phaeophyta (brown algae) and 800 of Rhodophyta (red algae). This is largely due to the length of the southerly-facing rocky coastline (i.e. the longest, ice-free, temperate coastline in the world) and the long period of geological isolation (Edyvane 1996). While other regions around the world, such as Japan and Pacific North America have more macroalgal species (1,452 and 1,254 species, respectively), their coastal waters encompass a wider range of climates (see Table 1.1).

**Table 1.1 Global macroalgal biodiversity (after Womersley 1990).**

| Region | Coast Length (km) | Temperature Range | Number of Species |
|---|---|---|---|
| Southern Australia | 5,500 | cold to warm temperate | 1,155 |
| NE North America | 8,000 | arctic to warm temperate | 399 |
| Pacific North America | 12,000 | arctic to tropical | 1,254 |
| Japan | 6,500 | subarctic to subtropical | 1,452 |
| New Zealand | 6,970 | sub-Antarctic to warm temperate | 835 |

Within Australia, the diversity of temperate species of macroalgae is three times that of tropical species (Womersley 1990). The most remarkable aspect of the southern temperate macroalgal flora is the diversity of red and brown algae, particularly the large number of genera recorded only from southern Australia. Of the 658 genera (and 4,000 species) of red algae recorded world wide, 43% of the genera and 20% of the species occur in southern Australia (Womersley 1990). Over 75% of red algae, 57% of brown algae and 30% of green algae do not occur outside this region (Womersley 1990), with probably over 100 species still to be named. Although the Tasmanian flora remains poorly known because of a lack of professional algal workers, the southeastern Tasmanian region includes probably the highest level of localised endemic species in Australia (Edgar *et al.* 1997).

Shallow reefs around eastern, southern and western Tasmania are more thickly vegetated by macroalgae than reefs elsewhere in Australia, presumably because of the relatively high nutrient levels and cool water temperatures (Crawford *et al.* in press). The macroalgal flora of Tasmania is typically cold temperate, with a small element of colder water

(sub-Antarctic) species. However, many of the recorded species of macroalgae in Tasmania also extend along the southern Australian coast into South Australian and southern Western Australian waters, encompassing a biogeographic region known as the Flindersian Province (Bennett & Pope 1960, Knox 1963, Edgar 1984a). In this province, about 83% of the known macroalgal species occur in the eastern region (eastern South Australia, Victoria and Tasmania), 60% in the western region (west of Kangaroo Island), and 45% generally along the entire coast. The macroalgal flora of Tasmania, and to a lesser extent Victoria, is considered cold temperate, while the rest of the Flindersian flora is considered transitional warm to cool temperate (Womersley 1990).

The cold temperate species of Tasmania include the largest Australian seaweeds, most notably giant kelp *Macrocystis pyrifera,* bull kelp *Durvillaea potatorum*, strap kelp *Lessonia corrugata*, common kelp *Ecklonia radiata* and other large brown algae such as crayweed (*Phyllospora comosa), Xiphophora gladiata, Desmarestia ligulata* and numerous *Sargassum* and *Cystophora* species (Womersley 1981, Edgar 1984a). *Durvillaea, Desmarestia, Lessonia* and *Macrocystis* possess close relatives throughout southern latitudes, including New Zealand, South America and the sub-Antarctic islands, and require cold nutrient-rich waters to thrive.

Tasmanian waters are also characterised by the presence of several sub-Antarctic macroalgal species which are not recorded elsewhere in Australia (i.e. *Urospora pencilliformis, Myrionema incommodum* and *Gononema ramosum*) (Edgar *et al.* 1997). The cool waters of Tasmania have provided ideal conditions for some of the largest areas of subtidal kelp habitat in Australia. In particular, *Macrocystis pyrifera* forms large forests on inshore reefs to 30 m depth, and provides a key habitat for several of the State's commercial shellfish species, including abalone and rock lobster. Although the extensive kelp forests are an important marine community off the State's coasts, some along the east coast have been in decline in recent years (Sanderson 1987).

### Seagrasses

Seagrasses are true grasses adapted to life in shallow, sheltered coastal environments. Southern Australia has extensive areas of seagrass (King 1981, Poiner & Peterken 1995, Kirkman 1997). These are characterised by warm temperate species in the genera *Posidonia* and *Amphibolis*, which decline in number from west to east. In contrast, the two species *Halophila australis* and *Heterozostera tasmanica* are distributed throughout the region while *Zostera muelleri* is confined to cool temperate waters. The distribution of species is greatly affected by coastal topography and environment. Seagrass beds are largely confined to more protected areas but some are found on exposed coasts protected by offshore reefs.

Six marine species of seagrass are recorded around Tasmania, while an additional two species occur in estuaries. The distribution and cover of the various species in Tasmania nevertheless remains poorly documented. Seagrass meadows occur on soft-sediments in shallow coastal environments, with the most extensive beds located along the northeastern and northwestern Tasmanian coast, and in the Furneaux Group. The most common seagrasses are *Posidonia australis, P. angustifolia* and *Amphibolis antarctica* (Jordan *et al.* 1998). Along the east coast no large open embayments exist south of Bass Strait for 150 km until Great Oyster Bay, where the seagrass *Amphibolis antarctica* occurs (Edgar *et al.* 1997).

Seagrasses are also present in the large embayments of the southeast coast, where *Heterozostera tasmanica* and *Halophila australis* occur primarily in estuaries and sheltered fringes of bays rather than carpeting the seabed (Crawford *et al.*, in press). Norfolk and Blackman Bays are, however, exceptional within this region because they possess extensive seagrass meadows. Along the western and southern coasts of Tasmania seagrasses are virtually absent other than in Port Davey because of the high wave exposure, lack of sheltered soft-sediment habitat, and low light penetration in estuaries due to tannin-stained leachates from adjacent coastal wetlands (Edyvane *et al.*, 2000).

Seagrass meadows play a key ecological role in Australia's coastal ecosystems (Poiner & Peterken 1995, Kirkman 1997) because of (i) high primary productivity and associated detrital food chains, (ii) the provision of substrata for attachment of plants and animals, (iii) the provision of 'critical' nursery, breeding or feeding areas for juveniles and adults of fish, crustacean and other animal species (Bell & Pollard 1989, Howard *et al.* 1989), (iv) the ability of extensive root and rhizome systems to trap sediments and organic nutrients, thereby stabilising nearshore sediments and sand banks, enhancing coastal water clarity and reducing coastal erosion, and (v) the ability of plant epiphytes associated with seagrass to supply calcium carbonate to form sediments.

The loss of seagrass beds is probably one of the most serious issues in Australia's marine environment (Shepherd *et al.* 1989, Poiner & Peterken 1995, Kirkman 1997). Seagrass habitats in Tasmania, as elsewhere in the world, have been lost, fragmented and damaged by development and poor catchment management, through practices such as sewage and stormwater discharges, urban runoff, dredging, boating and land reclamation (see review by Shepherd *et al.* 1989). Once lost, most seagrass ecosystems do not readily recover; recovery and recolonisation after large-scale losses are rare for temperate species in Australia, even when conditions return to normal (Poiner & Peterken 1996). Further, attempts to replant seagrass have been costly and largely unsuccessful because the plants appear to require special conditions in the substrate that are not present in disturbed sandy areas. In Tasmania, major losses of seagrass have been recorded in the large embayments of the southeast, i.e. Norfolk Bay (2,148 ha lost), Pittwater (1,201 ha), Ralphs Bay (430 ha) and along the northwest coast, i.e. Birch Point (397 ha) (Rees 1993).

### 1.3.2 Invertebrates

A very large number—probably well over 100,000—species of marine invertebrates are found in Australian waters (Zann 1995). Little is known about the taxonomic or distributional details of most small-sized invertebrates. Most marine invertebrates in Australia are undescribed, including a large proportion of those in southern Australia and Tasmania. Our knowledge of species in different habitats is also extremely patchy: the deep water benthic fauna, in particular, is huge but almost unknown.

The marine invertebrate fauna of temperate southern Australia, long isolated geologically and climatically, possesses a large number of endemic species (80–90%) in most faunal groups (Wilson & Allen 1987). For instance, more than 500 species of sponge have been recorded from southern Australia, 60% of which are only recorded from this region. Very little is known about their systematics or ecology. The same is true of more than two-thirds of the species of ascidians or 'sea squirts' (around 200), and

many of the 500 or more species of bryozoans or 'lace corals' found in southern Australia. Bryozoans reach their greatest species diversity in temperate southern Australia, where they contribute about 80% of the total shelf sediments. In this respect, bryozoans are the temperate equivalents of the hermatypic corals of the tropics of Australia. Virtually no species amongst the small invertebrate groups, such as harpacticoid copepods, nematodes, flatworms and rotifers, are known from Tasmanian waters, despite such groups being present in the hundreds of thousands per square metre in some habitat types.

By contrast, large species of Crustacea (lobsters, prawns and crabs) provide a significant commercial resource in southern Australia, hence, are relatively well-described. Notable amongst these species are the southern rock lobster (and the large deep-sea crab *Pseudocarcinus gigas,* the largest crab in the world by weight).

Species of Mollusca, such as abalone, oysters, and scallops, are also of direct economic importance in Tasmania, and similarly their status and biology is relatively well-known. In particular, major commercial fisheries have developed for blacklip abalone *Haliotis rubra,* and to a lesser extent, greenlip abalone *Haliotis laevigata* and also, scallops. Almost 5,000 tonne of blacklip abalone is harvested each year in Australia, of which, 2,510 tonne is harvested from Tasmania (McShane 1999). Of the wide range of Cephalopoda (squids, cuttlefish, octopus etc.) which occur on rocky reefs in temperate Australia, southern calamari squid, *Sepioteuthis australis* and the giant cuttlefish *Sepia apama* (one of the largest cuttle fish in the world) are important commercial and recreational species. In the cooler waters of Tasmania, Victoria and Australia, the Maori octopus, *Octopus maorum flindersi,* is also of commercial importance and is one of the largest octopuses in Australia, having been recorded with arm spans longer than 3 m and weighing more than 10 kg (Norman 1999). Other molluscs are also well represented in southern Australia and Tasmania, such as nudibranchs or 'sea-slugs' with over 500 recorded species. Volutes and cowries represent a relict fauna in Tasmania and southern Australia, with several species evolving into several subspecies, some of which are very rare. In Tasmania, as in other parts of temperate Australia, particular species are highly sought after by shell collectors.

Echinoderms (seastars, sea urchins, feather stars, sea cucumbers etc.) are also an important faunal element of Tasmanian and southern Australian waters. Within Tasmania, several species of seastar are endemic to the southeastern region: *Patiriella vivipara,* a rare live-brooding seastar which is known from only small areas of rock platform along the southeast coast; the live-brooding *Marginaster littoralis* which is known only from the Derwent Estuary; and *Smilasterias tasmaniae,* which is known only from the D'Entrecasteaux Channel region. Approximately 20 species of sea urchin occur in southern Australia, 18 of which are unique to the region (Andrew & Constable 1999). In Tasmania, 2 species are particularly important in the ecology of subtidal reefs — the common and widespread purple sea urchin, *Heliocidaris erythrogramma,* and the black sea urchin, *Centrostephanus rodgersii,* which occurs along the east coast and around eastern Bass Strait islands.

Endemic species that lack a planktonic larvae stage and possess narrow, vulnerable inshore distributions are most at risk from extinction. The seastar *Marginaster littoralis,* a

direct-developing intertidal species, has been found only in an area of less than a hectare adjacent to Hobart's oil terminal in the Derwent estuary. This species has been not found in recent surveys and is possibly now extinct (Materi 1994). Another direct-developing seastar, *Patiriella vivipara,* is also vulnerable because of its restricted intertidal habitats and possible competition from an introduced New Zealand seastar.

### 1.3.3 Fish

The Tasmanian fish fauna is highly diverse and includes more than 600 species. Over 50 species are utilised commercially, with 15-20 species contributing most to the annual commercial fisheries catch.

Most fish species present in Tasmania have also been recorded in Victoria, and, to a lesser extent, South Australia and southern and south-western Western Australia (Edgar 1984a, Edgar *et al.* 1997).

Despite the wide temperate ranges of the majority of local species, recent biogeographical studies of Australia's fish fauna indicate two unique zoogeographic provinces encompassing Tasmania — Bass Strait and the eastern, southern and western Tasmanian region (CSIRO 1996, Edgar *et al.* 1997). These regions comprise two of nine distinct biogeographical provinces recognised for the fish fauna in Australia's coastal shelf waters (CSIRO 1996, IMCRA Technical Group 1998). Difference between Bass Strait ecosystems and those further south are seen in the number of species that occur abundantly in each area but are much less abundant or absent in the other.

The fish fauna of the Bassian region is characterised as a mix of warm and cool temperate species and widespread southern Australian species (Edgar *et al.* 1997, IMCRA Technical Group 1998, Edgar 1999). Typical indicator species of this region include the horseshoe leatherjacket *Meuschenia hippocrepis*, Victorian scalyfin *Parma victoriae* and yellow-striped leatherjacket *Meuschenia flavolineata*, which are common in Bass Strait but do not extend south, and also, the herring cale *Odax cyanomelas*, magpie perch *Cheilodactylus nigripes* and old wife *Enoplosus armatus*, which gradually diminish down the east Tasmanian coast (Edgar 1999). These fish species, and others more typical of the New South Wales fauna, e.g. white ear *Parma microlepis*, eastern rock blackfish *Girella elevata* and herring cale *Odax cyanomelas*, appear to be strongly influenced by the dispersal of larvae south with the East Australian Current.

The fish fauna of the southern, western and eastern coasts of Tasmania is characterised by typical cold temperate species, a number of which also occur in New Zealand. Species that rarely if ever reach the Tasmanian north coast include sandpaper fish *Paratrachichthys* sp., real bastard trumpeter *Mendosoma allporti* and variable threefin *Forsterygion varium*. Other species — such as bastard trumpeter *Latridopsis forsteri*, stripey trumpeter *Latris lineata* and blue warehou *Seriolella brama* — are found right around Tasmania (Edgar 1999).

Tasmania also possesses a few fish species that are found only in the far southern region, particularly the southeastern embayments and Port Davey in the southwest (Edgar 1999). Port Davey provides a unique environment because a surface layer of brackish tannin-stained water blocks light penetration to the marine water below, greatly affecting normal ecosystem processes. Within the shallow waters of Port Davey, sharks,

skates and rays that are common at 50 metres depth on the continental shelf replace the normal mixture of wrasses, leatherjackets and other common coastal reef fish (Edgar 1999). One large skate with closest relatives in New Zealand and South America appears restricted to Port Davey and Macquarie Harbour, and is possibly a relict from Cretaceous times when these regions were joined as Gondwana.

Most notable amongst the southeastern Tasmanian fishes are several species of handfish, a family of fishes related to the anglerfish that is restricted to southeastern Australia. At least seven species are found in Tasmania, with five of the eight currently known species occurring only in Tasmania and Bass Strait (Bruce 1999). Unlike members of most families, handfish do not have a pelagic larval stage; consequently these species have extremely localised distributions. The spotted handfish, *Brachionichthys hirsutus* is found only on shallow, soft sediments of the lower Derwent Estuary and adjoining bays and channels. It was considered abundant until around twenty years ago, but has now almost disappeared, possibly because its eggs are vulnerable to predation by the introduced north pacific seastar *Asterias amurensis*. This species was the first marine fish listed as 'endangered' under the Tasmanian *Threatened Species Act* and Commonwealth *Endangered Species Protection Act* (Bruce 1999). The red handfish, *Brachionichthys politus* and an undescribed species, Ziebell's handfish *Brachionichthys* sp., appear to be confined to a few restricted, shallow reef habitats in southeastern Tasmania. The restricted ranges and unique biology of handfish means that all species are potentially at risk of population collapse. All species of handfish are protected in Tasmanian waters.

Other rare and endemic species of significance in Tasmania and southern Australia belong to the family Syngnathidae (pipefishes, seahorses, seadragons). Concerns have been expressed that numbers are decreasing because of trawling, destruction of habitat, and collection for aquaria and use in traditional Asian medicines. All species in this family, including the common seadragon *Phyllopteryx taeniolatus*, are protected in Tasmania. Species of syngnathids have recently been listed at the national level under schedules of the *Wildlife Protection (Regulation of Imports and Exports*) *Act* to control export for the Asian medicine trade, and the aquarium trade.

The Tasmanian whitebait *Lovettia sealii*, a small migratory species, is a commercially threatened species in Tasmania (Zann 1995). After catches peaked in the late 1940s, populations suffered a massive decline, leading to the closure of the fishery in 1974. Numbers have slowly increased since that time to sufficient levels for a limited recreational season since 1990 in a few rivers.

### 1.3.4 Reptiles

The leathery turtle *Dermochelys coriacea*, is a regular seasonal inhabitant of Tasmanian waters, particularly in Bass Strait near King Island, while a further three species of tropical and subtropical marine turtle (the loggerhead *Caretta caretta,* the hawksbill *Eretmochelys imbricata* and the green turtle *Chelonia mydas)* irregularly occur as vagrants. The status of turtles in Tasmanian waters is poorly known; however, all are considered globally under threat due to human predation of adults and eggs, and disturbance of breeding beaches.

### 1.3.5 Seabirds

The marine birds of Tasmania include seabirds, shorebirds and waders. Seabirds feed offshore (pelagic feeders), while shorebirds and waders feed on coastal mudflats, lagoons and estuaries above low tide. Offshore mainland island fauna have been surveyed by Green (1969) Pemberton (1995) and Brothers *et al.* (1996), and fauna on other islands by Bryant and Holdsworth (1992). The ecology of little penguins *Eudyptula minor* has been studied by Stahel *et al.* (1987), and the biology of the short-tailed shearwater *Puffinus tenuirostris* by Skira (1991).

The distribution and abundance of seabirds in Tasmania is relatively well known (Green 1969, Bryant and Holdsworth 1992, Brothers *et al.* 1996). However, population densities of only two threatened species — the shy albatross *Diomedea cauta* and australasian gannet *Morus serrator* — are regularly monitored by the Tasmanian National Parks and Wildlife Service. Seabirds breed on 90% of the 350 or so islands in Tasmanian waters. Bass Strait, with its many islands, has the greatest diversity and abundance of seabirds, including large numbers of short-tailed shearwaters (mutton birds) that return to breeding areas each year (Skira 1991).

A total of 15 species of marine birds are listed as threatened in Tasmania, three of which are endangered. Of the endangered species, the little tern *Sterna albifrons sinensis* breeds coastally, on beaches and sand spits, with less than 20 breeding pairs in Tasmania. The antarctic tern *Sterna vittata bethune* and wandering albatross *Diomedea exulans exulans* breed on Macquarie Island, but only the wandering albatross visits Tasmania's coasts.

Macquarie Island, one of Tasmania's two World Heritage Areas, has outstanding ecological significance, supporting enormous concentrations of breeding seabirds (and seals), which feed on marine life in the rich sub-Antarctic waters (Scott 1994, Bryant 1995). A total of 20 species of seabirds breed on Macquarie Island, with a possible 18 additional species recorded as visitors. Most of the 3.5 million breeding seabirds are penguins, of which there are four species: Gentoo Penguins (4700 breeding pairs), Royal Penguins (~850,000 breeding pairs; endemic to the island), Rockhopper Penguins (~100,000–500,000 breeding pairs) and King Penguins (~100,000 breeding pairs) (Scott 1994). Four species of albatrosses also breed on the the island: the light-mantled sooty albatross (~2000 breeding pairs), grey-headed albatross (~80 pairs), black-browed albatross (~140 pairs) and wandering albatross (less than 20 pairs).

### 1.3.6 Marine Mammals

Two species of otarid or "eared" seal breed in Tasmanian waters: the Australian fur seal *Arctocephalus pusillus doriferus* and the New Zealand fur seal *Arctocephalus forsterii*. The Australian fur seal is largely distributed in Bass Strait, but ranges from Port Macquarie (NSW) to south of Tasmania and west of Kangaroo Island. It breeds at nine sites in Bass Strait with five of these sites in Tasmanian waters. The species has haul-out sites on many other islands with the largest haul-outs being in the Maatsuyker Group off the south coast of Tasmania. In Tasmanian waters Judgement Rocks and Reid Rocks are the largest of the breeding colonies followed by Moriarty Rocks, Tenth Island and West Moncoeur. A small number of pups have also been recorded on Wright Rock. Over the

ten-year period 1989–1999 regular monitoring of pup production has been conducted at Tasmanian breeding sites with about 5,000 pups born each year. Whilst Judgement Rocks has shown an increase in pup production over the period of monitoring, all other colonies are stable or have decreased. Reid Rocks, Moriarty Rocks and Tenth Island are all relatively low lying colonies and are prone to storm events. Such events are responsible for huge fluctuations in pup numbers at these colonies.

Pemberton and Kirkwood (1994) estimated total pup production for Victorian and Tasmanian colonies to be 13,335 animals in 1991, with a total population estimate of between 46,672 and 60,000 animals. In relation to population estimates for other species of seals, worldwide this species is in low numbers. Pre-sealing estimates of the Australian fur seal population suggest that annual pup production was between 20,000 and 50,000 (Warneke, 1982).

In contrast, the New Zealand fur seal breeds in small numbers on the remote islands off the south coast of Tasmania. Brothers and Pemberton (1990) estimated the population of New Zealand fur seals on Maatsuyker Island to be at least 100 animals producing approximately 15 pups annually. However, continued monitoring indicates that the population is increasing and in March 1999 a total of 137 pups were counted on Maatsuyker Island. This suggests that the total population of the New Zealand fur seal in Tasmania is probably around 400–600 animals (F.Hume, pers coms).

Both the Australian fur seal and the New Zealand fur seal were subjected to a long period of exploitation by Europeans for pelts and oil, commencing in 1798 and finally ending around 1923 (Shaughnessy and Warneke, 1987).

Vivian (1983), Brothers and Pemberton (1990), Kirkwood et al. (1992), Pemberton (1993), Hindell and Pemberton (1997) and Shaughnessy (1999) describe the ecology and status of fur seals.

Of the ‘true’ or phocid seals, the southern elephant seal *Mirounga leonina* is a frequent visitor to Tasmania. Each year in Tasmania an average of three elephant seals are reported although some years this can be as high as ten. There have been two records of births on mainland Tasmania and two records on Maatsuyker Island (Pemberton and Skira, 1989). The breeding status of the animals on Maatsuyker Island is unknown and monitoring is being conducted to assess whether this species breeds regularly at this location or whether pupping here represents a random event. Elephant seals previously inhabited western Bass Strait, breeding on the Hunter Islands, New Years Islands and King Island but were quickly eliminated by the sealing industry (Shaughnessy,1999).

Other species of otarid and phocid seals also visit Tasmanian waters and include the crab-eater seal, leopard seal, Australian sea lion and sub-Antarctic fur seal. The leopard seal is a frequent visitor to Tasmania with an average of five reported sightings per year.

Four species of seal breed on Macquarie Island: the Antarctic fur seal *Arctocephalus gazella,* sub-Antarctic fur seal *Arctocephalus tropicalis,* New Zealand fur seal and southern elephant seal.

Whales and dolphins comprise another major group of marine mammals around Tasmania. Whales were once a conspicuous element of inshore coastal waters and the larger estuaries, but these animals were largely eliminated by hunting (Bannister *et al,* 1996). Three species are listed as endangered under the Tasmanian *Threatened Species Protection Act* (the blue whale *Balaenoptera musculus*, the southern right whale *Eubalaena australis* and the humpback whale *Megaptera novaeangliae),* while the fin whale *Balaenoptera physalus* is classed as vulnerable. Sightings of cetaceans around Tasmania between 1968 and 1990 are listed in Copson (1994).

## 1.4 MARINE ECOLOGY

### 1.4.1 Estuaries, Inlets and Wetlands

The wide range of rock types, tidal ranges and rainfall around Tasmania has produced an exceptionally wide variety of estuary, coastal wetland and lagoon types in a relatively small area. The combination of sheltered conditions and inputs from both marine and terrestrial sources means that wetlands, saltmarshes, intertidal seagrass meadows and other foreshore flats inside coastal inlets are also particularly rich in the variety and abundance of species of plant and animal life. These areas act as nurseries for many marine species and possess high productivity that supports flora and fauna.

Extensive wetland systems have developed along the coast of Tasmania, especially along sandy shores (Kirkpatrick & Glasby 1981, Kirkpatrick & Tyler 1988). In a major review of estuaries, coastal lakes, lagoons and rivers (upstream to the limit of tidal influence), Edgar *et al.* (1997) recognised 111 'estuaries' of moderate or large size around Tasmania and the Bass Strait islands. Different geomorphological types of estuaries are not evenly distributed around the Tasmanian coastline: over half of all coastal lagoons are located along the east coast, with many of the remaining lagoons in the Furneaux Group. River estuaries are prevalent along the north, west and south coasts of Tasmania, but are replaced by barrier estuaries elsewhere. Coastal inlets are concentrated in the northeast and southeast of the State. Catchments in the west, northwest and south of the state have high rainfall and high runoff, while catchments in the east and northeast are relatively dry. Estuaries in northern Tasmania have much greater tidal ranges than those on the eastern, southern and western coasts, and nearly all are open to the sea. In contrast, many estuaries in eastern Tasmania and the Bass Strait islands are closed intermittently by sand barriers.

On the basis of their physico-chemical attributes (including salinity and tidal range), estuaries in Tasmania were classified by Edgar *et al.* (1997) into nine major groups: intermittently-barred low-salinity estuary; small open estuary; marine inlet; hypersaline lagoon; mesotidal river estuary; mesotidal drowned river valley (Tamar estuary); microtidal drowned river valley; large open microtidal river; and microtidal intermittently-barred estuary (Wanderer estuary).

Aquatic diversity was found to vary with the type of estuary, with the greatest number of species recorded in marine inlets and small open estuaries. Relatively few species

occur in microtidal river estuaries, barred low-salinity estuaries or hypersaline lagoons, and very few in the western Tasmanian Wanderer estuary. North East Inlet (Flinders Island) and seagrass beds at the mouth of the Tamar estuary have an exceptionally high diversity of both fishes and invertebrates. The number of macrofaunal species is highest in the Furneaux Group, northeastern Tasmania and southeastern Tasmania, and lowest on the west coast and, to a lesser extent, south coast, central north coast and King Island. These patterns primarily reflected differences in estuary type between regions rather than the concentration of locally endemic species. The low number of species recorded from estuaries along the west coast reflected extremely low macrofaunal productivity in the region. This was attributable to unusually low concentrations of dissolved nutrients in rivers and the dark, tannin-stained waters that restrict algal photosynthesis and primary production (Edgar *et al.* 1997).

The number of macrofaunal species in estuaries is closely related to salinity and the biomass of submerged plant life, particularly seagrass. Nearly all fish and invertebrate species found in Tasmanian estuaries occur widely within the State and have also been found in southeastern Australia. Only 1% of the estuarine fish species and <5% of invertebrate species found in the Edgar *et al.* (1997) study were considered endemic to the State. A small (<10%) component was found only in the northeast (particularly Flinders Island), and a few species were restricted to particular regions.

Estuaries include the most degraded marine environments in Tasmania. In a survey of the health of estuaries in Tasmania, only 24 out of 90 Tasmanian mainland catchments were considered pristine, with little apparent human impact within the catchment (Edgar *et al.* 1997). The highest level of land clearance, population and urban development occurs in catchments along the southeast, east and north coasts of Tasmania. Major causes of estuarine degradation are siltation from land clearance and urban and rural run-off; increased nutrient loads from sewage and agricultural use of fertilisers; urban effluent; foreshore development and dredging; marine farms; modification to water flow through dams and weirs; acidification of rivers and heavy-metal pollution from mines; the spread of introduced pest species; and long-term climate change.

Eleven relatively undisturbed estuaries and associated catchments, including nine representative estuaries (based on physico-chemical criteria), North East Inlet and Southport Lagoon, have been recommended for establishment as an integrated system of estuarine protected areas (Edgar *et al.* 1997) (see Section 5.12.2).

### 1.4.2 Soft Sediments

Soft-bottom habitats (sand, mud and seagrass) are the dominant feature of inshore marine environments in Tasmania, particularly beaches, embayments, coastal lagoons and estuaries. While most soft-sediment habitats are not vegetated, extensive areas of seagrass occur in some areas: mostly *Posidonia australis* and *Amphibolis antarctica* along the north coast, and *Heterozostera tasmanica* and *Halophila australis* in estuaries and embayments (Rees 1993). While the distribution of seagrass habitats in Tasmania has been mapped at a coarse scale (Rees 1993, Edyvane *et al.* 2000), the ecology of seagrasses and their associated biota have not been adequately studied. Similarly, very few

ecological studies have investigated biological communities in soft-bottom habitats or assessed the physical and biological processes underpinning these ecosystems (Moverley & Jordan 1996).

A recent study of inshore environments (Georges Bay, Norfolk Bay and the Tamar River) found few differences in the diversity or density of soft-bottom invertebrate species (Moverley & Jordan 1996). Vegetated sites generally possessed greater faunal diversity and abundance than unvegetated sites, but occasional sites showed contrary trends (e.g. Norfolk Bay). The structure of faunal communities appeared to be determined more by site-specific environmental conditions (such as sediment and salinity) than by the presence of seagrass.

### 1.4.3 Reefs[1]

Differences in exposure to the prevailing weather patterns exert a strong influence on subtidal reef communities. Plants and animals living on the shallow rocky reefs in western Tasmania are adapted to exposed, harsh conditions, while species along the northern Tasmanian coast experience milder conditions, with lower swells and warmer water temperatures. Not surprisingly, biological communities associated with reefs in the two regions possess many differences. In general, the rocky reefs of Bass Strait have a high diversity of plant and animal species, and relatively low productivity. West coast reefs support fewer species, but organisms present can occur in extremely high abundance.

Most temperate reef communities in southern Australia, including Tasmania, are dominated by large seaweeds, such as bull kelp *Durvillaea potatorum*, giant kelp *Macrocystis pyrifera* and crayweed *Phyllospora comosa*, which form large, dense forests on inshore reefs. Similarly, invertebrate animals, particularly sessile organisms such as sponges, ascidians, bryozoans, hydroids and soft corals, are also a key feature of rocky reefs in Tasmania. Marine invertebrates are generally much more diverse in Tasmania than in other temperate regions of the world.

The flora and fauna living on Tasmanian reefs represents a complex mixture of species derived from several sources. The main components of this mixture are local Tasmanian species, which are mostly in the south; southern Australian species, which extend from South Australia into Bass Strait; and eastern Australian species, which extend from New South Wales along the Tasmanian east coast and westwards across Bass Strait. The relative importance of each of these components has changed markedly over the past fifty years.

The most obvious change in Tasmanian reef communities has been a huge increase in the prevalence of eastern Australian species at the expense of Tasmanian species. This shift reflects changes in the major oceanographic currents that sweep around the island, particularly the increasing penetration of the warm Eastern Australian Current

[1] From Edgar G. 1999. Tasmania. In, `*Under Southern Seas: the ecology of Australian rocky reefs'*, edited by N Andrew. University of New South Wales Press, Sydney, pp.30-39.

southward down the Tasmanian east coast. The causes of these changes are likely related to global climate-change.

The increased penetration of the East Australian Current has brought warmer, clearer water down the east coast, and a declining concentration of dissolved nutrients. This has caused several major changes in the composition of communities on rocky reefs. For example, forests of giant kelp that used to be sufficiently abundant to be harvested commercially have greatly diminished in area or have completely disappeared. Animal species that are common in New South Wales but had not been recorded in Tasmania before the 1960s, such as the large surf barnacle *Austromegabalanus nigrescens* and the black sea urchin *Centrostephanus rodgersii*, now dominate large patches of reef. Interpreting such long-term changes is complicated by intensive fishing. For many species, such as southern rock lobster, which have reduced in numbers along the east coast, and barracouta, which have shown a dramatic decline in population numbers overall, it is impossible to separate how much of the population change has been caused by fishing and how much is attributable to climate change.

### 1.4.4 Offshore Islands

About 600 named islands, rocks and reefs are present around the Tasmanian coast (Rounsevell 1989). The majority of these are true islands, with most of the land mass lying above the high-water mark. Many islands support flora and fauna of conservation significance, including breeding populations of seabirds and seals (Rounsevell 1989). The most northerly of the Bass Strait islands, Rodondo and West Moncoeur, lie only 13 and 16 km respectively from the Victorian coast.

### 1.4.5 Offshore Ecosystems

Very little is known of Tasmania's and Australia's offshore marine ecosystems. While geological surveys of the seabed for mineral and petroleum exploration have been undertaken over the past several decades, these rarely involve detailed surveys of the benthic biota. Similarly, oceanographic surveys and offshore fisheries research have given some insight into the physical oceanographic processes (i.e. currents, upwellings, etc.) and pelagic biota of Australia's offshore regions—but these have largely concentrated on examining ecological processes underpinning commercial pelagic resources (e.g. southern bluefin tuna, krill, orange roughy, patagonian toothfish, etc.).

The continental shelf of Australia is largely overlain with deposits of silt and sand (Harris 1995). These come from riverine discharges and the shells of marine organisms. Sediments are continuously being exchanged, moving onshore and offshore with tides, currents and weather. Vast amounts of sediment are also transported along the continental shelf. In Bass Strait, massive sediment deposits covering the sea-floor from Tasmania and Victoria are gradually moving eastwards, flowing off the continental shelf to the deep ocean floor. Some geological structures on the continental shelf formed when exposed to air during the last glacial period; for example, trenches created as ancient river channels (Harris 1995).

One of the more distinctive ecosystems of Tasmania's continental shelf is the offshore seamount field located between 50 and 100 km off southern Tasmania. In this region, about 70 seamounts — the cone-shaped remnants of extinct volcanoes — arise from water depths of between 1000 and 2000 m. Seamounts create a distinctive deep-sea environment by enhancing current flow across the sea bed; consequently, little sediment is deposited and unique deep-sea benthic communities can evolve, dominated by corals and filter-feeders. Fishes such as the orange roughy and deepwater oreos aggregate in these areas, presumably because of enhanced flow of prey organisms past the seamounts, and their role as position markers to concentrate spawning animals.

Seamounts in the region contain a diverse fauna, a high proportion of which have not been recorded elsewhere. The fauna is highly vulnerable to trawling and probably possesses a slow rate of recovery from disturbance. Animals living on seamounts typically possess low growth rates and low natural mortality.

In January 1997, CSIRO surveyed 14 seamounts on the continental slope south of Tasmania, over a range of depths and degrees of previous commercial trawling (from unfished to heavily fished) (Koslow and Gowlett-Holmes 1998). The species richness of the benthic seamount fauna was found to be high in global terms: 262 species of invertebrates and 37 species of fish were identified in the samples from a single cruise, whereas 598 species were reported world-wide from all seamount studies conducted before 1987. On seamounts that peaked at depths <1,400 m and that had not been heavily fished, the invertebrate fauna on the slopes was dense and diverse. It was generally dominated by filter-feeders, in particular a matrix-forming colonial hard coral *Solenosmilia variabilis*, but including a variety of hard and soft corals, hydroids, sponges and filter-feeding ophiuroids and sea-stars. This fauna has elements distinct from the fauna found elsewhere on the continental slope, and between 24 and 43% of the invertebrate species were considered to be new to science (Koslow & Gowlett-Holmes 1998).

Trawl operations appear to have significantly impacted the most heavily fished seamounts, such as Main Pedra and Sister, where the reef aggregate has been mostly removed from the slopes or turned to rubble. The benthic biomass from heavily fished seamounts was 83% less than from lightly fished or unfished seamounts and the number of species per sample was 59% less (Koslow & Gowlett-Holmes 1998).

The seamounts off Tasmania have recently been reserved by the Commonwealth as the Tasmanian Seamounts Marine Reserve, partly to protect a representative sample of the unique seamount region as part of the National Representative System of Marine Protected Areas, and also to protect the high biodiversity values of the seamount benthic communities from human-induced disturbance.

## 1.5 MARINE ECOSYSTEMS OF TASMANIA

Strategies for the conservation of marine biodiversity need to take account of the hierarchical nature of ecosystems, biodiversity and ecological processes. Biological diversity can be defined at the ecosystem, seascape / habitat, species and genetic levels (see Box 1.1); at all these levels, marine and coastal systems are extraordinarily diverse.

However, because of the inaccessibility of the marine environment and the lack of knowledge of marine biodiversity at the species level, biodiversity in marine environments is generally measured at the level of seascape or habitat (Ray 1991, Ray & Grassle 1991).

In large marine ecosystems, such as major oceanic and pelagic ecosystems, biodiversity is defined by large-scale processes such as oceanography (currents, upwellings), trophodynamics, coastal physiography and basin topography (Sherman *et al.* 1990). In smaller-scale ecosystems (e.g. open coasts, gulfs), habitats (e.g. reefs, estuaries, bays) and biological communities (e.g. mangroves, seagrasses, kelp forests, coral reefs), biodiversity is influenced by small-scale physical processes such as type of substrate, cyclones, storm events, changes in wave exposure, or biological processes such as competition and predation. In defining an ecologically representative system of Marine Protected Areas, the full range of Tasmania's marine biodiversity needs to be conserved, from the large marine ecosystems, to the habitat and community-level patterns of biodiversity.

### Box 1.1 What is Biological Diversity ?

The *National Strategy for the Conservation of Australia's Biological Diversity* (1996 p.1) defines biological diversity as: "the variety of all life forms—the different plants, animals, microorganisms, the genes they contain, and the ecosystems of which they form a part. It is not static, but constantly changing; it is increased by genetic change and evolutionary processes and reduced by processes such as habitat degradation, population decline and extinction. The concept emphasises the inter-relatedness of the biological world. It covers the terrestrial, marine and other aquatic environments.

Biological diversity can be considered at three fundamental levels:

- ***Genetic diversity*** – the variety of genetic information contained in all of the individual plants, animals and microorganisms that inhabit the earth. Genetic diversity occurs within and between the populations of organisms that comprise individual species as well as among species.
- ***Species diversity*** – the variety of species on earth.
- ***Ecosystem diversity*** – the variety of habitats, biotic communities and ecological processes".

Conservation of marine biodiversity in Tasmania also needs to take account of coastal and oceanographic change over geological time scales (particularly with respect to the evolution of the coastal and marine environments) and land–sea dynamics (Ray 1991). For temperate southern Australia, a long period of geological and continental isolation resulted in high endemism in the marine biota (Poore 1995), while continental drift and periods of global warming and cooling resulted in intrusions of warm water from the Indo–Pacific and in sea-level changes. In Tasmania, the southeast region is particularly significant, as it has not only many endemic species, but also sub-Antarctic species in the marine flora and fauna (Edgar *et al.* 1997).

Ecological processes and human impacts can also can be understood and managed at a range of space and time scales. Because of the nested hierarchical structure of ecosystems, marine management (including the establishment and management of Marine Protected Areas) needs to examine and operate on several scales (Ray & McCormick-Ray 1992). Such

an approach requires understanding of patterns and processes in natural systems, and a recognition of the scales of human impact, monitoring and management (Edyvane 1996).

### 1.5.1 Classifying Marine Ecosystems — Bioregionalisation

In natural ecosystems, the patterns of biodiversity, particularly habitat biodiversity, must be understood to identify appropriate ecological units for integrated management at the ecosystem level (e.g. catchment, seascape) (Kessler *et al.* 1992, Grumbine 1994, Klijn 1994). 'Bioregionalisation', or the definition of biogeographic regions, is therefore an essential step in marine conservation planning, and is also essential for designing an appropriate planning framework for ecosystem management (Ray & McCormick-Ray 1992, Muldoon 1995). Bioregionalisation can be used to identify ecologically or biogeographically representative Marine Protected Areas (MPAs) and the representativeness of an existing system of MPAs. It also provides a framework for multiple-use ecosystem management (Sainsbury *et al.* 1997).

In Tasmania, surveys of inshore marine habitats and biodiversity have been linked with physical aspects of the environment by the Parks and Wildlife Service to define the biogeographical regions of Tasmania at a range of spatial scales. This process should allow priority areas for marine conservation to be identified (Edgar 1981, 1984b, Edgar *et al.* 1997).

Due to the nested, hierarchical nature of ecosystems, patterns of marine biodiversity and ecological processes can be identified at several levels relevant to marine management:

- **Pelagic Provinces** (100,000s of $km^2$, gigascale), which provides a broad-scale strategic framework for the integrated management of pelagic resources; suitable for integrated pelagic fisheries and resources management, global reporting, auditing;
- **Demersal Provinces** (10,000s of $km^2$, macroscale), which provides a broad-scale strategic framework for the integrated management of demersal resources; suitable for integrated demersal fisheries and resources management, global reporting, auditing;
- **Biophysical Regions or `Bioregions`** (1,000s of $km^2$, mesoscale), which provides a national strategic framework for marine planning and ecological sustainable management of coastal resources; suitable for national biodiversity and conservation planning and priority-setting, reporting, auditing (e.g. national State of the Environment Report);
- **Ecosystems** (100s of $km^2$, microscale), which provides an ecosystem or regional framework for marine planning and ecological sustainable management of coastal resources; identifies functional ecosystem-level management units (e.g. rocky shores, dune barrier systems, archipelagos, shoals or reef systems, coastal peninsula, etc.) suitable for integrated multiple-use management and MPA declaration, regional biodiversity and conservation planning and priority-setting, fisheries management, reporting, auditing, monitoring, impact assessment;

- **Habitats** (1–10s of km², picascale), which provides information for tactical site management at the habitat level (e.g. bay, estuary, reefs, seagrass meadows); suitable for nature reserves, fishing closures, monitoring, impact assessment.

The approach to bioregionalisation used in Tasmania forms part of an integrated, coordinated State and Commonwealth effort to develop the *'Interim Marine and Coastal Regionalisation of Australia'* (IMCRA) — a tool to assist in developing a national representative system of Marine Protected Areas (NRSMPA) (Muldoon 1995, IMCRA Technical Group 1998). To date, 58 bioregions in the nearshore marine environments of Australia have been identified on the basis of physical and biological factors such as climate, oceanography (water temperature, wave energy), tidal range, coastal geomorphology and biology (habitats, marine mammals, endemic species) (Oritz & Burchmore 1992, CALM 1994, LCC / DCNR 1994, Hamilton 1994, Edyvane & Baker 1995, Stevens 1995). In Tasmania, the IMCRA classification was based principally on the distribution of subtidal organisms (particularly fish, crustaceans, molluscs and macroalgae) determined by systematic field surveys (Edgar *et al.* 1997).

For Tasmanian waters, a total of 1 pelagic province, 2 demersal provinces, 2 biotones (the zones of transition between core provinces) and 9 bioregions have been identified (IMCRA Technical Group 1998, see Table 1.2).

**Table 1.2 A hierarchical bioregional planning framework for Tasmania's coastal and marine ecosystems.**

| Pelagic Province | Demersal Province/ Biotones | Bioregion |
|---|---|---|
| *Gigascale (100,000s km²)* | *Macroscale (10,000s km²)* | *Mesoscale (1,000s km²)* |
| | West Bassian Biotone | Otway |
| Southern Pelagic Province | Tasmanian Province | Franklin |
| | | Davey |
| | | Bruny |
| | | Freycinet |
| | Bassian Province | Boags |
| | | Central Bass Strait |
| | South Eastern Biotone | Flinders |
| | | Twofold Shelf |

### 1.5.2 Province or Large Marine Ecosystems

#### Pelagic Ecosystems

The *Interim Marine and Coastal Regionalisation of Australia* (IMCRA Technical Group 1998) classification defines one pelagic province in Tasmanian waters: the Southern Pelagic

Province. This province includes offshore waters and extends along the southern Australian coast.

**Southern Pelagic Province**

Area: 482,000 km²

Location: Extending from near Albany (WA) in the west, along the southern coast to Lakes Entrance (Victoria) in the east and enclosing Bass Strait and the Tasmanian waters.

Remarks: Largely supports Flindersian cool-temperate species. The endpoint transition zones are also the southern limits for warm-temperate species in the Eastern and Western Pelagic Biotones. Between-province disjunctions occur at Esperance and east of Point Dempster near the western edge of the Baxter Cliffs. In the east, transition zones occur just east of Kangaroo Island and at Wilsons Promontory.

## Demersal Ecosystems

The *Interim Marine and Coastal Regionalisation of Australia* (IMCRA Technical Group 1998) classification defines two macroscale, demersal provinces for Tasmanian waters: the Tasmanian and Bassian, and two biotones (i.e., areas of biological overlap): the West Bassian and the South Eastern. The provinces and biotones are based on a classification of demersal fish species diversity and richness.

**Tasmanian Province -** Area: 32,220 km²

Location: Extending from the northeastern tip of Tasmania around Cape Naturaliste and encircling the east, south and west coasts up to Cape Grim at its northwesterly extremity.

Remarks: Defined by the southern sector of cool temperate Maugean Province (Whitley 1937). Its core region lies south of Bass Strait. Most species extend westward into the West Bassian Biotone and Gulfs Province, and northward to the central part of the South Eastern Biotone. The province is penetrated in its Eastern sector by elements of the Central Eastern Province in summer, and to a lesser extent by the Bassian Province and provinces further to the west.

Mesoscale Regions: Includes Franklin, Davey, Bruny and Freycinet regions.

**Bassian Province -** Area: 70,630 km²

Location: Comprising the core of Bass Strait flanked by King Island in the west and the Furneaux and Kent Group of islands in the east. The northwestern margin is just east of Cape Otway and extends to Waratah Bay. The southern limit extends along the Tasmanian coast from near Kangaroo Island to Tree Point (Little Musselroe Bay).

Remarks: A weak province defined by a small suite of narrow-ranging, endemic species confined to Bass Strait and adjacent biotones, superimposed on a strong biotone of mixed warm-temperate elements from the Central Eastern Province and, South Western Province, cool-temperate elements from the Tasmanian Province, and widespread southern-temperate species mix. The region is recognised on the basis of its small but unique indicator group that is important from a biodiversity conservation perspective.

Mesoscale Regions: Victorian Embayments, Central Victoria, Central Bass Strait and Boags regions.

**West Bassian Biotone -** Area: 89,751 km²

Location: Extends east from the Tasmanian Gulfs Province, past King Island to a southern limit at the northwestern tip of Tasmania and a northern limit slightly north of Apollo Bay (Victoria).

Remarks: Zone of overlap of faunal elements derived mainly from the Tasmanian Province and Bassian Province to the east, as well as a small suite of species from the Central Eastern Province and elements from the South Western Province and Gulfs Province.

Mesoscale Regions: Includes Otway and Coorong regions.

**South Eastern Biotone -** Area: 53,510 km²

Location: From the south of Wollongong to east of Wilsons Promontory, and south to Cape Portland, enclosing the Furneaux and the Kent Groups of islands.

Remarks: Zone of faunal overlap, strongly dominated by warm-temperate elements of the Central Eastern Province. Exhibits smaller influences from the North Eastern, Tasmanian, and Bassian Provinces. Contains a major disjunction near Cape Howe. The extent of southward penetration of northern species appears to be determined by the water masses of the extension of the warm East Australian Current.

Mesoscale Regions: Twofold Shelf, Batemans Shelf, and Flinders regions.

Tasmania's waters comprise essentially two major biogeographical provinces (bioprovinces): the *Bassian Bioprovince*, which encompasses the marine ecosystems of Bass Strait; and the *Tasmanian Bioprovince*, which encompasses the ecosystems of eastern, southern and western coasts of Tasmania. Reef fish, invertebrate and plant communities in Bass Strait differ substantially from those further south along the Tasmanian coast (Table 1.3; Edgar *et al.* 1997).

**Table 1.3 Species identified in an analysis of reef fauna as typical of the Bassian and Tasmanian provinces (after Edgar *et al.* 1997).**

(Virtually all species listed as typical of the Bassian province do not extend south into the Tasmanian province, whereas many of the Tasmanian province species occur in small numbers in Bass Strait.)

| Taxon | Bassian Province | Tasmanian Province |
|---|---|---|
| Fish | sergeant baker (*Aulopus purpurissatus*)<br>half-banded sea perch (*Hypoplectrodes maccullochi*)<br>rock blackfish (*Girella elevata)*<br>silver drummer (*Kyphosus sydneyanus)*<br>old wife (*Enoplosus armatus)*<br>scalyfin (*Parma victoriae*)<br>dusky morwong (*Dactylophora nigricans)*<br>short-fin pike (*Sphyraena novaehollandiae)*<br>horseshoe leatherjacket (*Meuschenia hippocrepis)*<br>collared catshark (*Parascyllium variolatum)*<br>banded seaperch (*Hypoplectrodes nigrorubrum)* | conger eel *(Conger verreauxi*)<br>rock ling (*Genypterus tigerinus)*<br>big-bellied seahorse (*Hippocampus abdominalis)*<br>weedy sea dragon (*Phyllopteryx taeniolatus)*<br>gurnard perch (*Neosebastes scorpaenoides*)<br>butterfly perch (*Caesioperca lepidoptera)*<br>jack mackerel (*Trachurus declivis)*<br>real bastard trumpeter *(Mendosoma allporti)*<br>variable threefin (*Forsterygion varium)*<br>warehou (*Seriolella brama)*<br>stripey trumpeter (*Latris lineata)*<br>ringed toadfish (*Omegophora armilla)*<br>sandpaper fish (*Paratrachichthys* sp.) |
| Invertebrates | *Nepanthia troughtoni*<br>*Echinaster arcystatus*<br>*Nectria macrobrachia*<br>*Holopneustes porosissimus*<br>*Haliotis laevigata*<br>*Haliotis scalaris* | *Astrostole scabra*<br>*Patiriella regularis*<br>*Argobuccinium vexillum* |
| Algae | *Caulerpa vesiculifera*<br>*Cystophora monilifera*<br>*Cystophora polycistidea*<br>*Scaberia agardhii*<br>*Xiphophora chondrophylla*<br>*Sargassum varians*<br>*Caulerpa cactoides* | *Macrocystis pyrifera*<br>*Xiphophora gladiata*<br>*Carpomitra costata*<br>*Jeannerettia lobata*<br>*Lenormandia muelleri*<br>*Dictymenia harveyana*<br>*Kallymenia cribrosa* |

| | |
|---|---|
| *Caulerpa obscura* | *Desmarestia ligulata* |
| *Dictyosphaeria sericea* | |
| *Apjohnia laetevirens* | |
| *Plocamium preissianum* | |
| *Sargassum heteromorphum* | |
| *Caulerpa flexilis var. muelleri* | |

### 1.5.3 Bioregion or Ecosystem-Level Regionalisation

Based on the distribution of reef plants and animals, the Bassian and Tasmanian marine bioprovinces (and biotones) are each further divided into eight distinct inshore marine biogeographical regions (or 'bioregions') (Figure 1.1 and Table 1.4). The Bassian bioprovince contains the Boags and Central Bass Strait bioregions; the West Bassian biotone contains the Otway bioregion; the Tasmanian bioprovince contains the Franklin, Davey, Bruny and Freycinet bioregions; and the South Eastern Biotone contains the Flinders and Twofold shelf bioregions. In addition, the waters around sub-Antarctic Macquarie Island are in the Insulantarctic Bioprovince.

Because bioregions extend for hundreds rather than thousands of kilometres, the 'distinctiveness' of bioregions relates to the mix of common species rather than the presence of unique species; most species present in each bioregion generally also occur in several other regions, but in different combinations. Two Tasmanian bioregions, Davey and Bruny, nevertheless differ from other bioregions around Australia because they possess numerous species confined to that area.

Each bioregion generally has a different proportion of major habitat types (Table 1.5). Seagrass meadows are most prevalent in the Boags and Flinders bioregions, whereas extensive reef areas occur in the Franklin bioregion. Surveys of reef habitat also indicate major differences in numbers of species between bioregions (Table 1.6). Highest numbers of fish species occur on reefs in the Twofold bioregion, extremely low numbers of invertebrates are recorded in the Davey and Franklin bioregions, and high plant species richness is recorded in the Bruny, Davey and Otway bioregions.

**FIGURE 1.1 Bioregions of Tasmania as defined under the Interim Marine and Coastal Regionalisation of Australia (IMCRA Technical Group 1998)**

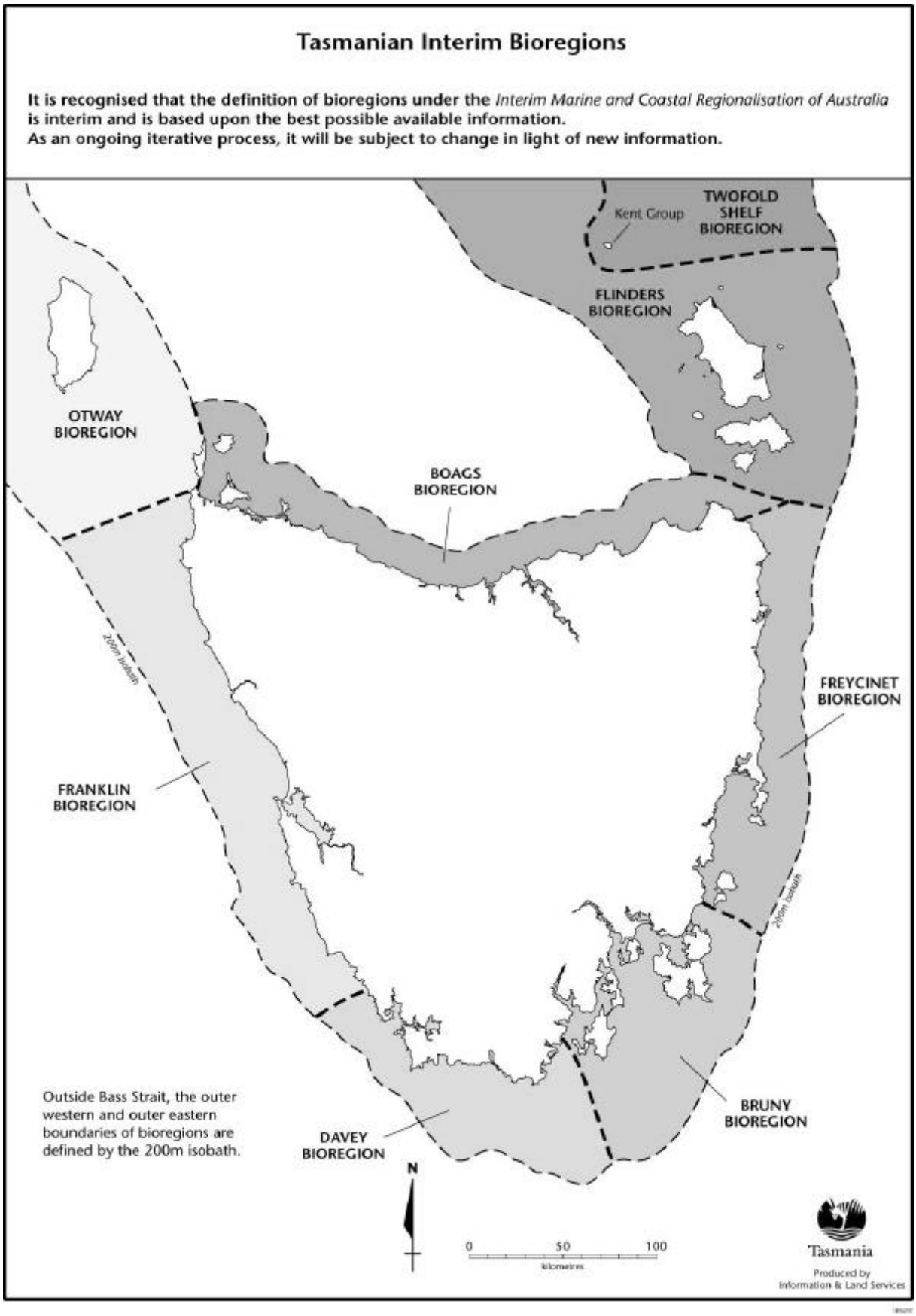

**Table 1.4 Summary of the IMCRA bioregions of Tasmania (from IMCRA Technical Group 1998).**

+ Seaward edge of bioregions defined by the 200 metre isobath.

| Province/ Biotone | Bioregion | Total area of Bioregion)+ ($km^2$) | Boundaries | Remarks |
|---|---|---|---|---|
| West Bassian Biotone | Otway | 37,331 | Cape Jaffa to slightly north of Apollo Bay; includes King Island environs | (Tas) Steep to moderate offshore gradients. High wave energy. Moderately strong currents through entrance to Bass Strait. |
| Tasmanian Province | Franklin | 10,363 | Svenor Point to Cape Grim | Extremely exposed open coastline with long sandy beaches broken by rocky headlands. Moderate tidal range 1.5 m. |
| | Davey | 6,794 | Southport to Svenor Point | Very exposed coastline with extensive rocky headlands separated by sandy beaches. Low tidal range ≈ 1 m. Biologically depauperate. Cold water. |
| | Bruny | 7,287 | Cape Bernier to Southport | Strongly dissected coastline with extensive bays protected from swell by islands and peninsulas. Low tidal range ≈ 1 m. Endemic plants and animals. |
| | Freycinet | 8,078 | Tree Point to Cape Bernier | Submaximally exposed coastline with approximately equal areas of rocky headland and sandy beach, and numerous coastal lagoons. Moderate tidal range ≈ 1.5 m. Cool water; subtropical convergence. |
| Bassian Province | Boags | 8,270 | Near Kangaroo Island to Tree Point (Little Musselroe Bay) | Sheltered open coastline with long sandy beaches broken by rocky headlands that extend under sand in relatively shallow depths (normally < 20 m). High tidal range ≈ 3 m. |
| | Central Bass Strait | 49,310 | Offshore Central Bass Strait | The sea floor is shaped like an irregular saucer about 80 m deep at its centre and 50 m on the margins. The substrate is mainly mud. Tidal velocities range from <0.05 ms-1 in the centre to 0.5 ms-1 at the margins where the islands and promontories form the western and eastern entrances to Bass Strait. Water mass characteristics are complex and vary seasonally with the mixing of the different water masses on the west and east of the Strait. |
| | Flinders | 20,951 | Eastern entrance to Bass Strait, includes Wilsons Promontory, Flinders Island and other islands (but not the Kent Group) | (Wilson's Promontory transition zone) Rapid changes in offshore gradient. Granitic coastline exposed to moderate / strong? swells on east-facing shores of Flinders Island and moderate to low swells elsewhere. Sandy beaches, with seagrass beds in shallow water. High tidal range ≈ 3 m and strong tidal currents. Sea-surface temperature is representative of Bass Strait waters. Waves highly variable. |
| | Twofold Shelf | 32,197 | East of Wilsons Promontory and north to Tathra, including the Kent Group of islands | Submaximally exposed coastline with long sandy beaches broken by rocky headlands, and numerous coastal lagoons. Moderate tidal range ≈ 2 m. Mean annual sea-surface temperature reflects the influence of warmer waters brought into Bass Strait by the East Australian Current. Variable wave energy. |
| | Total | 180,586 | | |

**Table 1.5 Patterns of major marine habitats in the Tasmanian marine bioregions (Edyvane et. al. 2000)**

| Bioregion | Total Area Of Bioregion[+] ($km^2$) | Tas Area[#] of Bioregion ($km^2$) | Total Mapped Area $km^2$ (% bioregion) | Major Inshore Habitats ($km^2$, % area mapped) |
|---|---|---|---|---|
| Otway | 37,331 | NA. | Not mapped. | NA. |
| Franklin | 10,364 | 2,346.8 | 653 (6.30%) | Seagrass (0 $km^2$, 0%)<br>Sand (404 $km^2$, 61.9%)<br>Reef (249 $km^2$, 38.1%) |
| Davey | 6,794 | 2,050.4 | 201 (2.96%) | Seagrass (5 $km^2$, 2.5%)<br>Sand (100 $km^2$, 49.8%)<br>Reef (96 $km^2$, 47.8 %) |
| Bruny | 7,288 | 4,042.6 | 498 (6.83%) | Seagrass (15 $km^2$, 3.0%)<br>Sand (412 $km^2$, 82.7%)<br>Reef (71 $km^2$, 14.3%) |
| Freycinet | 8,079 | 3,277.4 | 392 (4.86%) | Seagrass (13 $km^2$, %)<br>Sand (308 $km^2$, %)<br>Reef (72 $km^2$, %) |
| Central Bass Strait | 49,310 | 4,417.0 | NA | NA |
| Boags | 8,271 | 4,341.8 | 1258 (15.21%) | Seagrass (143 $km^2$, 11.4 %)<br>Sand (948 $km^2$, 75.3%)<br>Reef (168 $km^2$, 13.3%) |
| Flinders | 20,951 | 3,338.2 | 2019 (9.64%) | Seagrass (212 $km^2$, 10.5%)<br>Sand (1665 $km^2$, 82.5%)<br>Reef (141 $km^2$, 7.0%) |
| Twofold Shelf | 32,198 | NA. | Not mapped. | NA. |
| **TOTAL** | **180,586** | **23,814.5** | **5020.11 (2.83%)** | |

**Table 1.6 Patterns of marine biodiversity along the Tasmanian coast, as indicated by numbers of species recorded by divers along 50 m transects placed on reefs (from Edgar *et al.* 1997).**

| BIOREGION | SPECIES DIVERSITY (mean number of species, min-max) | | | |
|---|---|---|---|---|
| | fishes | invertebrates | plants | all taxa |
| **Franklin** | 5.4 (1-11) | 7.5 (5–11) | 14.2 (7–23) | 27.1 (16–41) |
| **Davey** | 7.9 (1–16) | 6.8 (4–16) | 20.6 (7–35) | 34.0 (10–46) |
| **Bruny** | 14.3 (5–21) | 12.3 (4–19) | 21.9 (9–33) | 48.4 (33–63) |
| **Freycinet** | 15.4 (6–26) | 12.2 (4–20) | 16.2 (3–31) | 43.8 (20–66) |
| **Boags** | 16.6 (7–29) | 12.3 (7–17) | 19.9 (13–28) | 48.6 (31–62) |
| **Flinders** | 13 (4–22) | 10.5 (6–17) | 19.3 (3–29) | 42.9 (17–57) |
| **Twofold** | 23.4 (16–34) | 11.0 (8–14) | 17.0 (7–28) | 51.4 (33–59) |
| **Otway** | 10.3 (4–18) | 11.0 (5–17) | 22.2 (18–28) | 44.8 (33–57) |

# CHAPTER 2

# MARINE MANAGEMENT IN TASMANIA

## 2.1 INTRODUCTION

Marine Protected Areas are one element of an integrated marine management framework, that contributes to both the conservation of biodiversity and ecologically sustainable use of marine resources (Kenchington 1990). While Marine Protected Areas set aside areas for the specific conservation of biodiversity, the management of sustainable use (i.e. protection from over-use or over-exploitation) and ecosystem health (i.e. protection from pollution or habitat degradation) are also key elements in maintaining the overall integrity of the ecosystem, conserving marine biodiversity and ecological processes (Kelleher & Kenchington 1991, Ray & McCormick-Ray 1992).

In Tasmania, this is attempted through a variety of legislation, policies and management mechanisms. These range from defining priority-use areas for specific activities (such as shipping and aquaculture), to prohibiting or regulating particular marine activities through area closures or gear restrictions (such as fisheries), and providing rights of access for activities (such as mining), to protecting sites of historic or cultural significance (such as historic shipwrecks). In addition to specific area management, legislation and management tools are also available to provide overall ecosystem protection from over-exploitation (e.g. quotas, gear restrictions, levels of production) and ecosystem harm (e.g. Codes of Practice, best practice).

Tasmanian marine and coastal activities are managed through the agencies and legislation described in the next sections.

## 2.2 JURISDICTION

Jurisdiction over coastal and marine areas in Australia is shared by the Commonwealth and State/Territory governments. The State of Tasmania generally has legislative jurisdiction (under the *Commonwealth Coastal Waters (State Powers) Act 1980*) over land, sea and the seabed out to 3 nautical miles seaward of the baseline. The baseline is either the low-water mark or straight lines drawn from specified headland to headland.

The Commonwealth Government has jurisdiction over any coastal land it owns and over marine areas from 3 to 200 nautical miles seaward of the baseline (the limit of Australia's Exclusive Economic Zone under the international Law of the Sea).

Offshore Constitutional Settlement arrangements between the State of Tasmania and the Commonwealth provide for certain resources in one jurisdiction to be managed by the other authority, or managed jointly.

On land, the State Government shares the jurisdiction with local government, which derives its powers from the *Local Government Act 1993*. In the coastal zone, the State Government has jurisdiction over, and management responsibility for, around 83% of the land immediately adjacent to Tasmania's coastline; the remaining 17% of the coastline is private land or under local government jurisdiction.

The State Government therefore has primary jurisdiction over land and water in the coastal zone. The agencies responsible for coastal land are the Department of Primary Industries, Water and Environment; and Forestry Tasmania. The agencies responsible for the marine environment are the Department of Primary Industries, Water and Environment; the Marine and Safety Authority of Tasmania; and a number of port companies.

## 2.3 INSTITUTIONAL ARRANGEMENTS

The overall management of the coastal zone and its resources is shared by the Commonwealth, State and local governments, which makes public administration complex. Increasingly, under the National Coastal Action Program announced in May 1995, all spheres of government are cooperating in coastal management.

### 2.3.1 Fisheries and Aquaculture

The Department of Primary Industries, Water and Environment (Food, Agriculture and Fisheries) is responsible for managing and regulating extraction and farming of marine resources under the *Living Marine Resources Management Act 1995* (LMRMA), and for marine farming planning under the *Marine Farming Planning Act 1995* (MFPA). Fish out to 3 nautical miles seaward of the baselines are managed by Tasmania, those from 3 to 200 nautical miles seaward of the baselines are managed by the Commonwealth, unless Offshore Constitutional Settlement arrangements are in place. These arrangements can provide that specified fish stocks from high water to the outer edge of Australia's 200 nautical mile Exclusive Economic Zone can be managed by either the State or the Commonwealth authority, or by them together as a joint authority. The main fisheries are the subject of such arrangements; for example, southern bluefin tuna and blue-eye trevalla are managed by the Commonwealth, while southern rock lobster, abalone and stripey trumpeter are managed by the State. The management of fish species or fisheries is not rigid and changes in jurisdiction do occur. As part of Tasmania's approach to sustainable use of its marine resources, significant changes are being proposed for the State's fisheries legislation, and management plans are being drafted to guide the conservation and use of marine resources.

The LMRMA has the objectives of promoting sustainable fishery development, maintaining ecological processes and genetic diversity, facilitating economic development, and sharing the responsibility for resource management among

Government, community and industry. The MFPA, using the objectives of the Resource Management and Planning System, sets out the process for preparing Marine Farm Development Plans, which allocate marine waters for marine farming around the State. A Marine Farm Development Plan indicating marine farming zones and providing management controls for marine farming must be in place before marine waters can be offered for lease. The LMRMA licenses both wild fisheries and operations, while the MFPA provides the legislative base for allocating areas and activities for mariculture development. Management plans for critical marine habitats and areas can also be developed under the LMRMA (see section 2.3.6).

### 2.3.2 Marine Pollution

The Department of Primary Industries, Water and Environment Tasmania (Division of Environment, Planning and Scientific Services) is responsible for preventing pollution of Tasmania's waterways under the *Environmental Management and Pollution Control Act 1994*. The central principle of this Act is to prevent 'environmental harm'. The concept of environmental harm is not linked to end-of-pipe standards, and together with the State Water Quality Policy, proposes a more comprehensive and strategic approach to water-quality management. The Act integrates environmental and planning approvals.

Marine pollution from ships is managed under the *Pollution of Waters by Noxious Substances Act 1987* and the International Convention on Pollution from Ships, (the MARPOL Convention). Annexes I (oil), II (noxious liquid substances) and V (garbage) of MARPOL are in force throughout Australia. Environment, Planning and Scientific Services also controls environmental impact assessments of development, including coastal development.

### 2.3.3 Shipping and Navigation

The Marine and Safety Authority of Tasmania (MAST) is responsible for shipping and navigation within Tasmania's waters under the *Marine and Safety Authority Act 1997*, while port companies manage Tasmania's sea ports under the *Port Companies Act 1997*. MAST also manages recreational boating facilities. Marine boards were recently abolished and hence are no longer planning authorities. The planning authority for the approval of structures below high-water mark and any dumping or reclamation now lies with local government (the planning authority under the *Land Use Planning and Approvals Act 1993)* and the Crown Land Services (lease over the seabed and / or foreshore reserves). Licenses for dredging operations are sought through Crown Land Services and assessed by the Environmental Management and Pollution Control Board.

To provide security to the new port companies, s.20(10) was inserted in *the Land Use Planning and Approvals Act 1993*, to the effect that a planning scheme cannot prohibit or require a discretionary permit for using and developing proclaimed wharves for port and shipping activities. Any other use or development within port areas that are not port activities are subject to existing zoning and planning controls exercised by local government.

### 2.3.4 Cultural Heritage

In Tasmania, the Cultural Heritage Branch of the Department of Primary Industries, Water and Environment (Resource Management and Conservation Division) is the government authority responsible for managing and conserving European and Aboriginal cultural heritage, including the State's historic shipwrecks in State waters and other maritime heritage sites.

Shipwrecks in Tasmanian waters are protected under two pieces of legislation: the *Commonwealth Historic Shipwrecks Act 1976* applies to waters extending from the Tasmanian baselines (see 2.2) to the outer edge of the continental shelf and; the *State Historic Cultural Heritage Act 1995* applies to shipwrecks that lie within the baselines (harbours, enclosed bays, estuaries, rivers and lakes). If a shipwreck is considered highly significant or vulnerable, a 'Protected Zone' may be declared around the site, requiring a permit from the management authority to enter. There are currently no 'Protected Zones' in Tasmania.

The Tasmanian Heritage Council is responsible for the Tasmanian Heritage Register, which identifies places of historic cultural heritage significance for listing.

In some cases shipwrecks may be proclaimed as reserves under the *National Parks and Wildlife Act 1970* (e.g. 'Sydney Cove' Historic Site).

### 2.3.5 Coastal Management

The Department of Primary Industries, Water and Environment has substantial coastal management and planning functions through the Parks and Wildlife Service, the Division of Environment, Planning and Scientific Services, and the Tasmanian Property Services Group. It administers the *Land Use Planning and Approvals Act 1993*, under which the majority of land-use planning in the State is conducted. The division is mainly responsible for strategic planning matters of Statewide interest. It also contains the Coastal and Marine Program, which oversees the implementation of the State Coastal Policy and the Tasmanian component of the National Coastal Action Plan. The program provides a link with the Commonwealth Government on all coastal matters.

The *Land Use Planning and Approvals Act 1993* sets out the statutory land-use planning process and the scope of planning control but it has limited applicability to marine areas.

The Department of Primary Industries Water and Environment (Tasmanian Property Services Group) is responsible under the *Crown Lands Act 1976* for leasing and licensing of coastal Crown Land for such uses as jetties, boatramps, holiday shacks and aquaculture shore facilities.

### 2.3.6 Conservation

The Parks and Wildlife Service (of the Department of Primary Industries, Water and Environment) manages all protected areas reserved under the *National Parks and Wildlife Act 1970*, and the *Crown Lands Act 1976*. The Act provides for the establishment of

marine areas as reserves for conservation purposes. Conservation purposes for particular classes are as follows:

National Park: The protection and maintenance of the natural and cultural values of the area while providing for ecologically sustainable recreation consistent with conserving those values.

Nature Reserve: The conservation of the natural biological diversity or geological diversity of the area, or both, and the natural values of that area that are unique, important or have representative value.

State Reserve: The protection and maintenance of any one or more of the following:
(a) the natural and cultural values of the area:
(b) sites, objects or places of significance to Aboriginal people contained in that area of land;
(c) use of the area of land by Aboriginal people while providing for ecologically sustainable recreation.

Conservation Area: The protection and maintenance of the natural and cultural values of the area and the sustainable use of the natural resources of that area.

It prepares management plans for the State's national parks, including coastal parks and marine reserves.

The Service is also responsible for conserving and protecting flora and fauna and some marine resources, (such as seals and seabirds), interpretation, enforcement and day-to-day management. Marine Reserves in Tasmania are managed by the Department of Primary Industries, Water and Environment under the *National Parks and Wildlife Act 1970* and the *Living Marine Resources Management Act 1995*. The department is also responsible for the establishment of Reserves and the protection of marine plants and animals. Day-to-day management responsibility rests with rangers on adjacent terrestrial national parks and the marine police. The department is responsible for the conservation of fish (including shellfish, scalefish and rock lobster), fishing regulations and enforcement, and also undertakes monitoring and research. Fisheries inspectors, marine police and authorised rangers are responsible for enforcing fisheries regulations in marine reserves.

The *Living Marine Resources Management Act 1995* provides for the establishment of 'marine resource protected areas'. These may be established for such purposes as the protection of representative marine and estuarine habitats and ecosystems, and the maintenance of fish species and genetic diversity.

## 2.4 RELEVANT PLANNING SYSTEMS

### 2.4.1 Resource Management and Planning System

The Tasmanian Resource Management and Planning System was established in 1993 with the introduction of a suite of legislation, a central component being the *State Policies and Projects Act 1993*. The concept of sustainable development, which provides overall direction for the system, is given expression in a set of objectives common to all Acts within the system.

The common objectives of the Resource Management and Planning System are:

- to promote the sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity;
- to provide for the fair, orderly and sustainable use and development of air, land and water;
- to encourage public involvement in resource management and planning;
- to facilitate economic development in accordance with the preceding objectives;
- to promote the sharing of responsibility for resource management and planning between the different spheres of Government, the community and industry in the State.

In the objectives, 'sustainable development' means managing the use, development and protection of natural and physical resources in a way, or at a rate, that enables people and communities to provide for their social, economic and cultural well-being and for their health and safety while:

- sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations;
- safeguarding the life-supporting capacity of air, water, soil and ecosystems; and
- avoiding, remedying or mitigating any adverse effects of activities on the environment.

The *State Policies and Projects Act 1993* provides for the making of Tasmanian Sustainable Development Policies (State Policies). A State Policy must seek to further the objectives of sustainable development; may only be made where there is a matter of State significance; must ensure a consistent and coordinated approach; must exercise minimum regulation to achieve its objectives. Before a State Policy can come into effect, it must be notified in the Tasmanian Government Gazette, and be approved by both Houses of Parliament.

The implementation of a State Policy partly depends on the subject matter and content of the policy. The policies can have different prescriptions and requirements, with different measures for implementing the policy. However, as all State Policies bind the

Crown, statutory authorities and local councils, all three must consider them when policy is being developed, developments initiated and activities managed.

Individuals are also bound by State Policies, and can be liable for a substantial fine if they contravene or fail to comply with a provision of a State Policy.

Two State Policies have an effect on the marine environment: the State Coastal Policy (Department of Environment and Land Management, 1996) and the State Policy on Water Quality Management (Tasmanian Government, 1997).

The purpose of the State Policy on Water Quality Management 1997 is to achieve the sustainable management of Tasmania's surface water and groundwater resources by protecting or enhancing their qualities while allowing for sustainable development in accordance with the objectives of Tasmania's Resource Management and Planning System (Schedule 1 of the *State Policies and Projects Act 1993).*

The function of the State Coastal Policy 1996 is to provide for the management and planning of Tasmania's coastal and marine areas, and to provide a statutory interpretation of the sustainable development objectives that underpin the Resource Management and Planning System.

The State Coastal Policy makes specific reference to water-based activities and promotes the land-use planning system as the appropriate mechanism for indicating intentions to develop on the coast. In accordance with the terms of the State Coastal Policy (1996) and the *State Policies and Projects Act 1993*, a review of the Policy has just begun.

The State Policy on Water Quality Management refers to key issues affecting water quality, and introduces a system of classifying the water-quality values of surface and ground waters, known as Protected Environmental Values. The Policy requires Protected Environmental Values be shown in draft planning schemes or equivalent draft planning instruments.

The *Living Marine Resources Management Act 1995*, the *Marine Farming Planning Act 1995*, and the *National Parks and Wildlife Act 1970* are part of the Resource Management and Planning System. While these Acts are part of the system by the common objective of sustainable development, each Act establishes a planning process specific to the activities or areas it regulates.

### 2.4.2 Resource Planning and Development Commission (RPDC)

The Resource Planning and Development Commission (the Commission) is an independent statutory authority established under *the Resource Planning and Development Commission Act 1997*. Under Section 7 of the Act the Minister may direct the Commisssion to investigate various matters and the Commission is required by the Act to make recommendations which further the sustainable development objectives of the Act.

Under the *Public Land (Administration and Forests) Act 1991*, when directed to do so by the Minister for Primary Industries, Water and Environment, the Commission is to inquire into, and to make recommendations on the use of public land. The Commission is obliged to make recommendations that will further the objectives of sustainable development.

The public land use objectives of the Commission are to:

- promote the balanced use of public land based on—
    - (i) the purpose for which it is best suited in the long-term interests of the State;
    - (ii) a thorough evaluation of its potential to fulfil social, economic and environmental needs;
- encourage public involvement in the land-use recommending processes;
- acquire the best information and encourage its use as a basis for recommendations and decisions on land use;
- promote the sharing of information and responsibility for land use recommendations.

The *Public Land (Administration and Forests) Act 1991* defines public land as any land vested in the Crown or any statutory authority or body corporate in which the Crown has a controlling interest, and includes as far as is relevant here any such land, covered by water, including the sea.

Members of the Commission, which consists of a chairperson (Executive Commissioner) and five Commissioners, must have the following attributes:

- planning experience;
- public administration experience relating to project implementation;
- expertise and management experience in resource conservation;
- experience in industry, commerce and planning;
- resource conservation or planning experience representing community interests.

Once the Commission has been asked by the Minister for Primary Industries, Water and Environment to conduct an inquiry into the use of any public land, the Commission has a duty to fully inform itself of all matters relevant to the reference. The Commission must prepare a Background Report that sets out, as far is as known, the resources of the land that is the subject of the reference and any existing commitments in respect of those resources. This Background Report must be released for a period of public comment. In the course of preparing its recommendations on a reference, the Commission must prepare for public comment a draft of its proposed recommendations.

Once the Commission has completed its final report, it must submit it to the Minister, who in turn must lay a copy of the report before both Houses of Parliament within ten days of receiving it.

# CHAPTER 3

# THE NATIONAL REPRESENTATIVE SYSTEM OF MARINE PROTECTED AREAS

## 3.1 WHY MARINE PROTECTED AREAS ?

Effective biodiversity conservation is recognised, both nationally and internationally, as relying on two basic strategies: (i) the establishment of a representative system of Marine Protected Areas and (ii) the ecologically sustainable management of natural resources. An island continent, Australia has a variety of coastal, marine and estuarine environments, ranging from the tropical ecosystems of northern Australia (such as coral reefs and tropical mangrove forests), to the cool temperate ecosystems in the south (such as kelp forests and deep-water sponge beds). As a developed nation with a maritime area larger than the continent itself (i.e. 894 million hectares), and as a signatory to such international conventions as the *Convention on Biological Diversity* (UNEP 1994), Australia has a special responsibility for conserving and managing its marine and coastal environments and their resources (ANZECC Task Force on Marine Protected Areas 1998).

While Australia has established reserves for terrestrial ecosystems for many decades, the formal conservation of Australia's marine environments and their resources is a relatively recent phenomenon. As of 1997, over 43 million hectares (or 5%) of Australia's waters (comprising States, Territories, External Territories and Commonwealth waters) have been reserved in 148 Marine Protected Areas (Cresswell & Thomas 1997). Of this total area , about 99.5% is in tropical regions, and of that about 89% is in the region of the Great Barrier Reef. This leaves many regions—particularly temperate ecosystems—poorly or under-represented, or not represented at all (McNeill 1994, Bleakley *et al.* 1996, Edyvane 1996). In 1993, 21 of the then-recognised 32 biogeographic regions around Australia had no significant protected areas (Ivanovici 1993). The regions without protection included the Gulf of Carpentaria, southern temperate waters (such as the Great Australian Bight), and deep offshore regions.

## 3.2 THE NATIONAL, REPRESENTATIVE SYSTEM OF MARINE PROTECTED AREAS (NRSMPA)

In 1991, the Commonwealth initiated of a 10-year marine conservation program, called *'Ocean Rescue 2000'* , to ensure the conservation and sustainable use of Australia's marine and estuarine environments. A key component of this initiative was a commitment to expand Australia's existing marine reserve system through establishing a national, representative system of Marine Protected Areas (or NRSMPA), which would protect areas, while permitting appropriate uses and promoting public education (Muldoon & Gillies 1996).

Establishing a NRSMPA also fulfils Australia's international obligations as a signatory to the *Convention on Biological Diversity* (UNEP 1992), which at a global level, through the International Union for the Conservation of Nature, Commission on National Parks and Protected Areas, has been promoting the establishment of a global representative system of marine protected areas (Kelleher *et al.* 1995) (see Box 3.1).

At the national level, a NRSMPA has been endorsed by States and Territories under the *Inter-governmental Agreement on the Environment* (1992), through the development of national strategies such as the *National Strategy for Ecologically Sustainable Development (1992b)* (Objective 10.2), and the *National Strategy for the Conservation of Australia's Biological Diversity (1996)* (Objective 1.4).

Tasmania is a signatory to the above arrangements and is committed to the establishment of the NRSMPA.

**Box 3.1 A Global Network of Marine Protected Areas**

Article 6 of the *Convention on Biological Diversity* (UNEP 1992) states that signatory Nations shall:

> *(a) develop national strategies, plans or programs for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programs which shall reflect, inter alia, the measures set out in this convention relevant to the contracting Party concerned; and*
>
> *(b) integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plan, programs and policies.*

At the global level, the International Union for the Conservation of Nature, through its Commission on National Parks and Protected Areas, has been promoting the establishment of a global representative system of Marine Protected Areas.

The primary goal of the Marine Protected Areas Program is:

> *to provide for the protection, restoration, wise use, understanding and enjoyment of the marine heritage of the world in perpetuity through the creation of a global, representative system of Marine Protected Areas and through the management, in accordance with the principles of the World Conservation Strategy, of human activities that use or affect the marine environment.*

### 3.2.1 National Guidelines for Establishing the NRSMPA

As early as 1986, States / Territory and Commonwealth governments have sought to develop a national approach to the establishment of Marine Protected Areas, including management objectives, classification and nomenclature (ACIUCN 1986). Since then, MPAs have been established in Australia with the objectives of preserving endangered or threatened species or habitats; preserving economically or ecologically important species or habitats or ecosystems; preserving areas for education and scientific research; and preserving historical and cultural sites (Pollard 1977, Suter 1983, Kelleher 1987, Ivanovici 1984, Ivanovici *et al.* 1993, McNeill 1994).

In 1992, the former Australian National Parks and Wildlife Service commissioned the report *Marine and Estuarine Protected Areas: A Strategy for a National Representative System within Australian Coastal and Marine Environments* (Ray & McCormick-Ray 1992). This report provided the strategic technical framework for establishing a national representative system of MPAs and identified the following steps to establish it:

1. **Define operational objectives**—endpoints defined with predictable, measurable outcomes, (e.g. fish refuge).

2. **Focus on ecosystem processes**—produce ecological gradients which circumscribe the boundaries of ecosystems. Resist generalisations about the sea.

3. **Emphasise land–sea interactions**—e.g. linkages, water-sheds.

4. **Gain public support**—society must see itself as a stakeholder in the health and sustainability of the coastal zones and oceans. A sense of urgency must be achieved.

5. **Represent biodiversity/seascape**—species lists are inadequate for marine systems. Level of seascape is adequate.

6. **Set MPAs in a regional context**—set within (i) large oceanographic systems, and (ii) land–sea, coastal zone interactions.

7. **Use appropriate scale**—nested, hierarchical structure of ecosystems for management at many scales, (e.g. bay, islands, regions, migratory fish, demersal fish).

8. **Provide for multiple-use and cooperative management**.

9. **Apply scientific procedures**—intuitive judgements by experts, public participation and political and social opportunity are only as a first step. Scientific procedures and clearly scientifically defensible boundaries must follow.

10. **Attain a national system**—need a systematic ecological framework or classification to produce a network of protected areas with collective goals of biodiversity, ecologically sustainable development and public support. A central information system (Geographic Information System) is required. A networked system needs:
    (i) a hierarchical, ecological framework within which MPAs are set, and
    (ii) facilitation of communications among individual sites.

In October 1998, the Commonwealth, States, Territories endorsed the *Guidelines for Establishing the National Representative System of Marine Protected Areas* (ANZECC Task Force on Marine Protected Areas 1998). The strategic framework for a NRSMPA includes:

- goals of the NRSMPA;
- principles for development of the NRSMPA;
- outcomes of the NRSMPA;
- development of the NRSMPA—developing national and regional priorities, role of jurisdictions;
- criteria for identifying and selecting of MPAs;
- implementation of the NRSMPA;
- evaluation of the NRSMPA.

Adoption of a common approach to identifying and selecting MPAs, analysing gaps and national standards for evaluation will contribute to a systematic establishment of the NRSMPA and consistency of reporting by jurisdictions.

### 3.2.2 Primary Goal of the NRSMPA

Essentially the primary objective of MPAs in Australia, as elsewhere in the world, is the same as for terrestrial protected areas: to protect ecosystems (particularly representative, unique and vulnerable species, communities and habitats), and to ensure the sustainable use of resources. This is consistent with the international perspective.

ANZECC (1998) defined the primary goal of the NRSMPA:

*To establish and manage a comprehensive, adequate and representative system of Marine Protected Areas to contribute to the long-term ecological viability of marine and estuarine systems, to maintain ecological processes and systems, and to protect Australia's biological diversity at all levels (p.49).*

### 3.2.3 DEFINING MARINE PROTECTED AREAS

In Australia, as elsewhere around the world, a variety of terms and definitions are used for areas that protect marine life (e.g. Marine Parks, Marine National Parks, Aquatic Reserves, Nature Reserves, Marine Reserves, Fish Habitat Reserves) (McNeill 1994, Cresswell & Thomas 1997). This causes considerable confusion, as different labels can be used for protected areas with identical management objectives.

Marine Protected Areas in Australia can range from small, highly protected no-take Marine Reserves, to large, multiple-use Marine Parks (e.g. Great Barrier Reef Marine Park) that permit such activities as fishing (commercial and recreational), tourism and

recreation, managed on an integrated basis (Kelleher & Kenchington 1991). Marine Protected Areas can be established for a variety of purposes and can provide for a range of activities while still protecting the environment. For example, Marine Protected Areas can be reserved for conservation, fisheries management, research, education, social and historical importance, tourism or recreational use, or a combination of any of these, and may also include neighbouring coastal lands and islands (Salm 1989, Ray & McCormick-Ray 1992).

Marine Protected Areas in Australia use the IUCN definition of 'protected area':

*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)

This definition has recently been endorsed by the Commonwealth Government, ANZECC, the Ministerial Council on Forestry, Fisheries and Aquaculture, and the State and Territory conservation agencies for use in a variety of protected area contexts.

The recent *Guidelines for Establishing the National Representative System of Marine Protected Areas* (ANZECC Task Force on Marine Protected Areas 1998) adopt this definition and identify four key characteristics that distinguish Marine Protected Areas in the NRSMPA from other marine managed areas:

### 3.2.4 Key Characteristics

**Key Characteristics**

- **Conservation of biodiversity**—the MPA must have been established especially to conserve biodiversity (consistent with the primary goal of the NRSMPA);
- **IUCN Protected Area Management Categories**—the MPA must be classifiable into one or more of the six IUCN Protected Area Management Categories;
- **Security**—the MPA must have secure status, which can only be revoked by a Parliamentary process; and
- **Comprehensiveness, Adequacy or Representativeness**—the MPA should contribute to the comprehensiveness, adequacy or representativeness of the NRSMPA.

The ANZECC Guidelines note that "the MPA may incorporate areas ranging from highly protected areas to sustainable multiple-use areas accommodating a wide spectrum of human activities".

### 3.2.5 A comprehensive adequate and representative (CAR) system of marine protected areas

The *Guidelines for Establishing the National Representative System of Marine Protected Areas* (ANZECC Task Force on Marine Protected Areas 1998) establish the following principles for the National Representative System of Marine Protected Areas:

- adoption of the *Interim Marine and Coastal Regionalisation of Australia (IMCRA)* as the regional planning framework for developing the NRSMPA, with ecosystems used as the basis for determining representativeness; and
- the principles of comprehensiveness, adequacy and representativeness (or CAR) as defined below.

***Establishing a Comprehensive, Adequate and Representative System***

***Comprehensiveness—****the reserve system will include the full range of ecosystems recognised at an appropriate scale within and across each bioregion.*

***Adequacy****—the reserve system 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.*

The principles of comprehensiveness, adequacy and representativeness (or CAR) incorporate ecological concepts utilised for the management of Australia's forest ecosystems (Commonwealth of Australia 1997) and the establishment of the National Reserve System (Commonwealth of Australia 1999).

Comprehensiveness means that the system protects examples of the full range of marine ecosystems across the marine environment.

Adequacy means that the level of reservation (size, boundaries, protection) is sufficient to ensure the viability and integrity of populations, species and communities. It also includes the concept of replication. Replication means that more than one example is protected and is essentially 'insurance' against the loss of natural values due to such events as oil spills and cyclones which may dramatically upset successional processes and reduce or entirely remove key habitats.

Representativeness means that the system should reasonably reflect the flora and fauna of each marine ecosystem.

## 3.3 KEY STEPS IN THE DEVELOPMENT OF AN NRSMPA

The NRSMPA is being developed jointly by Commonwealth, State and Territory agencies. The approach has been generally agreed by the Commonwealth, States and the

Northern Territory under the national *Guidelines for Establishing the National Representative System of Marine Protected Areas* (ANZECC Task Force on Marine Protected Areas 1998) and the *Strategic Plan of Action for National Representative System of Marine Protected Areas* (ANZECC Task Force on Marine Protected Areas 1999).

The national approach, which emphasises the use of the best available scientific data, broadly consists of identifying and classifying candidate areas and selecting MPA sites from these candidates. It uses IMCRA as the template or biogeographic framework for planning the NRSMPA.

The key steps identified for the development of a Tasmanian Representative System of MPAs outlined in section 5.6 are based on the NRSMPA key steps.

## 3.4 IUCN PROTECTED AREA CATEGORIES

The IUCN's Protected Area Management Categories (see Box 3.2) are a nationally and internationally consistent scheme of management types—independent of local nomenclature—to ensure the consistent reporting of objectives and management (Davey 1996). This classification was adopted by IUCN's Commission of National Parks and Protected Areas for its Global Representative System of Marine Protected Areas and also, at the national level, by ANZECC.

**Section 4.4.1 of the Strategic Plan**

The categories are not designed to drive the development of protected area systems, but to provide an international system of categorisation to facilitate understanding. They are not a commentary on management effectiveness and should be interpreted with flexibility at national and regional levels. Marine Protected Areas should be established to meet objectives consistent with national or regional goals and needs and only then be assigned an International Union for the Conservation of Nature (IUCN) category according to the agreed management objectives.

**Table 3.1 Management objectives of the IUCN Protected Area Management Categories.**

| Management Objective | IUCN Protected Area Management Category | | | | | | |
|---|---|---|---|---|---|---|---|
| | IA | IB | II | III | IV | V | VI |
| Scientific research | 1 | 3 | 2 | 2 | 2 | 2 | 3 |
| Wilderness protection | 1 | 2 | 2 | 3 | 3 | – | 2 |
| Preservation of species and genetic diversity | 1 | 2 | 1 | 1 | 1 | 2 | 1 |
| Maintenance of environmental services | 2 | 1 | 1 | – | 1 | 2 | 1 |
| Protection of specific natural / cultural features | – | – | 2 | 1 | 3 | 1 | 3 |
| Tourism and recreation | – | 2 | 1 | 1 | 3 | 1 | 3 |
| Education | – | – | 2 | 2 | 2 | 2 | 3 |
| Sustainable use of resources from natural ecosystems | – | 3 | 3 | – | 2 | 2 | 1 |
| Maintenance of cultural / traditional attributes | – | – | – | – | – | 1 | 2 |

1 = primary objective; 2 = secondary objective; 3 = potentially applicable objective;
– = not applicable

## Box 3.2 IUCN Protected Area Management Categories

*IA* **Strict Nature Reserve**—protected area managed mainly for science

Areas of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.

*IB* **Wilderness Area**—protected area managed mainly for wilderness protection

Large area of unmodified or slightly modified land and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition.

*II* **National Park**—protected area managed mainly for ecosystem protection and tourism

Natural area of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area, and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

*III* **Natural Monument**—protected area managed mainly for conservation of specific natural features

Area containing one or more specific natural or natural/cultural features which are of outstanding or unique value because of their inherent rarity, representative or aesthetic qualities, or cultural significance.

*IV* **Habitat/Species Management Area**—protected area managed mainly for conservation through management intervention

Area of land and/or sea subject to active intervention by management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.

*V* **Protected Landscape/Seascape** —protected area managed mainly for landscape/seascape conservation and recreation

Area of land, with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinctive character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.

VI **Managed Resource Protected Area**—protected area managed mainly for the sustainable use of natural ecosystems

Area containing predominantly unmodified natural systems, managed to ensure long-term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs. The area must also fit the overall definition of a protected area.

The IUCN protected area management categories provide a uniform classification that both identifies the principal management objectives of a protected area as well as acknowledging that other secondary uses and values can be conserved through reservation. In this respect, Marine Protected Areas may have a mix of management 0bjectives (see Table 3.1).

# CHAPTER 4

# MARINE CONSERVATION IN TASMANIA

## 4.1 THE TASMANIAN APPROACH

Nationally and internationally there have been two basic approaches to the development of systems of marine protected areas.

One approach is to declare large multiple use Marine Protected Areas such as the Great Barrier Reef Marine Park and manage a large region which includes exploitation of resources and some smaller areas of higher protection and no exploitation (Kelleher 1987).

The other approach is to declare much smaller highly protected Marine Protected Areas with no extractive activities and manage them within the broader framework of sustainable use and management of the larger region / State / country. This is the approach Tasmania has taken so far in the development of its Marine Protected Areas system (Tasmanian Government 1990).

Both approaches are equally legitimate and, if implemented properly, can achieve the desired outcomes in terms of the conservation of biodiversity.

Marine Protected Areas in Tasmania have largely been declared to protect biodiversity and provide areas for public recreation, education and research, rather than as areas in which activities and uses such as fishing, tourism, recreation and education are managed on a large, regional basis (Kriwokent & Hayward 1991, Kriwoken 1993). Consequently, the Marine Protected Areas in Tasmania are small marine reserves or marine extensions of land-based National Parks.

Monitoring of the marine reserves in Tasmania has however, highlighted the inadequacy of the size of some of the existing reserves to conserve biodiversity, particularly of exploited reef species (Edgar and Barrett 1997 & Edgar 1998).

Although most of the areas reserved as Marine Protected Areas in Tasmania are small, their marine life has been afforded a high level of protection (prohibiting most exploitative activities). This is in contrast with other States, particularly Victoria, Queensland , Western Australia and New South Wales, where Marine Protected Areas have been declared, but little protection has been afforded the marine life in these reserves.

## 4.2 NATIONAL STATUS OF MARINE PROTECTED AREAS

At the national level, most Marine Protected Areas have been declared in Commonwealth waters (i.e. 367,560.2 km$^2$ or 84.3% of the total national Marine Protected Area estate) (Ivanovici 1993, Bleakley *et al.* 1996, Edyvane 1996) (see Table 4.1). Marine Protected Areas in Western Australia and Queensland together comprise 93.9% of the total Marine Protected Areas declared in State and Territory waters (Table 4.1).

**Table 4.1 Number and area of Marine Protected Areas found in each State, Territory and Commonwealth jurisdiction to May 1997 (based on Cresswell & Thomas 1997).**

| State/Territory | No. MPAs | Area MPAs (ha) | IUCN Category | %of total State/Territory waters | %of total National waters |
|---|---|---|---|---|---|
| Queensland | 82 | 5,302,8 | IV, V | 77.2 | 12.155 |
| Western Australia | 7 | 1,146,6 | Ia, II,VI | 16.7 | 2.628 |
| Northern Territory | 3 | 223,946 | IV,VI | 3.3 | 0.513 |
| New South Wales | 8 | 85,803 | VI | 1.3 | 0.197 |
| South Australia | 15 | 59,580 | II | 0.9 | 0.137 |
| Victoria | 12 | 50,312 | VI, none | 0.7 | 0.115 |
| **Tasmania** | **4** | **2,050** | **II, IV** | **0.003** | **0.000** |
| Commonwealth | 18 | 36,756,0 | Ia,VI | NA | 84.254 |
| **TOTAL (AUST)** | **149** | **43,625,3** | | | |

The temperate States of Australia contribute the least to State, Territory and national coverage of MPAs. In 1997, Tasmania contributed 2,050 ha or 0.003% of the total area of MPAs declared in State/Territory waters (see Table 4.1). Similarly, progress in the establishment of MPAs has also been slow in Victoria and South Australia, which contributed 0.7% and 0.9% to the State/Territory total, respectively.

## 4.3 STATUS OF MARINE PROTECTION IN TASMANIA

### 4.3.1 Marine Reserves

Most reserves declared before 1960 were wildlife sanctuaries for wading birds, providing protection to waterfowl and their critical habitats (mainly estuaries, mudflats). Two marine reserves, representing over 80% of the total declared area in Tasmania, were in the South West World Heritage Area (Port Davey and Bathurst Harbour and a UNESCO Biosphere Reserve) and the adjacent South West Conservation Area (Macquarie Harbour). However, these areas, afford no protection to marine life.

The 15 coastal areas listed in 1984 as Marine (and Estuarine) Protected Areas (or MEPAs) in Tasmania, in *An Inventory of Declared Marine and Estuarine Protected Areas in Australia* by the Australian National Parks and Wildlife Service (Ivanovici 1984), were largely intertidal and estuarine habitats. The list comprised 9 Conservation Areas, 2 Historic Sites, 1 Marine Reserve, 2 National Parks and 1 Nature Reserve.

In 1991 (see Table 4.2), a total of four Marine Reserves (Nine Pin Point, Tinderbox, Maria Island, Governor Island) were declared, specifically to protect marine habitats and

biodiversity. Since then Tasmania has been pre-eminent nationally in research and monitoring to identify and establish Marine Protected Areas, but in the last decade no new MPAs have been declared.

The national inventory (*Terrestrial and Marine Protected Areas in Australia;* Cresswell & Thomas 1997), which uses the national 'Collaborative Australian Protected Areas Dataset' (CAPAD), listed only three Marine Protected Areas in Tasmania, or a total area of 172 ha, as of 30 June 1997. The marine extension of the Maria Island National Park was not recognised as a Marine Protected Area, as it did not specifically protect marine life in a Marine Protected Area. The inventory also does not recognise areas declared primarily for fisheries management purposes (e.g. Shark Nursery Areas, Restricted Fishing Areas, Closed Areas); or historic purposes (e.g. Historic Shipwrecks). Maria Island has been proposed for inclusion in the latest list, as about one-third of the marine extension affords significant protection to marine life by prohibiting fishing.

With these amendments, there are currently a total of four MPAs in Tasmania: three Marine Nature Reserves and one National Park (see Table 4.2). Together, these comprise 2,050 ha or approximately 0.011% of Tasmania's waters. However, it should be noted that Governor Island, Nine Pin and Tinderbox Marine Reserves, all include land components. Hence, the total area of MPAs in Tasmania is less than 2,050 ha.

The four Marine Reserves are all reserved under the *National Parks and Wildlife Act 1970,* with fishing prohibited under the Fisheries Rules (no.13) of the *Living Marine Resources Management Act 1995*. Under the former, any change requires an Act of Parliament. In contrast, under the latter, fisheries rules can be changed or rescinded by the Minister.

**Table 4.2 The present status of Marine Protected Areas (MPAs) in Tasmania, as of June 1999 (from Cresswell & Thomas 1997).**

| Designation of MPA | Area (ha) | Management Objective | IUCN Category | Year Declared |
|---|---|---|---|---|
| **Nature Reserve** | | | | |
| Governor Island Marine | 60 | recreation, aesthetics, biodiversity | IV | 1991 |
| Nine Pin Point Marine | 59 | biodiversity, unique environment, recreation | IV | 1991 |
| Tinderbox Marine | 53 | education, recreation, research, biodiversity | IV | 1991 |
| **National Park** | | | | |
| Maria Island Marine | 1938 | representative habitats, biodiversity | II | 1991 |
| STATE TOTAL: (4) | 2050 | | | |
| % STATE WATERS | 0.011 | | | |

Under the IUCN protected-area management categories, there are currently three Category IV and one Category II Marine Protected Areas in Tasmania (see Table 4.2). All the category IV MPAs afford a high level of protection to marine fauna and flora (i.e. no fishing); the Category II MPA permits some fishing. However all the reserves are probably more appropriately classified as IUCN Category II, as they provide for significant levels of recreation and public use. There is a paucity of Strict Nature

Reserves (category Ia), Wilderness Areas (Ib), Natural Monuments (III) and Multiple-use Protected Area categories (IV–VI) in Tasmania.

### 4.3.2 Terrestrial Protected Areas with Marine Components

Protected areas that contain *both* terrestrial and marine components should be classified as either Terrestrial Protected Areas (if they were specifically established to protect land areas) or Marine Protected Areas (if they were especially dedicated to protect marine areas).

Using this convention and the IUCN definition of a protected area, existing island and coastal State Reserves, Conservation Areas, Game Reserves and National Parks that extend to the low-water mark are more appropriately classified as Terrestrial Protected Areas (with a marine component).

In addition to MPAs, some terrestrial protected areas afford a measure of protection to marine life. Tasmania has many coastal and offshore–island Nature Reserves, Coastal Reserves, Wildlife Sanctuaries, Muttonbird Reserves, Conservation Areas and National Parks. While these areas are classified as Terrestrial Protected Areas by Cresswell and Thomas (1997), some of them were established primarily to protect marine species and intertidal marine habitats. Some of the offshore island conservation parks protect breeding and haul-out sites of the Australian fur seals and breeding sites for seabirds. While some coastal conservation parks and reserves protect areas of intertidal habitat (e.g. Macquarie Island Nature Reserve), they do not specifically protect marine life.

### 4.3.3 Other Marine Management Areas

In addition to MPAs particular marine areas declared for fisheries management purposes also afford a measure of protection to marine life. Some of these areas would, with appropriate upgrading of tenure and management, meet the requirements of an MPA.

Marine management areas in Tasmania established for fisheries management purposes are defined in formal fisheries management plans and regulated under Fisheries Rules of the *Living Marine Resources Management Act 1995* (or LMRMA). For instance, under the Scalefish Management Plan (DPIF 1998), or the Fisheries (Scalefish) Rules 1998, a total of 134 Fishing Restricted Areas are defined: 3 predominantly Recreational Fishing Areas, 74 No Netting / Restricted Fishing Areas, 11 Shark Nursery Areas, 39 Miscellaneous Restrictions, and 7 Closed Areas for Australian Salmon (see Table 4.3). Other restrictions also apply, such as the exclusion of trawling within 1 nautical mile of the shore and other specified areas and on fishing in areas set aside for marine farm purposes.

These areas restrict fishing at different levels:

- **3 Recreational Fishing Areas**—*areas where only recreational (amateur) fishing can take place (i.e. all or most commercial fishing is prohibited).*
- **74 No-Netting Areas/Restricted Fishing Areas**—*areas where no nets, fishtraps, longlines or droplines may be used.*

- **11 Shark Nursery Areas**—*areas in which no school or gummy shark can be taken and a range of gear restrictions apply.*
- **39 Other Miscellaneous Restrictions—***various restrictions on fishing.*

As can be seen from Table 4.3, most no-netting / restricted fishing areas in Tasmania are rivers, estuaries, coastal lagoons or sheltered inlets. Similarly, netting restrictions largely apply to bays, sheltered inlets and lagoons (see Table 4.3). Two areas protect fish from divers: Crayfish Point Marine Reserve and George III Rock Research Area.

In the Taroona Waters (Crayfish Point) Marine Reserve, fishing for rock lobster is prohibited, and no fish can be taken by diving, netting or swimming underwater. Taking of rock lobster in the reserve is prohibited under the Fisheries (Rock Lobster) Rules of the LMRMA.

George III Rock Research Area is protected under the Fisheries (Research Area) Order 1996, which prohibits the taking of any fish (including abalone) by diving or swimming underwater. No expiry date is given for the Fisheries Order, and the Minister has power to change or rescind it.

Under the Fisheries Rules of the LMRMA, closed areas or restrictions can be changed or rescinded by the Minister. While the Minister cannot revoke a closed area, unless in an emergency, the Minister can revoke a Management Plan, and in doing so, can revoke all closed or protected areas under the plan. Fisheries management areas, consequently, provide no security of tenure—and hence are not formally recognised as MPAs under the current ANZECC definition (see Table 4.4).

It is possible that several of the current fisheries management areas could be upgraded to formal MPAs, as defined by ANZECC. For instance, the Crayfish Point Marine Reserve and George III Rock Research Area could be upgraded if their tenure were more secure, and if the objectives (and management) of the reserves (i.e. lobster research, abalone research) were expanded to include biodiversity conservation.

Similarly, some of the no-netting areas (Frederick Henry Bay, Norfolk Bay, Mercury Passage), and restricted netting areas (Bathurst Harbour, Blackmans Bay, Recherche Bay, D'Entrecasteaux Channel, East Coast, Great Oyster Bay) could conceivably be upgraded to formal MPAs, if issues of security of tenure, management objectives and levels of protection were addressed.

**Table 4.3 Fisheries Management Areas in Tasmania.**

| TYPES | NO. | COMMENTS |
|---|---|---|
| **Recreational Fishing Areas** | **3** | Derwent River, D'Entrecasteaux Channel, Georges Bay |
| **No-Netting Areas/Restricted Fishing Areas** | | |
| North west region | 24 | Predominantly rivers, estuaries, lagoons and inlets. Marine areas include Sawyers Bay, Blowhole (KI) |
| North east region | 14 | Predominantly rivers, estuaries, lagoons and inlets. Marine areas include Barnougle Beach (Bridport). |
| Southern region | 32 | Predominantly rivers, estuaries, lagoons and inlets. Marine areas include North West Bay, Kingston-Blackmans Bay. |
| Others | 4 | Mostly rivers, lagoons. Marine areas include a summer closure at Coles Bay. |
| **Subtotal** | **74** | |
| **Shark Nursery Areas (SNAs)** | **11** | Marine areas include Blackmans Bay, D'Entrecasteaux Channel, East Coast, Frederick Henry and Norfolk Bay, Great Oyster Bay, Mercury Passage. |
| **Other Miscellaneous Restrictions** | | |
| No gill netting (in SNAs) | 5 | Marine areas include Frederick Henry Bay, Norfolk Bay, Mercury Passage. |
| Limited gill netting (in SNAs) | 2 | Marine areas include Great Oyster Bay, East Coast. |
| Limited graball netting (including SNAs) | 12 | Marine areas include Bathurst Harbour, Blackmans Bay, Recherche Bay, D'Entrecasteaux Channel, East Coast, Frederick Henry and Norfolk Bay, Great Oyster Bay, Mercury Passage. |
| No gill netting | 2 | Frederick Henry Bay, Norfolk Bay |
| No mullet netting | 15 | Marine areas include Macquarie Harbour, Bathurst Harbour, Recherche Bay. |
| No diving, no taking of fish by diving | 1 | George III Rock Research Area |
| No netting, no taking of fish by diving | 1 | Crayfish Point Marine Reserve |
| No beach seining | 1 | |
| **Subtotal** | **39** | |
| **Closed Areas for Licenced Fishers (Australian Salmon)** | **7** | Blackman Bay, Pittwater, Frederick Henry Bay, Norfolk Bay. Summer closures at Bicheno, Port Sorell, Great Oyster Bay, Coles Bay. |
| **Total Fishing-restricted Areas** | **134** | |
| Marine Farms | **168** | |

**Table 4.4 Fisheries management areas—Relationship to ANZECC MPA Criteria**

| TYPES | TOTAL NO. | TOTAL AREA (HA) | ANZECC MPA Criteria | | | |
|---|---|---|---|---|---|---|
| | | | Conservation of biodiversity | IUCN Protected Area Category | Parliamentary security | CAR# |
| **Recreational Fishing Areas** | 6 | 63,200 | No | No | No | ? |
| **No-netting Areas** | 61 | 90,440 | No | No | No | ? |
| **Restricted Fishing Areas** | 13 | 194,900 | No | No | No | ? |
| **Shark Nursery Areas (SNAs)** | 18 | 227,900 | No? | No? | No | ? |
| **Other Miscellaneous Restrictions** | | | | | | |
| Miscellaneous netting restrictions | 36 | ? | No | No | No | ? |
| No diving (or taking of fish by diving) | 1 | ? | Yes | No | No | ? |
| No netting, no taking of fish by diving | 1 | 65 | Yes | No | No | ? |
| No beach seining | 1 | ? | No | No | No | ? |
| **Closed Areas for Fishing Licence (Australian salmon)** | 7 | ? | No | No | No | ? |
| **Total Restricted Fishing Areas** | **134** | | | | | |
| **Marine Farms** | **168** | | No | No | No | No |
| **TOTAL** | **302** | | | | | |

# the potential of an area to contribute to a Comprehensive Adequate and Representative system—irrespective of the current level of protection.

## 4.4 ADEQUACY OF CURRENT TASMANIAN MPAS IN MEETING NRSMPA OBJECTIVES

### Representative Habitats, Ecosystems

Ecologically and biogeographically, many habitats and bioregions are under-represented as MPAs in Tasmania. One of the two bioprovinces of Tasmania, the Bassian province (consisting of the Boags, Otway, Flinders and Twofold bioregions), has no MPAs. Of the nine bioregions along the coast of Tasmania, only two bioregions both on the south east coast (i.e. Bruny, Freycinet), have any marine habitats or ecosystems formally reserved as MPAs (see Table 4.5). However, the areas reserved (0.239% of the Freycinet bioregion

and 0.015% of the Bruny bioregion) are extremely small by national and international standards.

Kelp communities, wave-exposed rocky habitats, drowned river valleys (e.g. Macquarie Harbour, Port Davey), soft-bottom benthos, estuaries, beach habitats and offshore deepwater habitats are significantly under-represented in Tasmania. The habitats, communities and ecosystems of Bass Strait; the western, northern and southern coasts of Tasmania; and the warmer-water habitats and ecosystems of Twofold Shelf bioregion, currently lack any protection or reservation as MPAs.

**Table 4.5 Representation of MPAs in Tasmanian bioregions (derived from Cresswell & Thomas 1997, ANZECC Task Force on Marine Protected Areas 1999).**

| Bioregion | Total Area of Bioregion ($km^2$)+ | Number of MPAs | Area of MPAs (ha) | MPA as % of Bioregion | Name of MPA; IUCN Category |
|---|---|---|---|---|---|
| Otway | 37,331 | 0 | 0 | 0 | Not applicable. |
| Franklin | 10,364 | 0 | 0 | 0 | Not applicable. |
| Davey | 6,794 | 0 | 0 | 0 | Not applicable. |
| Bruny | 7,288 | 2 | 112 | 0.015 | Nine Pin Point (IV); Tinderbox (IV) |
| Freycinet | 8,079 | 2 | 1938 | 0.239 | Governor Island (IV); Maria Island (II) |
| Boags | 8,271 | 0 | 0 | 0 | Not applicable. |
| Central Bass Strait | 50,331 | 0 | 0 | 0 | Not applicable. |
| Flinders | 16,916 | 0 | 0 | 0 | Not applicable. |
| Twofold Shelf | 32,198 | 0 | 0 | 0 | Not applicable. |
| **Total** | **177,572** | **4** | **2050** | **0.011** | |

+ Seaward boundary of bioregions defined by the 200 metre isobath.

## Other Management Objectives

Three of the four MPAs in Tasmania were declared for nature conservation and recreation management purposes. As a consequence, they do not meet all the recognised management objectives for MPAs. Only one MPA (Maria Island National Park) was reserved to protect representative marine habitats and ecosystems—the primary goal of the NRSMPA. As secondary MPA management goals, no MPAs have been declared to protect rare or endangered species, (such as the spotted handfish), or the critical habitat of threatened species such as the rare New Zealand fur seal *Arctocephalus forsteri*, or foraging sites of threatened seabirds. Similarly, there are also no MPAs to protect foraging seabirds from netting or other harmful activities in Tasmania. This is of particular relevance for

seabirds that forage in inshore regions close to their breeding colonies, such as little penguins, cormorants and shearwaters (Brothers *et al.* 1996).

In addition, no historic shipwreck sites protect the flora and fauna in addition to the wreck, and hence are not recognised as MPAs; and no MPAs have been established in Tasmania specifically for scientific research.

## 4.5 BIODIVERSITY SURVEYS AND ECOSYSTEM MAPPING

Collection of baseline biodiversity data is the first step to developing the NRSMPA.

Over the last decade in Tasmania, a program of marine habitat and biodiversity surveys has been defining biogeographical regions and ecosystems (at a range of spatial scales), and also identifying priority areas for marine conservation, based on regional patterns of biodiversity.

In recent years, the following marine habitat surveys and mapping have been undertaken, with Commonwealth funding assistance, to assist in a regional classification of Tasmania's inshore waters:

- **1991/92 D701 Bass Strait Marine Reserve Research.** (Barrett NS & G Edgar. 1992. *A Survey of Potential Marine Reserve Locations in Bass Strait*).
- **1993/94 D704 Biological Surveys of Reef Communities in Southern and Western Tasmania and the Furneaux Group.** (Edgar GJ & NS Barrett. 1997 *Biological Surveys of Reef Communities in Southern and Western Tasmania and the Furneaux Group.* Department of Primary Industries and Fisheries, Parks and Wildlife Service, Department of Environment and Land Management).
- **1993/94 D705 Regional Classification of Tasmanian Coastal Waters and Review of Representative MPA Strategy Sites.** (Edgar GJ, Moverley J, Peters D & C Reed. 1994. *Regional Classification of Tasmanian Coastal Waters and Preliminary Identification of Representative Marine Protected Area Sites.* Parks and Wildlife Service, Department of Environment and Land Management.)
- **1994/95 D705 Development of a Marine and Coastal Resource Information System for Tasmania (Stage 1, Phase 2).**
- **1994/95 Biological Surveys of Inshore Soft-bottom Communities in Tasmania.** (Moverley J & A Jordan. 1996. *Biological Surveys of Inshore Soft-bottom Communities in Tasmania.* Department of Primary Industry and Fisheries).
- **1995/96 D705 Regional Classification of Tasmanian Coastal Waters (Stage 2) – Estuaries.** (Edgar GJ, NS Barrett & DJ Graddon. 1997. *A Classification of Tasmanian Estuaries and Assessment of their Conservation Significance: an Analysis Using Ecological and Physical Attributes, Population and Land Use.* Parks and Wildlife Service, Department of Environment and Land Management).

Together, these studies have helped identify areas of high conservation value (as potential Marine Reserves), and also have provided a basis for the NRSMPA in

Tasmania, through the regional classification of Tasmania's inshore waters and ecosystems (at the bioregion and provincial scale).

While the IMCRA classification at the bioregion (or large marine ecosystem) level is appropriate for assessing the 'comprehensiveness' of the NRSMPA, it is not at a fine enough scale to assess the 'representativeness' or 'adequacy' of the NRSMPA or, importantly, to assist with the identification of individual Marine Protected Areas. Finer-scale marine-habitat mapping and ecosystem classification (at the scale of 100s of $km^2$) has been identified as a priority for establishing the NRSMPA under the *Strategic Plan of Action for the NRSMPA* (ANZECC Task Force on Marine Protected Areas 1998).

# CHAPTER 5

# DEVELOPING A REPRESENTATIVE SYSTEM OF MARINE PROTECTED AREAS IN TASMANIA

This outline of the goals, principles and outcomes of a Tasmanian Representative System of Marine Protected Areas (TRSMPA)[2] is based on the *Guidelines for Establishing the National Representative System of Marine Protected Areas* (ANZECC Task Force on Marine Protected Areas 1998). These guidelines have been modified where appropriate to suit the Tasmanian context and include the definition and key characteristics of MPA, IUCN categorisation and Comprehensiveness, Adequacy and Representativeness principles outlined in Chapter 3.

## 5.1 PRIMARY GOAL OF THE TRSMPA

Recognising the Tasmanian Resource Management and Planning System, the primary goal should be:

> *To establish and manage a comprehensive, adequate and representative system of Marine Protected Areas to contribute to the long-term ecological viability of marine and estuarine systems, to maintain ecological processes and systems, and to protect Tasmania's biological diversity at all levels.*

## 5.2 SECONDARY GOALS OF THE TRSMPA

Consistent with the National Biodiversity Strategy (Commonwealth of Australia, 1996), the Guidelines (ANZECC Task Force on Marine Protected Areas 1998), and the generally accepted objectives of MPAs (e.g. Suter 1983, ACIUCN 1986, Kelleher & Kenchington 1991, Thackway 1996), the TRSMPA should recognise the following secondary goals:

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[2] The Tasmanian Representative System of Marine Protected Areas proposals outlined by the Department in this Background Report have been used by the Marine and Marine Industries Council as the basis for the development of a draft Tasmanian Marine Protected Areas Strategy

### *Ecological*

- **representative habitats, ecosystems, biodiversity**—to protect and manage substantial examples of marine and estuarine systems to ensure their long-term ecological viability and to maintain biological diversity at all levels by establishing a comprehensive, adequate and representative system of MPAs; including highly protected areas, across all marine bioregions and across a range of ecosystems and habitats within bioregions;
- **rare, endangered and threatened species, habitats**—to protect depleted, threatened, rare, endangered or endemic species and ecological communities and in particular to preserve habitats considered critical for the survival of such species;
- **sensitive, vulnerable or species**—provide for special groups of organisms (e.g. species with complex habitat requirements, mobile or migratory species, or species vulnerable to disturbance) that may depend on reservation for their conservation;
- **ecologically significant areas**—including to protect areas of (i) high species diversity, (ii) natural refuges for flora and fauna, and (iii) centres of endemism;
- **rehabilitation of degraded ecosystems—**to facilitate the restoration of degraded marine ecosystems.

### *Economic*

- **economically significant habitats**—to protect and manage (i) habitats of significance to the life-cycles of economically important species, and (ii) habitats, species and seascapes of importance to recreation and tourism;
- **integrated marine management**—to provide a formal management framework for a broad spectrum of human activities, including recreation, tourism and the use or extraction of resources, that are compatible with the primary goal.

### *Social*

- **geological, archaeological, historical and cultural sites**—to protect and manage significant these sites for present and future generations;
- **aesthetic values**—to protect the natural aesthetic values of marine and estuarine areas for present and future generations;
- **indigenous cultural practices and values**—to cater for the management of marine areas and species by indigenous communities in accordance with traditional cultural practices and affiliations;
- **community support and participation**—to achieve the support and cooperation of the community, including indigenous communities;
- **public education and community awareness**—to facilitate the interpretation of marine and estuarine systems for the purposes of conservation, recreation and public education.

### *Scientific*

- **environment impact assessment**—to provide for research and training to monitor the environmental effects of human activities, including the direct and indirect effects of development and adjacent land-use practices;
- **scientific reference sites**—to provide reference sites for scientific studies, including sites for baseline fisheries monitoring and long-term environmental monitoring.

## 5.3 PRINCIPLES OF THE TRSMPA

The TRSMPA should be developed in accordance with the following principles:

- **Regional Framework**—the *Interim Marine and Coastal Regionalisation of Australia (IMCRA)* provides the regional planning framework for developing the TRSMPA, with ecosystems used as the basis for determining representativeness.
- **Comprehensiveness**—the TRSMPA will include the full range of ecosystems recognised at an appropriate scale within and across each bioregion.
- **Adequacy**—the TRSMPA 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.
- **Highly Protected Areas** —the TRSMPA will aim to include some highly protected areas (IUCN Categories I and II) in each bioregion.
- **Precautionary Principle**—the absence of scientific certainty should not be a reason for postponing measures to establish MPAs to protect representative ecosystems. If an activity is assessed as having a low risk of causing serious or irreversible adverse impacts, or if there is insufficient information with which to assess fully and with certainty the magnitude and nature of impacts, decision making should proceed in a conservative and cautious manner.
- **Consultation**—the process of identification and selection of MPAs will include effective and high-quality public consultation with appropriate community and interest groups, to address current and future social, economic and cultural issues.
- **Indigenous Involvement**—the interests of Australia's indigenous people should be recognised and incorporated in decision making.
- **Decision Making**—decision-making processes should effectively integrate both long-term and short-term environmental, economic, social and equity considerations.

These national guidelines may be amended in light of new information and issues. For example the definition of bioregions under IMCRA is interim and based upon the best available information: as an ongoing iterative process, it may change.

The following principles can also help identify and implement the TRSMPA:

*At an **Ecological** level the TRSMPA should:*

- provide for the protection of Tasmania's range of biodiversity, species, habitats, ecosystems;
- acknowledge rare, threatened and unique species, habitats and ecosystems;
- provide for a comprehensive, adequate and representative system of Marine Protected Areas;
- use ecosystems as the primary unit of biodiversity to determine representativeness;
- include MPAs that are:
  - of an appropriate size to be effective
  - protected from land-based pollution
  - safeguarded against redundancy—i.e. establishing several MPAs to provide insurance against natural and anthropogenic disasters

to achieve management objectives at an appropriate level of ecological integrity.

*At an **Economic–Social–Scientific** level:*

- MPAs should, where possible, facilitate, integrate and assist the sustainable management of economically important species.
- MPAs should, where appropriate, provide economic benefits.
- MPAs should, where appropriate, protect the rights of non-extractive uses (recreation, education, tourism, navigation, etc.).
- public education about the marine environment, and the role and benefits of MPAs, should be provided to ensure MPAs are successfully established and community-owned.
- Appropriate scientific studies MPAs should be facilitated.
- Monitoring of marine life, habitats, ecosystems and human activities within MPAs and adjacent areas to ensure effective management.
- Processes of selection, establishment and management of MPAs should include a process of consultation with, and participation of, community and user groups including indigenous communities.

*With respect to **Planning and Management**:*

- MPAs may incorporate zones ranging from core conservation zones, affording high levels of protection, to sustainable multiple-use zones, accommodating a spectrum of human activities.
- MPAs should contain a representative sample of marine ecosystems in the IMCRA planning framework for the Australian Exclusive Economic Zone, including State, Territory and Commonwealth waters.
- MPAs should be established and managed to facilitate national and international consistency in management approaches.

- Effective compliance promotion and law enforcement should be provided for each MPA.
- Integrated coastal and marine management should be facilitated through ensuring MPAs are managed in a manner consistent with other statutes, plans and policies.
- MPAs within the NRSMPA should have secure status that can be revoked only by a decision of Parliament.
- A long-term strategy should be developed for establishing the NRSMPA.
- Establishment of MPAs and the TRSMPA should adopt a 'systems approach' to planning (i.e. interdisciplinary project team; project management; use of a comprehensive data bases; and use of planning, design and management tools).

## 5.4 OUTCOMES OF THE TRSMPA

The goals of the NRSMPA relate primarily to the conservation of biodiversity and the sustainable and equitable management of human usage. However, the MPAs that make up the NRSMPA may also protect and manage many other important values, such as geological, archaeological, historical and cultural attributes. As well as the benefits or outcomes relating to biodiversity values, there are others that relate to the management and wise use of a range of other values. The outcomes listed below apply to the national system of MPAs as a whole, and not necessarily to each individual MPA in the system.

The outcomes of the NRSMPA in Tasmania should recognise the following management outcomes of the NRSMPA (ANZECC Task Force on Marine Protected Areas 1998):

- protection for Tasmania's marine biological diversity and marine ecological processes;
- protection and management of significant geological, archaeological, historical and cultural sites;
- recognition and protection of indigenous cultural and heritage values;
- management of certain marine areas and species by indigenous communities in accordance with traditional cultural practices and affiliations;
- a focus for research and training;
- monitoring of the environmental effects of human activities, including the direct and indirect effects of development and adjacent land-use practices;
- establishment of reference sites for scientific studies, including sites for long-term environmental monitoring;
- education of the community about the environment, attributes and appropriate uses of MPAs to develop a sense of stewardship and associated responsibility;
- protection of the natural aesthetic values of marine protected areas for the educational, recreational and spiritual benefit of the community;

- facilitation of the restoration of degraded marine ecosystems; and protection and management of habitats of significance to the life cycles of economically important species including propagation areas.

## 5.5 PROPOSED TYPES OF MARINE PROTECTED AREAS IN THE TRSMPA

Utilising exisitng legislation the following types of MPA are proposed:

### National Parks and Wildlife Act 1970

Under the *National Parks and Wildlife Act 1970*, land (including seabed) may be allocated as:

- **Nature Reserve (IUCN Ia)**—*an area which contains natural values that contribute to natural biological diversity and/or geological diversity, and also are unique, important or have representative value; and which is managed primarily for the preservation of these features.*
- **National Park (II, Ib)**—*a large natural area containing a representative or outstanding sample of major natural regions, features or scenery; and which should be managed for the protection and maintenance of natural and cultural values of the area, while providing for ecologically sustainable recreation consistent with conserving those values.*
- **State Reserve (III, Ib)—***an area containing significant natural landscapes and/or natural features and/or sites, objects or places of significance to Aboriginal people; and which should be managed for the protection and maintenance of natural and cultural values of the area and use of the area by Aboriginal people, while providing for ecologically sustainable recreation consistent with conserving those values.*
- **Conservation Area (IV, VI)—***an area predominantly in a natural state; and which should be managed for the protection and maintenance of natural and cultural values of the area and the sustainable use of the area's natural resources.*

### Living Marine Resources Management Act 1995

Under the *Living Marine Resources Management Act 1995*, an area may be allocated as:

- **Marine Resource Protected Area (IA)—***an area reserved for the purposes of protection of representative habitats and ecosystems; maintenance of fish species and genetic diversity; protection of fragile or ecologically significant sites; protection of fish productivity through enhanced egg production and propagation; protection of vulnerable species and habitats; establishment of scientific reference areas; and public education in the resources, protection and use of the marine environment.*

## 5.6 KEY STEPS IN DEVELOPING THE TRSMPA

The proposed process for establishing and managing the TRSMPA incorporates the steps and criteria outlined in the national approach. Some of these steps may be taken concurrently (see Box 5.1 and Figure 5.1). Stakeholders should be consulted at various stages of the process. The steps outlined above are not necessarily a sequence as many of the tasks may be performed simultaneously. In addition, all will involve feedback loops as the process is continual. The relationship between these steps is illustrated below.

**Box 5.1 KEY STEPS IN THE DEVELOPMENT OF THE TRSMPA**

*Step 1* Gather data at the bioregional level, including ecosystem mapping.

*Step 2* Using Tasmanian identification criteria, identify a list of candidate MPAs within IMCRA bioregions to represent major ecosystems. This will include an evaluation of all areas subject to exisiting fisheries management restrictions.

*Step 3* Identification of threatening processes such as human activities and natural recurrences that can cause some of the following effects: habitat destruction, species removal and disturbance, pollution (heavy metals, oil spills and toxic chemicals) and run-off.

*Step 4* Assess the comprehensiveness, adequacy and representativeness of ecosystems and habitats in existing MPAs within each IMCRA bioregion.

*Step 5* Develop priorities for MPAs at the bioregional and ecosystem level, based on the results of steps 3 and 4.

*Step 6* Develop additional criteria for identification and selection of MPAs if required.

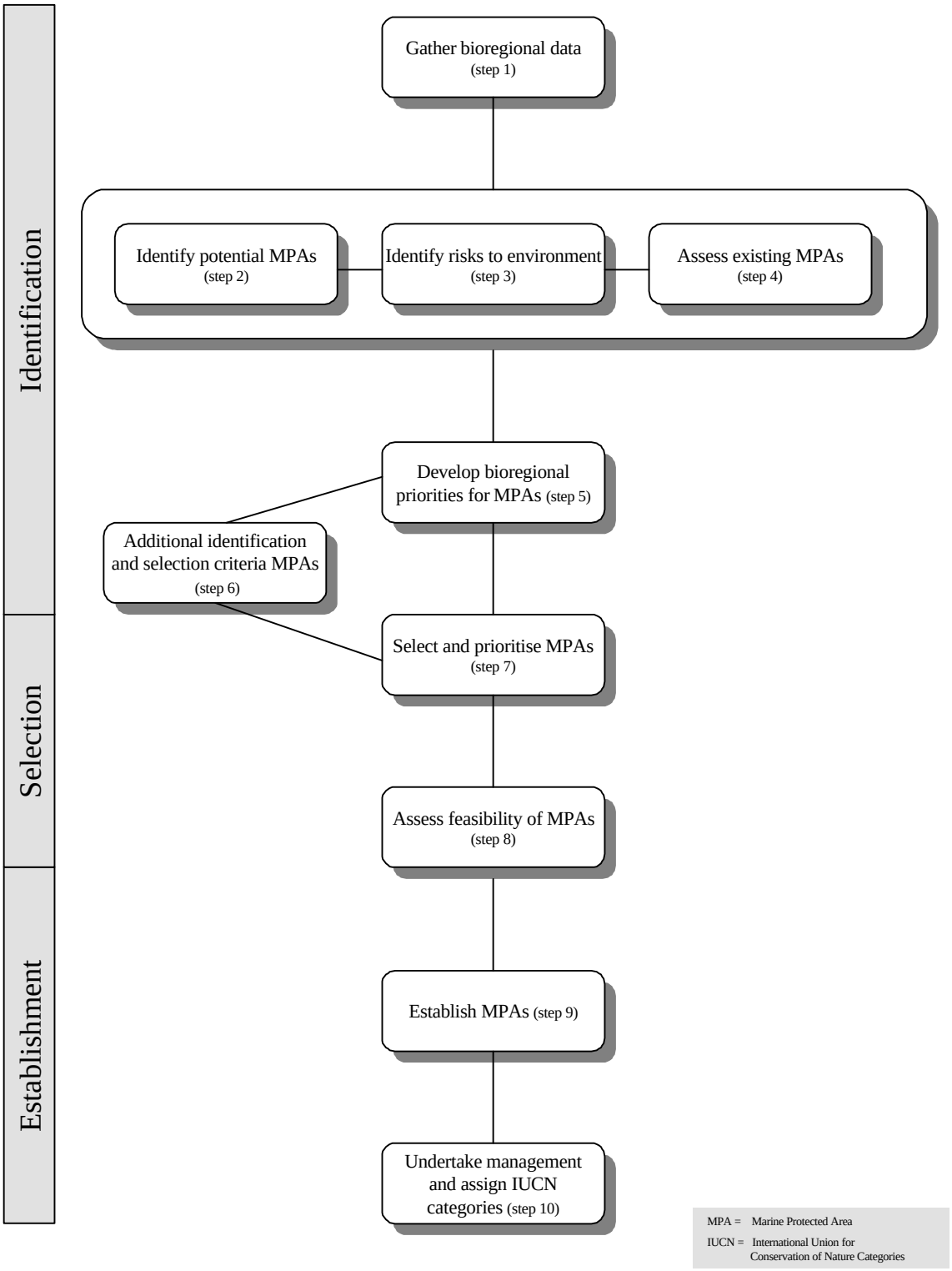
*Step 7* Select and prioritise sites for MPAs from a candidate list of MPAs, using Tasmanian selection criteria and any other additional criteria developed in step 6.

*Step 8* Assess feasibility of potential MPAs and negotiate new protected areas.

*Step 9* Establish MPAs and undertake management planning.

*Step 10* Undertake management tasks, including ongoing evaluation and review of MPAs, and assign IUCN Protected Area Management categories based on management objectives, values and resources identified in step 9.

**Figure 5.1 Key Steps in the Development of the Representative System of Marine Protected Areas in Tasmania**



Under the *Guidelines for Establishing the National Representative System of Marine Protected Areas* (ANZECC Task Force on Marine Protected Areas 1998), each jurisdiction is obliged to:

- provide input to national gap analysis by conducting gap analyses based on MPA coverage within IMCRA regions;
- carry out regional gap analyses to assign regional priorities for MPA selection;
- contribute to the marine component of the Collaborative Australian Protected Areas Database;
- identify and select MPAs for addition to the NRSMPA;
- report on implementation of the NRSMPA to ANZECC, through the Taskforce on Marine Protected Areas;
- review and further develop IMCRA, as appropriate.

## 5.7 CRITERIA FOR IDENTIFICATION AND SELECTION

Following the identification of marine ecosystems and patterns of marine biodiversity and ecological processes, the next step in establishing an NRSMPA is to develop criteria to identify areas as potential Marine Protected Areas, and criteria to select Marine Protected Areas from this candidate list.

There is a rich literature on approaches and criteria for identifying and selecting terrestrial nature parks (see Smith & Theberge 1986 for review). Many of these criteria have also been used as criteria for the establishment of Marine Protected Areas (e.g. Ray 1975, 1976, Salm 1989, Ballantine 1991, Kelleher & Kenchington 1991, Ray & McCormick-Ray 1992, Belbin 1993, Thackway 1996).

Criteria for identifying and selecting parks generally combine ecological, cultural, recreational criteria and can include the feasibility (both physical and economical) of preserving and managing the area. Ecological criteria can include representativeness, diversity, biogeographic importance, uniqueness and rarity, national and international value, naturalness, ecological integrity and inclusiveness. Social, cultural and economic criteria can take into account heritage, educational, recreational and economic values, as well as pragmatic criteria such as the value for scientific research and monitoring, degree of threat or fragility, redundancy and feasibility. Although the criteria for choosing a site as a Marine Protected Area are extensive, it is impossible to be entirely objective in choosing one area over others as worthy of preservation.

The *Guidelines for Establishing the National Representative System of Marine Protected Areas* (ANZECC Task Force on Marine Protected Areas 1998) establishes criteria for identifying candidate Marine Protected Areas (Box 5.2 and selecting among them for the National Representative System of Marine Protected Areas (Box 5.3).

For the NRSMPA, biodiversity conservation and environmental sustainability are the primary criteria for the *identification* of candidate areas. Biodiversity and other baseline data

are essential to ensure that decision-making rests on good science. Social, cultural and economic criteria are applied primarily in the *selection* of MPA sites from the candidate areas. In practice, jurisdictions may apply some of the selection criteria at an earlier stage in the identification process. Some selection criteria may select for a particular MPA if protection would be likely to significantly enhance values by increasing social, cultural or economic benefits. In contrast, other criteria may select against a proposed MPA site, if the values are significantly diminished by virtue of its establishment.

Vulnerability assessment is part of both the identification and selection processes. In the identification phase, vulnerability can be related to natural processes. In the selection phase, vulnerability is to human actions and threatening processes.

**BOX 5.2–NATIONAL CRITERIA FOR THE IDENTIFICATION OF MARINE PROTECTED AREAS**

- **Representativeness** – will the area
  - represent one or more ecosystems within an IMCRA bioregion, and to what degree?
  - add to the representativeness of the NRSMPA, and to what degree?
- **Comprehensiveness** – does the area
  - add to the coverage of the full range of ecosystems recognised at an appropriate scale within and across each bioregion?
  - add to the comprehensiveness of the NRSMPA?
- **Ecological Importance** – does the area
  - contribute to maintenance of essential ecological processes or life-support systems?
  - contain habitat for rare or endangered species?
  - preserve genetic diversity (ie. is diverse or abundant in species)?
  - contain areas on which other species or other systems depend, (e.g. nursery or juvenile areas, or feeding, breeding or rest areas for migratory species)?
  - contain one or more areas that are a biologically functional, self-sustaining ecological unit?
- **International or National Significance** – is the area rated, or have the potential to be listed on the World or a national Heritage List or declared as a Biosphere Reserve or subject to an international or national conservation agreement?
- **Uniqueness –** does the area
  - contain unique species, populations, communities or ecosystems?
  - contain unique or unusual geographic features?
- **Productivity** – do the species, populations, or communities of the area have a high natural productivity?
- **Vulnerability Assessment** – are the ecosystems and / or communities vulnerable to natural processes?
- **Biogeographic Importance** – does the area capture important biogeographic qualities?
- **Naturalness** – how much has the area has been protected from, or not been subjected to, human-induced change?

**BOX 5.3—NATIONAL CRITERIA FOR THE SELECTION OF MARINE PROTECTED AREAS**

- **Economic Interests** – does the area:
  - make existing or potential contribution to economic value by virtue of its protection (e.g. for recreation or tourism, as refuge or nursery area, or source of supply for economically important species?
  - have current or potential use for the extraction of or exploration for resources?
  - have importance for shipping and / or trade?
  - have usage by traditional users including commercial fishers?
  - contribute to local or regional employment and economic development?
- **Indigenous Interests** – does the site:
  - have traditional usage and / or current economic value?
  - have indigenous cultural values?
  - have native title considerations?
- **Social Interests** – does the site have existing or potential value to the local, national or international communities because of its heritage, cultural, traditional, aesthetic, educational, recreational or economic values?
- **Scientific Interests** – does the site have existing or potential value for research and monitoring?
- **Practicality/feasibility** – does the site:
  - have a degree of insulation from external destructive influences?
  - have social and political acceptability, and a degree of community support?
  - have access for recreation, tourism, education?
  - have compatibility between an MPA declaration generally and existing uses?
  - have relative ease of management, and compatibility with existing management regimes?
- **Vulnerability Assessment** – is the site vulnerable and susceptible to human-induced changes and threatening processes?
- **Replication –** will the site provide replication of ecosystems within the bioregion?

## 5.8 PROPOSED GUIDELINES FOR IDENTIFYING AND SELECTING THE TRSMPA

To apply the CAR principles, five stages must be undertaken once baseline, biodiversity information has been collected:

### Stage 1 Assess Comprehensiveness, Adequacy and Representativeness of Existing MPAs

Assess the reservation status of each IMCRA bioregion (i.e. comprehensiveness), the size of existing MPAs (i.e. adequacy) and the representativeness of habitats in MPAs (i.e.

representativeness). This stage represents Step 4 in the proposed development of the TRSMPA (see Figure 5.1).

This process, known as 'gap analysis', identifies the major gaps or deficiencies in the current reserve system. Gap analysis can be conducted at the national, regional or local scale.

### Stage 2 Identify Priorities for MPAs at the Bioregional and Ecosystem Level

Examine the results of the 'gap analysis' and assess the national / regional ecological significance of the gaps and threats to them. This stage is Steps 3 and 5 in the proposed development of the TRSMPA (see Figure 5.1).

This process is commonly referred to as 'priority-setting', as it identifies future priorities for reservation. Priority-setting can be conducted at the national, regional or local scale.

### Stage 3 Identify Candidate Areas for Marine Protected Areas

Identify candidate MPAs for each bioregion and ecosystem, based on the identification criteria (see Box 5.2). This stage represents Steps 2 and 6 in the proposed development of the TRSMPA (see Figure 5.1).

### Stage 4 Select Marine Protected Areas from Candidate List of Areas

From the candidate list of MPAs, select the MPAs, using the selection criteria (see Box 5.3). This stage represents Steps 6 and 7 in the proposed development of the TRSMPA (see Figure 5.1).

### Stage 5 Prioritise Selected MPAs

Prioritise selected potential MPAs for establishment, using a standardised method such as that used in Western Australia (CALM 1998b). Relate weightings to bioregional and ecosystem priorities identified in Steps 1 and 2. This stage represents Steps 7 and 8 in the proposed development of the TRSMPA (see Figure 5.1).

## 5.9 STATE AND REGIONAL PRIORITIES FOR THE TRSMPA

### 5.9.1 Identifying Gaps and Priorities

Under the *Guidelines for Establishing the National Representative System of Marine Protected Areas* (ANZECC Task Force on Marine Protected Areas 1998), the IMCRA is to be used to identify the gaps in the current system of Marine Protected Areas in Tasmania (and Australia) and to set priorities for allocating planning and management resources to fill these gaps (IMCRA Technical Group 1998). Further, under the national guidelines each jurisdiction is obliged to:

- provide input to national gap analysis by analysing MPA coverage in IMCRA regions; and

- undertake regional gap analyses to develop regional priorities relating to MPA selection.

A suite of conservation planning attributes that can be combined to identify broad gaps in the current system of protected areas and set priorities for developing an NRSMPA are being considered by Commonwealth, State and Territory jurisdictions under the ANZECC Taskforce on Marine Protected Areas.

The attributes being considered include:

- the reservation status of each mesoscale region;
- the level of bias in protected areas (i.e. how comprehensively the existing protected areas in each region sample the known environmental variation);
- ecosystem integrity (i.e. the health of each ecosystem in each mesoscale region);
- risks and limiting factors in establishing a viable NRSMPA;
- alternative conservation planning and management measures (such as statutory protection, planning instruments and voluntary conservation agreements).

The levels of priority being considered in establishing the NRSMPA use a combination of: (1) level of reservation status; (2) level of bias in the comprehensiveness of ecosystems within MPAs; and (3) the threatening processes:

*Priority 1*

- nil MPAs or low reservation status;
- high bias in the comprehensiveness of ecosystems within MPAs (i.e. MPAs do not comprehensively represent one or more ecosystems);
- threatened by current resource-use activities and / or management.

*Priority 2*

- low to moderate reservation status;
- high to moderate bias in the comprehensiveness of ecosystems within MPAs;
- threatened by current resource-use activities and / or management.

*Priority 3*

- moderate to high reservation status;
- moderate to low bias in the comprehensiveness of ecosystems within MPAs;
- not currently threatened by current resource-use activities and / or management.

The order of these priorities reflects that the highest priority is to be given to those IMCRA meso-scale regions where there is greatest need (IMCRA Technical Group 1998). Second and third level priorities are allocated to lesser needs.

While IMCRA may be used for broad identification of gaps, it is not appropriate for reserve identification and selection, which must be done at a much finer scale. Similarly, IMCRA should not be used as the sole criterion for allocating priorities in the selection of areas for reservation (IMCRA Technical Group 1998).

### 5.9.2 Methods for Tasmanian Gap Analysis and Priority-Setting

In Tasmania, the following steps and criteria can be used to identify the broad gaps and priorities in the reserve system at the bioregion and ecosystem scale:

Step 1 Assess level of endemism and / or rarity of species in each bioregion and ecosystem—all southern temperate regions of Australia have very high levels of endemism (>90%). However, within this region, the ecosystems of the Bruny Bioregion are recognised as containing distinct endemic elements. The large drowned river valleys and estuaries (e.g. Bathurst Harbour–Port Davey, Derwent Estuary) are also recognised as containing isolated populations and rare fauna and flora.

Step 2 Assess the reservation status of each bioregion and ecosystem:

- very low (<1%)
- low (1–10%)
- medium (10–30%)
- high (>30%).

Step 3 Assess the level of bias or comprehensiveness within protected areas of each bioregion and ecosystem by examining:
(a) the range and proportion of habitats within bioregions and ecosystems
(b) the range and proportion of the habitats in (a) within existing MPAs .

Step 4 Assess existing and potential threats to habitats in each bioregion and ecosystem by examining:

- *water quality:* land-based marine pollution discharges
- *habitat integrity:* habitat loss / degradation, dredging, trawling, introduced marine organisms
- *coastal development:* coastal population pressure, tourism, recreation
- *marine developments:* aquaculture (fish or shellfish farms), mining and petroleum leases, coastal structures (e.g. marinas)

Step 5 Assign priorities to bioregions and ecosystems for MPA establishment based on Steps 1-4.

Priorities for conservation are defined by the cumulative score for reservation status (1-4), representation (1-4), threats (1-4) and biodiversity / endemism (1-2). Priorities are ranked as follows: very high (scores equal to, or greater than 12); high (scores equal to, or greater than 9); moderate (scores equal, or greater than, 6); low (scores equal to, or greater than, 3); and very low (scores less than 3).

In some bioregions or ecosystems there are large differences in the level of existing and potential threats. For instance, the Boags Bioregion has areas of high human population and impact (e.g. Burnie), but also areas of very low coastal population and high habitat integrity and water quality (e.g. Rocky Cape, Hunter Group). In these instances, an indicative range might be given of the level of threats within a bioregion.

### 5.9.3 Identifying Gaps in the Existing Tasmanian MPA System

On the basis of the IMCRA regionalisation (see Chapter 1), biogeographically and ecologically (see Table 5.1), many bioregions and habitats are under-represented in MPAs in Tasmania.

Biogeographically, major bioprovinces and bioregions are either not represented or poorly represented in MPAs. Of the two major bioprovinces in Tasmanian waters, no MPAs have been established in the Bassian Province (the Boags, Otway, Flinders, Twofold and Central Bass Strait bioregions). Of the nine bioregions along the coast of Tasmania only two, both along the southeastern coast of Tasmania (Bruny, Freycinet), have any marine ecosystems formally reserved as MPAs (see Table 5.1). However, the level of reservation in these areas, (0.239% in the Freycinet bioregion and 0.015% in the Bruny bioregion) is extremely low by national and international standards.

**Table 5.1 Status of Marine Protected Areas for the offshore and inshore waters surrounding Tasmania (from ANZECC Task Force on Marine Protected Areas 1999).**

| Bioregion | Total Area of Bioregion ($km^2$)+ | Number of MPAs | Area of MPAs (ha) | MPA as % of (Bioregion) | Reservation Status |
|---|---|---|---|---|---|
| Otway | 37,331 | 0 | 0 | 0 | nil |
| Franklin | 10,364 | 0 | 0 | 0 | nil |
| Davey | 6,794 | 0 | 0 | 0 | nil |
| Bruny | 7,288 | 2 | 112 | 0.015 | very low |
| Freycinet | 8,079 | 2 | 1,938 | 0.239 | very low |
| Boags | 8,271 | 0 | 0 | 0 | nil |
| Central Bass Strait | 50,331 | 0 | 0 | 0 | nil |
| Flinders | 16,916 | ? | 11,900# | 0.704 | very low |
| Twofold Shelf | 32,198 | ? | 98# | <0.01 | very low |
| **Total** | **177,572** | **?** | **14,048** | **0.011** | |

+ Seaward boundary of bioregions defined by the 200 metre isobath.

# Denotes MPA declared in Victorian jurisdicational waters.

Ecologically, many habitats and ecosystems are under-represented by MPAs in Tasmania. In particular, kelp communities, wave-exposed rocky habitats, drowned river valleys (Macquarie Harbour, Port Davey, Derwent River, Huon River), soft-bottom benthos, estuaries, beach habitats and offshore deepwater habitats are not represented in Tasmania. Other habitats, communities or ecosystems of entire regions such as Bass Strait; the western, northern and southern coasts of Tasmania, and the warmer-water habitats and ecosystems of Twofold Shelf bioregion, currently lack any protection or reservation in MPAs.

### *Offshore (Commonwealth) Waters*

Until recently, no offshore (Commonwealth) waters off Tasmania (i.e. seaward of 3 nautical miles) had been reserved by the Commonwealth as Marine Protected Areas. In 1999, the Commonwealth announced the declaration of the Tasmanian Seamounts Marine Reserve, primarily to protect deep water seamount flora and fauna. The seamounts are a unique geological feature (extinct volcanoes) in deepwater (400–2000 m) 50–100 km south of Tasmania. A high proportion of their flora and fauna is unique (at least 8 new genera, high endemism in the biota), but are currently heavily impacted by deepwater trawling. The reserve has a total area of 370 $km^2$ and encompasses 15 of the 70 identified seamounts in the region.

In June 1999, the Commonwealth announced a Notice of Intent to declare the Macquarie Island Marine Park. The primary purpose of the park is to protect the foraging grounds of the abundant marine mammal populations (such as the sub-Antarctic fur-seal and the southern elephant seal), but also to protect the diverse seabird species in the region (including the threatened royal penguin, rockhopper penguin and five species of albatross). It is intended that the park will have a total area of 16 million hectares, and will include a 5.8 million hectare highly protected zone in which fishing and mining will be prohibited.

### *State Waters*

In contrast to the offshore waters off Tasmania, the State jurisdictional waters of Tasmania generally have very low levels of reservation and representation of MPAs (see Table 5.2). The Bruny and Freycinet bioregions have very low reservation; the remaining bioregions have none.

Tasmania is working with the Commonwealth on a joint approach to marine conservation at Macquarie Island. It is planning to complement the Commonwealth Marine Protected Area with a no-take marine reserve in Tasmanian waters.

**Table 5.2 Status of Marine Protected Areas in the inshore jurisdictional waters of Tasmania (derived from Cresswell & Thomas 1997).**

| Bioregion | Tas Area of Bioregion ($km^2$)+# | Number of MPAs | Area of MPAs (ha) | MPA as % of Tas Bioregion | Reservation Status |
|---|---|---|---|---|---|
| Otway | ? | 0 | 0 | 0 | nil |
| Franklin | 2,346.85 | 0 | 0 | 0 | nil |
| Davey | 2,050.47 | 0 | 0 | 0 | nil |
| Bruny | 4,042.69 | 2 | 112 | 0.027 | very low |
| Freycinet | 3,277.43 | 2 | 1,938 | 0.59 | very low |
| Boags | 4,314.83 | 0 | 0 | 0 | nil |
| Central Bass Strait | NA | 0 | 0 | 0 | nil |
| Flinders | 3,338.22 | 0 | 0 | 0 | nil |
| Twofold Shelf | ? | 0 | 0 | 0 | nil |
| **Total** | **?** | **4** | **2,050** | **?** | |

# Seaward boundary defined by 3 n.mile jurisdicational limit. + Bioregional areas provided by PWS (GIS).

## 5.10 IDENTIFYING BIOREGIONAL PRIORITIES FOR THE TRSMPA

Priorities for the inshore bioregions of Tasmania can be identified by assessing how comprehensive, adequate and representative the existing system of MPAs is, and assessing the level of endemism and/or rarity of species and ecosystems and the level of threats (existing and potential).

**Table 5.3 Representation of major inshore habitats within MPAs in Tasmania.**

| Bioregion | % seagrass | % reef | % sand | Major Habitats in MPAs | Representation |
|---|---|---|---|---|---|
| Otway | ? | ? | ? | nil | nil |
| Franklin | 0 | 38.17 | 61.83 | nil | nil |
| Davey | 2.53 | 47.76 | 49.71 | nil | nil |
| Bruny | 3.06 | 14.23 | 82.72 | reef, sand, seagrass | low |
| Freycinet | 3.32 | 18.26 | 78.42 | reef, sand, seagrass | low |
| Boags | 11.40 | 13.32 | 75.28 | nil | nil |
| Central Bass Strait | NA | NA | NA | NA | NA |
| Flinders | 10.52 | 6.99 | 82.49 | nil | nil |
| Twofold Shelf | ? | ? | ? | nil | nil |

## 5.11 SETTING TARGETS FOR AN RSMPA

It is difficult to set a target for the optimal protected area coverage for the world's oceans and coastal regions. For terrestrial systems, the present coverage of protected areas around the world is still far off the 10% global target.

At the global level, IUCN and the Commission on National Parks and Protected Areas (CNPPA) have identified a global target for protected area systems. Under Resolution 19.38 Targets for Protected Areas Systems, as well as Recommendation 16 of the Caracas Congress, governments have been urged to ensure that protected areas should cover a minimum of 10% of each biome by the year 2000. The recent World Conservation Congress in Montreal, Canada (IUCN 1996), urged quicker action by governments to establish national representative systems of Marine Protected Areas, and also recommended the establishment of Category I and II MPAs to protect a representative proportion of marine ecosystems in a natural state (and help maintain sustainable use and biodiversity throughout marine ecosystems).

For marine and coastal areas, factors determining the optimal size and coverage of protected areas are particularly complex and still not fully understood (Tisdell & Broadus 1989). Hence, it is not yet clear whether 10% of the world's coastline would be an appropriate target for coastal and marine protected areas (Elder 1993).

#### *Targets for Australia*

In Victoria, under the Land Conservation Council's *Marine and Coastal Special Investigation. Draft Final Recommendations* (Land Conservation Council 1996), 20 marine parks were proposed for Victoria's 2,000 km coastline. These would encompass the major habitats of Victoria's five bioregions as well as its three major bays. To provide the highest level of habitat protection a total of 21 sanctuary zones within the marine parks is proposed. The recommended Marine Parks encompass 195,300 ha or 19% of Victoria's marine area, 55,000 ha of which is in existing Marine Protected Areas.

In Western Australia, the scientific report, *A Representative Marine Reserve System for Western Australia* (CALM 1994) identified about 70 areas that would represent coastal habitats along 12,500 km of coastline of WA. However, no targets were proposed for the representative system, and further public consultation is proposed before any areas are dedicated to one of the three categories of marine conservation reserve.

## 5.12 IDENTIFYING AND SELECTING INDIVIDUAL MARINE PROTECTED AREAS

### 5.12.1 Current Approaches to Identifying and Selecting Potential Marine Protected Areas

Two approaches to identifying and selecting potential Marine Protected Areas can be used: the informal or 'delphic' such as the qualitative, best-guess of experts; and the more formal, systematic approach utilising guidelines, criteria and priority-setting frameworks. To date, potential MPA sites in Tasmania have been identified by the first approach, using results from targeted, systematic field surveys (Edgar 1981, 1984b,

Edgar *et al.* 1995), existing qualitative and quantitative biophysical and biogeographical information, and the best judgements of local experts.

### 5.12.2 Identified MPA Proposals by the 'Informal' or 'Delphic' Approach

Over the last decade, a number of potential Marine Protected Areas have been suggested. These suggestions are listed in Table 5.4 by source and are not in any priority order.

**Table 5.4 Sites previously suggested as potential Tasmanian marine protected areas**

| Bioregion | Potential Sites | Reference |
|---|---|---|
| Twofold Shelf | Kent Group (Deal, Dover & Erith Islands) | 2,3,6 |
| Flinders | Badger Corner–Trouser Point area (southwest Flinders Island) | 3,6 |
| | Cape Barren Island | 6 |
| | Prime Seal Island | 6 |
| | Wybalenna Island | 6 |
| | Cameron Inlet | 6 |
| Otway | Christmas and New Year Islands (northwest King Island) | 3 |
| | Kangaroo Island (Walker Channel) | 6 |
| | Sea Elephant Bay | 6 |
| | Phoques Bay | 6 |
| Boags | Rocky Cape–Boat Harbour | 1,3,6 |
| | Waterhouse Island | 1,3,6 |
| | Ringarooma Coastal Reserve | 6 |
| | Low Head–Five Mile Bluff | 6,7 |
| | Mayfield Point | 6 |
| | Badger Head | 6 |
| | Stanley | 6 |
| | Three Sisters–Goat Island | 7 |
| | Lillico Beach | 7 |
| | Tenth Island | 9 |
| Franklin | Sloop Rocks (south of Macquarie Harbour entrance) | 3 |
| | Point Hibbs | 3,6 |
| | Arthur River–Temma | 6 |
| Davey | Port Davey–Bathurst Harbour | 2,3,4 |
| | Bathurst Harbour | 7 |
| | Telopea Point–Cox Bight | 6 |
| Bruny | Port Arthur (Carnarvon Bay–Remarkable Cave) | 3,4,6 |
| | Tinderbox (extension of existing Marine Reserve) | 3,4,6 |
| | Ninepin Point (extension of existing Marine Reserve) | 3,4,6 |
| | Pirates Bay–Fortescue Bay | 6 |
| | Waterfall Bay | 8 |
| | Cape Bruny–Cloudy Bay (including Cloudy Lagoon) | 6 |
| Freycinet | Maria Island (extension of existing Marine Reserve to Booming Bay, Chinamans Bay), plus closure of “fishing” area | 1,3,6 |
| | Ansons Bay | 6 |
| | St Helen–Binalong Bay | 6,7 |
| | Waubs Bay | 6 |
| | Moulting Lagoon | 6 |
| Macquarie | Waters surrounding sub-Antarctic Macquarie Island | 3,5,6 |

[1]Edgar (1981); [2]Edgar (1984); [3]Edgar *et al.* (1995); [4]Edgar and Barrett (1995); [5]Scott (1994); [6]Marine Reserves 1996 Bronte Workshop; [7]Tasmanian Fisheries Industry Council and Tasmanian Amateur Sea Fishermens' Association (1997); [8]Eaglehawk Dive Centre; [9]PWS Seal biologists

As well as the large representative reserves the above table contains other categories of marine reserves proposed to complement the representative reserves in an integrated system. These are smaller and have primary objectives other than the protection of biodiversity within each bioregion. For example, they could be created for fish propagation, public education, recreational diving, seal and seabird breeding, and historic or cultural reasons. Several such reserves informally identified have either undergone, or are awaiting, initial assessment by DPIWE.

In addition the following areas have also been identified as potential MPA sites:

- The waters around a number of seal haul-out and breeding sites around Tasmania were identified as requiring protection in a PWS report *Seal Tourism Potential in Tasmania*, by Peter Marmion, July 1997.
- A total of 11 'pristine' estuaries and associated catchments, made up of 9 representative estuaries (based on physico-chemical criteria), North East Inlet and Southport Lagoon, have been recommended for establishment as an integrated system of estuarine protected areas (*A Classification of Tasmanian Estuaries and Assessment of their Conservation Significance*, by GJ Edgar, NS Barrett and DJ Graddon: Marine Protected Area Program, Regional Classification of Tasmanian Coastal Waters, Stage 2, 1997):
  - Black Estuary
  - Bryans Lagoon
  - New River Lagoon
  - Thirsty Lagoon
  - Tamar Estuary
  - Louisa River
  - Bathurst Harbour
  - Payne Bay
  - Wanderer Estuary
  - North East Inlet
  - Southport Lagoon

In addition, a number of sites for potential Marine Reserves in each of the Tasmanian bioregions, covering a number of different objectives, were identified at the Bronte Park Marine Protected Areas Workshop (see Table 5.4). This workshop (held at Bronte Park, Tasmania, on 7–8 December 1996) for major stakeholders was organised to review the Tasmanian Marine Reserves Strategy. Representatives from Government agencies, recreational fishing associations and industry (tourism) groups, conservation organisations, research institutions and other relevant groups attended the workshop. As well as identifying potential Marine Reserves, the workshop also served as preliminary stakeholder consultation before preparation of draft proposals for two representative marine reserves: Bathurst Harbour–Port Davey, and the Kent Group of

islands in Bass Strait. Many of the sites identified at the workshop have not yet been assessed.

These previously identified Marine Protected Area sites should all be considered when choosing sites for the RSMPA in Tasmania. However, while these sites were identified on biological and environmental grounds, they may not necessarily be the best choices on social, economic, scientific or cultural grounds. Compromises on boundaries may be necessary or other sites that more nearly satisfy all criteria within the bioregions may be chosen.

DPIWE has developed formal criteria for identifying and selecting suitable sites for large 'representative' reserves, primarily for the conservation of biodiversity.

### 5.12.3 DPIWE Criteria for Identifying and Selecting Potential MPAs

Within each bioregion, the results from field surveys are examined to identify the most suitable sites for representative Marine Protected Areas. Suitable sites for large representative reserves should:

(1) include a range of habitats (e.g. sheltered to exposed, shallow to deep, reef to soft bottom / seagrass);

(2) if adjacent to land, their surrounding shorelines and watersheds should already be protected from human impacts;

(3) have a total coastal length of at least 10 km.

Selection between suitable sites in a bioregion requires:

(4) minimising impacts on commercial and recreational fishing;

(5) maximising areas in good condition that have not been impacted on by humans.

Criteria 1, 2 and 3 (biological and environmental criteria) are basic to the requirements of a representative Marine Protected Area. In reality, it is unlikely that a proposed site will fit all five criteria. This means that some compromises are needed, in terms of the boundary of the Marine Protected Area and how well the area meets the criteria.

## 5.13 PROPOSED APPROACH TO IDENTIFYING AND SELECTING POTENTIAL MARINE PROTECTED AREAS FOR THE TRSMPA

The approach to identifying areas of high marine conservation value in Tasmania should use an analytic or systematic approach, and apply the national criteria for the identification and selection of Marine Protected Areas as established in the *Guidelines for Establishing the National Representative System of Marine Protected Areas* (ANZECC Task Force on Marine Protected Areas 1998) (Box 5.2 and 5.3). Such an approach would not only ensure that the full range of biodiversity values are represented in the reserve system, but also, importantly, would be a clear and transparent process that takes *all* values (ecological, social, cultural and economic) into account in establishing a reserve system.

In identifying potential sites for Marine Protected Areas, previously recognised areas of high conservation value should be included.

- previous recommendations of marine researchers (e.g. Edgar 1981, 1984b; Edgar *et al.* 1995; 1997; Marmion 1997);
- areas of recognised State significance (e.g. Nature Reserves, National Parks, Conservation Areas, sites on the Heritage List, historic shipwrecks, geological monuments);
- areas of recognised national significance for Wetlands of National Importance (ANCA 1996), sites on the Register of the National Estate), sites of recognised national importance for marine biota, such as shorebirds (Watkins 1993), cetaceans, etc. (Bannister *et al.* 1996);
- areas of recognised international significance (e.g. sites listed as the result of International Conventions).

Many of these recognised areas of high conservation value in Tasmania were identified by formal criteria that largely encompass the range of ecological values and criteria for identifying potential Marine Protected Areas.

# CHAPTER 6

# ESTABLISHMENT, CONSULTATION AND MANAGEMENT OF MARINE PROTECTED AREAS IN TASMANIA

## 6.1 STRATEGIC APPROACHES TO ESTABLISHING MPA SYSTEMS

Possible directions for establishing and implementing a network of Marine Protected Areas in Tasmania are suggested by the legislative, policy and administrative options and approaches taken by other States in Australia. Western Australia, Victoria and South Australia (which have similar temperate environments to Tasmania), and New South Wales (which does not) have developed different strategic approaches to establishing a representative system of Marine Protected Areas. These approaches are summarised in Table 6.1.

Fundamental differences in the primary planning objectives, design and implementation (i.e. legislative, policy and administrative approaches) of MPA networks by the four States generally reflect differences in:

- their strategic policy and planning objectives, including:
  - type of planning (MPA vs. multiple-use planning);
  - area of planning (MPAs or 'whole-of-coast');
  - type of MPAs (provision for resource development and planning);
  - sequential vs. simultaneous declaration of the MPA system;
  - designated MPA management agency (government agency or statutory authority).
- establishment and management of the MPA system, including:
  - the MPA planning process (government agency, independent planning authority or statutory authority);
  - identification of candidate MPAs;
  - selection and prioritisation of MPAs and MPA categories;
  - socio-economic assessment of MPAs;
  - consultation, community participation.

In short, Western Australia, South Australia and New South Wales adopted the concept of multiple-use Marine Protected Areas (CALM 1998a, South Australian Government 1998). Their marine reserves system is a vehicle for both preserving representative

ecosystems and establishing multiple-use management. In contrast, the Victorian government has adopted a 'whole-of-coast', integrated, multiple-use marine (and coastal) planning approach for the entire coast and nearshore waters, which includes a representative system of multiple-use marine reserves (Land Conservation Council 1995, 1996, Environment Conservation Council 1998). In Western Australia and New South Wales the representative system of MPAs is being developed through statutory Marine Park authorities (WA Marine Parks and Reserves Authority, NSW Marine Parks Authority); in Victoria they are being developed through independent public-land-use planning authorities (Land Conservation Council, Environment Conservation Council); in South Australia they are being developed through government agencies (Department of Environment, Heritage and Aboriginal Affairs, Department of Primary Industries and Resources).

In Tasmania, the strategic policy framework of an MPA system, including recommendations on a process and framework to establish and manage a CAR system of MPAs, are to be addressed in the *Tasmanian Marine Protected Areas Strategy* being developed by the Marine and Marine Industries Council.

As New South Wales has yet to develop a strategic policy framework for a representative MPA system, the following analysis of the approaches to establishment is confined to Western Australia, South Australia and Victoria.

**Table 6.1 Comparison of the approaches taken by Western Australia, South Australia and Victoria to establish representative systems of Marine Protected Areas.**

| | MPA Policy Framework | | |
|---|---|---|---|
| **Aspect of MPA Planning Process** | **Western Australia** | **Victoria** | **South Australia** |
| *MPA Planning Body* | Statutory Authority<br>i.e. Marine Reserves and Parks Authority (CALM) | Independent Public Land Use Planning Authority<br>i.e. Land Conservation Council (LCC) / Environment Conservation Council (ECC) | Government MPA Agencies<br>i.e. Department of Environment, Heritage & Aboriginal Affairs (DEHAA)<br>Primary Industries & Resources SA (PIRSA) |
| *MPA Strategic Policy* | *New Horizons in Marine Management* (CALM 1994) | *Marine and Coastal Special Investigation. Draft Final Recommendations* (LCC 1996)<br>*Marine, Coastal and Estuarine Investigation* (ECC 1998) | No specific MPA policy, but references to MPA system in the *SA Marine and Estuarine Strategy* (SA Government 1998) |
| *Type and Area of Planning* | MPA planning only—reservation of designated Marine Protected Areas | Multiple-use planning of whole-of-coast—reservation and zoning of all waters | MPA planning only—reservation of designated Marine Protected Areas |
| *Types of MPAs* | High protection to multiple- use MPAs | High protection to multiple-use MPAs | High protection to multiple- use MPAs |
| *Resource Development and Planning* | Facilitated within multiple-use MPAs | Designated development zones; also facilitated in multiple-use MPAs | Facilitated within multiple-use MPAs |
| *Establishment of MPA System* | Sequential establishment of MPAs | Simultaneous establishment of MPAs | Sequential establishment of MPAs |

| MPA Policy Framework | | | |
|---|---|---|---|
| **Aspect of MPA Planning Process** | **Western Australia** | **Victoria** | **South Australia** |
| *Designated MPA Management Agency* | Department of Conservation and Land Management | Department of Natural Resources & Environment (DNRE) | Department of Environment, Heritage & Aboriginal Affairs (DEHAA)<br>Primary Industries & Resources SA (PIRSA) |
| *Additional Infrastructure* | Scientific Advisory Committee;<br>Marine Conservation Unit (CALM) | None specified | None specified |
| *Integrated Coastal Zone Planning and Management (land–sea)* | No formal link or integration with whole-of-coast coastal planning strategies, but integration across adjacent terrestrial and marine reserves | Formal linkages and complementary 'whole-of-coast' planning with the *Victorian Coastal Strategy* (VCC 1997) | Informal links within the *SA Marine and Estuarine Strategy* (SA Government 1998) |
| **Establishment and Management of MPA System** | | | |
| *Identification of Candidate MPAs* | Undertaken by Marine Reserves Working Group (CALM 1994). No formal criteria—use of best expert advice. | Undertaken by LCC (LCC 1996)—informal process (limited formal criteria) | Undertaken by the South Australian Research and Development Institute) SARDI (Edyvane 1999). Use of IUCN criteria. |
| | Limited subtidal information; best available expert advice; additional studies at the MPA proposal stage (if required) | Mostly intertidal information, limited subtidal information | Extensive subtidal information on marine biodiversity, ecosystems (Edyvane 1999);<br>Additional studies at the MPA proposal stage (if required) |
| *Selection and Prioritisation of MPAs and MPA Category* | To be undertaken by Marine Reserves and Parks Authority | Undertaken by LCC (5-step selection process) | To be undertaken by DEHAA, PIRSA with community consultation. |
| *Social–Economic Assessment of MPAs* | Explicit in the assessment of individual MPA proposals | Formal socio-economic assessment of whole MPA system | Explicit in the assessment of individual MPA proposals |
| *Community Consultation and Participation* | 2 formal submission periods; State-wide consultation; ongoing MPA-based consultation | 3 formal submission periods; extensive consultation (1991–present). | To be undertaken by DEHAA, PIRSA |

## 6.2 IMPLICATIONS FOR ESTABLISHING AN TRSMPA

**MPA Planning Body**: Tasmania has several options for planning and managing a CAR system of Marine Protected Areas: an MPA government-based planning process (e.g. Department of Primary Industries, Water and Environment); an independent inquiry by a statutory land-use planning authority (e.g. Resource Planning and Development Commission); or a process by a new independent statutory authority.

The Resource Development and Planning Commission provides a statutory and independent framework for conducting a public-land-use inquiry with a high level of public consultation (similar to the LCC and ECC in Victoria) and with formal linkages to the Resource Management and Planning System. On the other hand, the establishment of a new independent statutory authority would duplicate the existing function and processes of the Resource Planning and Development Commission and require significant resourcing and new legislation.

**Type and Area of Planning:** Tasmania has opportunities to consider either an MPA-planning or a multiple-use planning approach in developing a system of MPAs. The process of developing an integrated, 'whole-of-coast' approach to coastal zone management as conducted in Victoria would require considerable resources and face the same difficulties as in Victoria. In contrast, multiple-use management frameworks can be established simply and sequentially in different regions of the State, as resources and regional priorities dictate (as in Western Australia and South Australia). In Tasmania, management of coastal public lands and overall coastal and marine management (out to 3 nautical miles seaward) is overseen by the Department of Primary Industries, Water and Environment (DPIWE). It is already responsible for fisheries, aquaculture and coastal management (and the implementation of the State Coastal Policy, administered by the Coastal and Marine Program).

There is, therefore, considerable logic in establishing an integrated and effective CAR system of MPAs (incorporating multiple-use management objectives) under the *National Parks and Wildlife Act 1970* and the *Living Marine Resources Management Act 1995*. Further, the integration of marine activities and the principles of ecologically sustainable development are promoted under the objectives of the Resource Management and Planning System and the State Coastal Policy.

**Resource Development and Planning:** Tasmania has adopted policies and management plans for marine-based aquaculture. These plans, which identify areas for aquaculture development along the Tasmanian coast and nearshore waters, are formally recognised and approved as developments under the *Marine Farming Planning Act 1995*. When developing a system of Marine Protected Areas in Tasmania, these development plans should be taken into account**.**

**Establishment of the MPA System (sequential vs. simultaneous declaration of MPAs):** Tasmania has probably more in common with the temperate regions of Western Australia than with Victoria, in terms of coastal length (4,000 km), types and patterns of human use along the coast, and human population patterns along the coast (i.e. the prevalence of remote, low-density, coastal populations). Sequential declaration of Marine Protected Areas would allow limited planning and management resources to be prioritised, and also gives more opportunity to raise public awareness of the value of Marine Protected Areas.

**Identification of Candidate MPAs:** Tasmania has the opportunity to make use of the international and the national guidelines for identifying and selecting Marine Protected Areas (ANZECC 1997). A comprehensive program of biological surveys and biodiversity assessments of the nearshore marine habitats has been in train since 1984, on behalf of the Department of Primary Industries, Water and Environment (with assistance from CSIRO

Division of Marine Research), to identify areas of high conservation value and assist in identifying a representative system of Marine Protected Areas. This information will improve the definition and delineation of representative habitats and ecologically significant areas, and give greater precision to achieving the ecological management objectives (representativeness, viability and ecological integrity).

**Selection and Prioritisation of Candidate MPAs and MPA Categories:** Tasmania is in the position to build on the work of other States and the Territory in selecting and prioritising Marine Protected Areas.

**Social and Economic Assessment of MPAs:** There would be considerable benefits to undertaking formal social and economic assessments of individual reserves as they are considered for declaration (as in Western Australia). This would not preclude considering economic and social criteria during the selection and prioritisation of MPAs. While a comprehensive cost-benefit analysis of establishing an entire system of MPAs (as in Victoria) could be performed, this would mean the entire system of MPAs would have to be selected and identified beforehand.

**Community Consultation and Participation:** Formal public consultation processes are currently required for the establishment and planning of individual Marine Protected Areas (under the *National Parks and Wildlife Act 1970* and the *Living Marine Resources Management Act 1995).* However, there would be a need for additional public consultation and input when establishing a CAR system of MPAs.

## 6.3 OPTIONS FOR PLANNING AND ESTABLISHING THE TRSMPA

Recognising the role of the Marine and Marine Industries Council in defining the policy framework for the RSMPA in Tasmania through the *Tasmanian Marine Protected Areas Strategy*, there are several options for the next stages of establishing and managing the RSMPA in Tasmania (see Table 6.2).

**Table 6.2 Options for Establishing and Managing the TRSMPA.**

| Establishment and Management of the RSMPA | DPIWE (Option A) | RPDC (Option B | Authority (Option C) | Other (Option D) | Other (Option E) |
|---|---|---|---|---|---|
| • identification of candidate MPAs | DPIWE | RPDC | Authority | DPIWE | DPIWE |
| • selection and prioritisation of MPAs and MPA Category | DPIWE | RPDC | Authority | DPIWE | RPDC / Authority |
| • social–economic assessment of MPAs | DPIWE | RPDC | Authority | DPIWE | RPDC / Authority |
| • community consultation and participation | DPIWE | RPDC | Authority | RPDC | RPDC / Authority |

The benefits and drawbacks of the various options or approaches for establishing and managing the RSMPA in Tasmania are outlined below:

- **Department of Primary Industries, Water and Environment (Option A).** Under this option the entire planning, establishment and management of the TRSMPA would be undertaken by the Department of Primary Industries, Water and Environment, with the approval of the Minister. The department would use existing technical and planning resources, and existing legislation (similar to the approach taken in South Australia). This process is likely to be timely and inexpensive as the agency currently has expertise and resources (including databases, and marine policy and biodiversity expertise). It would also be able to use outside expertise as necessary e.g. University of Tasmania and CSIRO. This process (i.e. government and agency-driven) may not be perceived as 'independent' by other stakeholders.

- **Resource Planning and Development Commission (Option B).** Under this option the Resource Planning and Development Commission would conduct an independent, statutory, public-land-use inquiry into the identification, selection and establishment of the TRSMPA, using the procedures prescribed under the *Public Land (Administration and Forests) Act 1991*. It may draw on the marine information and policy and technical expertise of the DPIWE and other organisations such as the University of Tasmania and the CSIRSO—while the RPDC would contribute expertise and experience in resource planning, environmental and socio–economic assessment, public consultation and conflict management. Under this option, the existing MPA management agency (i.e. DPIWE) would then be responsible for managing the MPA system.

  The RPDC is independent and can co-opt required expertise for such an inquiry. One of the main benefits of the RPDC option is the public trust and confidence the RPDC has generated in previous inquiries. A major drawback of this option however, is the relatively long timeline (at least two years) required under the RPDC legislation to complete the process.

- **New Independent Statutory Authority (Option C).** Under this option a Marine Protected Areas Authority would need to be created to undertake the planning and establishment of the TRSMPA.

  Such an Authority would, like the RPDC, have the independence and expertise required of a public land-use planning authority and could draw on the expertise of the DPIWE, University of Tasmania and CSIRO as required. It would essentially duplicate the existing planning function and processes of the RPDC. The establishment of such an Authority would also need significant extra resourcing (with policy and administrative support). It would require new legislation if the Authority is to have the statutory powers to undertake the planning process. There would probably be considerable delays in creating such new legislation and such a new body. It is possible but unlikely that a new

authority could undertake the public consultation on the identification and selection in less time than the RPDC.

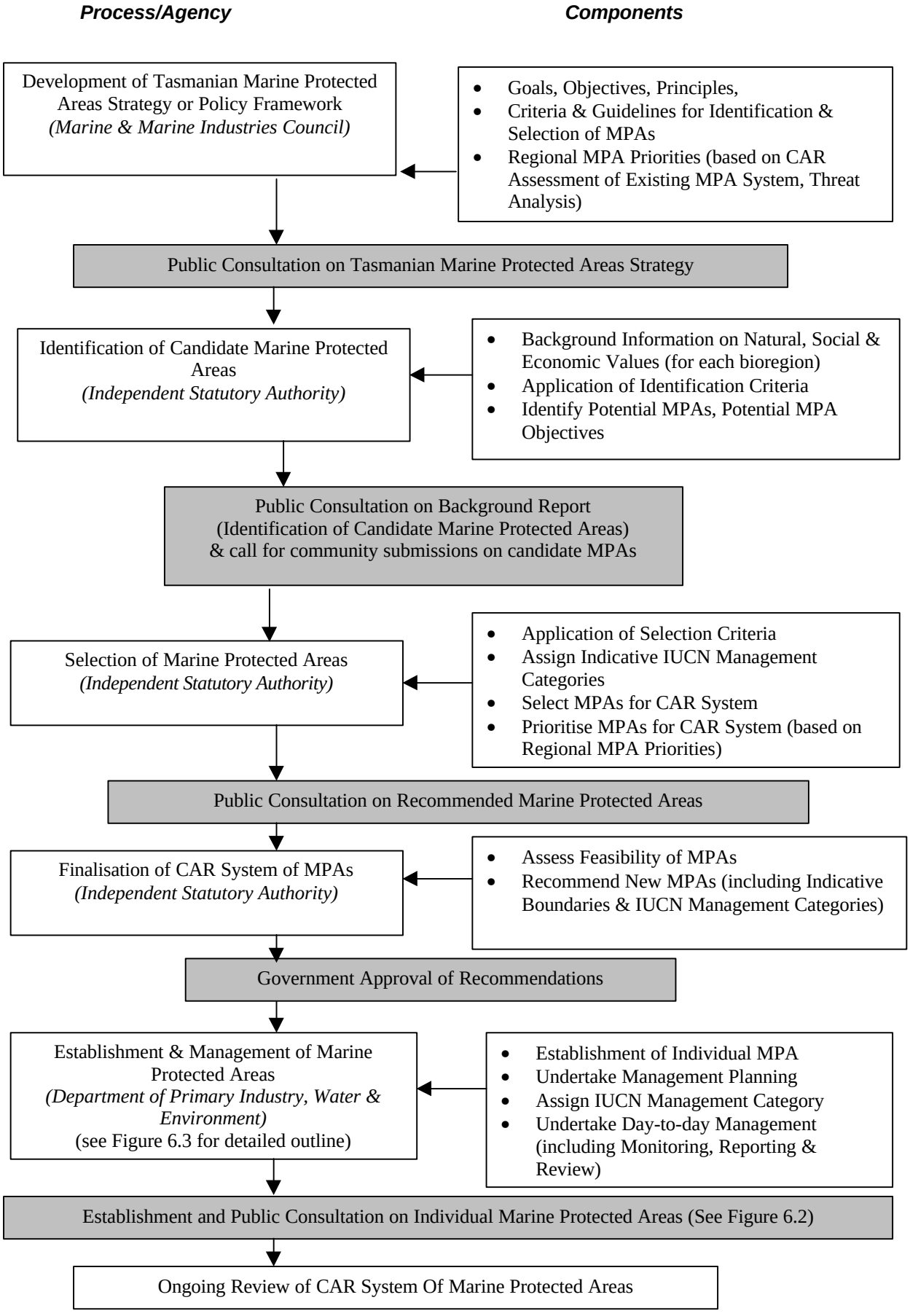
- **Shared responsibility (Options D and E).** Under these options, the TRSMPA could be established and managed by a combination of the RPDC and an MPA Authority. The range of options depends on which agencies undertake the planning tasks, and whether an MPA Authority is established. Under Option D, the RPDC would be solely responsible for public consultation on the RSMPA in Tasmania, while under Option E, DPIWE would be responsible for identifying candidate areas and the RPDC (or new Authority) would be responsible for selecting MPAs, social and economic assessments and public consultation (similar to Western Australia by the Marine Reserves and Parks Authority). While these approaches satisfy the criteria for independence and also provide more flexibility, they are unlikely to provide a continuous or complementary planning process.

In indentifying an approach to establishing a CAR system of Marine Protected Areas in Tasmania, there is a need to acknowledge:

- the statutory obligations and timeframes for public consultation under existing legislation;
- the specific individual tasks which need to be undertaken in the identification, selection and establishment of a system.

Fig. 6.1 provides an overview of the proposed planning process.

**Figure 6.1 Establishing a CAR System of Marine Protected Areas in Tasmania**



## 6.4 MANAGING THE TRSMPA

### 6.4.1 Management Agency

MPAs should ideally be managed through a coordinated and integrated approach to conserving biodiversity and managing ecologically sustainable uses and activities. In Australia, MPAs are generally managed at a State level by a number of agencies. In Tasmania, as in most States, resource management and conservation objectives have been separated, with MPAs being established and managed jointly under fisheries legislation (*Living Marine Resources Management Act 1995*) and national parks legislation (*National Parks & Wildlife Act 1970*).

Management of RSMPA and individual MPAs is primarily the concern of the State jurisdictions, but ANZECC (1998) recognises a need to share information and develop performance assessment at the national level for management of the NRSMPA.

#### Proposed MPA Management Agency

Marine Protected Areas in Tasmania should continue to be managed by the Department of Primary Industries, Water and Environment under the *National Parks and Wildlife Act 1970* and the *Living Marine Resources Management Act 1995*. The department is also responsible for the protection of marine creatures, such as seals and seabirds, reservation, interpretation, enforcement and day-to-day management (the last currently performed by rangers on adjacent terrestrial national parks and the Marine Police). The department is responsible for conserving of fish (including shellfish, scalefish and crustaceans), issuing and enforcing fishing regulations, and undertaking monitoring and research. Fisheries Inspectors, Marine Police and authorised rangers enforce fisheries regulations in marine reserves.

The *National Parks and Wildlife Act 1970* provides for the establishment of reserves in the terrestrial or marine environments for a range of purposes, including the protection of representative areas. The *Living Marine Resources Management Act 1995* provides for the establishment of 'marine resource protected areas'. Amongst other things, they may be established to protect representative samples of marine and estuarine habitats and ecosystems, and maintain fish species and genetic diversity.

### 6.4.2 Proposed Establishment of Individual MPAs

The following steps should be undertaken to establish and manage individual MPAs:

| | |
|---|---|
| Stage 1 | legal establishment of boundar)ies (either preceded or followed by formal management planning) |
| Stage 2 | zoning |
| Stage 3 | enactment of zoning regulations |
| Stage 4 | specific-site planning |
| Stage 5 | specific-site management |
| Stage 6 | day-to-day management |
| Stage 7 | review and revision of management |

At each of these stages, the following factors should be taken into account, at a level of detail that increases from Stage 1 to Stage 7:

- geographic habitat classification
- physical and biological resources
- climate
- access
- history
- current usage
- management issues and policies
- management resources

Under the *Guidelines for Establishing the NRSMPA* (ANZECC Task Force on Marine Protected Areas 1998), jurisdictions, such as Tasmania, are obliged to undertake the following tasks when establishing an MPA:

- assess relative ecological and socio-economic values;
- assess threatening processes;
- identify management objectives and intentions;
- consult with adjacent and other relevant jurisdictions;
- consult with stakeholders, including consideration of industry, displacement and compensation issues;
- declare MPAs for addition to the NRSMPA;
- manage MPAs under their jurisdiction;
- determine IUCN Protected Area management categories for MPAs proposed for addition to the NRSMPA;
- ensure proposals for declaration and management of MPAs are consistent with the full range of Australia's obligations.

### 6.4.3 The Management Planning Process

A management plan is the means by which the planners and managers define the purposes for which a MPA may be used. The zoning and management plan can be synonymous. For large MPAs, the objectives of a management plan will include both the integrated management of the entire ecosystem (the Great Barrier Reef Marine Park for example, encompasses whole ecosystems), and also site-specific management appropriate to the areas within the MPA (Kelleher & Kenchington 1991). Achieving the first objective will require a broad strategic approach to sustainable use and management of natural resources and environments (such as fishing and pollution), on a scale that matches the scale of the ecosystems. The second objective will require tactical site or habitat management to address specific objectives of biodiversity preservation, research, education and recreation.

A management or zoning plan is likely to be successful only if planning systematically uses a holistic, interdisciplinary or 'systems' approach and if the plan is developed in consultation with most of the users and neighbours of an MPA. Public participation should be a key element in the drawing up of any management plan for an MPA.

Kelleher and Kenchington (1991) outline five desirable stages in the development of a management plan for an MPA:

(1) Initial information gathering and preparation

(2) Public participation or consultation—prior to the preparation of a plan

(3) Preparation of a draft plan

(4) Public participation or consultation—review of draft plan

(5) Plan finalisation

The format of a management plan will depend on its legislative basis and the conventions and procedures of the government agencies involved in the plan's development.

**The Need for Buffer Zones**

When managing human activities within an MPA, fences or boundaries to protect critical areas are purely nominal; protection of specific areas must provide for buffer zones. This is because water can transport pollutants, nutrients and marine organisms into or out of protected areas. Zoning or management plans for MPAs should therefore consider the need for buffer and transition zones if specific areas are to be protected.

The principle of a buffer zone protecting a core site from impact was originally developed under UNESCO's Biosphere Reserve system. Although it is well established for terrestrial environments, its application to marine environments is very recent. However, the more connected or open nature of marine environments suggests that the minimum area for protected areas and their buffer zones may have to be considerably larger in marine environments than in terrestrial environments if external influences are to be adequately buffered or diluted.

Large multiple-use MPAs are an ideal tool for establishing buffer and transition zones to protect core areas; the small, high-protection areas such as Marine Reserves can be encompassed and protected within the broader integrated management regime afforded by a Marine Park (Kelleher & Kenchington 1991).

### 6.4.4 Proposed Consultative Framework for Selecting and Declaring Individual MPAs

Public participation is one of the most important elements in the management of MPAs. Unless users are persuaded that the restrictions are reasonable and likely to achieve a useful purpose, measures to protect the environment will be costly and ineffective. This is particularly true in marine environments, where the waters and resources are 'common property', boundaries difficult to define and entry points impossible to check.

Hence, without public and user commitment to the planning process and its outcomes, any Marine Protected Area would probably fail.

Multiple users of the marine environment and its resources effectively means that there are multiple owners. Hence, establishing and planning Marine Protected Areas cannot be achieved without coordinating the interests and involvement of all users. If consultation it is to be effective, coordination must not be dominated or directed by the interests of any one sector.

When encouraging community participation the usage patterns, expectations, attitudes and local knowledge of users should be determined in the planning stage. Marine Protected Area planning should not be allowed to become the task of remote experts with no direct contact with, or understanding of, local issues (Kelleher & Kenchington 1991).

**Proposed Consultative Framework**

The Tasmanian Government is committed to full and open consultation before an area is dedicated as a Marine Protected Area. Under the *National Parks and Wildlife Act 1970* and the *Living Marine Resources Management Act 1995*, the Government has clearly defined the process that will have to be followed for an area to be considered as a Marine Protected Area:

1. The area is identified and its proposed boundaries determined.
2. The area's biological and economic resources and social values are assessed.
3. Liaison with the community is conducted throughout the process, including when preparing the management plan/s and proposing the various management zones.
4. DPIWE prepares a report on the reservation proposal for the Minister for Primary Industries, Water and Environment.
5. An indicative management plan outlining the reserve's proposed management objectives and zones is prepared.
6. When these steps have been completed, the Minister for Primary Industries, Water and Environment formally publishes a notice of intent to declare a Marine Protected Area and releases the indicative management plan for public comment. (All Marine Protected Area proposals are subject to a minimum one-month public comment period before a final decision by Government).
7. DPIWE provides the Minister for Primary Industries, Water and Environment with a report on the public submissions received in response to the reservation proposal and the indicative management plan, and a revised proposal if relevant.
8. The concurrence of the Minister is obtained.
9. The reserve is then created by Order of the Governor.
10. The Minister for Primary Industries, Water and Environment also tables in each House of Parliament the draft proclamation to reserve the new marine reserve. Either House can resolve to disallow a reservation.

For established Marine Protected Areas (i.e. Marine Reserves), the public must be consulted in the development of management plans and zoning schemes.

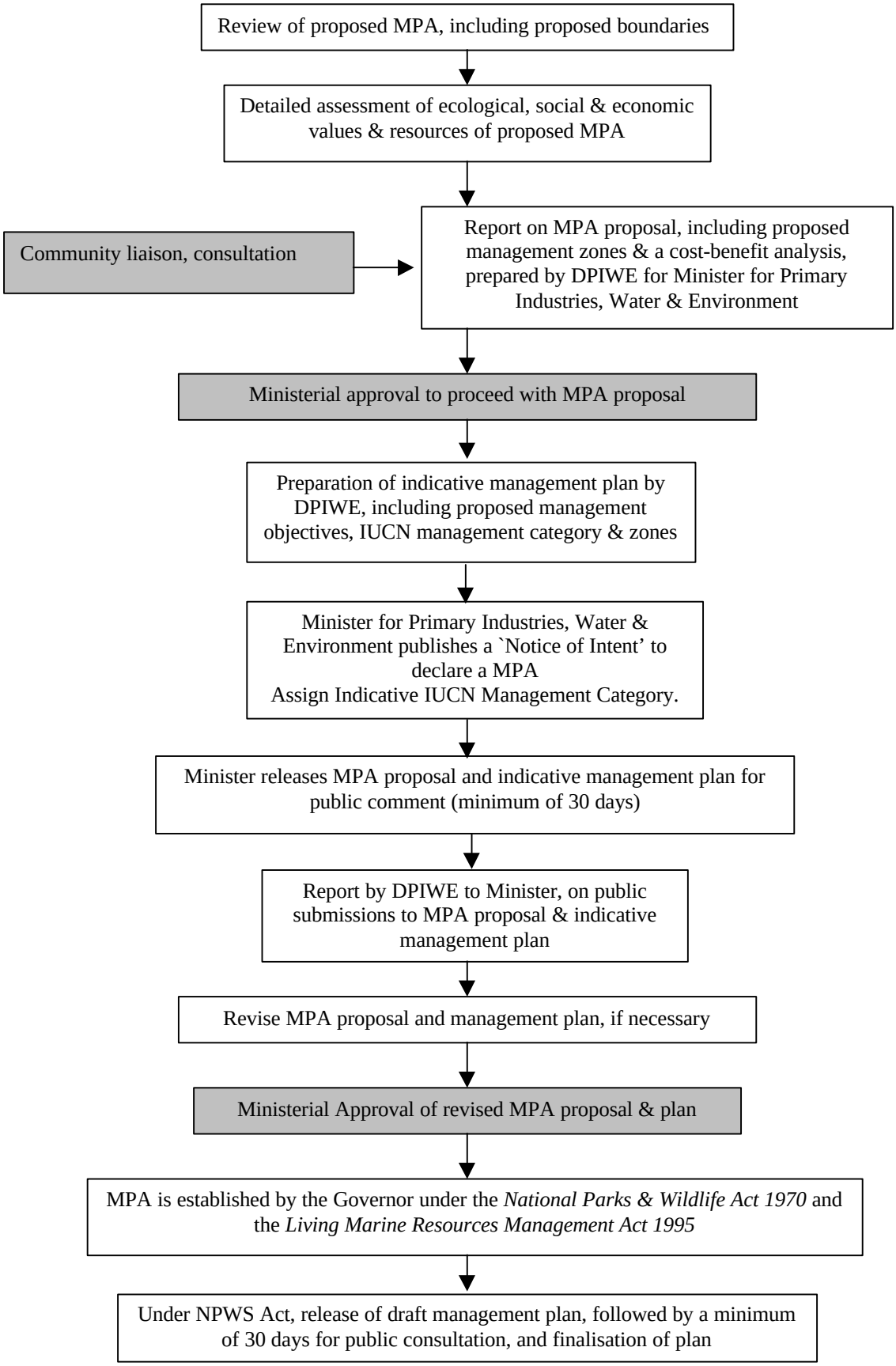
Under the *Living Marine Resources Management Act 1995*, all draft proposals allow 30 to 90 days for public consultation, after which they are declared by the Minister. Under the *National Parks and Wildlife Act 1970*, proposals have to be approved by both Houses of Parliament. MPAs may be declared under both Acts and it is proposed that, where relevant, future MPAs will be declared under both Acts.

Under the *National Parks and Wildlife Act 1970*, a management plan is prepared after declaration, with a minimum of 30 days allowed for public consultation after newspaper advertising. The Minister makes the final decision. Under the *Living Marine Resources Act 1995*, the management planning process is the declaration process.

The process of public consultation in the establishment of a Marine Protected Area is outlined in Fig. 6.2.

**FIGURE 6.2 ESTABLISHMENT OF A MARINE PROTECTED AREA[#] – PROPOSED CONSULTATION PROCESS**

([#] Process for individual MPA or for several MPAs simultaneously)



### 6.4.5 Managing Uses Within MPAs

Tasmania's marine environment is economically very important. Access for resource users, whether commercial or recreational, extractive or non-extractive, needs to be considered and appropriately managed. For the NRSMPA, access to the resources of an MPA should be considered in the context of the potential impact of all uses and potential uses on the defined biodiversity conservation values of the MPA and the management objectives (ANZECC Task Force on Marine Protected Areas 1999). Allowable uses are those that do not compromise the defined biodiversity values and management objectives.

If the decision is made to allow resource use within an MPA on the basis that the biodiversity conservation values will not be compromised, the principles of ecological sustainability must apply. The management arrangements developed for individual MPAs may require higher standards of management of resource use than would otherwise apply to the use or activity, in order that the primary goal of the MPA is not compromised. For instance, a commercial fishery that is managed generally in accordance with ecologically sustainable development principles could be allowed within the MPA but may be subject to more comprehensive management arrangements, such as limiting gear type or catch ( Task Force on Marine Protected Areas 1999).

In managing the RSMPA in Tasmania, the following principles and approaches should be recognised:

- **adaptive management**—neither marine planning nor the nature of human activities is ever static. Management must adapt to change and new information, and also refine and improve management performance in the light of ongoing assessment.
- **sustainable development**—acknowledging the objectives of the Tasmanian Resource Management and Planning System and the National Strategy for Ecologically Sustainable Development, activities and uses should be conducted on an ecologically sustainable basis, i.e. '*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*'.
- **ecosystem approach to management**—ecosystem management provides a focus for the management and ecological integrity of an ecosystem as a whole, while providing for a variety of uses.
- **multiple-use management**—the application of the principles of multiple-use management (i.e. maintenance of ecosystem integrity; wealth generation and resource use; equity; and participatory decision-making) provide a clear framework or process for resource allocation and decision-making, particularly in planning and establishing Marine Protected Areas.
- **joint management arrangements**—in recognition of the connected nature of marine environments and ecosystems, joint management and jurisdictional arrangements may be necessary to implement best practice approaches to marine planning.

## 6.5 MPA MANAGEMENT TASKS

The tasks required in the pre-declaration, declaration and post-declaration stages of an MPA includes:

- **information gathering**—collection of baseline data on (at least) the resources and the usage levels, before or during the development of an MPA proposal;
- **management planning**—preparation of a management plan that has, as a paramount consideration, the maintenance of the ecosystem;
- **agency cooperation**—close cooperation of agencies with responsibilities within and adjacent to MPA boundaries;
- **monitoring**—subsequent to declaration, wherever possible, a regular monitoring program should be undertaken to include:
  - assessment of the extent to which the objectives identified for each MPA are being achieved;
  - assessment of possible impacts on the ecosystem from human activity;
  - refinement of, and adjustments to, the management plan;
  - any necessary subsequent adjustments to legislation.
- **enforcement** —development of an effective enforcement program that would include penalties for gross or persistent infringement of regulations;
- **surveillance—**the use of regular surveillance to monitor activities and usage in MPAs. Such surveillance will contribute to safety and the acquisition of resource data, and be a deterrent to misuse. Aerial surveillance is the most appropriate and cost-effective method, especially for larger or widely dispersed, relatively inaccessible MPAs;
- **education**—development of comprehensive and well-planned education and information programs to increase public awareness of MPAs;
- **review**—regular review of management plans on the basis of monitoring and research data.

Once established, management of MPAs will require the development, coordination and implementation of a conservation framework and, in multiple-use MPAs, the coordination and management of uses. In multiple-use MPAs, activities are generally managed by the various resource management agencies, whose tasks include:

- licensing and supervising equipment;
- allocating sustainable yield between commercial and recreational fishing interests;
- licensing and supervising recreational boating and related activities;
- supervising the use of sites protected for the purposes of research;
- education, recreation and tourism.

In multiple-use MPAs, a combination of the following instruments may be used to balance conservation values and resource uses:

- establishing high-protection 'no take' areas;
- establishing area boundaries for specific activities;
- enforcing closure during parts of the year critical to life histories of species, or for longer periods;
- setting size limits, maximum permitted catches, harvest limits;
- prohibiting or limiting use of unacceptable equipment;
- licensing or issuing permits to provide specific controls or to limit the number of participants in a form of use;
- limiting access by setting a carrying capacity that may not be exceeded.

### 6.5.1 Monitoring and Reporting

#### 6.5.1.1 Types of Monitoring

The ecological integrity and protection of marine resources in an established MPA will depend on regular monitoring and research into the effects of human usage on the designated area. Three of the key elements of a management program for MPAs are essentially monitoring tasks:

(1) surveillance or activity monitoring to assess how people are using the area;

(2) scientific monitoring to provide information on the condition of the managed area and the impacts on it of human use and other factors; and

(3) impact prediction and management (advance assessment of the likely impact of new or changed uses, e.g. facility development, and establishment of management conditions for that use) (Kenchington 1990).

Scientific monitoring can not only test the effectiveness with which a management regime protects species and habitats, but can also assess the regimes by examining areas before and after establishment as MPAs.

#### 6.5.1.2 Evaluating the NRSMPA

The effectiveness of the NRSMPA will be monitored by the Commonwealth with assistance from the States and Northern Territory. The processes for monitoring and reporting for the NRSMPA, including details of performance assessment, are presented in the *Strategic Plan of Action for the NRSMPA* (ANZECC Task Force on Marine Protected Areas 1999). This is a collaborative process involving the Commonwealth, the States and the Northern Territory through ANZECC.

For the NRSMPA, performance-assessment reporting is required at (1) the individual MPA level; (2) the bioregion level; and (3) the system as a whole. The responsibility for reporting is different for each level. Assessment of individual MPAs is the responsibility of the jurisdiction in which the MPA is declared. Bioregion reporting requires jurisdictional and cross-jurisdictional reporting. The responsibility for performance assessment of the whole NRSMPA concerns all jurisdictions, and is coordinated by the ANZECC Taskforce on Marine Protected Areas.

#### 6.5.1.3 Evaluating the TRSMPA

Under the *National Parks and Wildlife Act 1970* and the *Living Marine Resources Management Act 1995*, there are legislated objectives for MPAs reserved under the Acts, but no guidelines on performance assessment or monitoring of either a system of MPAs or individual MPAs in Tasmania.

Performance assessment of the NRSMPA is critical to the development of an effective CAR system of MPAs. According to the NRSMPA Strategic Plan of Action, performance assessment requires reporting at three inter-related scales:

1. At the MPA Level
2. At the Bioregional Level
3. At the National System Level.

In Tasmania the MPA management agency (DPIWE) commissioned studies to monitor and assess the performance of the NRSMPA at the MPA level (Edgar & Barrett 1997, Barrett & Edgar 1998). At the bioregional level the performance of the NRSMPA was assessed by mapping inshore marine habitats (reefs, estuaries, soft-bottom communities) and biodiversity surveys (Edgar 1981, 1984, Barrett & Edgar 1992, Edgar & Barrett 1996, Edgar *et al.* 1994, 1997, Moverley & Jordan 1996)). This work critical in identifying 'representative' ecosystems and bioregions and also potential MPA sites. The relevant MPA research is outlined below:

- Marine Reserve Monitoring (Edgar & Barrett 1997, Barrett & Edgar 1998)
- Identification of Potential Marine Reserves
- Tasmania (Edgar 1981, 1984)
- Bass Strait (Barrett & Edgar 1992)
- Southern and Western Coasts, Furneaux (Edgar & Barrett 1996)
- Other MPA-Related Research
- Bioregionalisation of Tasmania's inshore waters (i.e. IMCRA) (Edgar *et al.* 1994)
- Survey of Soft-bottom Communities (Moverley & Jordan 1996)
- Survey of Estuaries (Edgar *et al.* 1997)
- Ongoing Inshore Habitat Mapping (DPIWE, CSIRO)

In addition to the ongoing marine-habitat mapping and biodiversity surveys, spatial information on other biological and ecological values (seabirds, mammals, rare and threatened species) and other natural values (e.g. geoheritage information) and also, socio–cultural information (e.g. shipwrecks, historic sites, education sites) are being collated to assist with evaluating the NRSMPA in Tasmania.

*1. MPA LEVEL*

Since the first set of MPAs proclaimed in 1991, the Tasmanian Government (as part of the then agreement with fisheries stakeholders to proceed with MPAs), has been committed to assessing the performance of MPAs in conserving biodiversity.

The Tasmanian MPA Monitoring Program, which has Commonwealth funding assistance, has largely been carried out by marine researchers from Tasmanian Aquaculture and Fisheries Institute (and the former DPIF), on behalf of DPIWE. The program includes monitoring the marine biodiversity (algae, invertebrates, fish) of the four existing MPAs in Tasmania (Tinderbox, Ninepin Point, Governor Island, Maria Island), as well as the size and abundance of fished species in reference areas outside the reserves. The results of some seven years of monitoring (1992–1999) have provided clear indications as to the effectiveness of Tasmania's four existing MPAs and have also highlighted measures required to make them more effective. In particular it has enabled recommendations to be made on what size of MPA is adequate for temperate reefs (7 km of coastal length).

In addition to the monitoring, threats to the existing MPAs from introduced pests are also being assessed.

Under the *Strategic Plan of Action for the NRSMPA* (ANZECC Task Force on Marine Protected Areas 1999) (Action 32), each jurisdiction is required to develop and implement a performance-assessment system, together with performance indicators, for each individual MPA. It is to be consistent with the following nationally agreed reporting framework:

- Derive strategic objectives and goals for the MPA that reflect management intentions and enabling legislation.
- Translate goals and objectives into sets of distinct MPA standards, targets or thresholds.
- Assess and monitor the condition of the environmental values in relation to the impact of threatening processes inside and outside the MPAs.
- Select indicators to measure the degree to which individual MPA targets are being achieved.
- Collate and assess existing biological, physical and socio–economic baseline information for individual MPAs and identify gaps in this information.
- Design and implement gathering of baseline-data to fill in the gaps.
- Design and implement a monitoring program in tandem with the choice of performance indicators.

- Develop a reporting mechanism on each MPAs performance, using existing processes established by marine management agencies where possible.

**Proposed Core MPA-level Performance Reporting**

1. Name of MPA
2. Objectives of MPA
3. Area of MPA
4. Management zones (name, objectives, restrictions, area)
5. IUCN Protected Area Category (of MPA / management zones)
6. Habitat diversity, extent (habitat type, area)
7. Habitat quality (e.g. algal blooms, habitat loss)
8. Protected species (species, breeding status, distribution, relative abundance)
9. Introduced marine organisms (e.g. species, relative abundance through assessment)
10. Pollution (number and type of coastal discharges, loads, oil spills, closures due to health risks)
11. Shipping (shipping accidents)
12. Sustainable management – visitor numbers, licensed or permitted activities (such as number of licences, effort, catch, lease area, trawl area, production)
13. Research (project, objective, funding, published reports)
14. Surveillance (staffing, patrols, prosecutions)

Other non-core performance indicators are to be developed during the management planning process for each MPA, based on the strategic goals and objectives of the MPA, and relevant objectives under the IUCN Protected Area Management Category.

*2. BIOREGIONAL LEVEL*

Under the *Strategic Plan of Action for the NRSMPA* ( Task Force on Marine Protected Areas 1999) (Action 33), each jurisdiction is required to develop performance indicators and aggregate performance information for each bioregion (consistent with the nationally agreed reporting framework). Indicators for the bioregional level will include:

- the number of MPAs present in a bioregion;
- the area of the bioregion covered by the MPAs;
- the IUCN Protected Area Management Categories
- the degree to which comprehensiveness, adequacy and representativeness have been achieved;

- the degree of effectiveness of cross-jurisdictional planning and management arrangements within bioregions.

**Proposed Core Bioregion Performance Reporting**

1. Number of MPAs present in a bioregion
2. Area of bioregion covered by the MPAs
3. Area of IUCN Protected Area Management Categories
4. Comprehensiveness (number, area, type of ecosystems in MPAs within bioregion)
5. Adequacy (size and viability of habitats within each MPA, size and viability of ecosystems in MPAs within bioregion, type and level of threats to each MPA / bioregion, level of management within and adjacent to MPAs, quality and level of replication of MPAs within bioregion)
6. Representativeness (number, area, type of habitats within MPA, distribution / viability of populations, habitats, ecosystems within bioregion)
7. Ecosystem information (area mapped, scale of mapping)
8. Cross-jurisdictional planning and management

Other non-core performance indicators to be developed will reflect the ecological values, characteristics, activities and threats of each bioregion.

*3. NATIONAL SYSTEM LEVEL*

At the national level, Tasmania contributes to the Collaborative Australian Protected Areas Dataset, which at present reports on how well the MPAs represent the bioregion. In due course, and to be useful for proper planning of a comprehensive system, the State will need to report on the representation of major ecosystems.

Under the *Strategic Plan of Action for the NRSMPA* (ANZECC Task Force on Marine Protected Areas 1999) (Action 34), the ANZECC Taskforce on Marine Protected Areas will report on the agreed national set of performance indicators, drawn from all jurisdictions. Specific actions include:

- Develop a framework for adapting and analysing MPA-level indicators for use at the NRSMPA level.
- Develop and agree on minimum standards for monitoring programs relating to agreed performance indicators.
- Assess whether these processes lead to sufficient information to assess performance nationally and identify deficiencies.
- Further develop elements of performance assessment as necessary by tracking national and international developments.

- Expand and maintain policy links with other national processes, for example, Oceans Policy, Australia's Marine Science and Technology Plan, and the Marine Industry Development Strategy.

### 6.5.2 Education and Interpretation

Effective education and promotion programs are a key element of the management of MPAs. Educational measures ensure that user groups affected by a proposed MPA are aware of their rights and responsibilities under the management plan, and also that the community generally supports the goals and objectives of the legislation. Few countries can afford the cost of effective enforcement if the public is generally hostile, whereas where public support exists, the costs of enforcement can be low (Kelleher & Kenchington 1992).

A well-designed education and public involvement program can also generate political and public enthusiasm for a proposed MPA, together with its goal and objectives. In particular, the establishment of the concept of 'local ownership', (i.e. that it is the people's MPA) can generate local support and pride and commitment to the MPA's objectives.

In Tasmania, Marine Protected Area education and interpretation programs have included the establishment of an underwater interpretation trail at the Tinderbox Marine Reserve, the production of a poster and booklet on Tasmania's Marine Reserves, and educational signage and interpretation for existing Marine Reserves. In addition, DPIWE is involved in community seminars and producing community displays on Tasmania's Marine Reserves.

#### Proposed Education Priorities for the TRSMPA

1. Develop an education and community awareness program to promote Tasmania's marine biodiversity, habitats and ecosystems.
2. Develop an education and community awareness program to promote the role and benefits of establishing Marine Protected Areas.
3. Investigate and support opportunities to establish community-based monitoring and awareness programs (such as 'Dragon Search', 'Reef Watch') as a tool to raise community awareness of Tasmania's diverse marine environments.

### 6.5.3 Review

Statutory provision for a review of zoning or other protective arrangements within a specified time is an important part of the management of MPAs. The period between reviews should be neither so short that lack of resources is a problem, nor so long that management is not responsive: 5–7 years is recommended (Kelleher & Kenchington 1992). The review must have as its basis the monitoring of impacts, of patterns of use, of the effectiveness of existing management arrangements, and improved scientific understanding.

In Tasmania, a review of management plans is a statutory requirement under the *National Parks and Wildlife Act 1970* and the *Living Marine Resources Management Act 1995*.

# ACRONYMS

| | |
|---|---|
| ANZECC | Australian and New Zealand Environment and Conservation Council |
| CALM | Department of Conservation and Land Management (WA) |
| CAR | Comprehensive, Adequate and Representative |
| CSIRO | Commonwealth Scientific and Industrial Research Organisation |
| DPIWE | Department of Primary Industries, Water and Environment |
| IMCRA | Interim Marine and Coastal Regionalisation for Australia |
| IUCN | World Conservation Union (formerly known as the International Union for the Conservation of Nature) |
| MPA | Marine protected area |
| NRSMPA | National Representative System of Marine Protected Areas |
| TRSMPA | Tasmanian Representative System of Marine Protected Areas |
| UNESCO | United Nations Educational, Scientific and Cultural Organisation |

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