

# Information Sheet on Ramsar Wetlands

Categories approved by Recommendation 4.7 of the Conference of the Contracting Parties.

## 1. Date this sheet was completed/updated:

October 2002.

FOR OFFICE USE ONLY.

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Designation date

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Site Reference Number

## 2. Country:

Australia

## 3. Name of wetland:

Elizabeth and Middleton Reefs Marine National Nature Reserve

## 4. Geographical coordinates:

Elizabeth Reef - Latitude: 29° 56' S ; Longitude: 159° 05' E

Middleton Reef - Latitude: 29° 27' S ; Longitude: 159° 07' E

## 5. Altitude:

Wetland areas within the site are situated at, and several metres below, mean sea level. Sand cays within the site have an elevation (variable) of only one or two metres.

## 6. Area:

188,000 ha

The site boundary corresponds to the boundary of Elizabeth and Middleton Reefs Marine National Nature Reserve.

The area of reef wetland within the Reserve is estimated to be 8,800 ha, of which approximately 5,100 ha is located at Elizabeth Reef and 3,700 ha is located at Middleton Reef. For both reefs, the estimated area of wetland includes some water more than 6.0 metres deep at low tide.

## 7. Overview:

Elizabeth and Middleton Reefs are the southernmost coral atolls in the world. Their coral structures occur atop isolated, oceanic sea mounts and are influenced both by tropical and temperate ocean currents. The Reefs support a diverse marine fauna including uncommon and undescribed fishes, several endemic species of mollusc, and provide the only habitat for these species in a vast area of ocean.

## 8. Wetland Type:

marine-coastal: A B C D **E** F G H I J K

inland: L M N O P Q R Sp Ss Tp Ts

U Va Vt W Xf Xp Y Zg Zk

man-made: 1 2 3 4 5 6 7 8 9

Please now rank these wetland types by listing from the most to the least dominant: C, E.

**9. Ramsar Criteria:** 1, 2, 3, 4 and 8.

① ② ③ 4 5 6 7 8

**Please specify the most significant criterion applicable to the site:** 4.

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**10. Map of site included?** Please tick *yes*  -or- *no*.

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**11. Name and address of the compiler of this form:**

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**12. Justification of the criteria selected under point 9, on previous page.****Criterion 1.**

There has been no formal inventory of wetlands throughout the Tasman Sea and a biogeographic regionalisation for Australia's oceanic territory has not been finalised. However, Elizabeth and Middleton Reefs may be considered as both rare and representative examples of coral reef wetland in this oceanic region as they are among the few, and largest, present. Furthermore, these reefs are distinctive in occurring atop oceanic sea mounts; they are the southern-most open-ocean platform reefs in the world (Environment Australia 2002a). They represent an environment not present elsewhere in Australian waters, and are a unique coral reef community (ANPWS 1992, pp. xvii, 111).

**Criterion 2.**

Green Turtle *Chelonia mydas* occurs in waters around the Reefs (ANPWS 1992). There is insufficient sand habitat for nesting by this species at the site and no assessment of its population within the site has been conducted. Nevertheless, Green Turtle is listed as vulnerable under Australian Commonwealth legislation (*Environment Protection and Biodiversity Conservation Act 1999*), is classified as endangered on the IUCN Red List, and is protected under the *Convention on the International Trade of Endangered Species of Wild Animals* (CITES) to which Australia is a signatory.

**Criterion 3.**

There has been no formal inventory of wetland biodiversity throughout the Tasman Sea. However, in view of the rarity of reef habitat in this oceanic region and the moderately large number of marine animal species and diversity of faunal groups recorded at the site (ANPWS 1992), the Reefs represent a 'hotspot' of biological diversity in the region (Ramsar Convention 2002). To date, 314 fishes belonging to 174 genera and 75 families have provisionally been recorded at the Reefs, compared to only half or less of this number of species at other Tasman Sea islands (ANPWS 1992, p. 90). Furthermore, seven undescribed and thus potentially endemic fishes have been recorded at the Reefs (ANPWS 1992, pp. 92-3). The limited scientific investigations to date have yielded approximately 122 species of corals, 122 species of crustacean, 240 species of mollusc and 74 species of echinoderm (ANPWS 1992), and further surveys would be expected to yield much higher numbers of species. Of the mollusc species collected, 3% are endemic and many of these are numerically dominant at the site (ANPWS 1992).

**Criterion 4.**

Populations of Black Cod *Epinephelus daemeli* on the Elizabeth-Middleton Reefs are important to survival and protection of this species; in the past, spear-fishing has posed a large threat to populations here and on the east coast of Australia. Furthermore, the coral reefs of the site, together with those of Lord Howe Island, provide the only habitat within an extensive area of ocean for a diverse community of sedentary reef-inhabiting animals. In addition, at least 12 species of migratory waterbirds use the Reefs as resting places. These are mostly terns such as Sooty Tern *Sterna fuscata* and boobies such as Masked Booby *Sula dactylatra*, and some shorebirds (Ruddy Turnstone *Arenaria interpres*) (ANPWS 1992, p. 93). A small breeding colony of 30 pairs of Common Noddy *Anous stolidus* has been documented on a shipwreck on Middleton Reef.

The Reefs potentially provide rare shelter for other species during severe storms.

**Criterion 8.**

It can be assumed that the productive shallow waters of the Reefs provide a significant nursery area for fishes that have open-water adult stages (Ramsar Convention 2002). The Rosy Job Fish *Aprion virescens*, which is commercially harvested on shallow sea mounts in the Tasman Sea, may also depend upon the reef system, however this has not yet been investigated (ANPWS 1992, p. 110). Migratory Bigeye Tuna *Thunnus obesus* also aggregate near the reefs in this region.

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### **13. General location:**

Elizabeth and Middleton Reefs Marine National Nature Reserve is located in the northern Tasman Sea, 630 km east of Coffs Harbour, New South Wales, and 690 km east-south-east of Brisbane (population more than 1.0 million), Queensland. The Reserve is within the Coral Sea Islands Territory, and is administered by the Commonwealth of Australia.

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### **14. Physical features:**

The Reefs are 50 km apart, separated by deep ocean, and are situated atop separate volcanic sea mounts that rise steeply from the Lord Howe Rise. Though more than 20 volcanic peaks are known in the Tasman Sea, only Lord Howe Island and Elizabeth and Middleton Reefs are presently above sea level. It is thought that volcanic activity occurred between the Eocene and Miocene, and that reefs have existed on the two peaks for some time (Environment Australia 2002b).

Elizabeth Reef is an open-ocean platform coral reef roughly oval in shape, approximately 8.2 km by 5.5 km. Its lagoon is considerably infilled by reticulated reefs that form a mesh reef complex with the sandy bottom. Water depths of 20-30 metres are common in this area, while the western end of the lagoon is generally shallower (2-3 metres). Along the southern inner margin of the reef, a reticulated reef flat has developed consisting of a fragile non-living pavement derived from coralline algae, with live, active sides. This grades into the generally smooth pavement of the outer reef flat. In places, the outer reef flat is dotted with large boulders which are thought to have been thrown up from the reef slope where there is an extensive high-energy surf zone with well developed and extensive surge channels, gutters, sink holes and groove-spur development. The reef slopes show little leeward/windward differentiation, suggesting that winds do not prevail from any particular direction. The reef slope is being eroded by wave action, suggesting a gradual reduction in the size of the reef (Environment Australia 2002b).

Middleton Reef is an open-ocean platform coral reef roughly kidney-shaped, approximately 8.9 km by 6.3 km. Its lagoon is structurally complex with areas of relatively deep water in the centre and at the eastern end of the main lagoon. Isolated patch reefs with a high percentage of fragile, living corals occur at the western end of the lagoon. The lagoon floor consists of very fine silt, indicating that minimal tidal flushing occurs. Towards the south of the lagoon, patch reefs become increasingly reticulated, finally fusing to form a pavement-like inner reefal margin of coralline algae. This margin forms the boundary of the outer reef flat which is bisected by a moat in which occurs a porous, fragile 'pie crust' of live coral. Sand patches occur towards the eastern end of the moat. The seaward margin of the reef flat is formed by a hard algal ridge. Both algal ridge and reef flat are exposed at low tide. At the only entrance to the lagoon, on the northern side of the reef, a back reef environment has developed and is characterised by large patch reefs dominated by *Acropora* and *Seriatopora* coral species (Environment Australia 2002b).

In summer, the Reefs receive warm tropical water from the East Australian Current, which apparently sustains the reef growth. Although the Reefs remain continually in the path of the Tropical Convergence, in winter cooler water from the Southern Ocean reaches the Reefs via the dominant West Wind Drift. Therefore, coral growth and erosion are probably seasonal and delicately balanced.

The Reefs are completely inundated at high tide, except for the presence of sand cays which occur on both Elizabeth and Middleton Reef. Tides are semi-diurnal, modified by local wind and currents; monthly tidal maxima range from 1.8 to 2.6 m and minima range from 0.0 to 0.2 m (ANPWS 1992). Surface seawater temperatures vary seasonally from 20°C to 25°C (ANPWS 1992).

There are no rainfall data for the site but data at Lord Howe Island (150 km to the south), despite the presence of mountain peaks, may broadly indicate conditions at Elizabeth and Middleton Reefs. Monthly averages at Lord Howe range from 108 mm in February to 184 mm in July. Air temperatures range from maxima of 25°C in summer to minima of 14°C in winter. The Reefs lie at latitudes just within the southern-most zone of influence of destructive tropical cyclones.

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### **15. Hydrological values:**

As isolated oceanic wetlands with no permanent dry land, the Reefs have no hydrological value with regards to this information category.

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### **16. Ecological features:**

Elizabeth and Middleton reefs have a restricted number of habitats, for instance there is a complete lack of leeward or outer reef slopes protected from the wind. However, the reefs can be divided into three major habitats:

- **Outer exposed reef** slope which is deeply dissected by spurs and grooves, and which, below 30m, drops off rapidly into deeper water;
- **Reef crest** which is exposed at low tide;
- **Shallow protected lagoon** with well developed patch reefs that coalesce to form a reticulated reefal structure around the margins of the lagoon.

Apart from small sand cays present at both Reefs, the reef areas within the site are entirely submerged at high tide and do not support terrestrial plant communities. Coral communities, sandy lagoons and algal meadows (encrusting or turf algae) form the dominant structural components and ecological features of the site, and these are described within Item 14. Seagrass, *Halophila ovalis*, has a small patchy distribution on the sheltered sandy lagoons at both Reefs. The Reefs also support an extremely rich and diverse algal flora (see Item 17).

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### **17. Noteworthy flora:**

No terrestrial plants occur at present (see item 16), though there is evidence that the sandy cay was vegetated with grass in the recent past (Environment Australia 2002b). A preliminary survey revealed that the Reefs have a rich and diverse algal flora; to date 18 taxa have been identified, and the remoteness of the site suggests a high potential for genetic uniqueness. The only seagrass recorded is *Halophila ovalis* (ANPWS 1992, p. 97).

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### **18. Noteworthy fauna:**

#### **Threatened species.**

The globally endangered Green Turtle *Chelonia mydas* occurs in waters around the Reefs (ANPWS 1992). See Item 12, Criterion 2.

#### **Other noteworthy fauna.**

The Reefs support possibly the only remaining large population of Black (Saddle) Cod *Epinephelus daemeli*, which is protected in Commonwealth and New South Wales waters (ANPWS 1992). This fish is a large, slow-growing, sedentary, reef-dwelling serranid that occurs in seas of the south-western Pacific and north-eastern Australia. World-wide, most members of its genus are in demand for human consumption. The Reefs also provide the southernmost habitat for the Queensland Giant Groper *Epinephelus lanceolatus* (Environment Australia 2002a), which in Queensland receives a medium level of legislative protection.

Three mollusc species are endemic to the site (Anabathridae *Amphithalamus* sp. nov.; Retusidae *Decorifer elisa*; Mytilidae *Musculus nubilis*) and seven are endemic to the group of islands in this part of

the Tasman Sea. Most of these endemics are abundant on both reefs, but many of the species with much wider geographic distributions are rare at the site.

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### **19. Social and cultural values:**

Many ships have been wrecked on the Reefs, dating back to the earliest years of European settlement in Australia in the late 18th Century, making the area of considerable marine archaeological significance. Remains of several wrecks are a conspicuous feature of the site. Shipwrecks located within the Reserves are protected under the *Historic Shipwrecks Act 1976* if they are more than 75 years old.

The wreck *Fuku Maru* on Middleton Reef supports a small breeding colony of sea terns; due to lack of suitable dry land, the colony otherwise would not occur at the site.

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### **20. Land tenure/ownership:**

#### **a) Site**

The site is a National Nature Reserve owned by the Commonwealth Government of Australia.

#### **b) Surrounding area**

Oceanic waters surrounding the Reserve are within the Economic Exclusion Zone of Australia.

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### **21. Current land use:**

#### **a) Site**

Nature conservation and scientific research; also limited recreational diving and fishing; no resident human population is present on or near the site.

#### **b) Surroundings/catchment**

Surrounding areas support commercial, demersal long-line fisheries based on Blue-eye Trevella *Hyperglyphe antarctica* and Rosy Job Fish *Aprion virescens*.

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### **22. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects:**

#### **a) Site**

#### **b) Around the site**

No exotic species have been observed at the Reefs, and occasional visitation by humans is believed to be largely benign. However, the Crown-of-thorns Starfish *Acanthaster planci* has been quite common and widespread on the reefs and may be responsible for recent reduction in live coral cover, as it has on the Great Barrier Reef (ANPWS 1992). Under present management plans, a number of potentially detrimental activities are not permitted (see Item 23). However, oil spills associated with shipwrecks, anchoring and diving do represent potential threats to the Reefs.

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### **23. Conservation measures taken:**

Elizabeth and Middleton Reefs Marine National Nature Reserve was proclaimed in December 1987 and is subject to provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. It is a Category 1a Nature Reserve under IUCN classification, as it is managed primarily for scientific research and environmental monitoring. The second Management Plan for the Reserve came into effect in March 1994 and applies for ten years (Environment Australia 2002b). The main objectives of the Reserve are to protect the natural communities and species and to maintain and protect natural processes in an undisturbed state. Activities such as scientific research, dive charter tours and other commercial activities are allowed but are managed through the use of permits. Staff from Environment Australia undertake on average one management patrol per year to the Reserve, generally using Royal Australian Navy patrol boats or Customs vessels for transport and support. Commercial fishing and operations for the recovery of minerals are not permitted whilst the current Plan is in effect.

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#### **24. Conservation measures proposed but not yet implemented:**

Environment Australia is currently developing a formal monitoring program for the Reserve for some species and habitat parameters. A new Management Plan is also to be completed for the Reserve by March 2004 – a draft plan will be released for public comment in late 2002.

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#### **25. Current scientific research and facilities:**

The Reefs have been visited by a number of scientific expeditions, notably that of the Australian Museum in December 1987 (ANPWS 1992). Due to the remote location and lack of permanent dry land, research opportunities are limited and no permanent field station exists at the Reefs. However, staff from Environment Australia undertake observations of key features during management patrols to the Reserve and are developing a formal monitoring program for some habitat parameters and species, including Black Cod.

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#### **26. Current conservation education:**

Due to the remote location and limited land area, the Reefs are not suitable for visitor education programs or static educational displays. Detailed information on the Reefs, including the Management Plan, photographs, and a brochure are available on the Internet (Environment Australia 2002a).

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#### **27. Current recreation and tourism:**

Due to the remote location and limited land area, the Reefs are not convenient or popular destinations for recreation or tourism. Recreational and commercial dive and/or fishing charter tours and cruise ships have visited the Reefs in the past. However, no permits for commercial activities in the Reserve have been requested of, nor issued by, Environment Australia in recent times.

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#### **28. Jurisdiction:**

The Reserve is within the Coral Sea Islands Territory and falls under the jurisdiction of the Commonwealth Government of Australia. Functional jurisdiction lies with the Director of National Parks, Department of Environment and Heritage, Canberra.

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#### **29. Management authority:**

The Reserve is managed by the Marine Protected Areas Section, Marine and Water Division, Environment Australia, GPO Box 787, Canberra ACT 2601, Australia.

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#### **30. Bibliographical references:**

ANPWS (ed. P. Hutchings) (1992) *Reef Biology: A survey of Elizabeth and Middleton Reefs, South Pacific, by The Australian Museum*. Kowari 3 (series), Australian National Parks & Wildlife Service, Canberra. 230 pp.

Environment Australia (2002a) *Elizabeth and Middleton Reefs Marine National Nature Reserve*. [Online], <http://www.ea.gov.au/coasts/mpa/elizabeth/index.html>, 20 June 2002.

Environment Australia (2002b) *Elizabeth and Middleton Reefs Marine National Nature Reserve Plan of Management*. [Online], <http://www.ea.gov.au/coasts/mpa/elizabeth/plan.html>, 4 June 2002.

Ramsar Convention (2002) Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance of the Convention on Wetlands. [Online], [http://www.ramsar.org/key\\_guide\\_list\\_e.htm](http://www.ramsar.org/key_guide_list_e.htm), 4 June 2002.

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