

# Information Sheet on Ramsar Wetlands (RIS)

*Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8<sup>th</sup> Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9<sup>th</sup> Conference of the Contracting Parties (2005).*

This Ramsar Information Sheet has been converted to meet the 2009 – 2012 format, but the RIS content has not been updated in this conversion. The new format seeks some additional information which could not yet be included. This information will be added when future updates of this Ramsar Information Sheet are completed. Until then, notes on any changes in the ecological character of the Ramsar site may be obtained from the Ecological Character Description (if completed) and other relevant sources.

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

Compiled by the Department of Conservation and Land Management (DCLM).

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Designation date

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Site Reference Number

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**2. Date this sheet was completed/updated:**

November 2003

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**3. Country:**

Australia

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**4. Name of the Ramsar site:**

The precise name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Alternative names, including in local language(s), should be given in parentheses after the precise name.

Eighty-mile Beach, Western Australia

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**5. Designation of new Ramsar site or update of existing site:**

Eighty-mile Beach, Western Australia was designated on 7 June 1990.

The previous RIS was dated 1998.

This RIS is for (tick one box only):

- a) Designation of a new Ramsar site ☐; or  
b) Updated information on an existing Ramsar site ☒

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**6. For RIS updates only, changes to the site since its designation or earlier update:**

**a) Site boundary and area**

The Ramsar site boundary and site area are unchanged: ☐

or

**If the site boundary has changed:**

- i) the boundary has been delineated more accurately ☐; or
- ii) the boundary has been extended ☐; or
- iii) the boundary has been restricted\*\* ☐

and/or

**If the site area has changed:**

- i) the area has been measured more accurately ☒; or
- ii) the area has been extended ☐; or
- iii) the area has been reduced\*\* ☐

**\*\* Important note:** If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

**b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:**

The site continues to meet the criteria for which it was listed, plus an additional (**Criterion 2**) which was omitted in the original Ramsar nomination.

**7. Map of site:**

Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

**a) A map of the site, with clearly delineated boundaries, is included as:**

- i) a **hard copy** (required for inclusion of site in the Ramsar List): ☒;
- ii) an **electronic format** (e.g. a JPEG or ArcView image) ☒;
- iii) a **GIS file providing geo-referenced site boundary vectors and attribute tables** ☐.

**b) Describe briefly the type of boundary delineation applied:**

e.g. the boundary is the same as an existing protected area (nature reserve, national park, etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

**8. Geographical coordinates (latitude/longitude, in degrees and minutes):**

Provide the coordinates of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas.

Latitude: (approx.) 19°02' S to 20°00' S; Longitude: (approx.) 119°48' E to 121°32' E

**9. General location:**

Include in which part of the country and which large administrative region(s) the site lies and the location of the nearest large town.

Eighty-mile Beach is located in the Shire of Broome (local authority) in the State of Western Australia (population ca. 1.95 million in 2003). The Site includes Eighty-mile Beach from Cape Missiessy (located 142 km south southwest of the town of Broome, population ca. 13,500 in 2001) to Cape Keraudren (220 km south of Cape Missiessy) and including Mandora Salt Marsh, Western Australia.

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**10. Elevation:** (in metres: average and/or maximum & minimum)  
Sea level to 50 m (Australian Height Datum)

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**11. Area:** (in hectares)  
175 487 ha

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**12. General overview of the site:**

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

The site consists of a 220km section of coastline and adjacent mudflats, together with two large ephemeral lakes and a series of springs occurring in marshland to the east. More than 472,000 migratory waders have been counted on the mudflats during the September to November period. The site is one of the three most important for migratory shorebirds in Australia. It is considered to be one of the major arrival and departure areas for migratory shorebirds visiting Australia. The springs in the hinterland are on an old palaeo-river and palaeo-estuary system and support unusual vegetation.

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**13. Ramsar Criteria:**

Tick the box under each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11). All Criteria which apply should be ticked.

1 •	2 •	3 •	4 •	5 •	6 •	7	8 •	9
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**14. Justification for the application of each Criterion listed in 13 above:**

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

The site continues to meet the criteria for which it was listed, plus an additional (**Criterion 2**) which was omitted in the original Ramsar nomination.

***Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.***

[Formerly listed as **Criterion 1(a)** under the Pre-1999 Criteria].

The Site includes an outstanding example of a major beach with associated inter-tidal flats and coastal floodplain, located in the arid tropics; a good example of a classical raised peat bog located in the arid tropics; and contains the most inland occurrences of mangroves in Western Australia (52 km inland from Eighty-mile Beach).

***Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.***

[**Criterion 2(a)** under the Pre-1999 Criteria - was omitted in the original Ramsar nomination for the site.]

The vulnerable Bilby *Macrotis lagotis* occurs within the Mandora Salt Marsh, and the vulnerable Flatback Turtle *Natator depressus* regularly nest at scattered locations along Eighty-mile Beach.

**Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.**

[Formerly listed as **Criterion 2(c)** under the Pre-1999 Criteria]

It is estimated that more than 500,000 shorebirds use Eighty-mile Beach as a migration terminus each year, while another 150-200,000 use the site as a migration stop-over site on their way to southwest, southern and south-eastern Australian coasts. In terms of total numbers, the site is one of the most important non-breeding and migratory stop-over areas in the East Asian – Australasian Flyway for use by migrant shorebirds.

**Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.**

[Formerly listed as **Criterion 3(a)** under the Pre-1999 Criteria]

Over 336,000 shorebirds were counted at Eighty-mile Beach in November 1982, while 472,000 were present in November 2001 and 465,000 were counted in October 1998; this number of shorebirds has not been exceeded elsewhere in Australia and these are some of the highest counts for the East Asian – Australasian Flyway.

**Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.**

[Formerly listed as **Criterion 3(a)** under the Pre-1999 Criteria]

Eighty-mile Beach supports more than 1% of the flyway population (or 1% of the Australian population for resident species) of 18 shorebirds (17 waders and 1 tern), including 15 migratory species and 3 Australian residents: Large Sand Plover *Charadrius leschenaultii*, Oriental Plover *C. veredus*, Red-capped Plover *C. ruficapillus* (resident), Grey Plover *Pluvialis squatarola*, Bar-tailed Godwit *Limosa lapponica*, Red Knot *Calidris canutus*, Great Knot *C. tenuirostris*, Red-necked Stint *C. ruficollis*, Sanderling *C. alba*, Sharp-tailed Sandpiper *C. acuminata*, Curlew Sandpiper *C. ferruginea*, Eastern Curlew *Numenius madagascariensis*, Common Greenshank *Tringa nebularia*, Grey-tailed Tattler *Heteroscelus brevipes*, Terek Sandpiper *Xenus cinereus*, Ruddy Turnstone *Arenaria interpres*, Pied Oystercatcher *Haematopus longirostris* (resident) and Caspian Tern *Sterna caspia* (resident).

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**15. Biogeography** (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

**a) biogeographic region:**

Dampierland (Eighty-mile Beach) and the Great Sandy Desert (Mandora Salt Marsh) (terrestrial bioregion) and Eighty-mile Beach (marine meso-scale bioregion).

**b) biogeographic regionalisation scheme** (include reference citation):

Interim Biogeographic Regionalisation for Australia (IBRA) Version 5.1 (Cummings and Hardy 2000) and the Interim Marine and Coastal Regionalisation for Australia (IMCRA) Version 3.3 (IMCRA Technical Group 1998).

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**16. Physical features of the site:**

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

Eighty-mile Beach is a megascale (220 km) linear sand-coast; the beach is 100 m wide and includes several muddy, microscale irregular embayments. Adjoining tidal mudflats vary from 1.1 to 5 km in width (G. Pearson, pers. comm.). The maximum width of tidal flat was recorded at 3.8 km on low water spring tides in 1999, but probably exceeds 5 km (D. Rogers, pers. comm.). The site also includes a megascale (c. 100 km long), discontinuous linear floodplain immediately inland of the

frontal sand dunes; in places (notably north-east of Anna Plains Homestead) it includes distinct sumplands. Situated in the Canning Basin; the dunes are in part white calcareous sand, in part oolitic coastal aeolianite and at other locations quartzose calcarenite or fine to coarse calcilutite. Cross-bedded fossiliferous beach ridges also occur. The mudflats are of soft alkaline marine sediment <63 µm silt and mud (G. Pearson, pers. comm.). Low, slightly undulating "pindan" country lies immediately inland of the plain.

Mandora Salt Marsh has formed over thousands of years upon what was the lower reaches and mouth of a palaeo-river and palaeo-estuary system (Graham 1999). The predominant features are two large lakes which are inundated following heavy cyclonic rains. The western lake (Walyarta) is a claypan that starts close to the Great Northern Highway and extends east approximately 30 km. It is up to 5 km wide and during flooding, the water depth never exceeds 2 m (Graham 1999). The eastern lake, separated from Walyarta by a calcrete ridge, is a broad, braided drainage line with islands of vegetation and small salt/clay pans (Graham 1999). It is extensive when flooded but rapidly becomes a series of isolated salt/clay pans as it dries out (Graham 1999). Running between Walyarta and the eastern lake is Salt Creek, an old watercourse lined with mangroves *Avicenna marina* that is about 20 m wide and 5 km long. Salt Creek is permanently inundated and it appears to be fed by a series of soaks (Graham 1999). It is possibly connected to the sea by an aquifer.

Mandora Salt Marsh includes a number of permanent or almost permanent fresh-water swamps supplied by springs which are located along the southern side of the two main lakes. Typically, the mound springs consist of a central, raised (2-3 m elevation) mound of saturated peat, supporting a mixture of *Melaleuca* and *Sesbania* trees with mangroves *Avicenna marina* appearing on the brackish-saline springs (Graham 1999). The springs vary in size from 0.1 ha to several hectares. Generally, the mound is encircled by an inundated moat, varying from a depth of approximately 50 cm to isolated shallow pools or even damp ground. Many of the springs also support small stands of Cumbungi *Typha domingensis* and the understorey of some springs is dominated by the fern *Achrostichum speciosum*. The most spectacular of the springs is Mandora Soak, one of the Eil Eil complex, which is a classical raised peat bog.

On both the northern and southern sides of Mandora Salt Marsh are stands and thickets of Saltwater Paperbark *Melaleuca acacioides* which remain inundated for longer into the dry season than other areas (Graham 1999). Several stock watering bores have been established in these thickets and troughs holding water are used by waterbirds throughout the year.

The climate is semi-arid monsoonal with a hot wet summer and a warm dry winter. Median and mean annual rainfall at Mandora is 327 mm and 341 mm respectively (varies from Cape to Cape by c. 100 mm). Annual evaporation is c. 3400-3600 mm. It is important to note that there is a high degree of variability in rainfall events with significant variations in rainfall between years as well as the period when the bulk of the rain falls (Graham 1999).

Cyclones, especially in the months January to March, contribute much of the rainfall, and have sometimes resulted in heavy stock losses. The churning effect of cyclone-generated waves in December 1995 during Cyclone 'Gertie' killed large numbers of bivalves, temporarily increasing food abundance for Bar-tailed Godwit, Great Knot and Red Knot (Jessop and Collins 2000). Every year from 1995 to 1999 a cyclone has crossed the site or passed over very nearby (Graham 1999).

## 17. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, and climate (including climate type).

There is evidence that in the Great Sandy Desert some 30 km inland of Eighty-mile Beach, aeolian sand ridges were truncated and remoulded into chevron ridges by a massive palaeo-tsunami (tidal wave) which deposited marine shells and lateritic gravels in these dunes and stacked large lateritic

boulders at the front of the dunes (Bryant 2001). Dating of shell deposits indicates that the tsunami occurred around A.D.1080.

### 18. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

The major hydrological values of the nominated area occur in Mandora Salt Marsh, where the Eil Eil Springs, Grant Spring and Salt Creek are discharge sites for groundwater. They are located in a palaeoriver channel.

### 19. Wetland Types

#### a) presence:

Circle or underline the applicable codes for the wetland types of the Ramsar "Classification System for Wetland Type" present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

Marine/coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

Inland: L • M • N • O • P • Q • R • Sp • Ss • Tp • Ts • U • Va •  
Vt • W • Xf • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

#### b) dominance:

List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

G, R, I, E, Sp, Y, U, Xf

### 20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

Eighty-mile Beach is one of the most important non-breeding and migratory stop-over areas for shorebirds in the East Asian – Australasian Flyway, regularly supporting in excess of 300-400,000 birds (Bamford et al. in prep; Australasian Wader Study Group – AWSG, unpublished data from expeditions in October 1998 and November 2001). It is one of the most important sites in the world for the migration of Great Knot and it supports at least 1% of the flyway population (or 1% of the national population for resident species) of 18 shorebird species (17 waders and 1 tern, comprising 15 migratory and 3 resident species); highest counts for these species are:

Large Sand Plover <i>Charadrius leschenaultii</i>	57,600 (AWSG, unpub. data)
Oriental Plover <i>C. veredus</i> ,	58,000 (AWSG Oct 1998, unpub. data)
Red-capped Plover <i>C. ruficapillus</i> (resident)	15,200 (AWSG, unpub. data)
Grey Plover <i>Pluvialis squatarola</i>	1,650 (Watkins 1993a)
Bar-tailed Godwit <i>Limosa lapponica</i>	110,000 (AWSG Oct 1998, unpub. data)
Red Knot <i>Calidris canutus</i>	80,700 (Watkins 1993a)
Great Knot <i>C. tenuirostris</i>	169,000 (AWSG Nov 2001, unpub. data)
Red-necked Stint <i>C. ruficollis</i>	60,000 (Watkins 1993a)
Sanderling <i>C. alba</i>	3,200 (AWSG Nov 2001, unpub data)
Sharp-tailed Sandpiper <i>C. acuminata</i>	25,000 (Watkins 1993a)
Curlew Sandpiper <i>C. ferruginea</i>	60,000 (Watkins 1993a)
Eastern Curlew <i>Numenius madagascariensis</i>	710 (AWSG Oct 1998, unpub data)

Common Greenshank <i>Tringa nebularia</i>	5,300	(AWSG, unpub data)
Grey-tailed Tattler <i>Heteroscelus brevipes</i>	14,640	(AWSG Nov 2001, unpub data)
Terek Sandpiper <i>Xenus cinereus</i>	9,820	(AWSG Nov 2001, unpub data)
Ruddy Turnstone <i>Arenaria interpres</i>	3,480	(AWSG Oct 1998, unpub data)
Pied Oystercatcher <i>Haematopus longirostris</i> (res.)	620	(AWSG July 2003, unpub data)
Caspian Tern <i>Sterna caspia</i>	177	(AWSG July 2003, unpub data)

The principal conservation value of the area is the presence of so many waders. However, Mandora Salt Marsh is part of a palaeo-drainage system extending from the eastern Kimberley, through Lake Gregory, to Eighty-mile Beach. The peat deposit in Mandora Soak is estimated to be about 7 000 years old. The springs support interesting and unusual plant assemblages and the lake to the east of Salt Creek contains the most inland mangroves (52 km from the coast) in Western Australia.

The dominant flora on the coastal sand-dunes are *Triodia epactia*, *Crotalaria cunninghamii* and *Spinifex longifolius*. The most common species of mangrove is *Avicennia marina*. Mandora Soak supports *Melaleuca leucadendra*, *M. acacioides*, *Sesbania formosa*, sedges, bullrushes and ferns. The marshy areas contain samphire vegetation and *Sporobolus virginicus* grassland.

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## 21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

### Eighty-mile Beach

At Eighty-mile Beach, primary beach dunes are stabilised by *Spinifex longifolius* and *Crotalaria cunninghamii* (Burbidge 1944, Craig 1983). Secondary parallel, calcareous dune ridges and swales commonly feature scattered Dune Wattle *Acacia bivenosa* (McKenzie 1985). Important grasses include *Whiteochloa airoides* and the local endemic *Triodia epactia*, a resinous hummock-forming species (Jacobs 1992). There are two minor mangrove stands, both occupying about 50 ha in small tidal creeks near Mandora Station. The stands are dominated by *Avicennia marina* to 4-6 m height with a few *Ceriops tagal*. Samphire communities also occur in the vicinity (Johnstone 1990).

Inland grasslands have been extensively modified by intensive grazing and are dominated by introduced Buffel Grass *Cenchrus ciliaris* and Birdwood Grass *Cenchrus setiger*. Saline grasslands feature Saltwater Couch *Sporobolus virginicus*, often fringed by thickets of Salt Wattle *Acacia ampliceps* and Paperbark, typically *Melaleuca acacioides*. Low open woodland with Poverty Bush *Acacia translucens* and scattered *Bauhinia cunninghamii* trees occurs on reddish pindan sandy soils inland (T. Willing, pers. comm.).

### Mandora Salt Marsh

To date, a total of 269 species of vascular plants, from 55 families, have been collected from the Mandora Salt Marsh. This includes 37 species from the family Poaceae, and 9 introduced weeds. The most inland occurrences of mangroves in Western Australia, Grey Mangrove *Avicenna marina*, occur east of the Sandfire Roadhouse (Beard 1967). The stands commence from an island in Walyarta (30 km inland) and occur along the length of Salt Creek, terminating with an isolated stand about 52 km inland of Eighty-mile Beach (T. Willing, pers. comm.). A new, calcrete-associated thorny Bush Tomato (*Solanum oligandrum*) known only from the Mandora marsh area was first described in 2001 (Symon 2001).

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## 22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare,

endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

### **Eighty-mile Beach**

**Threatened Species:** Little Tern *Sterna albifrons* occur, mainly the Asian migrant race, but no breeding of the threatened Australian population has yet been recorded for Eighty-mile Beach (D. Rogers, pers. comm.).

**Species Composition:** 65 bird species have been recorded from Eighty-mile Beach and Anna Plains (Beach c. 40 spp.; plain c. 37); 33 are listed under treaties (Japan – Australia Migratory Bird Agreement and the China – Australia Migratory Bird Agreement) and are specially protected by the Commonwealth Environment Protection and Biodiversity Conservation Act (1999). The 65 include nine herons and allies, 31 shorebirds and seven terns. The beach regularly supports a few individuals of Redshank *Tringa totanus* and Asian Dowitcher *Limnodromus semipalmatus*. The Australasian Wader Studies Group (AWSG) has caught Swinhoe's Snipe *Gallinago megala*. Pin-tailed Snipe *G. stenura*, are probably present and Long-toed Stint *Calidris subminuta* occur at the coastal plain swamps. Vagrants such as Ruff *Philomachus pugnax* and Spotted Redshank *Tringa erythropus* (on the northern Beach) have been recorded (D. Rogers, pers. comm.).

Flatback Turtle *Natator depressus* regularly nest at scattered locations along Eighty-mile Beach, between October and April (R. Prince, pers. comm.). Flatback Turtles are listed as a vulnerable species under the Commonwealth *Environment Protection and Biodiversity Conservation Act* (1999).

Coastal plains in the southern portion of Anna Plains Station are a stronghold for Australian Bustard *Ardeotis australis* and support high densities of Red Kangaroo *Macropus rufus* (T. Willing, pers. comm.). The western part of Walla Station is notable for dense populations of Euro *Macropus robustus* (T. Willing, pers. comm.).

**Migration Stop-over:** In terms of numbers counted, Eighty-mile Beach is the most important in Australia for use by migrant shorebirds, particularly on southward migration (August-November); it is therefore also important in the context of the East Asian - Australasian Flyway. Major arrivals of Sharp-tailed Sandpiper *Calidris acuminata* have been observed; thousands were resting in tight-packed flocks on the beach in September 1982 and 25 000 arrived overnight in mid-September 1984.

**Shorebird Banding:** Banding NW Australian shorebirds with a yellow plastic leg flag, attached to the right tibia, commenced in August 1992. This has greatly facilitated rapid visual recognition of birds banded in NW Australia at key stop-over sites and furnished valuable information in delineating migration routes, with over 36 000 waders flagged (Minton and Jessop 1999.) Lists of sightings away from flagging locations, including Russia, Korea and China, have been published at almost annual intervals in the journal *Stilt*.

**Shorebird Roosting:** High tide roosts in the order of 10 000 shorebirds occur at intervals along the Beach, with highest number of flocks per km in the north (Anna Plains) sector. During the non-breeding season, the highest numbers of waders occur in a relatively short stretch of the Beach 5 to 30 km south of the access point near Anna Plains Homestead (D. Rogers, pers. comm.) The richest pearling grounds lie west of the same stretch of shoreline (G. Pearson, pers. comm.). Numbers of birds roosting on different parts of the Beach at high tide showed a broad correspondence with density of birds feeding on adjacent flats at low tide. This correspondence is somewhat obscured on big tides, because birds fly along the Beach to roost at sites where the Beach is broadest (D. Rogers, pers. comm.). In winter 2003, during the first-ever complete ground census of Eighty-mile Beach, the distribution of waders was considerably different than generally occurs during the summer non-breeding season, with significantly more waders occupying the southern beaches than in summer (AWSG, July 2003, unpub data).



**Shorebird Numbers:** The highest number of shorebirds counted on the Beach was 472 000 in November 2001; this number of shorebirds has not been exceeded elsewhere in Australia and is one of the highest counts in the Flyway. Due to onwards passage of birds through spring, the total number of shorebirds using the site each year may be much higher. A complete census of Eighty-mile Beach undertaken during the Boreal summer breeding season (July 2003) recorded a total of 41 500 waders and another 4 300 gulls and terns (Minton et al. in press). The highest number of waterbirds counted on the plain/swamps was 75 000 in September 1982 (Jaensch 1989); up to 10 000 ducks (mainly Hardhead *Aythya australis*) and 45 000 shorebirds (mainly Sharp-tailed Sandpiper *Calidris acuminata* and Little Curlew *Numenius minutus*) use the plain/swamps.

The most abundant species at Eighty-mile Beach are Great Knot *Calidris tenuirostris* (up to 169 000), Bar-tailed Godwit *Limosa lapponica* (110 300), and Red Knot *Calidris canutus* (80 700, though subsequent counts have been much lower - D. Rogers, pers. comm.). Other notable species include: Curlew Sandpiper *Calidris ferruginea* (60 000), Red-necked Stint *Calidris ruficollis* (60 000), Large Sand Plover *Charadrius leschenaultii* (64 584) and Oriental Plover *Charadrius veredus* (57 600) at the Beach, Sharp-tailed Sandpiper *Calidris acuminata* (25 000) at both Beach and swamps, and Little Curlew (12 000) at the plain. The site has the highest or second highest counts in Australia for each of these species except Little Curlew (national rank 3). It supports at least 1% of the flyway population (or Australian population in the case of resident species) of the nine above-mentioned species as well as the following: Grey Plover *Pluvialis squatarola* (1 650), Ruddy Turnstone *Arenaria interpres* (3 480), Eastern Curlew *Numenius madagascariensis* (480), Grey-tailed Tattler *Tringa brevipes* (14 647), Terek Sandpiper *T. terek* (6 100), Greenshank *T. nebularia* (5 300), Sanderling *Calidris alba* (3 220), Red-capped Plover *Charadrius ruficapillus* (15 200), Pied Oystercatcher *Haematopus longirostris* (620) and Caspian Tern *Sterna caspia* (180). Species also present include: Lesser Golden Plover *P. fulva*, Black-winged Stilt *Himantopus himantopus*, Marsh Sandpiper *T. stagnatilis*, and Whimbrel *N. phaeopus*. Surveys during the Boreal summer breeding season (July 2003) recorded nine species (6 migratory and 3 resident species) in numbers greater than 1% of the flyway population (or the Australian population for resident species): Pied Oystercatcher (620), Large Sand Plover (3 600), Red-capped Plover (2 950), Bar-tailed Godwit (13 750), Red Knot (2 300), Great Knot (10 650), Red-necked Stint (5 100), Sanderling (1000) and Caspian Tern (180). (RAOU/WADCALM ground/aerial surveys 1981-92; Blakers et al. 1984; Jessop 1985; Lane 1987; Lane & Jaensch 1989; WADCALM 1990, Minton, et al. in press, D. Price pers. comm.)

**Benthic Fauna:** The ANNABIM-99 project (October 1999) brought together volunteers through Environs Kimberley and researchers from the Department of Conservation and Land Management, Netherlands Institute for Sea Research (NIOZ), and the Universities of Charles Sturt, Curtin and Sydney. 900 sample stations were visited along 80 km of the Mandora/Cape Missiessy sector of Eighty-mile Beach. 18,600 invertebrates were collected, representing about 114 taxa. Fewer habitat types occur, in comparison to Roebuck Bay. There was broad correspondence between shorebird abundance and their benthic prey. Bivalves were in unusually high densities – up to 8000/sq. m for *Siliqua* cf *winteriana* and *Donax*. Crabs were of reduced importance in the Wallal sector of the Beach. An interesting species of reef-forming tubeworm (Sabellariidae) was collected and a number of macro-invertebrate collections may be new to science (Piersma et al.1999).

Detailed results of the ANNABIM-99 project are forthcoming (Pearson et al. 2002).

### **Mandora Salt Marsh**

**Waterbirds:** A total of 55 species of waterbirds, including 19 shorebirds (waders), 7 ducks, 2 grebes, 4 darters and cormorants, 6 herons and egrets, 7 rails and crakes, and 4 gulls and terns (Graham 1999). Of these, at least 13 species have been recorded breeding in the Marsh. Particularly common species include: Black-winged Stilt *Himantopus himantopus* (more than 10 000 in June 1997); Whiskered Tern *Chlidonias hybridus* (3 000 observed to be opportunistically feeding on Spangled Perch being

washed over the Great Northern Highway during flooding in 1999); Grey Teal *Anas gracilis* (420 at Coolabah Claypan and 400-500 at Walyarta in October 1999); White-necked Heron *Ardea pacifica* (200 in October 1999); Great Egret *A. alba* (1200 at Walyarta in October 1999); and Australian Pelicans *Pelecanus conspicillatus* (4950 in May 1999 and 7000 in October 1999) (Graham 1999). Mandora Marsh is an important breeding area for Pelicans and they bred in huge colonies after flooding in 1999; eggs were first laid in the first week of April 1999 and the last hatching dates were in mid September 1999, indicating that four breeding cycles may have occurred on Walyarta during 1999 (Graham 1999). Large numbers of Black Swan *Cygnus atratus* (700) including eggs and cygnets were also observed at Walyarta in May and October 1999 (Graham 1999).

**Fish:** A new, apparently endemic goby has been discovered in Salt Creek (T. Willing, pers. comm.). Following extensive flooding in 1999, Spangled Perch *Madigania unicolour* were widespread in Walyarta (Graham 1999).

**Mammals:** The vulnerable Bilby *Macrotis lagotis*, which is specially protected by the Commonwealth *Environment Protection and Biodiversity Conservation Act* (1999), has been recorded in sandy sites within the Mandora Salt Marsh. A total of 22 mammals, including 4 dasyurids, 2 macropods, 4 native mice, 3 native bats, and 6 feral species have been recorded using the Marsh. At least 49 reptiles and 6 amphibians also occur at the Marsh (Graham 1999).

### 23. Social and cultural values:

a) Describe if the site has any general social and/or cultural values e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values:

The southern sector of Eighty-mile Beach is regarded by Aboriginal people as being part of Nyangumarta country, while the northern area (Anna Plains Station) is regarded as Karajarri country. In the Karajarri language, the Eighty-mile Beach is named *Wender*, meaning “a creaking noise”, apparently in reference to the sound of walking through its dry sand (Worms 1944). Many of the Aboriginal people with connections to the area now reside at Bidiyadanga Community (formerly La Grange Mission) and nearby at Frazier Downs. A number of soaks, known as *lirri*, are located immediately inland of the Eighty-mile Beach and were important for the provision of drinking water (Yu 2000). Many soaks became Water Reserves on the Kimberley-De Grey Stock Route, used until the 1960s for long distance cattle-droving (Watkins et al. 1997).

The Talgarno military base, immediately east of Anna Plains homestead, was significant in the post-Second World War period for the monitoring and recovery of British Blue Streak rockets, test-fired from Woomera in South Australia. A large gravel airstrip, artesian bores and a few concrete blockhouses remain (Watkins et al. 1997). In 1999 the Department of Defence test-fired a missile from a site on Anna Plains, in connection with the development of the Jindalee over-the-horizon radar project (Willing, pers. comm.).

Eighty-mile Beach is Interim Listed on the Register of the National Estate (Commonwealth of Australia Gazette No. P 25, dated 21 November 2000).

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning?

If Yes, tick the box ☐ and describe this importance under one or more of the following categories:

- i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:
- ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:
- iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:
- iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

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**24. Land tenure/ownership:**

**a) within the Ramsar site:**

The Government of Western Australia has control over marine areas of the site. Native Title Claims by Karrajarri and Nyangumarta Aboriginal groups await resolution. The western (Eighty-mile Beach) part of the nominated area extends only 40 metres above high-tide mark and is mainly Unallocated Crown Land.

**b) in the surrounding area:**

Four large pastoral leases (Anna Plains, Mandora, Wallal and Pardoo) adjoin Eighty-mile Beach. The leases commence 40m above high tide mark and are used for rangeland grazing (Watkins *et al.* 1997). Exploration permits are held over some of the area.

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**25. Current land (including water) use:**

**a) within the Ramsar site:**

Localised beach-based recreation occurs on Eighty-mile Beach and Caravan Park has been established on Wallal Downs, just behind the dunes. Another is proposed at Cape Keraudren. Cattle grazing occurs on the Mandora Salt Marsh. There is seasonal commercial net fishing (licensees at Anna Plains, Mandora and Wallal) and offshore pearling. Shallow waters west (seaward) of Eighty-mile Beach constitute the major pearling grounds for sourcing wild live shell for the Broome-based cultured pearl industry, focused on *Pinctada maxima* (Watkins *et al.* 1997). The Western Australian Department of Fisheries enforces strict commercial quotas for live shell, to ensure sustainable harvest of the resource. Petroleum exploration permits are held over the area.

**b) in the surroundings/catchment:**

There is intensive grazing of cattle on the coastal plain with a low human population, resident at station homesteads and two roadhouses (Pardoo and Sandfire) on the Great Northern Highway. Limited tourism also occurs.

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

**a) within the Ramsar site:**

Cattle grazing has probably had little or no detrimental effect on the samphire areas of Mandora Salt Marsh with respect to waterbird usage but has caused substantial deterioration in the vegetation and physical environment of the springs and Salt Creek. An investigation of ways of reducing the impact of grazing in these areas, especially around Mandora Soak, is desirable. High numbers of feral cats and camels are present in the Mandora Salt Marsh.

Exploration for petroleum may occur in future and, provided it is subject to environmental safeguards to maintain the ecological character of the wetland and habitat for the waterbirds using it, will be compatible with status as a Wetland of International Importance.

Limited visitor access to the southern end of Eighty-mile Beach is of no major concern, but vehicles should normally be excluded from the section of beach near Anna Plains Homestead, because of shorebird concentrations there. Heavy usage of 4WD vehicles on the Beach is also thought likely to have a detrimental impact on beach crab populations, especially Ghost Crabs *Ocypode* spp. (Watkins et al. 1997).

A commercial net fishery which operates seasonally, targeting Giant Threadfin (*Eleutheronema tetradactylum*) and sharks near Anna Plains Station, may be causing local depletion of some small sharks and rays (G. Pearson, pers. comm.).

Foxes are believed to be having an adverse impact on roosting shorebirds and Flatback Turtle nesting sites (Willing, pers. obs.).

**b) in the surrounding area:**

The possibility of a major offshore oil spill poses a potential threat. Local overgrazing, including degradation of coastal plain vegetation (especially at swamps) may occur during drought periods. Numerous cleared survey lines are visible on the coastal plain.

**27. Conservation measures taken:**

**a)** List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site:

In particular, if the site is partly or wholly a World Heritage Site and/or a UNESCO Biosphere Reserve, please give the names of the site under these designations.

**b)** If appropriate, list the IUCN (1994) protected areas category/ies which apply to the site (tick the box or boxes as appropriate):

Ia ☐; Ib ☐; II ☐; III ☐; IV ☐; V ☐; VI ☐

**c)** Does an officially approved management plan exist; and is it being implemented?:

**d)** Describe any other current management practices:

Some 30 km of fencing has been erected on Anna Plains pastoral lease to exclude cattle from part of Eighty-Mile Beach and the dune systems (funded by the Commonwealth Coastcare program in 2001). Additional exclusion fencing is being considered (Pearson, pers. comm.).

In 1997, Saunders Spring in Mandora Salt Marsh was fenced to exclude cattle from all but one watering point using funding from the Commonwealth Natural Heritage Trust program. Funding was also obtained to fence Grants Spring, which was completed in 2001.

**28. Conservation measures proposed but not yet implemented:**

e.g. management plan in preparation; official proposal as a legally protected area, etc.

The Department of Conservation and Land Management is currently undertaking negotiations with surrounding pastoral leaseholders to add significant terrestrial areas adjacent to the site to the conservation estate.

The managers of Eighty-mile Beach Caravan Park have called for motor bikes to be banned from the Beach between November and April, to minimise impacts on turtle nesting and shorebirds (Watson 1996).

In 1994, The Department of Conservation and Land Management published a report titled *A Representative Marine Reserve System for Western Australia*, prepared by the Marine Parks and Reserves Selection Working Group (DCLM 1994). In the report, the Working Group recommended that a section of Eighty-mile Beach and adjoining marine waters, including tidal flats and a 40 metre strip of land above high tide, should be reserved for the protection of marine flora and fauna, including migratory shorebirds. The Working Group suggested that the reserve should be in the vicinity of Anna Plains and extend seawards, preferably to the limit of State waters however, the Working Group also recommended that a decision on which section should be reserved should be deferred until the Royal Australasian Ornithologists Union (now Birds Australia) completes its study of the area, enabling the areas of most importance to migratory shorebirds to be included.

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

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

Eighty-mile Beach and (to a lesser extent) Anna Plains have been intensively surveyed for shorebirds by the Australasian Wader Studies Group since 1981, mainly through an ongoing program of shorebird banding expeditions. Numerous shorebird recoveries have been reported from China, Korea and Russia. The expeditions usually include foreign participants, notably researchers from Asian countries of the Shorebird Flyway, receiving training in shorebird study techniques.

A community monitoring program of periodic benthic sampling at three sites near Anna Plains is current, involving joint collaboration between Environs Kimberley, the Department of Conservation and Land Management and the Netherlands Institute for Sea Research (G. Pearson, pers. comm.).

A postgraduate student (S Wade) at Central Washington University, USA, is currently engaged on a project to accurately map inundation of the mudflats of the Beach from satellite imagery and develop a discussion paper on management issues at Eighty-mile Beach (G. Pearson, pers. comm.).

The connection between localised benthic richness at the Beach and a possible nutrient supply, emanating from the gypsum-rich Mandora paleo-catchment area, i.e. the Walyarta/Salt Creek system, warrants further research (T. Willing, pers. comms.).

In 1999, the Department of Conservation and Land Management coordinated a detailed study of the ecology of Mandora Salt Marsh, including systematic, quadrat-based recording (presence/absence) of plants, birds, mammals, reptiles, amphibians, aquatic invertebrates and water chemistry, as well as opportunistic sampling of habitats of interest (Graham 1999). The major aim of the survey was to provide an overall resource inventory for the area to assist in the identification of land management issues affecting the area (Graham 1999).

At the present time there are no research facilities, however the manager of Anna Plains Station has provided ongoing logistical support to researchers over many years (T. Willing, pers. comm.)

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### **30. Current communications, education, participation and awareness (CEPA) activities related to or benefiting the site:**

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

An educational pamphlet for visitors to Eighty-mile Beach has been jointly produced and colour-printed for Environs Kimberley, Broome Bird Observatory and the Department of Conservation and Land Management with funding support from the Gordon Reid Foundation (Lotteries Commission of Western Australia).

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

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

Cape Keraudren, at the southern end of Eighty-mile Beach, has a Recreation Reserve (39135, 4 800 ha), vested in the Shire of East Pilbara. The area is popular for informal camping and fishing and has a Shire-appointed ranger (Chalmers 1986). Eighty-mile Beach Caravan Park is a commercial caravan park, with powered sites and water, operating on an 11 ha special lease near Wallal. Eighty-mile Beach is famous for its abundance of large baler and other shells and because of this has become a popular shell-collecting area (Watkins et al. 1997). Recreational fishing occurs on Eighty-mile Beach.

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### 32. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

**Territorial:** Government of Western Australia

**Functional:** Department of Land Administration and the Department of Conservation and Land Management.

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### 33. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

Several State Government Agencies are involved in management of the site. The key agency is the Department of Conservation and Land Management, because of the Ramsar listing of the site  
The contact details for the management office are:

Department of Conservation and Land Management Broome Workcentre  
PO Box 65  
Broome  
WESTERN AUSTRALIA, 6725

Phone: +61 8 9192 1036  
Fax: +61 8 9193 5027  
Email: timw@calm.wa.gov.au

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Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.

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