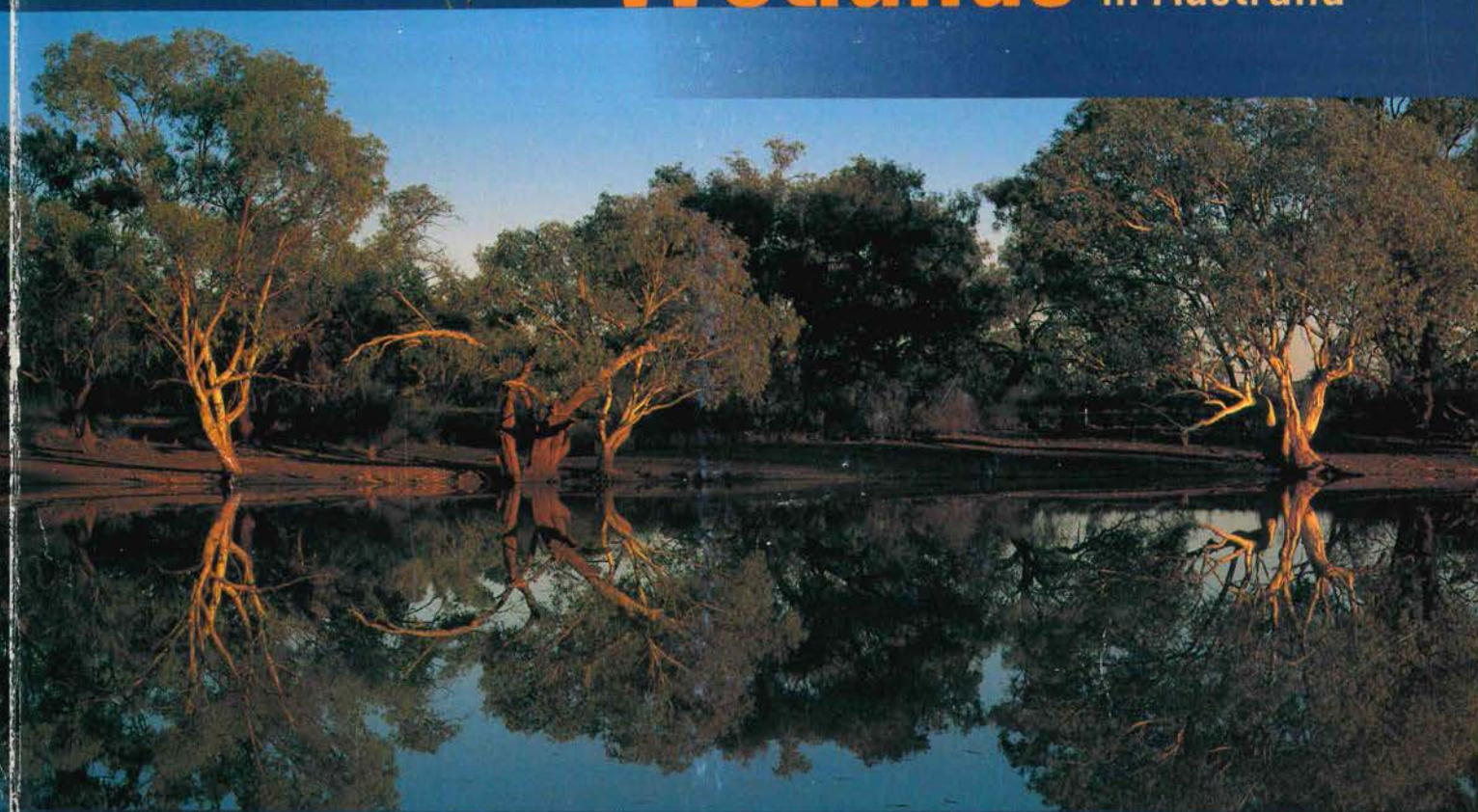
3rd edition

A Directory of Important Wetlands in Australia



A cooperative project between the Commonwealth, State and Territory Governments to promote the conservation, wise use and management of Australia's wetlands

A Directory of Important

Wetlands in Australia

Third Edition

A cooperative project between the Commonwealth, State and Territory Governments of Australia, coordinated by Environment Australia and involving:

- Environment ACT
- New South Wales National Parks and Wildlife Service
- Parks and Wildlife Commission of the Northern Territory
- Queensland Environmental Protection Agency
- South Australian Department for Environment and Heritage
- Tasmanian Department of Primary Industry, Water and Environment
- Victorian Department of Natural Resources and Environment
- Western Australian Department of Conservation and Land Management

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National Wetlands Program

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A Directory of Important Wetlands in Australia is now online at:
http://www.environment.gov.au/water/wetlands

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River Red Gums along the Paroo River, south-west Queensland
Great Egret (*Ardea alba*), Darling River billabong, north-west NSW
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Foreword

IT IS WELL RECOGNISED THAT WETLANDS PLAY AN IMPORTANT ROLE IN MAINTAINING BIOLOGICAL DIVERSITY. They also perform vital functions such as water purification, nutrient retention, maintenance of water tables, storm protection, flood mitigation, shoreline stabilisation, erosion control, and groundwater recharge—all of which are important for Australia's unique natural resources and landscape. Wetlands also provide for social and cultural wellbeing and, if managed wisely, they can provide economic benefits.

The special values and functions of wetlands can only be maintained if ecological processes are allowed to continue to function. Unfortunately, wetlands are amongst the most threatened ecosystems worldwide due largely to destructive practices such as draining, infilling, pollution and overexploitation of their resources. In order to prevent further loss of important wetland habitat in Australia, building and maintaining a comprehensive inventory of our wetlands is crucial so that we gain a better understanding of their values and location.

The Commonwealth Government has invested around $2 million through the National Wetlands Program to do just that—to undertake, in cooperation with State and Territory governments, a comprehensive inventory of Australia's nationally important wetlands known as *A Directory of Important Wetlands in Australia* (the Directory). Since the release of the first and second editions of the Directory in 1993 and 1996 respectively, funding has been provided for comprehensive reviews of existing data and to investigate regions of Australia that were previously under-represented or not represented in the Directory.

At the time of the launch of the second edition of the Directory, the Commonwealth Government made a commitment to investigate means by which the information contained in the Directory could be made electronically available via the Internet. This will make it more widely available to a wide variety of potential users wishing to access the information. The Commonwealth Government has honoured this commitment—*A Directory of Important Wetlands in Australia* is now available "online" on the Environment Australia website.

With this shift from hard copy to electronic format, the Directory data set is now easier to update—as new information becomes available it will be immediately uploaded. From now on the electronic Directory will greatly facilitate more rapid availability of the data for nationally important wetland sites.

I envisage that the Directory will become a much more useful tool for policy makers, biodiversity professionals and the community. It provides information useful for making decisions on the protection of wetlands and how wetland resources will be utilised. It will enable those who wish to restore or rehabilitate wetlands to access a valuable source of information on wetland characteristics. It can also provide a substantial basis for the future development of a national wetlands inventory to document all of Australia's wetlands, not just those that are considered to be nationally or internationally important.

It is particularly auspicious that both the summary publication of the third edition of the Directory and the online database are launched on 2 February 2001—World Wetlands Day. It marks the 30th anniversary of the signing of the Convention on Wetlands (Ramsar, Iran, 1971) to which Australia was one of the first signatories, and is cause for celebration. Australia has made a valuable contribution to wetland conservation during this time and these launches provide an opportunity to promote not only to all Australians but to the International community alike that the Australian Government is continuing to meet its strong commitment to the conservation of Australia's important wetlands.

ROBERT HILL

Minister for the Environment and Heritage

FEBRUARY 2001

Acknowledgments

THE WETLANDS SECTION WOULD LIKE TO THANK THE AUTHORS who produced the Introductory text for their respective State and Territory Chapters for their input to this publication. The primary authors and contributors are Mark Lintermans (ACT), Paul Adam and Deb Stevenson (NSW), Gavin Blackman (Qld), Stewart Blackhall (Tas), Janet Holmes (Vic), and Jim Lane (WA).

No new Introductory text was provided for NT and SA. The text for these chapters was edited and updated by the national editors.

We would also like to thank NHT National Wetlands Program project proponents who contributed new site information to the Directory.

Geoff Larmour produced the summary statistics for the Introduction and Convention on Wetlands Chapters, and the Summary analysis sections for the State and Territory Chapters.

Our colleagues in ERIN provided invaluable assistance. Rod Nowrojee and Mathew Brooks contributed to the publication through the production of maps and underlying GIS layers, and through the production of summary statistics for the Directory sites.

Tony Rosling developed the database to hold both Directory and Ramsar data, and accomplished the transfer of all of the existing site information from text form to the database, enabling the information to be widely accessible via the Internet.

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1. Introduction

Alison Russell-French
Assistant Secretary
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Context

To develop *A Directory of Important Wetlands in Australia* (the Directory) is an ambitious undertaking that encompasses a number of important elements. The Directory not only identifies important wetlands, it provides a substantial knowledge base of what defines wetlands, their variety and the dependence on them of many flora and fauna species. Many of Australia's wetlands are unique and very distinct. Without the Directory we would not have the valuable catalogue of these unique ecosystems that now exists.

The first edition of *A Directory of Important Wetlands in Australia* (ANCA 1993) was a collaborative effort between the Commonwealth Government and each of the State and Territory nature conservation agencies. A total of 517 wetlands qualified as nationally important and were included in the Directory. The second edition of *A Directory of Important Wetlands in Australia* (ANCA 1996) built on the information of the first edition, with a review of existing entries and the addition of 181 new site entries, bringing the total to 698 nationally important wetlands.

The information used to populate the Directory data set is provided in the main by State and Territory agencies, some of which are receiving funds for inventory projects under the National Wetlands Program of the Natural Heritage Trust to update and expand their State and Territory Chapters.

Since publication of the second edition of the Directory in 1996, extensive survey work has been undertaken, particularly in the north-west and south coast regions of New South Wales and in Victoria, to assess important streams and rivers. An inventory of important wetlands on Commonwealth owned and managed areas has also been undertaken.

Table 1.1 charts the changes to Directory listings since the second edition by jurisdiction. The total number of sites in the third edition of the Directory is 851 sites (refer to Figure 1), the net increase is 153, mostly from New South Wales and Victoria, including a significant number of important rivers and streams. The inventory of wetlands on Commonwealth owned and managed areas resulted in the addition of 20 wetlands to the Directory, three in the External Territories and 17 in the Defence Estate on mainland Australia, including Beecroft Peninsula which is managed by the Department of Environment and Heritage for the Department of Defence.

Table 1.1 Changes to Directory listings in each jurisdiction

Jurisdiction	No. of Sites in 2nd Edition	No. of Sites added	No. of C'wealth Sites added	No. of Sites Deleted	No. of Sites in 3rd Edition
Australian Capital Territory	13	1	0	1	13
New South Wales	94	81	3	0	178
Northern Territory	30	0	3	0	33
Queensland	165	12	4	0	181
South Australia	68	0	1	0	69
Tasmania	91	1	0	3	89
Victoria	121	38	0	0	159
Western Australia	110	4	6	0	120
External Territories	6		3	0	9
Total	**698**	**137**	**20**	**4**	**851**

Brief Summary and Analysis of Directory Data

The Directory describes 851 wetlands that have qualified as nationally important against the Criteria for inclusion outlined in Chapter 2. Of these wetlands, 56 are designated to the List of Wetlands of International Importance of the Ramsar Convention. These sites are summarised in Chapter 4.

The distribution of Australia's nationally important wetlands is shown at Figure 1. A breakdown of nationally important wetlands by State and Territory and area coverage is provided at Table 1.2. Wetlands occurring on land owned or managed by the Commonwealth in continental Australia, such as Kakadu National Park in the Northern Territory, are listed geographically under the relevant State or Territory chapter. There are no Commonwealth listings in the Australian Capital Territory and Tasmania. Wetlands of the External Territories under Commonwealth jurisdiction are described in Chapter 13.

Table 1.2 Number of wetlands and approximate area in each jurisdiction

Jurisdiction	No. of Sites (C'wealth)	Area (ha)
Australian Capital Territory	13 (0)	1,257
New South Wales	178 (6)	2,334,734
Northern Territory	33 (4)	4,033,230
Queensland	181 (8)	42,875,159
South Australia	69 (1)	4,223,988
Tasmania	89 (0)	51,514
Victoria	159 (4)	557,888
Western Australia	120 (8)	2,583,325
External Territories	9 (9)	1,168,427
Total	**851 (40)**	**57,829,522**

The Wetland Classification System used in the Directory and the Criteria for determining nationally important wetlands are described in Chapter 2. Tables showing the breakdown of sites in each wetland type by jurisdiction and the number of sites included in the Directory against each criterion by jurisdiction are included in Appendix 1.

Interim Biogeographic Regionalisation for Australia (IBRA) analysis

Wetlands listed in the Directory (with the exception of the External Territories) are described against IBRA version 4.0 (Thackway and Creswell 1995) which is used for this analysis. Some wetlands, particularly rivers, occur in more than one bioregion and in this situation the first named bioregion is used for analytical purposes, on the assumption that most of the wetland occurs within that bioregion. For the few sites where no bioregion is identified, an overlay of the IBRA coverage was used to determine bioregion. An overview of the IBRA regionalisation, a map of IBRA regions and a table showing the number of nationally important wetlands by bioregion, are at Appendix 2.

There are some significant biases in the distribution and representation of nationally important wetlands in relation to bioregions, reflecting climatic regime and other factors such as remoteness and gaps in primary information.

Five bioregions (Mulga Lands, Murray-Darling Depression, Riverina, Sydney Basin and South Eastern Highlands) in the east and south of the Continent, contain 30 or more listed wetlands accounting for 227 wetlands, or 26.5% of the total number of wetlands in the Directory.

Twenty-nine of the 80 IBRA regions contain 10 or more nationally important wetlands (refer Table 1.3). These bioregions contain 664 or 78% of the listed wetlands. The remaining 187 listed wetlands occur across 42 bioregions.

Nine bioregions have no recognised nationally important wetlands: Broken Hill Complex; Burt Plain; Central Arnhem; Cobar Peneplain; Gawler; Hampton; Nandewar; Nullarbor; and Sturt Plateau. The combined area of these bioregions is 633,794 square kilometres or 8.25% of the continental landmass. Not all of these bioregions are arid zone areas or remote from major population centres.

Table 1.3 IBRA regions containing ten or more nationally important wetlands

IBRA region	No. of sites	Area (ha)
Mulga Lands	57	897,860
Murray-Darling Depression	48	657,620
Riverina	46	204,031
Sydney Basin	43	93,745
South Eastern Highlands	31	34,874
South East Corner	29	82,364
Swan Coastal Plain	29	30,470
Wet Tropics	29	163,079
Victorian Volcanic Plain	26	47,107
Channel Country	25	3,057,435
Cape York Peninsula	23	2,429,936
NSW North Coast	23	232,209
South East Coastal Plain	23	154,284
Naracoorte Coastal Plain	20	301,193
Tasmanian Midlands	20	2,128
Lofty Block	18	50,750
Australian Alps	16	1,012
Eyre and Yorke Blocks	16	38,238
Ben Lomond	15	281
Gulf Plains	15	2,221,612
Central Mackay Coast	14	703,220
Furneaux	14	3,729
Brigalow Belt South	14	247,754
Einasleigh Uplands	13	132,170
South Eastern Queensland	13	667,130
Central Highlands	12	2,420
Top End Coastal	12	978,900
Brigalow Belt North	10	475,697
Woolnorth	10	35,179
Total	**664**	**13,946,427**

A new version of the national bioregionalisation, IBRA version 5.1, with revised boundaries and 5 additional regions, was agreed by all States and Territories during the production of this publication. It is anticipated that wetland site information will be updated using the revised IBRA boundaries, where relevant.

Drainage Basin analysis

Analysis of the distribution and representation of nationally important wetlands in drainage basins was undertaken using the Australian Water Resources Commission Drainage Division and Basins coverage. The coverage defines 245 drainage basins in continental Australia.

Twenty-two drainage basins contain 10 or more nationally important wetlands (refer to Table 1.4). These basins occur from the arid to humid zones. The Paroo River basin contains the largest number of nationally important wetlands with 33 wetlands covering an area of approximately 780,000 hectares. Of those drainage basins containing important wetlands, 89 (48%) contain 2 or less nationally important wetlands. Fifty-six drainage basins contain no recognised nationally important wetlands. Further analysis and a map of drainage basins is included at Appendix 3.

Table 1.4 Drainage Basins containing 10 or more nationally important wetlands

Drainage Basin	No. of Sites	Area (ha)
Paroo River	33	779,561
Murrumbidgee River	29	205,789
Condamine-Culgoa Rivers	20	288,002
Loddon River	18	28,282
Swan Coast	17	6,094
Wimmera-Avon Rivers	16	89,322
Mallee	16	41,320
Lake Corangamite	16	35,824
Millicent Coast	14	155,262
Snowy River	14	54,254
Flinders-Cape Barren Islands	14	3,729
Tamar River	14	164
Clyde River-Jervis Bay	13	53,789
Kangaroo Island	13	50,304
Derwent River	13	4,016
Burdekin River	12	171,582
East Coast	12	7,940
Piper-Ringarooma Rivers	12	256
Cooper Creek	11	2,418,502
Lower Murray River	10	175,147
Avoca River	10	25,752
Hawkesbury River	10	5,222
Total	**337**	**4,600,113**

Note: area figures are approximate only and are not available for all wetlands.

Applications of Directory data

The brief analyses above demonstrate the potential applications of the wetland site data held in the Directory. Specific projects that are being pursued using the Directory database include the identification of new Ramsar sites in Australia, implementing Resolution 15.11 *"Strategic framework and guidelines for the future development of the list of Wetlands of International Importance"* adopted at the 7th Conference of Parties in Costa Rica, 1999 which urges Contracting Parties to develop a systematic approach to identifying future Ramsar sites for designation to the List of Wetlands of International Importance (Ramsar Convention Bureau 2000a).

Identification of the new Ramsar sites in Western Australia (sites 54–56) was undertaken using a strategic and systematic approach, consistent with this resolution (Jaensch and Watkins 1998). The Western Australian chapter of the second edition of *A Directory of Important Wetlands in Australia* was used as the primary data source for identifying potential candidate Ramsar wetlands.

The Directory will also be used to identify sites of importance for particular species, including threatened or migratory species, assisting with the implementation of conservation initiatives to protect migratory waterbirds, through identification of important habitat and the addition of new Australian sites to the East Asian–Australasian Shorebird Site Network.

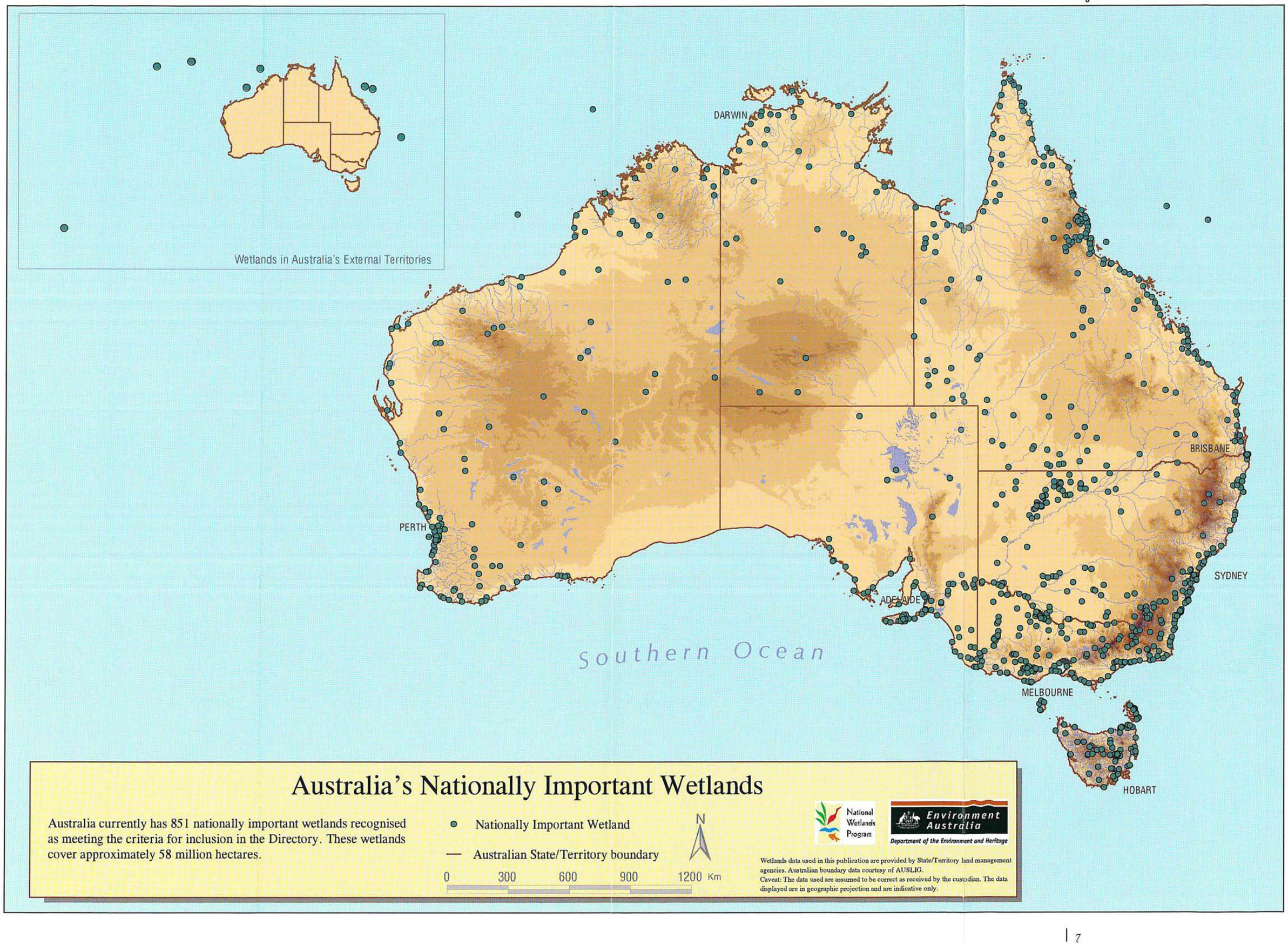
Future of the inventory project

Work is ongoing in most jurisdictions to assess under-represented regions, and future additions to the Directory are expected from survey projects underway in Western Australia, Queensland, South Australia and the arid zone of the Northern Territory. Environment Australia will continue to examine wetlands occurring on Commonwealth land to identify any further sites that meet the criteria for inclusion in the Directory. Regular updates of existing listings will also be sought to revise information on wetland sites.

There is a need however for ongoing survey work, particularly in regions where significant gaps in information exist so that comprehensive State/Territory wetland inventories can be developed and aggregated towards a national wetlands inventory. Some States have already embarked on a comprehensive assessment of wetland types and coverage and will be producing digital data sets that could form the basis of a national wetland inventory.

Environment Australia, through the ANZECC Wetlands and Migratory Shorebird Taskforce, will be working with the States and Territories to develop a protocol and methodology for the future development of a national wetland inventory.

Figure 1



Australia's Nationally Important Wetlands

Australia currently has 851 nationally important wetlands recognised as meeting the criteria for inclusion in the Directory. These wetlands cover approximately 58 million hectares.

Nationally Important Wetland

Australian State/Territory boundary

N

0 300 600 900 1200 Km

National Wetlands Program

Environment Australia

Department of the Environment and Heritage

Wetlands data used in this publication are provided by State/Territory land management agencies. Australian boundary data courtesy of AUSLIG.
Caveat: The data used are assumed to be correct as received by the custodian. The data displayed are in geographic projection and are indicative only.

2. Wetland classification system, Criteria for inclusion and Data presentation

Geoff Larmour
Wetlands Section
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Wetland classification system

THE DEFINITION OF A WETLAND USED IN THE DIRECTORY CONTINUES TO BE THAT ADOPTED BY THE RAMSAR CONVENTION UNDER ARTICLE 1.1, NAMELY:

> *"wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent of temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres."*

Within this broad definition, the wetland classification system used in the Directory identifies 40 different wetland types in three categories: A—Marine and Coastal Zone wetlands, B—Inland wetlands, and C—Human-made wetlands (refer below). This system has not been altered since it was agreed to by the then ANZECC Wetlands Network[1] in 1994, hence it remains the same as that used in the second edition.

The system is based on that used by the Ramsar Convention in describing Wetlands of International Importance, but was modified slightly to suit the Australian situation in describing wetlands of national importance. Notable alterations to the Ramsar classification system included the addition of non-tidal freshwater forested wetlands (A12) and rock pools (B17). Inland karst systems were also added (B19), although the Ramsar classification system now includes karst systems under all categories.

A—Marine and Coastal Zone wetlands

1 Marine waters—permanent shallow waters less than six metres deep at low tide; includes sea bays, straits

2 Subtidal aquatic beds; includes kelp beds, seagrasses, tropical marine meadows

3 Coral reefs

4 Rocky marine shores; includes rocky offshore islands, sea cliffs

5 Sand, shingle or pebble beaches; includes sand bars, spits, sandy islets

1 ANZECC, the Australian and New Zealand Environment and Conservation Council, is the Council of Environment Ministers from the Australian Federal Government, the New Zealand Government and all Australian State and Territory Governments. The ANZECC Wetlands Network, now known as the ANZECC Wetlands and Migratory Shorebirds Taskforce, is a group of officers representing each of the nature conservation agencies of the Governments represented in ANZECC. The Taskforce is responsible for coordinating implementation of the Ramsar Convention in Australia.

6 Estuarine waters; permanent waters of estuaries and estuarine systems of deltas

7 Intertidal mud, sand or salt flats

8 Intertidal marshes; includes saltmarshes, salt meadows, saltings, raised salt marshes, tidal brackish and freshwater marshes

9 Intertidal forested wetlands; includes mangrove swamps, nipa swamps, tidal freshwater swamp forests

10 Brackish to saline lagoons and marshes with one or more relatively narrow connections with the sea

11 Freshwater lagoons and marshes in the coastal zone

12 Non-tidal freshwater forested wetlands

B—Inland wetlands

1 Permanent rivers and streams; includes waterfalls

2 Seasonal and irregular rivers and streams

3 Inland deltas (permanent)

4 Riverine floodplains; includes river flats, flooded river basins, seasonally flooded grassland, savanna and palm savanna

5 Permanent freshwater lakes (> 8 ha); includes large oxbow lakes

6 Seasonal/intermittent freshwater lakes (> 8 ha), floodplain lakes

7 Permanent saline/brackish lakes

8 Seasonal/intermittent saline lakes

9 Permanent freshwater ponds (< 8 ha), marshes and swamps on inorganic soils; with emergent vegetation waterlogged for at least most of the growing season

10 Seasonal/intermittent freshwater ponds and marshes on inorganic soils; includes sloughs, potholes; seasonally flooded meadows, sedge marshes

11 Permanent saline/brackish marshes

12 Seasonal saline marshes

13 Shrub swamps; shrub-dominated freshwater marsh, shrub carr, alder thicket on inorganic soils

14 Freshwater swamp forest; seasonally flooded forest, wooded swamps; on inorganic soils

15 Peatlands; forest, shrub or open bogs

16 Alpine and tundra wetlands; includes alpine meadows, tundra pools, temporary waters from snow melt

17 Freshwater springs, oases and rock pools

18 Geothermal wetlands

19 Inland, subterranean karst wetlands

C—Human-made wetlands

1 Water storage areas; reservoirs, barrages, hydro-electric dams, impoundments (generally > 8 ha)

2 Ponds, including farm ponds, stock ponds, small tanks (generally < 8 ha)

3 Aquaculture ponds; fish ponds, shrimp ponds

4 Salt exploitation; salt pans, salines

5 Excavations; gravel pits, borrow pits, mining pools

6 Wastewater treatment; sewage farms, settling ponds, oxidation basins

7 Irrigated land and irrigation channels; rice fields, canals, ditches

8 Seasonally flooded arable land, farm land

9 Canals

Criteria for determining important wetlands

The criteria for determining nationally important wetlands in Australia, and hence inclusion in the Directory, are those agreed to by the ANZECC Wetlands Network in 1994 and used in the second edition.

A wetland may be considered nationally important if it meets at least one of the following criteria:

1. *It is a good example of a wetland type occurring within a biogeographic region in Australia.*
2. *It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex.*
3. *It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail.*
4. *The wetland supports 1% or more of the national populations of any native plant or animal taxa.*
5. *The wetland supports native plant or animal taxa or communities which are considered endangered or vulnerable at the national level.*
6. *The wetland is of outstanding historical or cultural significance.*

Many of the sites in the Directory meet more than one of the criteria. Application of the criteria to individual wetland sites involves a degree of subjectivity. Not only may certain aspects of a site's significance be interpreted differently by different investigators, but information gaps often exist which make it difficult to judge whether or not a site meets a particular criterion.

The Interim Biogeographic Regionalisation for Australia (IBRA) is used as the framework for applying Criterion 1, which identifies wetlands that are unique or representative within a biogeographic region in Australia. An overview of the IBRA regionalisation and a map of IBRA regions is included in Appendix 2.

Data presentation

The ANZECC Wetlands Network also agreed in 1994 to conform to a standard format to describe wetlands included in the Directory. This format is considered the "minimum data set" for describing wetlands.

Now that the Directory is in database format these information descriptors have become field descriptors. Again there is some subjective interpretation of these descriptors, and in the current database not all fields contain information. Information is still presented under these headings by the online Directory. In moving the Directory from a hard copy publication to an online database the format for reference numbers has been changed to enable easier addition of sites to the database. Changes have also been introduced to the notable flora and fauna sections to reflect the categories of threatened species introduced under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

If additional information on particular sites in the online Directory is required, users should either consult the online reference list, or contact the relevant member of the ANZECC Wetlands and Migratory Shorebirds Taskforce (see Contacts list).

Standard format for describing wetlands in the Directory

Name of wetland: The name of the site.

Reference number: Each site has been allocated an individual reference number. The code used has been amended since the second edition. This is now a sequential number with a two or three letter prefix for the State or Territory in which the wetland occurs. There is no longer any reference to the bioregion. The State and Territory lists of important wetlands in their respective chapters give both old and new reference numbers for sites that were included in the second edition. Sites listed since 1996 have only the new reference number. An example showing both old and new reference numbers follows:

Old Reference No.	Wetland name	New Reference No.
NET001NS	Little Llangothlin Lagoon	NSW022
NET002NS	New England Wetlands	NSW023
NET003NS	Round Mountain Swamps	NSW024

Location: Latitude and longitude at the centre of the wetland. If the site consists of two or more discrete entities, the centre coordinates of each of these entities is given. A general description of the location of the wetland including the distance from the nearest landmark, town, reserve or access point. This also includes bioregion name (IBRA, see Appendix 2) and local government area where applicable.

Area: In hectares.

Elevation: In metres above sea level (m ASL).

Other wetlands in same aggregation: Those wetlands included in the Directory, listed by reference number. Wetlands in the same aggregation are those where there is a hydrological, ecological or biological connection apparent.

Wetland type: All wetland habitat types occurring at the site using the wetland classification system code (A1, A2, etc) discussed above and including an indication of the dominant wetland type.

Criteria for inclusion: Reference numbers for criteria (1–6) discussed above indicating why the wetland is nationally important.

Site description: A brief summary of the important characteristics of the wetland, ie those that make it nationally important.

Further details of the features of the site are supplied under the following subheadings:

Physical features: Description of the following where relevant: landform, geology, geomorphology, origin, soil types and climate, including rainfall and evaporation.

Hydrological features: A brief description of the principal hydrological features such as source of water supply, maximum water depth, persistence, salinity regime and pH values. Other features may include the role of the wetland in recharge and discharge of ground water, flood mitigation, and maintenance of water quality.

Ecological features: A brief description of the main habitats, listing dominant plant communities, species present and describing any seasonal variation or long-term changes in species composition. This includes information on adjacent areas where appropriate, to put the wetland in context.

Significance: The significance of the site within its bioregion.

Specific features of significance are also addressed under the following subheadings. For threatened species of flora and fauna the common name and scientific name (in italics) is followed by the appropriate code of conservation status in brackets:

National Conservation status	Code	State/Territory Conservation status [2]	Code
Critically endangered (CR) [1]	Ncr	Critically endangered (CR)	Scr
Endangered (E)	Ne	Endangered (E or EN)	Se
Vulnerable (V)	Nv	Vulnerable (V or VU)	Sv
Conservation dependent (CD) [1]	Ncd	Lower Risk (LR)	Slr
Rare (R)	Nr	Rare (R)	Sr
		Data Deficient (DD)	Sdd

1 these categories established under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

2 conservation status categories and definitions vary between jurisdictions.

Notable flora: Threatened species: threatened flora at national or State level that occur on the site (includes any threatened species identified under national or State legislation, ANZECC lists or action plans). Composition: information on the composition of any plant species or communities for which the wetland is particularly important (eg local endemic species or good examples of native plant communities).

Notable fauna: Threatened species: list of threatened fauna at national or State level that are present at the site (includes any threatened species identified under national or State legislation, ANZECC lists or action plans). Composition: information regarding composition of important fauna that may inhabit the wetland permanently or seasonally, including migratory species. An indication of population sizes, breeding colonies, migration stopover etc is also given where available.

Social and cultural values: Social and/or cultural values of the wetland. Social values may include tourism, recreation, scientific research, education, grazing, water supply, fisheries production etc. Cultural values include specific prehistoric or historical associations whether they relate to indigenous or non-indigenous culture.

Land tenure: Using standard terminology, land tenure is addressed under the following subheadings:

On site: Details of land ownership of the wetland site.

Surrounding area: Details of the tenure type that is dominant in the surrounding areas if possible.

Current land use: Using standard terminology, land use is addressed under the following subheadings:

On site: Current human use of the designated wetland area.

Surrounding area: Human use on land adjacent to the wetlands, and more broadly in the surrounding catchment.

Disturbances or threats: Disturbances or threats are defined as any direct or indirect human activities at the site or in the catchment area that may have a detrimental effect on the ecological character of the wetland. The effect may be a low level disturbance (eg low intensity grazing) or a major threat (eg water diversion schemes). Examples include disturbance by stock, water extraction, river regulation, siltation, salinity, urban development, drainage, pollution, excessive human activity, and impact of invasive species. Disturbances or threats are addressed under the following subheadings:

Current: Activities or features that are adversely affecting the wetland at present. An indication of the severity or degree of threat may be given where known, eg high, moderate, or low.

Potential: Potential future threats, for example planned changes in land use or degradation of the site from current land use practices (eg increased salinity).

Conservation measures taken: Details of conservation measures being undertaken at the site, and where appropriate, the names of any protected areas established at or around the wetland. This includes details of any management plans for the site and whether they are being implemented. It also includes the status of the site in terms of National Estate, Ramsar or World Heritage listing, or whether it falls within a Biosphere Reserve.

Management authority and jurisdiction: The name of the body or bodies responsible for management of the wetland.

Compiler & date: The name of individuals and associated organisations who provided information for the site description, with the date of compilation and that of the most recent update.

3. Use and future development of the Directory

Geoff Larmour
Wetlands Section
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Using the Directory

THE DIRECTORY IS NOW ESSENTIALLY AN ONLINE TOOL, AND UNLIKELY TO APPEAR AGAIN IN PRINT AS IN THE FIRST TWO EDITIONS (ANCA 1993, 1996). The site information within these two publications has been transferred to an Oracle database that is now accessible via the Internet.

This is an important advance for the Directory and fulfils a commitment made in the second edition to make the information available electronically. In practical terms it means that the latest information on existing and new nationally important wetlands can be made available as soon as it is entered into the Directory database. Inventory work currently in progress, funded through the National Wetlands Program, can be immediately uploaded when it is completed.

The Directory Internet site includes a map of the listed wetland where available. The present coverage used to illustrate Directory sites has been derived largely from a 1:250,000 coverage of waterbodies produced by the Australian Surveying and Land Information Group (1994). Environment Australia is negotiating with the States and Territories, and Commonwealth land managers, for the supply of more accurate spatial data where these are available.

The Directory interface is being set up to provide users with as much functionality as possible. Site data can be sought through a search form that allows users to query the data on a number of fields, such as State, Bioregion, Wetland type and Criteria for inclusion from a menu, and user-defined text in other fields. Users can also use a spatial data engine to select an area on the map to search for listed wetlands. A Help facility for the online Directory is included.

Access to Directory data is via the Wetlands Section—Environment Australia homepage: http://www.environment.gov.au/water/wetlands

Future development of the Directory

Now that the wetland data are in electronic format it is possible to perform the types of analyses illustrated in this publication. These provide a useful snapshot of the current representation of wetland types and criteria for inclusion across jurisdictions and, perhaps more importantly, across biogeographic regions.

The summary statistics presented in this publication utilise the data most readily accessible in the database. Information on wetland types and criteria has been stored according to the appropriate codes, making it much easier to extract and manipulate. Most of the information is text based and hence analyses are not so straight forward, for example, analyses on land tenure and management arrangements for wetlands listed in the Directory is currently quite difficult. Environment Australia will be investigating how best to make text based data more easily accessible for analytical purposes.

The Directory entries also contain useful information about wetland taxa, but these data have also been entered in text fields. Of particular interest from a conservation point of view, and in meeting legislative obligations, is information about threatened and migratory species. The database has been set up with taxon tables to allow for entry, and hence searching and reporting, of taxon specific information for wetland sites. Extracting data in the existing site descriptions and seeking additional survey data not previously included to populate these tables is a large undertaking, but it is anticipated that this will be done progressively to increase the usefulness of the Directory as a resource.

The fact that the data are now in electronic format and can be displayed in a GIS has allowed some analysis of the distribution of sites in relation to Drainage Divisions and Basins. It is intended to add these data to the Directory information for future reference.

Feedback on the Directory from all users is welcome. If your comments relate to site information contained in the Directory, or information relating to possible new sites, these would be best directed to the ANZECC Taskforce member in your State or Territory. If you have comments relating to the online Directory and how this may be improved, please direct your comments to Geoff Larmour in the Environment Australia Wetlands Section. Contact details are provided at the end of the publication.

4. The Convention on Wetlands in Australia

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The Convention on Wetlands

THE CONVENTION ON WETLANDS (RAMSAR, IRAN, 1971), MORE COMMONLY KNOWN AS THE RAMSAR CONVENTION, is an intergovernmental treaty dedicated to the conservation and "wise use" of wetlands. The Convention's mission is *'...the conservation and wise use of wetlands by national action and international cooperation as a means to achieving sustainable development throughout the world'* (Ramsar Convention Bureau 2000b).

The "wise use" of wetlands is a key concept of the Convention and is defined as:

> *'the sustainable utilisation of wetlands for the benefit of mankind in a way compatible with the maintenance of the natural properties of the ecosystem'* (Recommendation 3.3).

Sustainable utilisation of a wetland is defined as:

> *'human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspiration of future generations'* (Recommendation 3.3).

Australia was one of the first of 18 countries to become a signatory to the Convention in 1971, and in 1974 designated the first wetland to the Ramsar List of Wetlands of International Importance – Cobourg Peninsula Aboriginal Land and Wildlife Sanctuary.

As of December 2000, there are 123 Contracting Parties to the Convention with 1044 wetland sites designated for inclusion in the List of Wetlands of International Importance, totalling 78.5 million hectares (Ramsar Convention Bureau 2000b). Australia has 56 Ramsar sites covering an area of approximately 5.3 million hectares (refer to Figure 2).

Further information on the Convention on Wetlands can be obtained by visiting the Ramsar Convention Bureau's website at http://ramsar.org

Ramsar Criteria for Inclusion

A wetland is identified as being of international importance if it meets at least one of a number of criteria relating to the site's uniqueness, rarity, or representativeness, or the flora, fauna or ecological communities it supports. The current criteria, agreed upon by Contracting Parties at the seventh Conference of Parties held in Costa Rica, May 1999 have been applied to sites designated since that time and to any sites where the Ramsar Information Sheet (RIS) has been reviewed and updated. The criteria are set out below:

Group A of the Criteria. Sites containing representative, rare or unique wetland types

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.

Group B of the Criteria. Sites of international importance for conserving biological diversity

CRITERIA BASED ON SPECIES AND ECOLOGICAL COMMUNITIES

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

Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

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.

SPECIFIC CRITERIA BASED ON WATERBIRDS

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

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.

SPECIFIC CRITERIA BASED ON FISH

Criterion 7: A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.

Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

The following criteria are applicable to those sites designated prior to May 1999. As sites are reviewed, the new criteria will be applied and the RIS for the site will be updated.

1. Criteria for representative or unique wetlands

A wetland should be considered internationally important if:

(a) it is a particularly good representative example of a natural or near-natural wetland, characteristic of the appropriate biogeographical region; or

(b) it is a particularly good representative example of a natural or near-natural wetland, common to more than one biogeographical region; or

(c) it is a particularly good representative example of a wetland which plays a substantial hydrological, biological or ecological role in the natural functioning of a major river basin or coastal system, especially where it is located in a trans-border position; or

(d) it is an example of a specific type of wetland, rare or unusual in the appropriate biogeographical region.

2. General criteria based on plants or animals

A wetland should be considered internationally important if:

(a) it supports an appreciable assemblage of rare, vulnerable or endangered species or subspecies of plant or animal, or an appreciable number of individuals of any one or more of these species; or

(b) it is of special value for maintaining the genetic and ecological diversity of a region because of the quality and peculiarities of its flora and fauna; or

(c) it is of special value as the habitat of plants or animals at a critical stage of their biological cycle; or

(d) it is of special value for one or more endemic plant or animal species or communities.

3. Specific criteria based on waterfowl

A wetland should be considered internationally important if:

(a) it regularly supports 20,000 waterfowl; or

(b) it regularly supports substantial numbers of individuals from particular groups of waterfowl, indicative of wetland values, productivity or diversity; or

(c) where data on populations are available, it regularly supports 1% of the individuals in a population of one species or subspecies of waterfowl.

4. Specific criteria based on fish

A wetland should be considered internationally important if:

(a) it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity; or

(b) it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

Management of Listed Ramsar Sites

Once a site is designated to the List of Wetlands of International Importance under the Convention, the relevant Contracting Party must ensure that the site is managed such that its ecological character is maintained. The ecological character of a site is *'...the sum of the biological, physical, and chemical components of the wetland ecosystem, and their interactions, which maintain the wetland and its products, functions, and attributes'* (Ramsar Convention Bureau 2000b).

Management planning provides an appropriate framework for ensuring that the ecological character of a Ramsar site is maintained. The Ramsar Convention has developed management planning guidelines to assist Contracting Parties to develop management plans for each Ramsar site. Australia currently has management plans in place or in preparation for 44 (79%) of its 56 Ramsar sites.

Australia's obligations to protect and maintain the ecological character of its Ramsar sites have recently been recognised in national legislation through the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*. The Act introduces an environmental assessment and approval regime for actions that have, may have or are likely to have a significant impact on Ramsar Wetlands and most importantly, establishes new standards for managing Ramsar wetlands through the Australian Ramsar Management Principles which have been established as regulations under the Act.

Further information on the EPBC Act can be obtained from Environment Australia's EPBC website at http://www.environment.gov.au/epbc

Ramsar in Australia

Australia has designated 56 wetlands to the Ramsar List of Wetlands of International Importance (Figure 2). Table 4.1 indicates the number of Ramsar sites in each management jurisdiction and the total area coverage. A summary of the area, wetland types and Ramsar criteria for each site is listed at Table 4.2 (The Ramsar Classification System for Wetland Type is at Appendix 4). A Ramsar Information Sheet describing each Ramsar site and a map showing the site's boundary can be obtained through the Wetlands Section—Environment Australia website: http://www.environment.gov.au/water/wetlands

Table 4.1 Number and area of Ramsar sites in each Australian jurisdiction

Management authority		No. of sites	Area (ha)
Australian Capital Territory	ACT	1	343
Commonwealth	COMM	4	1,376,062.33
New South Wales	NSW	9	74,382.50
Northern Territory	NT	1	220,700
Queensland	QLD	5*	632,374
South Australia	SA	4	2,154,300
Tasmania	TAS	10	26,207
Victoria	VIC	10	306,844
Western Australia	WA	12	517,970
Total		**56**	**5,309,182.83**

** includes Shoalwater Bay which is jointly managed with the Commonwealth*

Table 4.2 Summary List of Australia's Ramsar sites

Site no.	Site name	Management authority	Area (ha)	Wetland type	Ramsar Criteria
1	Cobourg Peninsula	NT	220,700	C, D, E, F, G, I, N, Sp	1a, 2a, 3a, 3b
2	Kakadu National Park (Stage 1) (Including the extension of boundaries of Stage I to incorporate wetland components of Kakadu National Park Stage III)	COMM	683,000	A, B, E, F, G, H, I, K, L, M, N, R, Sp, Tp, Ts, Xp, 6	1a, 1b, 1c, 2a 2b, 3a, 3b, 3c
3	Moulting Lagoon Game Reserve	TAS	4,496	F, G, H, M, R	1a, 2a, 3b, 3c
4	Logan Lagoon Conservation Area	TAS	2,172	E, J, N	1a, 2c, 3b
5	Lavinia Nature Reserve	TAS	6,904	F, G, H, K, M, O, Sp, Ts, W, Xf	2a, 2c, 2d
6	Pitt Water–Orielton Lagoon	TAS	3,289	F, G, H, M, Q, R	2a, 2b, 2d, 3b
7	Apsley Marshes	TAS	865	F, R, Tp	2a, 2b
8	East Coast Cape Barren Island Lagoons	TAS	4,480	J	2b, 2d
9	Flood Plain Lower Ringarooma River including 'The Chimneys'	TAS	3,407	M, Tp, Ts	2a, 2b
10	Jocks Lagoon	TAS	19	E, K	2b
11	Interlaken Lakeside Reserve (Lake Crescent)	TAS	519	O, R	2a, 2b
12	Little Waterhouse Lake	TAS	56	K	1b, 2b
13	Corner Inlet	VIC	67,186	A, G, H, I	1a, 1b, 1c, 2b, 3a, 3b, 3c
14	Barmah Forest	VIC	28,515	N, O, Ts, Xf	1a, 2b, 3a, 3b, 3c
15	Gunbower Forest	VIC	19,931	N, Ts, Xf	2b, 3a, 3b, 3c
16	Hattah–Kulkyne Lakes	VIC	955	O, P	2b, 3a, 3b, 3c
17	Kerang Wetlands	VIC	9,419	O, Q, Tp, Ts	1a, 1b, 2b, 3a, 3b, 3c
18	Port Phillip Bay (Western Shoreline) and Bellarine Peninsula	VIC	22,897	A, D, E, F, G, H, M, Tp, 3, 8	1a, 1b, 2b, 3a, 3b, 3c
19	Western Port	VIC	59,297	B, G, H, I	1a, 1b, 3a, 3b, 3c
20	Western District Lakes	VIC	32,898	O, Q	1a, 3a, 3b, 3c
21	Gippsland Lakes	VIC	60,015	J, Sp, Tp	1a, 3a, 3b, 3c
22	Lake Albacutya	VIC	5,731	P	1a, 1b, 3a, 3b, 3c
23	Towra Point Nature Reserve	NSW	386,50	E, F, G, H	1a, 2a, 2b, 3b, 3c
24	Kooragang Nature Reserve	NSW	2,926	D, E, F, G, H, I, J, K	1a, 2a, 2b, 3b, 3c
25	The Coorong, and Lakes Alexandrina and Albert Wetland	SA	140,500	F, J, M, O, Q, 6	1, 2, 3, 4, 5, 6
26	Bool and Hacks Lagoons	SA	3,200	N, O, P, Tp	1a, 1b, 1c, 2a, 2b, 2c, 3a, 3c
27	Coongie Lakes	SA	1,980,000	M, N, P, Sp, Tp, Ts	1b, 1c, 2a, 2b, 2c, 2d, 3a, 3c
28	The Macquarie Marshes	NSW	18,726	N,P,Tp,Ts,W, Xf	1, 2, 3, 4, 5

Site no.	Site name	Management authority	Area (ha)	Wetland type	Ramsar Criteria
29	"Riverland"	SA	30,600	M, O, P, R, Tp	1a, 1b, 1c, 3b
30	Kakadu National Park (Stage 2)	COMM	692,940	A, B, E, F, G, H, I, M, N, R, Sp, Tp, Xp	1a, 1c, 2b, 2c, 3a, 3b, 3c
31	Ord River Floodplain	WA	141,453	F, G, H, I, J, K, N, Tp, Ts, W, Xf, Y	1, 2, 3
32	Lakes Argyle and Kununurra	WA	150,000	M, O, 6	2a, 3a
33	Roebuck Bay	WA	55,000	G	1a, 3a, 3c
34	Eighty-mile Beach	WA	125,000	G, R, Sp	1a, 2c, 3a, 3c
35	Forrestdale and Thomsons Lakes	WA	754	P	1a, 2b, 3c
36	Peel—Yalgorup System	WA	26,530	F, G, H, Q, Tp, Ts, W, Xf	1a, 2c, 3a, 3c
37	Lake Toolibin	WA	493	Xf	1, 2, 3, 4
38	Vasse—Wonnerup System	WA	1,115	J, N, Ss, Xf	5, 6
39	Lake Warden System	WA	2,300	J, Q, R	1a, 3a, 3c
40	Hosnie's Spring, Christmas Island	COMM	0.33	M, Xf, Y	1a, 2a, 2d
41	Moreton Bay	QLD	113,314	A, B, C, D, E, F, G, H, I, J, L, M, O, Q, Tp, Ts, W, Xf, Xp, 9	1b, 1c, 2a, 2b, 2c, 3a, 3b, 3c
42	Bowling Green Bay	QLD	35,500	A, D, E, F, G, H, I, J, N, R, Ss, Ts, Xf, 2	1a, 1b, 1c, 2a, 2b, 2c, 3a, 3b, 3c
43	Currawinya Lakes (Currawinya National Park)	QLD	151,300	N, O, P, Q, Ts	1a, 1b, 2a, 2b, 2c, 3a, 3b, 3c
44	Shoalwater and Corio Bays Area (Shoalwater Bay Training Area, in part—Corio Bay)	QLD & COMM	239,100	A, B, D, E, F, G, H, I, J	1a, 1c, 2a, 2b, 2c, 2d, 3a, 3b, 3c
45	Ginini Flats Wetland Complex	ACT	343	U	1a, 2a, 2b, 2c
46	Pulu Keeling National Park (North Keeling Island)	COMM	122	B, C, D, E	1a, 1d, 2a, 2b, 2c
47	Little Llangothlin Nature Reserve	NSW	258	P, Q	1a, 2a, 2c
48	Blue Lake	NSW	320	Vt	1a, 1d, 2b, 2d
49	Lake Pinaroo (Fort Grey Basin)	NSW	800	R	1a, 2a, 2c, 2d, 3b
50	Gwydir Wetlands: Gingham and Lower Gwydir (Big Leather) Watercourses	NSW	823	L, N, P, Tp, Ts, W, Xf	1a, 1b, 1c, 1d, 2a, 2b, 2c, 3a, 3b
51	Great Sandy Strait (including Great Sandy Strait, Tin Can Bay and Tin Can Inlet)	QLD	93,160	A, B, C, E, F, G, H, I, J, K, U, Xf	1a, 1b, 1d, 2a, 2b, 3a, 3b, 3c, 4b
52	Myall Lakes	NSW	44,612	D, E, F, H, I, J, K	1a, 1c, 2a, 3b
53	Narran Lake Nature Reserve	NSW	5,531	N, P, Ts, W, Xf	1a, 2c, 3c
54	Becher Point Wetlands	WA	677	Ts, W	1, 2
55	Lake Gore	WA	4,017	R, Ss	4, 5, 6
56	Muir—Byenup System	WA	10,631	O, R, Tp, Ts, U, W, Xf	2, 4, 5, 6

Looking to the Future

Contracting Parties to the Convention on Wetlands adopted the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* (Ramsar Convention Bureau 2000a) at the seventh Conference of Parties in May 1999. Its purpose is to provide a clearer vision of the long-term targets which the Convention is seeking to achieve through the Ramsar List, and to assist Contracting Parties to take a systematic approach to identifying priorities for future designations. Contracting Parties also agreed to a short-term target of 2,000 sites for the Ramsar List by the year 2005, recognising that the Strategic Framework and Guidelines should be taken into consideration.

A *Global Review of Wetland Resources and Priorities for Wetland Inventory*, undertaken by Wetlands International (Finlayson and Spiers 1999), highlighted wetland types for which inventory data was lacking and which are poorly represented in the Ramsar List of Wetlands of International Importance. Resolution VII.20 calls upon Contracting Parties to give attention to these priority wetland habitats which include: seagrasses, coral reefs, salt marshes and coastal flats, mangroves, arid zone wetlands, peatlands, rivers and streams, and artificial wetlands.

An analysis of Australian Ramsar sites indicates that a number of wetland types are not represented or are under-represented on the List of Wetlands of International Importance (Table 4.3). These include karst and cave systems; peatlands; coral reefs; and arid zone wetlands (which may include permanent and seasonal/intermittent saline/brackish/alkaline water bodies, and freshwater springs).

The Commonwealth Government will be undertaking a systematic review of its wetland holdings to determine which sites satisfy the Ramsar criteria, with a view to listing new sites. Priority will be placed on these wetland types when considering new sites for listing under the Convention on Wetlands. The States and Territories will also be encouraged to undertake a similar analysis for wetlands within their jurisdiction.

Several State and Territory governments are currently undertaking wetland inventory projects with funding provided by the National Wetlands Program of the Natural Heritage Trust. Particular focus is being placed on wetland types and bioregions that are either under-represented or not represented in the Directory (refer to Appendices 1 and 2). In particular, the Parks and Wildlife Commission of the Northern Territory is undertaking an inventory of wetlands in the arid zone of the Northern Territory. The project covers 10 bioregions, including the MacDonnell Ranges and Burt Plain. The Queensland Environmental Protection Agency is surveying the South East Queensland, Einasleigh Uplands, and the Brigalow Belt North and South bioregions. Not only will these projects deliver new listings for the Directory, it is also likely that potential Ramsar wetlands will be identified.

Table 4.3 Number of Ramsar sites in each wetland type by jurisdiction

(The Ramsar Classification System for Wetland Type is at Appendix 4).

Marine /coastal wetlands

Wetland type:	A	B	C	D	E	F	G	H	I	J	K	Zk(a)
ACT	0	0	0	0	0	0	0	0	0	0	0	0
COMM	2	3	1	1	3	2	2	2	2	0	1	0
NSW	0	0	0	2	3	3	2	3	2	2	2	0
NT	0	0	1	1	1	1	1	0	1	0	0	0
QLD	4	3	2	3	4	4	4	4	4	4	1	0
SA	0	0	0	0	0	1	0	0	0	1	0	0
TAS	0	0	0	0	2	4	3	3	0	2	3	0
VIC	2	1	0	1	1	1	3	3	2	1	0	0
WA	0	0	0	0	0	2	4	2	1	3	1	0
Total*	**8**	**7**	**4**	**8**	**14**	**18**	**19**	**17**	**12**	**13**	**8**	**0**

Inland wetlands

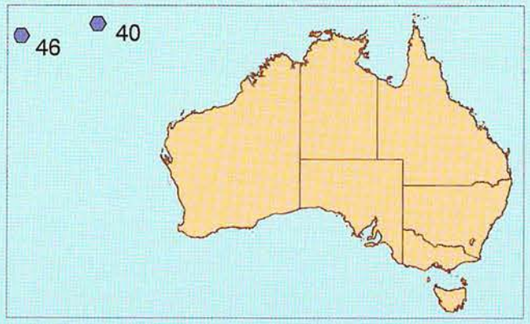
Wetland type:	L	M	N	O	P	Q	R	Sp	Ss	Tp	Ts	U	Va	Vt	W	Xf	Xp	Y	Zg	Zk(b)
ACT	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
COMM	1	3	2	0	0	0	2	2	0	2	1	0	0	0	0	1	2	1	0	0
NSW	1	0	3	0	4	1	1	0	0	2	3	0	0	1	3	3	0	0	0	0
NT	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
QLD	1	1	2	2	1	2	1	0	1	1	3	1	0	0	1	0	1	0	0	0
SA	0	3	2	3	3	1	1	1	0	3	1	0	0	0	0	0	0	0	0	0
TAS	0	4	1	2	0	1	4	1	0	2	2	0	0	0	1	1	0	0	0	0
VIC	0	1	2	4	2	2	0	1	0	3	3	0	0	0	0	2	0	0	0	0
WA	0	1	2	2	1	2	4	1	2	3	4	1	0	0	4	5	0	1	0	0
Total*	**3**	**13**	**15**	**13**	**11**	**9**	**13**	**7**	**3**	**16**	**17**	**3**	**0**	**1**	**9**	**12**	**3**	**2**	**0**	**0**

Human-made wetlands

Wetland type:	1	2	3	4	5	6	7	8	9
ACT	0	0	0	0	0	0	0	0	0
COMM	0	0	0	0	0	1	0	0	0
NSW	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0
QLD	0	1	0	0	0	0	0	0	1
SA	0	0	0	0	0	1	0	0	0
TAS	0	0	0	0	0	0	0	0	0
VIC	0	0	1	0	0	0	0	1	0
WA	0	0	0	0	0	1	0	0	0
Total*	**0**	**1**	**1**	**0**	**0**	**3**	**0**	**1**	**1**

** A wetland listing/site may be counted against more than one wetland type*

1. Cobourg Peninsula
2. Kakadu National Park, Stage I & part Stage 3
3. Moulting Lagoon Game Reserve
4. Logan Lagoon Wildlife Sanctuary
5. Lavinia Nature Reserve
6. Pittwater - Orielton Lagoon
7. Apsley Marshes
8. East Coast Cape Barren Island Lagoons
9. Flood Plain Lower Ringarooma River
10. Jocks Lagoon
11. Interlaken Lakeside Reserve
12. Little Waterhouse Lake
13. Corner Inlet
14. Barmah Forest
15. Gunbower Forest
16. Hattah-Kulkyne Lakes
17. Kerang Wetlands
18. Port Phillip Bay and Bellarine Peninsula
19. Western Port
20. Western District Lakes
21. Gippsland Lakes
22. Lake Albacutya
23. Towra Point Nature Reserve
24. Kooragang Nature Reserve
25. Coorong and Lakes Alexandrina and Albert
26. Bool and Hacks Lagoons
27. Coongie Lakes
28. Macquarie Marshes
29. "Riverland"
30. Kakadu National Park, Stage 2
31. Ord River Floodplain
32. Lakes Argyle and Kununurra
33. Roebuck Bay
34. Eighty-mile Beach
35. Forrestdale & Thomsons Lakes
36. Peel-Yalgorup System
37. Lake Toolibin
38. Vasse-Wonnerup System
39. Lake Warden System
40. Hosnie's Spring
41. Moreton Bay
42. Bowling Green Bay
43. Currawinya Lakes
44. Shoalwater and Corio Bays Area
45. Ginini Flats Subalpine Bog Complex
46. Pulu Keeling National Park
47. Little Llangothlin Nature Reserve
48. Blue Lake
49. Lake Pinaroo
50. Gwydir Wetlands
51. Great Sandy Strait
52. Myall Lakes
53. Narran Lake Nature Reserve
54. Becher Point Wetlands
55. Lake Gore
56. Muir-Byenup System



DARWIN
PERTH
ADELAIDE
BRISBANE
SYDNEY
MELBOURNE
HOBART
Southern Ocean

Australia's Ramsar Sites

Australia currently has 56 wetlands of International Importance listed under the Convention on Wetlands (Ramsar, Iran, 1971). These sites cover a total area of approximately 5.3 million hectares.

Ramsar wetland

Australian State/Territory boundary

N

0 300 600 900 1200 Km

Ramsar

National Wetlands Program

Environment Australia
Department of the Environment and Heritage

Wetlands data used in this publication are provided by State/Territory land management agencies. Australian boundary data courtesy of AUSLIG.
Caveat: The data used are assumed to be correct as received by the custodian. The data displayed are in geographic projection and are indicative only.

5. Australian Capital Territory

Introduction

Mark Lintermans, Environment ACT

The Australian Capital Territory (ACT) is the smallest of Australia's States and Territories (235,600 ha) but has a diverse range of aquatic habitats ranging from small subalpine bogs to the larger riverine systems such as the Murrumbidgee River. However the geographic location and altitude of the ACT preclude some wetland types which are common in other States and the Northern Territory.

For example the inland location of the ACT means that there are no marine, estuarine or brackish wetlands. Similarly, with the location of the ACT in the south-eastern highlands, large lowland floodplain systems are also absent.

The first substantial review of aquatic ecosystems in the ACT was conducted by Hogg and Wicks (1989). This review dealt mainly with lotic systems and did not attempt to cover the high altitude wetlands such as fens and bogs. Subsequently Evans and Keenan (1993) reviewed the published and unpublished literature on high altitude wetlands in the ACT.

The ACT is located within two biogeographic regions defined by Thackway and Cresswell (1995) as the Australian Alps, and the South Eastern Highlands, with the majority of its important wetlands being found in the Australian Alps bioregion.

Most of the significant high altitude wetlands of the ACT are located in the Cotter and Gudgenby River catchments. The Cotter River catchment lies between the Brindabella Range in the west, the Bimberi and Scabby Ranges in the south and the Cotter/Gudgenby divide in the east. The tops of these ranges form the western and southern borders of the ACT. The Naas and Gudgenby rivers lie further to the east and have a catchment boundary with the Cotter River catchment. Locations of each of the wetland sites are shown in Figure 3. Most of the wetlands described here are above 1,000 metres altitude with the highest being Cotter Source Bog at 1,718 metres.

In the subalpine and montane zones of the ACT, vegetation communities in wet areas often constitute *Sphagnum* bog or *Carex* fen (or swamp) interspersed with patches of wet heath and wet herbfield. The bogs are generally acidic and have a low nutrient content (Hope and Southern 1983). Bog and fen are distinguished in this region as indicated by Costin (1954) who stated that bogs are dominated by hummock-forming mosses whereas fens lack hummock-forming mosses (Beadle 1981) and contain mainly grass-like plants, such as sedges or rushes (Hope and Southern 1983).

As a representative example of subalpine ecosystems, the wetland sites included here are of 'National Significance' (National Capital Planning Authority 1990) as well as regional or local significance.

The ACT is fortunate in that the vast majority of its remaining wetlands are protected in nature reserves or national parks. Approximately 52% of the ACT is managed for nature conservation purposes with the largest reserved area being Namadgi National Park, covering 105,900 ha. This park contains all the wetlands within the Australian Alps bioregion listed in this chapter.

The majority of the larger lowland aquatic habitats in the ACT are also protected in nature reserves such as the Jerrabomberra Wetlands Nature Reserve and the four nature reserves which make up the Murrumbidgee River Corridor. Since the publication of the second edition of *A Directory of Important Wetlands in Australia* in 1996, a preliminary survey of lowland wetlands in the ACT has been completed. This survey was based on aerial photo interpretation and did not locate any additional wetlands of national or regional importance.

The Cotter Source Bog has been added to the list of nationally important wetlands in the ACT since the second edition. Big Creamy Flats has been removed from the list because it is no longer considered to exhibit the characteristics of the wetland types it was nominated for, and is no longer considered to be of regional or national significance.

The ACT does not have a formal wetlands policy but wetlands issues are addressed in the management plans for the respective nature reserves (ACT Parks and Conservation Service 1986, 1994; ACT Government 1998a, 1997b), or in action plans for threatened aquatic species (ACT Government 1997a, 1999a,b,c,d). The *ACT Nature Conservation Strategy* (ACT Government 1998b) also recognises the importance of aquatic communities and wetlands and provides a framework for guiding the development of nature conservation priorities and directions, and their integration into the overall planning and management process.

This chapter updates the work of Evans and Keenan (1993) and Lintermans and Ingwersen (1996).

Summary analysis

The Directory describes 13 nationally important wetlands in the Australian Capital Territory. The distribution of nationally important wetlands in the ACT (including Ramsar wetlands) is shown in Figure 3. A list compiling data on bioregion, site area, wetland type and criteria for inclusion for each wetland is provided at the end of this chapter.

Only two bioregions occur in the ACT, both of which are shared with Victoria and New South Wales (refer to Table 5.1). The total of nine wetlands listed in the Australian Alps bioregion in the ACT is more than the combined number of sites listed in this bioregion for the other two States, although the ACT contains only 3.4% of the 11,718 km^2 total area of the bioregion. An overview of the IBRA regionalisation and a map of IBRA regions is included in Appendix 2.

Table 5.1 Number and area of nationally important wetlands in the ACT by IBRA region

IBRA Region	IBRA code	No. of Sites	Area (ha)
Australian Alps	AA	9	909
South Eastern Highlands	SEH	4	348
Total	2	13	1257

The geographic location of the ACT in the elevated south-east of the continent, and its small area, significantly limit the range of wetland types present (refer to Table 5.2). Only eight of the 40 types are represented, with the most common being B10—Seasonal/intermittent freshwater ponds and marshes (n=6). The Wetland classification system and Criteria for inclusion in the Directory are explained in Chapter 2.

Table 5.2 Number of ACT sites in each Wetland type

A—Marine and Coastal Zone wetlands

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
Total	0	0	0	0	0	0	0	0	0	0	0	0

B—Inland wetlands

	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19
Total	3	1	0	1	0	0	0	0	3	6	0	0	0	0	3	0	0	0	0

C—Human-made wetlands

	C1	C2	C3	C4	C5	C6	C7	C8	C9
Total	1	0	0	0	0	1	0	0	0

Most ACT wetlands are included in the Directory as good examples of their types within their bioregion (Criterion 1, n=9), but a high number are also included for their outstanding historical or cultural significance (Criterion 6, n=7) (refer to Table 5.3).

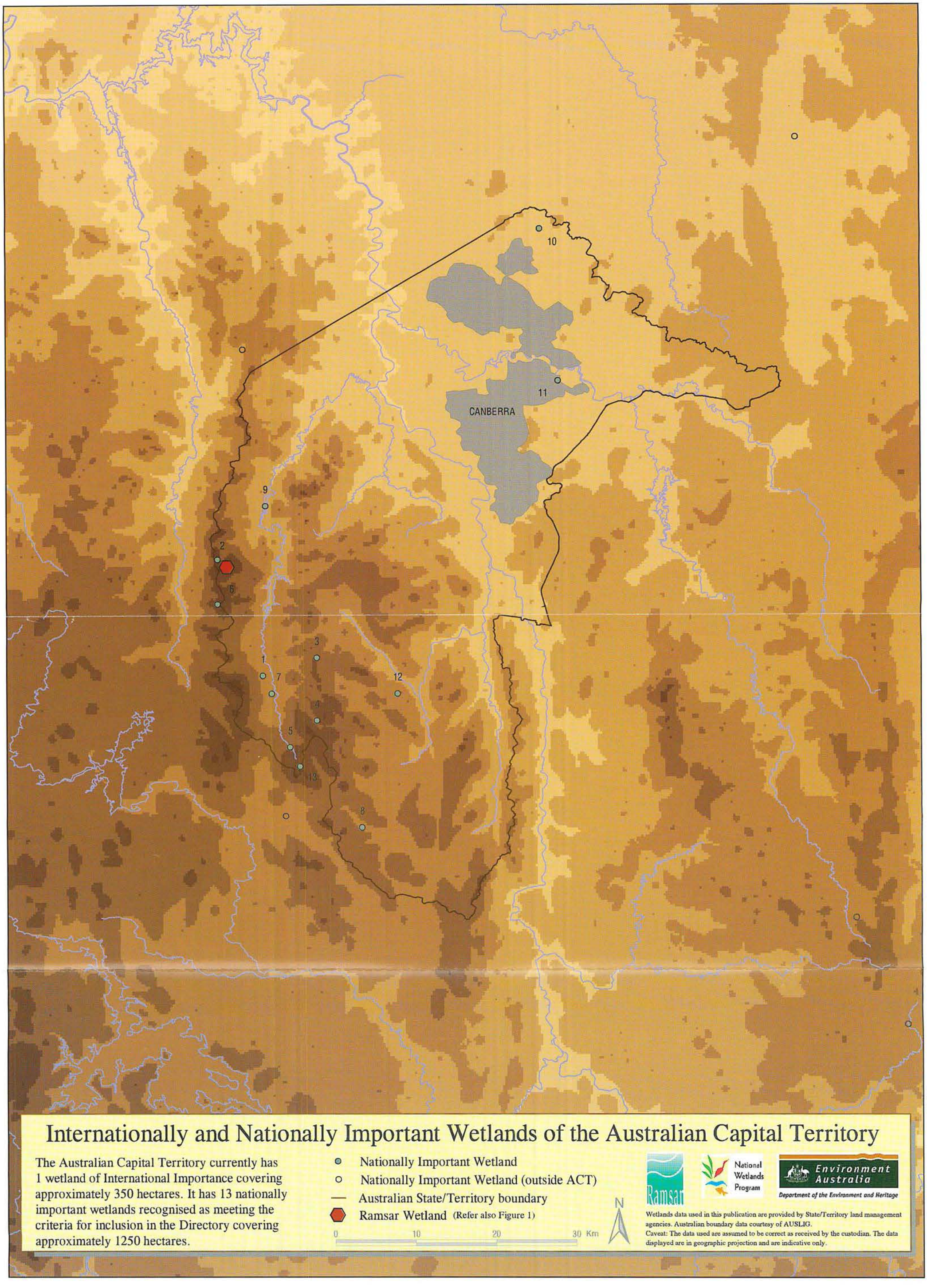
Table 5.3 Number of ACT sites included under each Criterion

	1	2	3	4	5	6
Total	9	3	2	1	3	7

List of nationally important wetlands in the Australian Capital Territory

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Big Creamy Flats	AA001AC	Deleted				
Cotter Flats	AA004AC	ACT001	AA	41	B1, B10	1
Ginini and Cheyenne Flats	AA006AC	ACT002	AA	125	B15	1, 2, 4, 5, 6
Rock Flats	AA010AC	ACT003	AA	12	B10	1
Rotten Swamp	AA011AC	ACT004	AA	30	B10	1, 6
Scabby Range Lake	AA012AC	ACT005	AA	5	B10	2
Snowy Flats	AA014AC	ACT006	AA	35	B10, B15	5
Upper Cotter River	AA015AC	ACT007	AA	600	B1	1, 6
Upper Naas Creek	AA016AC	ACT008	AA	56	B9	1
Bendora Reservoir	SEH002AC	ACT009	SEH	81	B1, C1	5
Horse Park Wetland	SEH007AC	ACT010	SEH	40	B2, B9	1, 3, 6
Jerrabomberra Wetlands	SEH009AC	ACT011	SEH	174	B4, B10, C6	3, 6
Nursery Swamp	SEH018AC	ACT012	SEH	53	B9	1, 6
Cotter Source Bog		ACT013	AA	5	B15	1, 2, 6

Note: area figures for the above tables are approximate only.



Internationally and Nationally Important Wetlands of the Australian Capital Territory

The Australian Capital Territory currently has 1 wetland of International Importance covering approximately 350 hectares. It has 13 nationally important wetlands recognised as meeting the criteria for inclusion in the Directory covering approximately 1250 hectares.

- Nationally Important Wetland
- Nationally Important Wetland (outside ACT)
- Australian State/Territory boundary
- Ramsar Wetland (Refer also Figure 1)

0 10 20 30 Km

N

Ramsar

National Wetlands Program

Environment Australia

Department of the Environment and Heritage

Wetlands data used in this publication are provided by State/Territory land management agencies. Australian boundary data courtesy of AUSLIG.
Caveat: The data used are assumed to be correct as received by the custodian. The data displayed are in geographic projection and are indicative only.

6. New South Wales

Introduction

Associate Professor Paul Adam, School of Biological Sciences, University of New South Wales

NEW SOUTH WALES (NSW) HAS A GREAT DIVERSITY OF WETLANDS, FROM ALPINE TO SUBTROPICAL AND FROM THE COASTAL TO THE ARID ZONE.

There has been increasing recognition of the value of these wetlands, not only as individual entities in their own right, but as essential components of the broader landscape. Since publication of the second edition of *A Directory of Important Wetlands in Australia*, the value of the State's wetlands has been acknowledged through the adoption of the whole-of-Government *NSW Wetlands Management Policy* and numerous on-ground management initiatives developed through Total Catchment Management, and other, community-based programs.

Conservation of the wetland resource will require continuing management, and the involvement of a wide range of agencies, as well as a broad cross section of the community, will be essential. However, whole wetland management should be adaptive, continually building on new knowledge; the starting point being a broad overview of the nature and condition of wetlands across the State. *A Directory of Important Wetlands in Australia* thus provides an important foundation for wetlands management.

As with the earlier editions of the Directory, this third edition is a work in progress. The accounts of previously listed sites in NSW have been updated and new entries have been added.

A further 81 wetlands have been added by NSW National Parks & Wildlife Service. A significant number of these have come from the Mulga Lands bioregion in the west of the State. Five wetlands in the Sydney Basin bioregion have been nominated in conjunction with Shoalhaven City Council.

There is still much to be discovered about wetlands in New South Wales, and the absence of particular sites from the Directory should not be taken as an indication that they are not important.

Information about some of the wetland types (defined in Chapter 2) in NSW is inadequate at present to determine whether particular sites meet the criteria for inclusion in the Directory. However, as these information gaps are addressed, a broader selection of wetland types will inevitably be nominated to the Directory.

Further information about sites included in NSW, and suggestions for additional sites to be included in the Directory, should be provided to:

Deb Stevenson
NSW National Parks & Wildlife Service
GPO Box 1967
Hurstville NSW 2220
Ph: (02) 9585 6692
Fax: (02) 9585 6495

The information for the third edition of *A Directory of Important Wetlands in Australia* was compiled by Tania Laity, NSW National Parks and Wildlife Service. Much assistance was provided by officers in the Regional offices of National Parks & Wildlife Service with information about specific sites being provided by relevant local experts, and members of the Editorial Committee. Members of the Editorial Committee included Cath Webb (World Wide Fund for Nature), Phil Straw (Birds Australia), Dayle Green (Department of Land & Water Conservation), Paul Adam (University of NSW), Jim Noble (CSIRO), Duncan Leadbitter (Ocean Watch), and John Porter (National Parks & Wildlife Service).

Other sources of information for the Directory included many individuals and organisations. These contributors are acknowledged throughout the text under the individual site entries to which they provided input.

Summary analysis

The Directory describes 178 nationally important wetlands in New South Wales. The distribution of nationally important wetlands in NSW (including Ramsar wetlands) is shown in Figure 4. A list compiling data on bioregion, site area, wetland type and criteria for inclusion for each wetland is provided at the end of this chapter.

Seventeen bioregions occur in NSW (refer to Table 6.1); 15 of these are shared with adjacent States and Territories and the Northern Territory. Most of the nationally important wetlands listed in this edition of the Directory occur in the Sydney Basin (n=43) and Mulga Lands (n=42) bioregions, reflecting to a large degree survey effort and information availability and to a certain extent tenure, as there is more known about wetlands on public lands. Only one or two nationally important wetlands have been listed in four other bioregions: Brigalow Belt South, Channel Country, Murray-Darling Depression and Simpson-Strzelecki Dunefields. Of the three bioregions where no wetlands are listed, Cobar Peneplain is wholly contained in NSW and the majority of Nandewar and Broken Hill Complex occur in the State. An overview of the IBRA regionalisation and a map of IBRA regions is included in Appendix 2.

Table 6.1 Number and area of nationally important wetlands in NSW by IBRA region

IBRA Region	IBRA code	No. of Sites	Area (ha)
Australian Alps	AA	4	90
Brigalow Belt South	BBS	1	6,385
Broken Hill Complex	BHC	0	0
Channel Country	CHC	2	179,125
Cobar Peneplain	CP	0	0
Darling Riverine Plains	DRP	7	400,566
Mulga Lands	ML	42	780,929
Murray-Darling Depression	MDD	2	469,000
Nandewar	NAN	0	0
NSW North Coast	NNC	23	232,209
NSW South Western Slopes	NSS	5	22,875
New England Tableland	NET	3	588
Riverina	RIV	16	117,370
Simpson-Strzelecki Dunefields	SSD	2	5,816
South East Corner	SEC	15	8,120
South Eastern Highlands	SHE	13	17,916
Sydney Basin	SB	43	93,745
Total	17	178	2,334,734

There is a wide representation of wetland types listed in NSW, with 36 of the 40 types included (refer to Table 6.2). Most numerous is type B6—Seasonal/intermittent freshwater lakes (n=44), followed by B10—Seasonal/intermittent freshwater ponds and marshes (n=34) and A8—Intertidal marshes (n=33) (refer to Table 6.2).

Table 6.2 Number of NSW sites in each Wetland type

A—Marine and Coastal Zone wetlands

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
Total	2	20	1	9	13	31	24	33	31	16	23	15

B—Inland wetlands

	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19
Total	10	25	2	23	16	44	7	8	18	34	1	2	31	26	26	2	2	0	0

C—Human-made wetlands

	C1	C2	C3	C4	C5	C6	C7	C8	C9
Total	7	1	0	1	1	1	1	1	0

NSW wetlands are most often included in the Directory because they represent good examples of a particular wetland type characteristic of a certain bioregion (Criterion 1, n=159) (refer to Table 6.3). The next most common reason for inclusion is because sites provide a refuge or habitat for animal taxa at a vulnerable stage in their life cycles (Criterion 3, n=106). The Wetland classification system and Criteria for inclusion in the Directory are explained in Chapter 2.

Table 6.3 Number of NSW sites included under each Criterion

	1	2	3	4	5	6
Total	159	76	106	34	82	42

List of nationally important wetlands in New South Wales

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Blue Lake (Kosciuszko)	AA002NS	NSW001	AA	14	B5, B16	1, 4, 5
Kosciuszko Alpine Fens, Bogs and Lakes	AA007NS	NSW002	AA	30	B2, B5, B9, B10, B15, B16	1, 4, 5
Rennex Gap	AA009NS	NSW003	AA	45	B15	1, 3
Snowgum Flat	AA013NS	NSW004	AA	1	B15	1
Goran Lake	BBS007NS	NSW005	BBS	6385	B6	1, 3, 4
Bulloo Overflow/Carypundy Swamp	CHC003NS	NSW006	CHC	178560	B2, B4, B6, B10, B13, B14	1, 3, 4
Salisbury Lake (Lake Altibouka)	CHC023NS	NSW007	CHC	565	B8	1, 5
Gwydir Wetlands	DRP002NS	NSW008	DRP	102120	B2, B4, B5, B6, B10, B14	1, 3, 5
Macquarie Marshes	DRP003NS	NSW009	DRP	200000	B1, B2, B4, B9, B10, B13, B14	1, 3
Menindee Lakes	DRP004NS	NSW010	DRP	45000	B2, B4, B5, B6, B13, B14, C1	1 3, 4, 5
Narran Lakes	DRP005NS	NSW011	DRP	30000	B2, B4, B6, B10, B13, B14	1, 2, 3, 4, 6
Talyawalka Anabranch and Teryawynia Creek	DRP006NS	NSW012	DRP	–	B2, B4, B6, B10, B12, B13, B14	1, 4
Green Creek Swamp	ML001NS	NSW013	ML	–	B10, B13, B14	1, 3, 4
Lake Burkanoko	ML002NS	NSW014	ML	271	B8	1
Lake Nichebulka	ML003NS	NSW015	ML	348	B8	1
Murphys Lake	ML007NS	NSW016	ML	1000	B8	1, 3
Paroo River Distributary Channels	ML008NS	NSW017	ML	720000	B2, B4, B6, B8, B10, B12, B13, B14	1, 3, 5
Willeroo Lake	ML009NS	NSW018	ML	113	B10, B14	1, 3
Yantabulla Swamp (Cuttaburra Basin)	ML010NS	NSW019	ML	37200	B2, B10, B13, B14	1, 3, 4, 5
Darling Anabranch Lakes	MDD005NS	NSW020	MDD	269000	B2, B4, B6, B10, B13, B14	1, 2, 5
Lowbidgee Floodplain	MDD021NS	NSW021	MDD	200000	B1, B2, B4, B6, B9, B10, B13, B14, C1, C7	1, 2, 3, 4, 5
Little Llangothlin Lagoon	NET001NS	NSW022	NET	258	B5, B6, B15	1, 3, 4, 5
New England Wetlands	NET002NS	NSW023	NET	30	B5, B6, B9, B10, B15	1, 2, 3, 4, 6
Round Mountain Swamps	NET003NS	NSW024	NET	300	B9, B15	1
Barrington Tops Swamps	NNC001NS	NSW025	NNC	1500	B15	1, 2, 5

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Bundjalung National Park	NNC002NS	NSW026	NNC	17738	A4, A5, A6, A8, A9, A10, A11	1, 3, 5, 6
Clarence River Estuary	NNC003NS	NSW027	NNC	1700	A2, A6, A7, A8, A9, A10	1, 2, 3, 4, 5
Clybucca Creek Estuary	NNC004NS	NSW028	NNC	1817	A2, A6, A7, A8, A9	1, 3, 6
Crowdy Bay National Park	NNC005NS	NSW029	NNC	9519	A4, A5, A9, A11, A12,	1, 3, 5, 6
Everlasting Swamp	NNC006NS	NSW030	NNC	1930	A11, A12	1, 3
Lake Hiawatha and Minnie Water	NNC007NS	NSW031	NNC	367	A11	1, 3, 5
Limeburners Creek Nature Reserve	NNC008NS	NSW032	NNC	9123	A4, A5, A6, A8, A9, A10, A11	1, 2, 5, 6
Myall Lakes	NNC009NS	NSW033	NNC	31777	A2, A4, A5, A6, A7, A8, A9, A10, A11, A12	1, 2, 5
Port Stephens Estuary	NNC010NS	NSW034	NNC	30253	A2, A6, A7, A8, A9	1, 3, 5
Swan Pool / Belmore Swamp	NNC011NS	NSW035	NNC	6350	A11, A12	1, 3
The Broadwater	NNC012NS	NSW036	NNC	2800	A2, A6, A7, A9, A11, A12	1, 3, 5
Upper Coldstream	NNC013NS	NSW037	NNC	1995	B4, B5, B9, B10	1, 3
Wallis Lake and adjacent estuarine islands	NNC014NS	NSW038	NNC	8556	A2, A6, A7, A8, A9	1, 3, 5
Wooloweyah Lagoon	NNC015NS	NSW039	NNC	2390	A2, A6, A7, A8, A9	1, 3, 5
Lake Cowal/Wilbertroy Wetlands	NSS002NS	NSW040	NSS	20500	B3, B6, B13, B14	1, 2, 3
Tomneys Plain	NSS004NS	NSW041	NSS	90	B15	1
Black Swamp and Coopers Swamp	RIV002NS	NSW042	RIV	350	B10, B13, B14	1, 3, 5
Booligal Wetlands	RIV004NS	NSW043	RIV	5000	B2, B4, B10, B13, B14	1, 2, 3
Cuba Dam	RIV007NS	NSW044	RIV	1680	B2, B4, B9, B13, C1	1, 3, 4
Great Cumbung Swamp	RIV010NS	NSW045	RIV	16000	B1, B2, B4, B6, B9, B10, B13, B14	1, 2, 3, 4
Koondrook and Perricoota Forests	RIV015NS	NSW046	RIV	31150	B1, B2, B4, B10, B14	1, 2
Lachlan Swamp (Part of mid Lachlan Wetlands)	RIV017NS	NSW047	RIV	6600	B1, B2, B4 B6, B10, B14	1, 2, 3
Lake Brewster	RIV019NS	NSW048	RIV	6140	B6	1, 3, 5
Lake Merrimajeel/ Murrumbidgil Swamp	RIV023NS	NSW049	RIV	300	B2, B4, B6, B13, B14	1, 3, 6
Lower Mirrool Creek Floodplain	RIV028NS	NSW050	RIV	—	B2, B4, B6, B10	1, 2 ,3, 5
Merrowie Creek (Cuba Dam to Chillichil Swamp)	RIV029NS	NSW051	RIV	2500	B6, B13, C2	1, 2, 3
Mid Murrumbidgee Wetlands	RIV030NS	NSW052	RIV	—	B1, B2, B4, B6, B9, B10, B14, C1	1, 2, 3, 5

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Millewa Forest	RIV031NS	NSW053	RIV	33636	B1, B2, B4, B6, B10, B14	1, 2, 3, 4, 5
Tuckerbil Swamp	RIV039NS	NSW054	RIV	280	B8	4, 5, 6
Wakool—Tullakool Evaporation Basins	RIV040NS	NSW055	RIV	2100	C1, C4, C6	1, 3
Werai Forest	RIV042NS	NSW056	RIV	11234	B1, B4, B10, B14	1, 2, 5
Sturt National Park Wetlands	SSD003NS	NSW057	SSD	—	B8, B10, B13, B14	1, 3, 5
The Salt Lake	SSD004NS	NSW058	SSD	5816	B8	1
Clyde River Estuary	SEC001NS	NSW059	SEC	2900	A2, A6, A7, A8, A9	1, 3, 5
Cullendulla Creek and Embayment	SEC002NS	NSW060	SEC	220	A2, A6, A7, A8, A9	1, 6
Merimbula Lake	SEC006NS	NSW061	SEC	450	A2, A6, A7, A8, A9	1
Bega Swamp	SEH001NS	NSW062	SEH	23	B15	1, 6
Big Badja Swamp	SEH003NS	NSW063	SEH	106	B4, B15	1, 5, 6
Coopers Swamp	SEH006NS	NSW064	SEH	18	B15	1, 3
Jacksons Bog	SEH008NS	NSW065	SEH	150	B15	1, 6
Lake Bathurst	SEH010NS	NSW066	SEH	1350	B6	1, 3, 6
Lake George	SEH012NS	NSW067	SEH	15000	B6	1, 3, 5, 6
Micalong Swamp	SEH015NS	NSW068	SEH	526	B15	1, 6
Monaro Lakes	SEH016NS	NSW069	SEH	215	B9, B10, B15	1, 2, 5
Yaouk Swamp	SEH024NS	NSW070	SEH	258	B10, B15	1
Bicentennial Park	SB001NS	NSW071	SB	56	A6, A7, A8	1, 2, 3, 5
Blue Mountains Sedge Swamps	SB002NS	NSW072	SB	35	B15	1, 2, 5
Botany Wetlands[C]	SB003NS	NSW073	SB	64	B5, B13	1, 6
Boyd Plateau Bogs	SB004NS	NSW074	SB	—	B15	1, 2, 5
Budderoo National Park and Barren Grounds Nature Reserve Heath swamps	SB005NS	NSW075	SB	1150	B13, B15	1, 2, 5
Coomonderry Swamp	SB006NS	NSW076	SB	670	A11, A12	1, 3, 4
Eve St. Marsh, Arncliffe	SB007NS	NSW077	SB	2	A7, A8	3, 6
Jervis Bay[C]	SB008NS	NSW078	SB	41044	A2, A6, A7, A8, A9, B2, B7	1, 3, 4, 5 6
Killalea Lagoon	SB009NS	NSW079	SB	20	A11	1, 3
Kooragang Nature Reserve	SB010NS	NSW080	SB	2926	A4, A5, A6, A7, A8, A9, A11	1, 3, 4, 5, 6
Lake Illawarra	SB011NS	NSW081	SB	3227	A10	1, 3, 5
Long, Hanging Rock, Mundego and Stingray Swamps (Paddys River Swamps)	SB012NS	NSW082	SB	88	B15	1, 3, 5

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Longneck Lagoon	SB013NS	NSW083	SB	24	B9, B10	3, 5, 6
Minnamurra River Estuary	SB014NS	NSW084	SB	200	A2, A6, A7, A8, A9, A10, A11	1, 5
Newington Wetlands	SB015NS	NSW085	SB	71	A8, B1, B11	1, 2, 6
O'Hares Creek Catchment	SB016NS	NSW086	SB	9000	B9, B10, B13, B15	1, 3, 5, 6
Pitt Town Lagoon	SB017NS	NSW087	SB	41	B10	1
Shoalhaven / Crookhaven Estuary	SB018NS	NSW088	SB	2500	A2, A5, A6, A7, A8, A9	1, 3, 4, 5
Shortland Wetlands Centre	SB019NS	NSW089	SB	45	A11, A12	3, 6
St. Georges Basin	SB020NS	NSW090	SB	4400	A2, A6, A7, A8, A9	1, 3
Thirlmere Lakes	SB021NS	NSW091	SB	50	B5, B15	1, 2, 3, 4, 6
Towra Point Estuarine Wetlands	SB022NS	NSW092	SB	1161	A2, A5, A6, A7, A8, A9	1, 3, 4, 5, 6
Wingecarribee Swamp	SB023NS	NSW093	SB	691	B15, C1, C5	1, 4, 5, 6
Wollumboola Lake	SB024NS	NSW094	SB	850	A2, A8, A9, A10	1, 2, 3, 5, 6
Morella Watercourse / Boobera Lagoon / Pungbougal Lagoon		NSW095	DRP	460	B5	1, 2, 3, 6
Blue Lake (Paroo)		NSW096	ML	237	B13	2, 3, 5
Gilpoko Lake		NSW097	ML	436	B6	1, 3, 4, 5
Great Artesian Basin Springs		NSW098	ML & DRP	–	B17	1, 2, 3, 4
Green Lake		NSW099	ML	392	B13	2, 3, 5
Mullawoolka Basin		NSW100	ML	2026	B6	1, 2, 3, 5
Peery Lake (Peri Lake)		NSW101	ML	5026	B6, B17	1, 2, 3, 4, 5, 6
Poloko Lake (Olepoloko Lake)		NSW102	ML	3722	B6	1, 2, 3, 5
Tongo Lake		NSW103	ML	524	B13	1, 2, 3, 5
Yantabangee Lake		NSW104	ML	1427	B6	1, 2, 3, 5
Billinudgel Nature Reserve		NSW105	NNC	713	A12	1, 3
Cook Island Nature Reserve		NSW106	NNC	5	A4	1, 3
Cowans Pond Reserve		NSW107	NNC	5	B9	3
Cudgen Nature Reserve		NSW108	NNC	614	A9	1, 2, 3, 5
Solitary Islands Marine Park		NSW109	NNC	100000	A1, A2, A3, A4, A5, A6, A7, A8	1, 5, 6
Stotts Island Nature Reserve		NSW110	NNC	142	A12	1, 5
Ukerebagh Nature Reserve		NSW111	NNC	125	A6, A7, A9	1, 2, 3, 4, 5, 6
Bethungra Dam Reserve		NSW112	NNS	385	C1	3
Doodle Corner Swamp		NSW113	NNS	1700	B14	1
Walla Walla Swamp (Gum Swamp)		NSW114	NNS	200	B6	1, 3

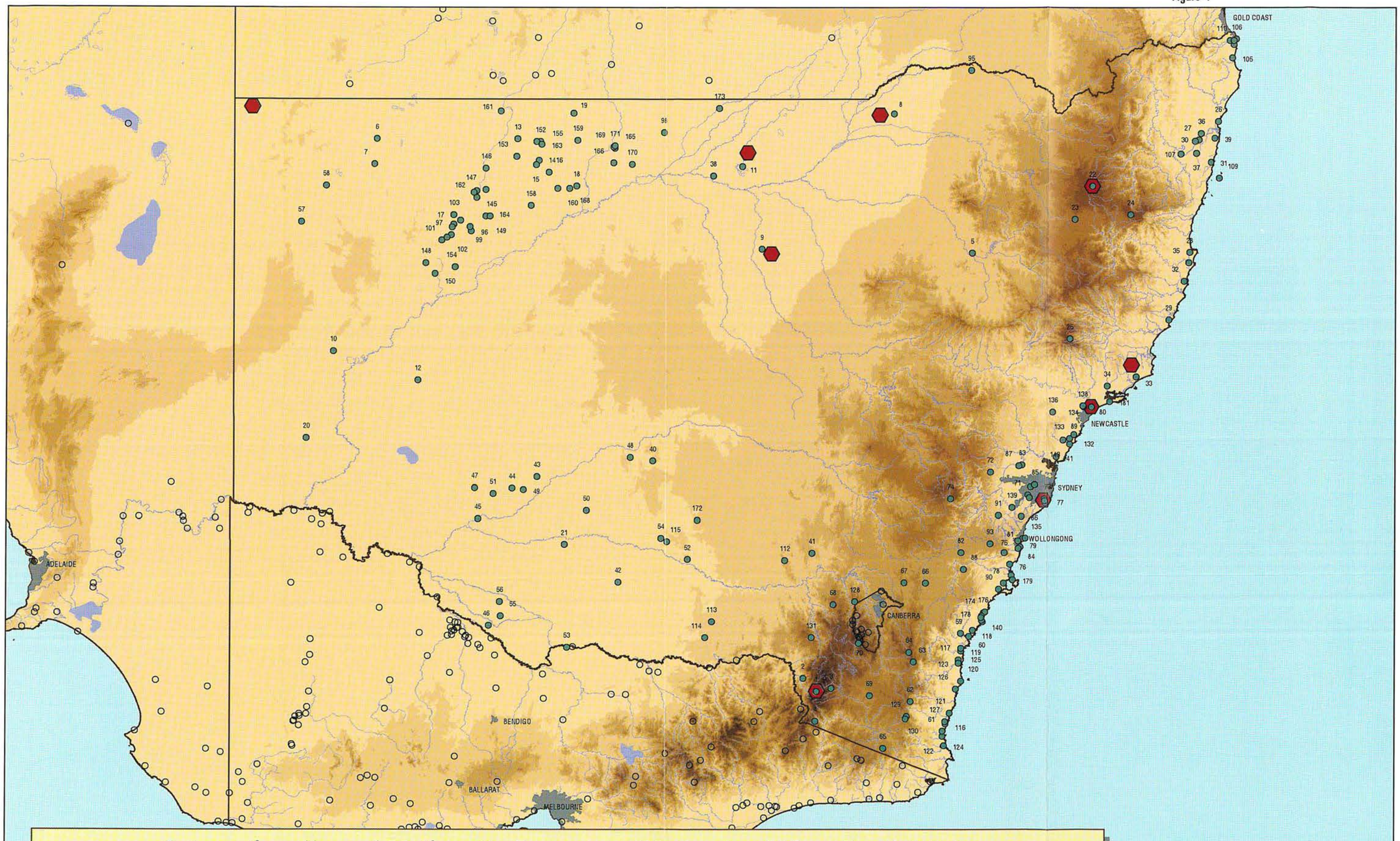
Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Fivebough Swamp		NSW115	RIV	400	B7	4
Bondi Lake		NSW116	SEC	50	A11	1, 6
Coila Creek Delta		NSW117	SEC	40	A7, A8, A10	1, 4
Durras Lake		NSW118	SEC	400	A2, A10	1, 6
Moruya River Estuary Saltmarshes		NSW119	SEC	50	A8	1, 2
Nargal Lake		NSW120	SEC	25	A11	1, 3
Nelson Lagoon		NSW121	SEC	200	A8, A10	1
Pambula Estuarine Wetlands		NSW122	SEC	200	A6	2, 3, 5, 6
Tuross River Estuary		NSW123	SEC	1200	A6	1, 2, 5
Twofold Bay		NSW124	SEC	850	A1, A6, A10	1, 3, 5, 6
Waldrons Swamp		NSW125	SEC	225	A10	1, 3
Wallaga Lake		NSW126	SEC	950	A2, A5, A6	5, 6
Wallagoot Lagoon (Wallagoot Lake)		NSW127	SEC	360	A2, A5, A6	5, 6
Coree Flats		NSW128	SEH	40	B10, B15	1
Nunnock Swamp		NSW129	SEH	100	B2, B9, B13, B15	1, 2, 3, 5
Packers Swamp		NSW130	SEH	40	B2, B9, B15	1, 2
Tomneys Plain		NSW131	SEH	90	B15	1
Brisbane Water Estuary		NSW132	SB	2768	A5, A6, A7, A8, A9	2, 3, 4
Budgewoi Lake Sand Mass		NSW133	SB	112	A5, A6, A7, A9	2, 3, 5
Colongra Swamp		NSW134	SB	60	A11	3
Coomaditchy Lagoon		NSW135	SB	4	A11	1, 3, 6
Ellalong Lagoon		NSW136	SB	250	A11, A12	1, 3
Five Islands Nature Reserve		NSW137	SB	1	A4	1, 3
Hexham Swamp		NSW138	SB	1750	A6, A8, A9, A10, A11, C8	1, 2, 3, 4, 5, 6
Jervis Bay Sea Cliffs[C]		NSW139	SB	175	A4	1, 2, 6
Swan Lagoon		NSW140	SB	6	A10	3, 6
Tuggerah Lake		NSW141	SB	600	A5, A6, A7, A8, A9	3, 4
Voyager Point		NSW142	SB	50	A6, A7, A9, A11, A12	1, 5
Wyong Racecourse Swamp		NSW143	SB	60	A11	2, 3, 5
Blue Lake (overflow)		NSW144	ML	307	B5	1, 2, 3, 5
Budtha Waterhole		NSW145	ML	124	B6	1, 2, 5
Calbocaro Billabong		NSW146	ML	66	B6	1, 2, 5
Camel Lake		NSW147	ML	126	B5	1, 2, 5
Coona Coona Lake		NSW148	ML	75	B6	1, 2
Deadmans Swamp		NSW149	ML	471	B6	1, 2, 5

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Dick Lake		NSW150	ML	708	B5	1, 2, 5
Dry Lake		NSW151	ML	87	B5	1, 2, 3, 5
Gidgee Lake		NSW152	ML	81	B7	1, 2, 3
Gypsum Swamp		NSW153	ML	82	B6	1, 2
Horseshoe Lake		NSW154	ML	90	B6	1, 2
Horseshoe Lake (Bartons Ck)		NSW155	ML	513	B7	1, 2
Pelora Lake		NSW156	ML	50	B6	1, 2
Pirillie Lake		NSW157	ML	129	B6	1, 2, 5
Taylors Lake		NSW158	ML	46	B7	1, 2
Tenannia Waterhole		NSW159	ML	624	B6	1, 2, 3
Waitchie Lake		NSW160	ML	205	B5	1, 2, 3
Wirrania Swamp		NSW161	ML	86	B6	1, 2
Yammaramie Swamp		NSW162	ML	3082	B6	1, 2, 3
Birdsnest Swamp		NSW163	ML	117	B6	1, 2, 5
Bottom Lila Lake		NSW164	ML	286	B5	1, 2, 5
Lake Yandaroo		NSW165	ML	33	B7	1, 3
Racecourse Swamp		NSW166	ML	358	B6	1, 2
The Dry Lake		NSW167	ML	133	B6	1, 2, 3
Toms Lake		NSW168	ML	239	B6	1, 2
Yarran Swamp		NSW169	ML	89	B6	1, 2
Culgoa River Floodplain		NSW170	DRP	22986	B2, B10, B14	1, 4, 5
Tabourie Lake		NSW171	SB	285	A8, A9, A10, A12, B10, B13	1,2,3
Cormorant Beach		NSW172	SB	12	A11, A12, B9, B13	1
Lagoon Head		NSW173	SB	6	A10, A11, A12, B10, B13	1
Lake Termeil Wetland Complex		NSW174	SB	71	A8, A9, A11, A12, B13	1,2,3
Meroo Lake Wetland Complex		NSW175	SB	176	A8, A9, A12, B13	1,2,3
Beecroft Peninsula[C]		NSW176	SB	4044	A8, A9, B2, B7	1, 3, 6
Liverpool Military Training Area[C]		NSW177	SB	15000	B1, B3, B4, B9	1, 5
Salt Ash Air Weapons Range[C]		NSW178	NNC	2790	A6, A8, A9, B4, B9, B10, B13, B14	1, 2, 3, 5

C *wetlands occurring in part on land owned or managed by the Commonwealth (six sites).*

Note: *area figures for the above tables are approximate only and are not available for all wetlands.*

Figure 4



Internationally and Nationally Important Wetlands of New South Wales

New South Wales currently has 9 wetlands of International Importance covering approximately 73,000 hectares. It has 178 nationally important wetlands recognised as meeting the criteria for inclusion in the Directory covering approximately 2.34 million hectares.

Note: Not all wetlands have been numbered.

- Nationally Important Wetland
- Nationally Important Wetland (outside NSW)
- Australian State/Territory boundary
- Ramsar Wetland (Refer also Figure 1)

0 100 200 300 Km

N

Ramsar

National Wetlands Program

Environment Australia
Department of the Environment and Heritage

Wetlands data used in this publication are provided by State/Territory land management agencies. Australian boundary data courtesy of AUSLIG.
Caveat: The data used are assumed to be correct as received by the custodian. The data displayed are in geographic projection and are indicative only.

7. Northern Territory

Introduction

Peter J. Whitehead and Ray Chatto, Parks and Wildlife Commission of the Northern Territory
(reprinted from the second edition)

ASIDE FROM THE FAMOUS MONOLITH IN THE DESERTS OF ULURU, WETLAND SCENES PROVIDE THE BEST RECOGNISED IMAGES OF THE NORTHERN TERRITORY (NT) LANDSCAPE. Yet this apparent familiarity is misleading. Our knowledge of the flora and fauna of these environments is patchy, and understanding of their ecological functioning often little better than rudimentary.

The constraints that this knowledge deficit places on the robust discrimination of the relative conservation significance of different sites was explicitly recognised in the first edition of this Directory. Rather than create a potentially misleading list of 'best' sites, a small number of wetlands, thought to represent a reasonable sample of the range of wetland environments existing in the NT, was identified and their better known characteristics summarised.

In that first edition, another critical point of interpretation was made, which bears repetition in the introduction to this slightly different list. In a landscape dominated by environments that are most often structurally intact, preoccupation with features of individual sites, as required by an attempt to list and rank, is a less than ideal way to analyse and present the conservation values of many wetland types. Under the influence of north Australia's erratic climate and harsh seasonal droughts, wetlands are better viewed as complexes, as functionally integrated systems made up of highly dynamic and resource-rich patches in a matrix of drier, often nutrient-poor lands.

In combination, as components of this complex mosaic, they reliably support an extraordinarily diverse and abundant flora and fauna, in a way that no individual site could duplicate. A quest to assign importance to the separate pieces of the jigsaw is quixotic, because we can ill afford to lose any of them. It is the integrity and linked ecological function of the whole that must be protected and maintained.

In the period between issue of the first edition and the preparation of this second statement, there have been some improvements in the knowledge base, particularly in regard to the coast, and the subhumid wetlands of the middle latitudes of the NT. In this edition, most revisions of prior listings derive from enhanced information on coastal sites, and the few additions are for new sites in the subhumid tropics, for which a useful knowledge base was provided by the extensive surveys of Jaensch (1994) and Jaensch and Bellchambers (1997).

Since the first edition of the Directory was produced, the Australian and New Zealand Environment and Conservation Council (ANZECC) has adopted the Interim Biogeographic Regionalisation of Australia (IBRA: Thackway and Cresswell 1995). Criteria for inclusion of sites in this Directory have accordingly been revised (Chapter 2) to include an objective to rank sites within bioregional boundaries (Criterion 1). Given the knowledge deficit already discussed, a requirement to discriminate at this finer level of resolution is an even less profitable exercise than at the Territory-wide level. Our response has been to review the criteria under which existing sites were listed rather than to attempt a detailed re-analysis from a biogeographic perspective. We conclude that retention of all of the sites listed in the first edition is justified on grounds other than biogeographic uniqueness or representativeness. Thus there have been no deletions of sites listed in the first edition, despite the obvious bias towards the wetlands of the Top End Coastal bioregion.

The NT regards this contribution to the Directory, and the resultant lists, as insignificant in themselves, but rather as small steps in a larger and much more important process. That is, to derive conservation strategies that embed the conservation of the region's extraordinary wetlands in sustainable management arrangements encompassing entire landscapes. To replace the spurious notion of relative importance, we look forward to recognition and further development of the Directory as a comprehensive inventory of all substantial wetlands. This will ultimately allow presentation to reflect functional wetland groupings, better indicate the role of wetland systems in the regional ecology, and the management actions needed to maintain that role.

Acknowledgments

The NT chapter of *A Directory of Important Wetlands in Australia* was originally compiled by Roger P. Jaensch, for the Conservation Commission of the Northern Territory (CCNT). This revision was completed by Peter Whitehead and Ray Chatto of the Parks and Wildlife Commission for the Northern Territory (PWCNT) and, in respect of the wetlands of the subhumid inland, by Roger Jaensch, Oceania Program of Wetlands International.

Funds for the desk revision were provided to PWCNT by the then Australian Nature Conservation Agency through the National Wetlands Program, and additional survey work was performed with the financial support of the Australian Heritage Commission and the Parks and Wildlife Commission of the Northern Territory (formerly Conservation Commission).

The following people gave general support and/or information on wetlands. At PWCNT: John Woinarski, Keith Bellchambers, Dave Liddle, Rod Kennett, Keith Saalfeld, Tom Vigus, Peter Brocklehurst, and Peter Latz. Others: Brett Ottley (Wildlife Management International P/L), Helen Larson (NT Museum), Richard Noske (NT University, NT Naturalists' Club), Roland Griffin and Tim Wood (Department of Primary Industries and Fisheries), Australian Heritage Commission, Arthur Georges (University of Canberra).

Summary analysis

The Directory describes 33 nationally important wetlands in the Northern Territory. The distribution of nationally important wetlands in the NT (including Ramsar wetlands) is shown in Figure 5. A list compiling data on bioregion, site area, wetland type and criteria for inclusion for each wetland is provided at the end of this chapter.

Twenty bioregions occur in the NT (refer to Table 7.1), with 12 of these shared with adjacent States. Eight of the bioregions contain no wetlands currently recognised as nationally important. The most nationally important wetlands are in the Top End Coastal bioregion (n=12). Mitchell Grass Downs (n=6) is the only other region to have more than three wetlands listed. Five bioregions have only one important wetland listed. An overview of the IBRA regionalisation and a map of IBRA regions is included in Appendix 2.

Table 7.1 Number and area of nationally important wetlands in the NT by IBRA region

IBRA Region	IBRA code	No. of Sites	Area (ha)
Burt Plain	BRT	0	0
Central Arnhem	CA	0	0
Central Ranges	CR	0	0
Channel Country	CHC	0	0
Daly Basin	DAB	1	1,650
Finke	FIN	1	30,000
Gulf Fall and Uplands	GFU	1	100
Great Sandy Desert	GSD	2	133,700
Gulf Coastal	GUC	3	303,890
Gulf Plains	GUP	0	0
MacDonnell Ranges	MAC	1	10
Mitchell Grass Downs	MGD	6	333,090
Ord-Victoria Plains	OVP	2	25,000
Pine-Creek Arnhem	PCA	2	1,376,090
Simpson-Strzelecki Dunefields	SSD	0	0
Stony Plains	STP	0	0
Sturt Plateau	STU	0	0
Tanami	TAN	1	800
Top End Coastal	TEC	12	978,900
Victoria Bonaparte	VB	2	880,000
Total	20	33	4,033,230

The 33 nationally important wetlands currently recognised in the NT exhibit 24 of the 40 wetland types (refer to Table 7.2). The most numerous type included is B14—Freshwater swamp forest (n=17), and the next most numerous B10—Seasonal/intermittent freshwater ponds and marshes (n=15). The most numerous Marine and Coastal Zone wetland type is A6—Estuarine waters (n=14). The Wetland classification system and Criteria for inclusion in the Directory are explained in Chapter 2.

Table 7.2 Number of NT sites in each Wetland type

A—Marine and Coastal Zone wetlands

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
Total	3	4	1	0	1	14	13	11	13	1	1	0

B—Inland wetlands

	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19
Total	14	7	1	11	1	12	0	2	6	15	0	0	9	17	0	0	2	0	0

C—Human-made wetlands

	C1	C2	C3	C4	C5	C6	C7	C8	C9
Total	2	1	0	0	0	0	0	0	0

All Criteria for inclusion are well represented in the NT wetlands listed (refer to Table 7.3). Twenty-seven wetlands are included under each of Criteria 1,2 and 3. All wetlands except one, Lake Amadeus which is included only as representative of its wetland type within the bioregion (Criterion 1), meet multiple criteria for inclusion. Four sites have been included under all six criteria.

Table 7.3 Number of NT sites included under each Criterion

	1	2	3	4	5	6
Total	27	27	27	18	11	18

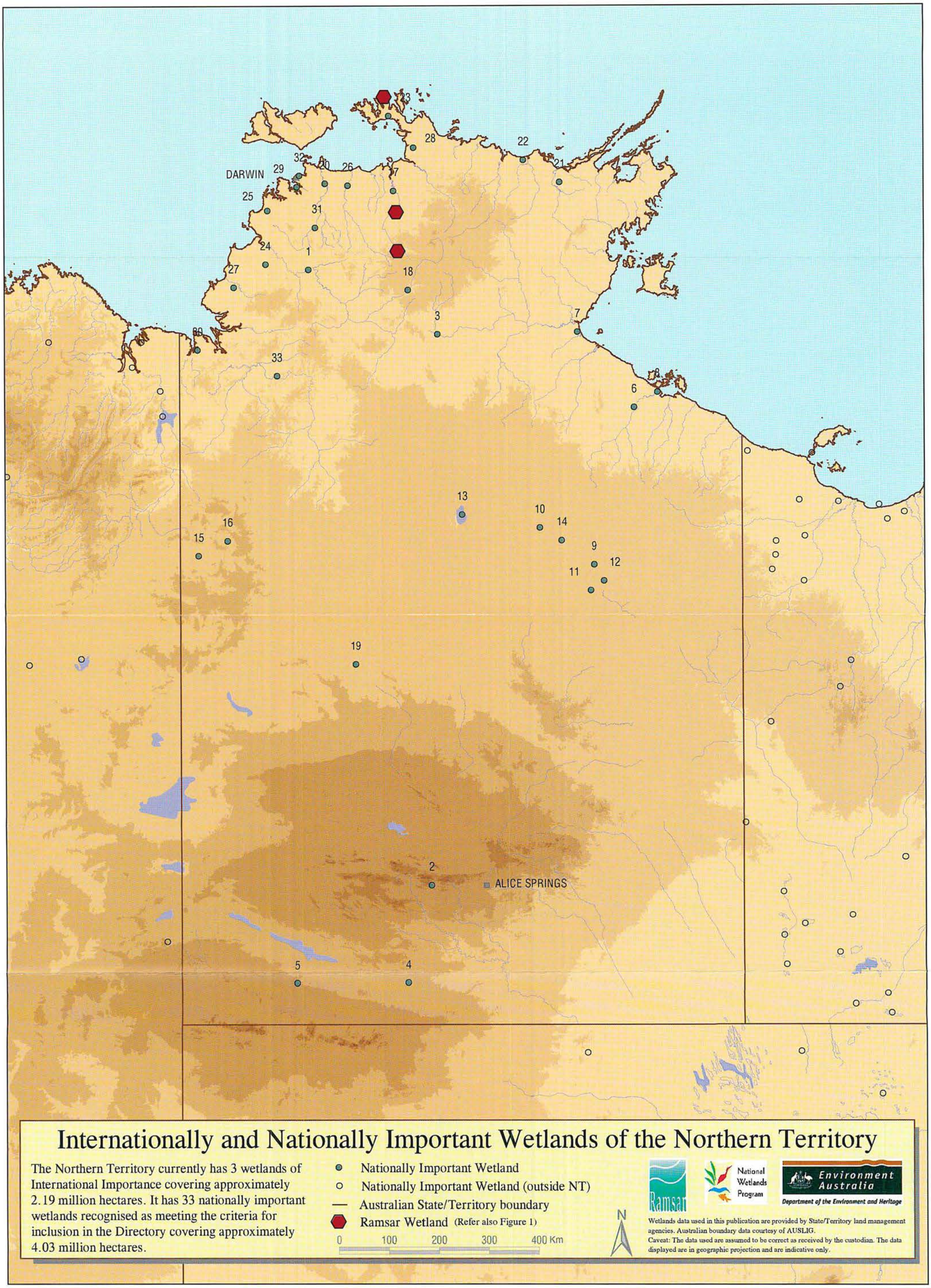
List of nationally important wetlands in the Northern Territory

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Daly River Middle Reaches	DAB001NT	NT001	DAB	1650	B1, B6	1, 2, 3, 4
Finke River Headwater Gorges System	FIN001NT	NT002	MAC	10	B1	1, 2, 3, 5, 6
Mataranka Thermal Pools	GFU002NT	NT003	GFU	100	B17	1, 6
Karinga Creek Palaeodrainage System	GSD002NT	NT004	FIN	30000	B8	1, 4, 6
Lake Amadeus	GSD003NT	NT005	GSD	103700	B8	1
Borroloola Bluebush Swamps	GUC001NT	NT006	GUC	90	B13, B14	1, 3
Limmen Bight (Port Roper) Tidal Wetlands System	GUC002NT	NT007	GUC	184800	A2, A6, A7, A8, A9	1, 2, 3, 4, 5, 6
Port McArthur Tidal Wetlands System	GUC003NT	NT008	GUC	119000	A1, A2, A6, A7, A8, A9, B5	1, 2, 3, 4, 5
Corella Lake	MGD002NT	NT009	MGD	15000	B1, B6, B13, B14	1, 2, 3
Eva Downs Swamp	MGD004NT	NT010	MGD	17000	B6, B10, B13, B14	1, 2, 3
Lake de Burgh	MGD005NT	NT011	MGD	35000	B6, B13, B14	1, 2, 3, 4
Lake Sylvester	MGD006NT	NT012	MGD	41000	B1, B6, B10, B13, B14	1, 2, 3, 4, 6
Lake Woods	MGD007NT	NT013	MGD	5090	B1, B6, B10, B13, B14	1, 2, 3, 4
Tarrabool Lake	MGD008NT	NT014	MGD	220000	B6, B10, B13, B14	1, 2, 3
Birrindudu Waterhole and Floodplain	OVP001NT	NT015	OVP	19000	B4, B6, B10, B13, B14	1, 2, 3
Nongra Lake	OVP002NT	NT016	OVP	6000	B6, B14	1, 2, 3, 6
Kakadu National Park[C]	PCA001NT	NT017	PCA	1375940	A1, A2, A5, A6, A7, A8, A9, B1, B2, B3, B9, B10, B14, B17, C1	1, 3, 4, 5, 6
Katherine River Gorge	PCA002NT	NT018	PCA	150	B1	1, 2, 6
Lake Surprise (Yinapaka)	TAN002NT	NT019	TAN	800	B6	1, 2, 3
Adelaide River Floodplain System	TEC001NT	NT020	TEC	134800	A6, A7, A8, A9, B1, B4, B6, B9, B10, B14, C1	2, 3, 4, 5, 6
Arafura Swamp	TEC002NT	NT021	TEC	71400	B1, B2, B4, B9, B10, B14	2, 3, 4, 6
Blyth–Cadell Floodplain and Boucaut Bay System	TEC003NT	NT022	TEC	35500	A6, A7, A8, A9, B4, B10	1, 2, 3, 4, 5, 6
Cobourg Peninsula System	TEC004NT	NT023	TEC	84000	A6, A7, A8, A9, A10, B14	1, 2, 3, 4, 5, 6
Daly–Reynolds Floodplain–Estuary System	TEC005NT	NT024	TEC	159300	A6, A7, A8, A9, B1, B2, B4, B9, B10, B14	1, 2, 3, 4, 5

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Finniss Floodplain and Fog Bay System	TEC006NT	NT025	TEC	81300	A6, A7, A8, A9, B2, B4, B9, B10, B14	1, 2, 3, 4, 6
Mary Floodplain System	TEC007NT	NT026	TEC	127600	A6, A7, A8, A9, B1, B4, B9, B10, B14	1, 2, 3, 4, 6
Moyle Floodplain and Hyland Bay System	TEC008NT	NT027	TEC	48100	A6, A7, A9, B1, B2, B4, B10, B14	1, 2, 3, 4, 6
Murgenella–Cooper Floodplain System	TEC009NT	NT028	TEC	81500	A6, A7, A8, A9, B1, B2, B4, B10	1, 2, 3, 4, 6
Port Darwin	TEC010NT	NT029	TEC	48800	A1, A2, A3, A6, A7, A9	1, 2, 3, 4, 5, 6
Legune Wetlands	VB003NT	NT030	VB	9000	B6, B10, B13, C2	1, 2, 3
Mount Bundey Training Area –Mary River Floodplain[C]		NT031	TEC	105000	B1, B2, B4	2, 5
Shoal Bay–Micket Creek[C]		NT032	TEC	1600	A6, A7, A8, A9, A11	3, 6
Bradshaw Field Training Area[C]		NT033	VB	871000	A6, B4	2, 5

C wetlands occurring in part on land owned or managed by the Commonwealth (four sites).

Note: area figures for the above tables are approximate only.



Internationally and Nationally Important Wetlands of the Northern Territory

The Northern Territory currently has 3 wetlands of International Importance covering approximately 2.19 million hectares. It has 33 nationally important wetlands recognised as meeting the criteria for inclusion in the Directory covering approximately 4.03 million hectares.

Ramsar

National Wetlands Program

Environment Australia

Department of the Environment and Heritage

Wetlands data used in this publication are provided by State/Territory land management agencies. Australian boundary data courtesy of AUSLIG.

Caveat: The data used are assumed to be correct as received by the custodian. The data displayed are in geographic projection and are indicative only.

8. Queensland

Introduction

J.G. Blackman, Queensland Environmental Protection Agency

THE WETLANDS INCLUDED IN THIS THIRD EDITION OF *A DIRECTORY OF IMPORTANT WETLANDS IN AUSTRALIA* provide a biogeographically based Statewide sample of wetlands which meet the criteria for inclusion. The listings encompass the full range of diversity in natural wetland types occurring within Queensland (Qld) (Blackman *et al.* 1999). An additional 12 wetlands in the Mulga Lands bioregion and four sites on land owned or managed by the Commonwealth are included, bringing the current Qld listing to a total of 181 wetlands. Of these, 178 are terrestrial sites covering about 8.5 million ha, and three are eastern seaboard marine sites covering about 34.2 million hectares. The location of each of the sites is illustrated in Figure 6.

Wetland information contained in the Directory has been derived from Department of Environment and Heritage field surveys of wetlands in the Gulf Plains, western Cape York Peninsula, north-east and south-western Queensland as part of the Queensland Wetland Inventory Program; the Natural Resource Analysis Program of the Cape York Peninsula Land Use Strategy; published and unpublished information on wetlands; field data and descriptions solicited from others; and interpretation of satellite image data and aerial photography, supported by existing natural resource mapping (geology, soil, vegetation and land systems). The wetlands listed have been mapped as digital coverages in a geographic information system (GIS).

The Queensland Environment

Nineteen bioregions are currently recognised for Queensland (Thackway and Cresswell 1995). Thirteen of these fall entirely or predominantly within the State, seven of these have coastal sections bordering tropical or subtropical marine environments.

Queensland has an area of approximately 1.7 million km^2, with an additional 5,780 km^2 comprising 1,165 offshore islands. It has a total coastline of 5,700 km. Approximately 55% of the State and 4,600 km of shoreline lie north of the Tropic of Capricorn. The Great Barrier Reef extends along the northern and central sections of the eastern seaboard between latitudes approximately 10° 41' S and 24° 30' S.

Queensland falls within three broad climatic zones (Anon. 1989). North Queensland, above the Tropic of Capricorn, has a tropical climate characterised by a generally hot, humid summer with strongly seasonal rainfall, and a mild to warm, dry winter. Below the Tropic

of Capricorn, the south-eastern half of the State is subtropical with a similarly hot, humid summer and seasonal rainfall, but with some significant rainfall occurring during the mild winter. The remaining south-western portion of the State experiences an arid subtropical climate where summers can be extremely hot and dry, with variable rainfall, and winters are mild to warm and dry, with irregular light rain.

Accounts of Qld's wetlands (Stanton 1975, Arthington and Hegerl 1988, Blackman *et al.* 1993, Blackman *et al.* 1996, Blackman *et al.* 1999) have increasingly confirmed their outstanding biological richness, diversity, geographical extent, and importance as habitat for a similarly rich and diverse biota. Only two of the 40 classes of wetland types used in the Directory, class B3–Permanent inland deltas, and class B16–Alpine and tundra wetlands, do not occur in Qld. The present compilation of sites includes wetlands with representatives of 37 of the remaining 38 wetland types.

Queensland Wetland Policy and Programs

The Environmental Protection Agency (EPA—formerly Department of Environment and Heritage) is the lead agency for wetlands in Qld. The EPA is implementing the Queensland Government's *Strategy for the Conservation and Management of Queensland Wetlands* (Environmental Protection Agency 1999) in cooperation with other relevant State agencies, local and Commonwealth governments, landholders, and the community. The Strategy provides the enabling framework through which all government departments exercising control in wetland areas can work towards managing the State's wetlands in accordance with the goal, core objectives and guiding principles set out in the *National Strategy for Ecologically Sustainable Development* (Commonwealth of Australia 1992). Wetlands, lakes and springs that are listed in *A Directory of Important Wetlands in Australia* and subsequent updates are designated as significant under both the *State Policy for Vegetation Management on Freehold Land* (Department of Natural Resources, 2000a), and the *Broadscale Tree Clearing Policy for State Lands* (Department of Natural Resources, 2000b).

A number of wetland programs aimed at supporting the above strategy are in progress. These include development of management plans for Ramsar sites, and ongoing Statewide assessment of wetlands (currently focussing on South East Queensland, Brigalow Belt North, Desert Uplands and Einasleigh Uplands) through the Queensland Wetland Inventory Program. Bioregions and their component provinces provide the framework for the program (Stanton and Morgan 1977; Blackman, Gardiner and Morgan, 1996; Sattler and Williams 1999), as well as the regionalisation for systematic classification and assessment of Queensland's wetlands and deepwater habitats (Blackman, Spain and Whiteley 1992).

Range of wetlands incorporated

With the exception of several bioregions, wetlands listed in the first edition of the Directory were mostly chosen arbitrarily, based on available information. In the second edition, selection of new sites was much less arbitrary for the Cape York Peninsula, Channel Country, Gulf Plains and Wet Tropics bioregions, and for coastal areas of the two Brigalow Belt bioregions, because of new broadly based information becoming available for these. With regard to broad representation across the State, the number of bioregions with ten or more representative wetlands was increased from three to eight.

Taken overall, the criteria for importance and the wetland types (see Chapter 2) presented for each wetland are a minimum set. Absence of a criterion or a wetland type for a particular wetland does not imply that either are absent; each may simply have been omitted due to lack of information. The frequency in which criteria for inclusion in the Directory were recorded is shown in the summary Table 8.4. Nineteen sites, listed in Table 8.1 below, met all six criteria for importance.

Table 8.1 Qld Sites meeting all six Criteria for inclusion

Site Name	Bioregion	No. of wetland types	Area (ha)
Burdekin–Townsville Coastal Aggregation	BBN	22	149,198
Burdekin Delta Aggregation	BBN	18	31,724
Moreton Bay	SEQ	17	300,177
Noosa River Wetlands	SEQ	15	9,945
Fraser Island	SEQ	14	163,294
Bowling Green Bay	BBN	14	32,541
Edmund Kennedy Wetlands	WT	14	11,084
Tully River–Murray River Floodplains	WT	12	39,154
Northern Holroyd Plain Aggregation	CYP	10	1,114,325
Southeast Karumba Plain Aggregation	GUP	10	336,234
Northeast Karumba Aggregation	CYP	10	182,149
Great Basalt Wall	EIU	10	100,254
Missionary Bay	WT	10	11,230
Great Sandy Strait	SEQ	9	93,160
Southern Gulf Aggregation	GUP	8	553,382
Great Barrier Reef Marine Park	GBR	8	3,250,000
Hinchinbrook Channel	WT	7	30,682
Lake Numalla Aggregation	ML	4	10,724
Lake Wyara	ML	4	6,021

The incidence of wetland types present at sites are: coastal wetland types (64 sites), inland wetland types (140 sites), and human-made wetland types (23 sites). Twenty seven sites each had 10 or more wetland types: South East Queensland (4 sites), Cape York Peninsula (5 sites), Wet Tropics (6 sites), Gulf Plains (4 sites), Brigalow Belt North (3 sites), Central Mackay Coast (5 sites), and Einasleigh Uplands (1 site). The largest number of wetland types recorded for any site was 26 at Herbert River Floodplain in the Wet Tropics bioregion.

The most commonly recorded wetland type was B2—Seasonal and irregular rivers and streams, appearing in 40% of the sites. Six other wetland types (A7, A9, B4, B6, B10, B14) appeared in more than 30% of sites. A further ten wetland types (A1, A2, A5, A6, A8, B1, B4, B5, B9, B13) appeared in more than 20% of sites; four wetland types appeared in more than 10% of sites (A4, A10, A11, A12); and seven wetland types (A3, B8, B12, B15, B17, C1, C2) appeared in more than 5% of sites. Finally, seven wetland types (B7, B11, B19, C3, C6, C7, C8) appeared in less than 5% of sites, and three wetland types (B18, C4, C5) were recorded at only one site each. Type C9—Canals, is the only class of human-made wetlands not included in any site.

In general, there is a positive relationship between the number of wetland types present and the area of sites, however, the number of criteria recorded is not necessarily related to either numbers of wetland types or the area of a site. Very large sites, eg Great Barrier Reef Marine Park and Northern Holroyd Plain, are not necessarily the most diverse; the most diverse sites, eg Herbert River Floodplain, are not necessarily the largest; and sites with high importance, eg Lake Numalla and Lake Wyara, may comprise few wetland types and be relatively small.

Caveats on Data

The listings added in the second edition, and subsequently, appreciably increased bioregional representation throughout the State. Nonetheless, the list is far from exhaustive and large areas are under-represented. Because of this it is not appropriate to rank the present sites in terms of their overall conservation importance until there has been a more even coverage of all areas of the State. Notwithstanding this, it is likely that the wetlands listed that meet all six criteria are amongst the most significant in Qld (refer to Table 8.1). It is notable that these include four of the State's Ramsar sites: Bowling Green Bay, Moreton Bay, Currawinya Lakes (Lake Numalla and Lake Wyara wetlands) and Great Sandy Strait (refer to Figure 6).

Remaining Gaps

The current listings partially define the geographical distribution of both the major areas of wetland development across the State, as well as the strengths and weaknesses of current information on which to make assessments of wetlands. For example, the better representation of Channel Country, Cape York Peninsula, Gulf Plains, Mulga Lands and Wet Tropics bioregions reflects that these bioregions contain the most extensive areas of wetland development in Qld and are amongst the best known. Other bioregions are poorly represented because they are little known, particularly the Mitchell Grass Downs. The Simpson-Strzelecki Dunefields, Nandewar, New England Tableland, and New South Wales North Coast bioregions are not represented at all. With the exception of the Simpson-Strzelecki Dunefields, the latter bioregions have very small Qld extents. Although representation has been increased for the Einasleigh Uplands, Desert Uplands, and the two Brigalow Belt bioregions, these are still under-represented, and are known to contain a range of very significant wetlands (Blackman unpublished).

On a Statewide basis, coastal freshwater, estuarine and intertidal marine wetlands are now reasonably well represented, but other marine wetlands, notably coral reefs, are poorly represented as individual sites. Of the 178 terrestrial wetlands, 121 (totalling almost 6.6 million hectares) lie north of the Tropic of Capricorn; while 57 (totalling approximately 1.9 million hectares) lie south of this latitude. While this partially reflects real differences in the natural occurrence of wetlands, the southern areas are none-the-less clearly under-represented.

The present work underscores the relative paucity of regional scale primary data derived from systematic field surveys, as well as the lack of overall comparative information throughout the State. Completion of the field surveys necessary to provide such data is a priority but also a considerable undertaking because of the huge areas involved. In this respect bioregions have proved to be a suitable framework for inventory of wetlands in Qld's

terrestrial environments, and this should now be extended to corresponding marine environments.

The major priority is regional scale identification and delineation of at least all major wetland aggregations to allow statewide assessment at the resolution of the present Directory. At the same time this will identify areas which require additional systematic field surveys to complete this assessment.

Acknowledgments

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Summary analysis

The Directory describes 181 nationally important wetlands in Queensland. The distribution of nationally important wetlands in Qld (including Ramsar wetlands) is shown in Figure 6. A list compiling data on bioregion, site area, wetland type and criteria for inclusion for each wetland is provided at the end of this chapter.

Generally speaking, the nationally important wetlands are well spread across the 19 bioregions that occur in Qld (refer to Table 8.2). Eleven bioregions are shared with New South Wales and the Northern Territory. The four bioregions that do not have nationally important wetlands listed are all shared and have minor extents in Qld, as are the bioregions where there are only one or two wetlands listed. Not surprisingly the Wet Tropics bioregion contains the most sites (n=29). An overview of the IBRA regionalisation and a map of IBRA regions is included in Appendix 2.

Table 8.2 Number and area of nationally important wetlands in Qld by IBRA region

IBRA Region	IBRA code	No. of Sites	Area (ha)
Brigalow Belt North	BBN	10	475,697
Brigalow Belt South	BBS	13	241,369
Channel Country	CHC	20	898,310
Central Mackay Coast	CMC	14	703,220
Cape York Peninsula	CYP	23	2,429,936
Desert Uplands	DEU	5	50,560
Darling Riverine Plains	DRP	1	24,000
Einasleigh Uplands	EIU	13	132,170
Gulf Fall and Uplands	GFU	1	1,133
Gulf Plains	GUP	15	2,221,612
Mitchell Grass Downs	MGD	2	69,795
Mount Isa Inlier	MII	4	329,204
Mulga Lands	ML	15	116,506
Nandewar	NAN	0	0
New England Tableland	NET	0	0
NSW North Coast	NNC	0	0
South Eastern Queensland	SEQ	13	667,130
Simpson-Strzelecki Dunefields	SSD	0	0
Wet Tropics	WT	29	163,079
Great Barrier Reef		3	34,251,468
Total	**19**	**181**	**42,775,189**

Thirty-seven of the 40 wetland types are exhibited by the nationally important wetlands in Qld, giving it the best representation of wetland types in any jurisdiction (refer to Table 8.3). Most numerous are B2—Seasonal and irregular rivers and streams (n=72), followed by B10—Seasonal/intermittent freshwater ponds (n=65) and A9—Intertidal forested wetlands (n=64). Queensland contains the only example of wetland type B18—Geothermal wetlands in Australia: Innot Hot Springs. The Wetland classification system and Criteria for inclusion in the Directory are explained in Chapter 2.

Table 8.3 Number of Qld sites in each Wetland type

A—Marine and Coastal Zone wetlands

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
Total	43	42	11	22	52	51	56	51	64	28	35	23

B—Inland wetlands

	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19
Total	49	72	0	56	40	54	5	13	45	65	2	9	48	62	10	0	13	1	2

C—Human-made wetlands

	C1	C2	C3	C4	C5	C6	C7	C8	C9
Total	15	9	2	1	1	3	3	3	0

With the exception of RAAF Townsville, each wetland is listed because it is a good example of a wetland type occurring within its biogeographic region (Criterion 1, n=180). The next most important criterion for inclusion is Criterion 3—wetlands that provide a refuge or habitat for animal taxa at a vulnerable stage in their life cycles (n=135).

Table 8.4 Number of Qld sites included under each Criterion

	1	2	3	4	5	6
Total	180	117	135	48	85	43

List of nationally important wetlands in Queensland

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Abbot Point—Caley Valley	BBN001QL	QLD001	BBN	5154	A1, A5, A6, A8, A9, A10, A11, C1	1, 2, 3, 4, 5
Bowling Green Bay	BBN002QL	QLD002	BBN	32541	A2, A4, A5, A6, A7, A8, A9, A10, A11, A12, B6, B10, C1, C2	1, 2, 3, 4, 5, 6
Broad Sound	BBN003QL	QLD003	BBN	212042	A1, A2, A5, A6, A7, A8, A9, A10, A11	1, 2, 3, 5
Burdekin Delta Aggregation	BBN004QL	QLD004	BBN	31723	A5, A6, A7, A8, A9, A10, A11, A12, B1, B4, B5, B6, B9, B10, B14, C1, C2, C3	1, 2, 3, 4, 5, 6
Burdekin—Townsville Coastal Aggregation	BBN005QL	QLD005	BBN	149197	A1, A2, A4, A5, A6, A7, A8, A9, A10, A11, A12, B1, B2, B4, B5, B6, B9, B10, B14, C1, C2, C3	1, 2, 3, 4, 5, 6
Lake Dalrymple	BBN006QL	QLD006	BBN	30570	C1	1, 2, 3
Lake Elphinstone	BBN007QL	QLD007	BBN	300	B6, B10, B14	1, 2, 3
Ross River Reservoir	BBN008QL	QLD008	BBN	2781	C1	1, 2, 3, 4
Southern Upstart Bay	BBN009QL	QLD009	BBN	11089	A2, A5, A6, A7, A8, A9, A10, A11, C1	1, 2, 3, 5
Boggomoss Springs	BBS001QL	QLD010	BBS	400	B17	1, 3, 4
Fairbairn Dam	BBS002QL	QLD011	BBS	15397	C1	1, 3
Fitzroy River Delta	BBS003QL	QLD012	BBS	70254	A1, A2, A6, A7, A8, A9, A11, C4	1, 2, 3, 6
Fitzroy River Floodplain	BBS004QL	QLD013	BBN	19500	B4, B6, B9, B10, B14	1, 2, 3
Hedlow Wetlands	BBS005QL	QLD014	BBN	11101	B2, B4, B5, B6, B9, B10, B14	1, 3, 4
Lake Broadwater	BBS006QL	QLD015	BBS	215	B2, B5, B10, B14	1, 2, 3, 5
Lake Nuga Nuga	BBS008QL	QLD016	BBS	2069	B2, B6	1, 3
Northeast Curtis Island	BBS009QL	QLD017	BBN	9536	A1, A3, A4, A5, A6, A7, A8, A9, A11, A12	1, 2, 3, 5
Palm Tree and Robinson Creeks	BBS010QL	QLD018	BBS	50274	B2, B10	1, 5
Port Curtis	BBS011QL	QLD019	BBS	31264	A1, A2, A3, A4, A5, A6, A7, A8, A9	1, 2, 3, 4, 5, 6
The Gums Lagoon	BBS012QL	QLD020	BBS	343	B10, B14	1, 3
The Narrows	BBS013QL	QLD021	BBN	20906	A1, A2, A6, A7, A8, A9, A11	1, 2, 3, 6

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Yeppoon—Keppel Sands Tidal Wetlands	BBS014QL	QLD022	BBN	10110	A1, A4, A5, A6, A7, A8, A9, A11, A12	1, 3, 5
Birdsville—Durrie Waterholes Aggregation	CHC001QL	QLD023	CHC	32656	B2, B4, B5, B6, B9, B13	1, 2, 3
Bulloo Lake	CHC002QL	QLD024	CHC	83227	B2, B4, B6, B10, B13	1, 2, 3
Cooper Creek Overflow Swamps—Windorah	CHC005QL	QLD025	CHC	124853	B2, B4, B13	1
Cooper Creek Swamps —Nappa Merrie	CHC006QL	QLD026	CHC	106311	B2, B4, B9, B10, B13, B14	1, 2, 3
Cooper Creek—Wilson River Junction	CHC007QL	QLD027	CHC	63925	B2, B4, B9, B10, B13, B14	1, 2
Diamantina Lakes Area	CHC008QL	QLD028	CHC	393	B2, B4, B5, B13	1, 2, 3
Diamantina Overflow Swamp —Durrie Station	CHC009QL	QLD029	CHC	29196	B2, B4, B13	1, 2
Georgina River— King Creek Floodout	CHC011QL	QLD030	CHC	138347	B2, B4, B9, B13	1, 2
Lake Bullawarra	CHC012QL	QLD031	CHC	1287	B2, B4, B6, B13	1, 3
Lake Constance	CHC013QL	QLD032	CHC	1841	B2, B4, B6, B13	1, 2
Lake Cuddapan	CHC014QL	QLD033	CHC	1704	B6	1
Lake Mipia Area	CHC015QL	QLD034	CHC	69691	B2, B4, B6, B9, B13	1, 2, 3
Lake Phillipi	CHC016QL	QLD035	CHC	16086	B6	1
Lake Torquinie Area	CHC017QL	QLD036	CHC	15242	B2, B4, B8, B10	1, 2, 4
Lake Yamma Yamma	CHC018QL	QLD037	CHC	86548	B8, B13	1
Moonda Lake—Shallow Lake Aggregation	CHC019QL	QLD038	CHC	14738	B6, B13	1
Mulligan River—Wheeler Creek Junction	CHC020QL	QLD039	CHC	17014	B2, B4, B8, B9, B13	1, 2, 3
Muncoonie Lakes Area	CHC021QL	QLD040	CHC	88767	B2, B4, B8, B9, B10, B13	1, 3
Nooyeah Downs Swamps Aggregation	CHC022QL	QLD041	CHC	6241	B2, B4, B13	1
Toko Gorge and Waterhole	CHC025QL	QLD042	CHC	243	B2, B4, B9, B14, B17	1, 3, 6
Corio Bay Wetlands[C]	CMC001QL	QLD043	CMC	6909	A1, A2, A4, A5, A6, A7, A8, A9, A10, A11, B1, B2, B10, B14	1, 2, 3, 5
Dismal Swamp—Water Park Creek[C]	CMC002QL	QLD044	CMC	1000	A11, A12, B5, B15	1, 2, 3, 5
Edgecumbe Bay	CMC003QL	QLD045	CMC	4593	A1, A2, A5, A7, A8, A9, A10, A11	1, 3, 5
Eungella Dam	CMC004QL	QLD046	CMC	797	B1, B4, C1	1, 2, 3

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Four Mile Beach	CMC005QL	QLD047	CMC	7130	A1, A2, A5, A6, A7, A8, A10	1, 3
Island Head Creek—Port Clinton Area	CMC006QL	QLD048	CMC	27042	A1, A2, A3, A4, A5, A6, A7, A8, A9, A11, A12	1, 2, 3, 5
Iwasaki Wetlands	CMC007QL	QLD049	CMC	646	A7, A8, A9, A11, A12	1, 2, 3
Proserpine—Goorganga Plain	CMC008QL	QLD050	CMC	16851	A1, A5, A6, A7, A8, A9, A10, A11, B1, B4, B6, B10, B14	1, 2, 3, 4, 5
Sand Bay	CMC009QL	QLD051	CMC	10182	A1, A4, A5, A6, A7, A8, A9	1, 2, 3, 4, 5
Sandringham Bay—Bakers Creek Aggregation	CMC010QL	QLD052	CMC	7372	A1, A4, A5, A6, A7, A8, A9	1, 2, 3, 4, 5
Sarina Inlet—Ince Bay Aggregation	CMC011QL	QLD053	CMC	27945	A1, A2, A3, A4, A5, A6, A7, A9, A11, C1	1, 2, 3, 4, 5
Shoalwater Bay[C]	CMC012QL	QLD054	CMC	122672	A1, A2, A4, A5, A6, A7, A8, A9, A10	1, 2, 3
St. Helens Bay Area	CMC013QL	QLD055	CMC	16081	A1, A2, A3, A4, A5, A6, A7, A9	1, 2, 3, 4, 5
Archer Bay Aggregation	CYP001QL	QLD056	CYP	29911	A1, A2, A5, A6, A7, A8, A9, A10, A11, A12, B10, B13, B14	1, 2, 3, 5, 6
Archer River Aggregation	CYP002QL	QLD057	CYP	149761	B1, B2, B4, B5, B6, B10, B14	1, 2, 3, 5, 6
Bull Lake	CYP003QL	QLD058	CYP	26	B5, B14	1, 2, 3, 6
Cape Flattery Dune Lakes	CYP004QL	QLD059	CYP	44034	B5, B6, B17	1, 2, 3
Cape Grenville Area	CYP005QL	QLD060	CYP	7304	A1, A2, A5, A6, A9, B1, B2, B4, B5, B6, B7, B8, B10, B13, B14	1
Cape Melville—Bathurst Bay	CYP006QL	QLD061	CYP	5480	A8, A9, B2, B9, B10, B12	1, 5
Harmer River—Shelburne Bay Aggregation	CYP007QL	QLD062	CYP	31751	A9, B2, B5, B6, B9, B10	1, 3, 5
Jardine River Wetlands Aggregation	CYP008QL	QLD063	CYP	81740	A2, A5, A6, A7, A8, A9, A10, A11, B1, B2, B4, B5, B6, B9, B10, B14	1, 2, 6
Lloyd Bay	CYP009QL	QLD064	CYP	15682	A1, A2, A5, A6, A7, A8, A9	1, 3, 5, 6
Marina Plains—Lakefield Aggregation	CYP010QL	QLD065	CYP	392333	B1, B2, B4, B6, B9, B10, B12, B13, B14	1, 2, 3, 5

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Newcastle Bay–Escape River Estuarine Complex	CYP011QL	QLD066	CYP	42307	A1, A2, A5, A6, A7, A8, A9, A10, B11, B12	1, 2, 3, 6
Northeast Karumba Plain Aggregation	CYP012QL	QLD067	CYP	182418	A1, A2, A5, A6, A7, A8, A9, A10, A11, A12	1, 2, 3, 4, 5, 6
Northern Holroyd Plain Aggregation	CYP013QL	QLD068	CYP	1114324	B1, B2, B4, B5, B6, B9, B10, B13, B14, C2	1, 2, 3, 4, 5, 6
Olive River	CYP014QL	QLD069	CYP	17609	A8, A9, B1, B2, B4, B9, B10, B13, B14	1, 2, 3, 5
Orford Bay–Sharp Point Dunefield Aggregation	CYP015QL	QLD070	CYP	17239	B5, B10, B13, B14	1, 5
Port Musgrave Aggregation	CYP016QL	QLD071	CYP	52685	A1, A2, A6, A7, A8, A9, A10, A11, A12	1, 3, 5
Princess Charlotte Bay Marine Area	CYP017QL	QLD072	CYP	87835	A2, A7, A8, A9	1, 2, 3, 5
Silver Plains–Nesbit River Aggregation	CYP018QL	QLD073	CYP	44834	A2, A7, A8, A9, A10, B2, B13, B14	1, 3, 5
Skardon River–Cotterell River Aggregation	CYP019QL	QLD074	CYP	63194	A7, A8, A9, B4, B9, B13, B14	1, 2, 3, 5
Somerset Dunefield Aggregation	CYP020QL	QLD075	CYP	8095	B5, B10, B13, B14	1, 5
Temple Bay	CYP021QL	QLD076	CYP	4424	A2, A7, A9, B2	1, 2, 3, 5
The Jack Lakes Aggregation	CYP022QL	QLD077	CYP	35054	B2, B5, B13, B14	1
Violet Vale	CYP023QL	QLD078	CYP	1896	B2, B5, B6, B9, B10	1
Aramac Springs	DEU001QL	QLD079	DEU	400	B17	1, 3
Cauckingburra Swamp	DEU002QL	QLD080	DEU	782	B2, B6, B10	1, 2, 3, 4, 5
Doongmabulla Springs	DEU003QL	QLD081	DEU	399	B17	1, 3
Lake Buchanan	DEU004QL	QLD082	DEU	23201	B8, B12	1, 2, 3, 4, 5
Lake Galilee	DEU005QL	QLD083	DEU	25778	B8, B10	1, 2, 3, 4, 5
Balonne River Floodplain	DRP001QL	QLD084	DRP	24000	B1, B2, B4, B5, B10, B14	1, 2, 3
Blencoe Falls–Blencoe Creek	EIU001QL	QLD085	EIU	87	B1, B9	1, 3
Great Basalt Wall	EIU002QL	QLD086	EIU	100253	B1, B2, B4, B5, B6, B9, B10, B14, B17, C2	1, 2, 3, 4, 5, 6
Herbert River Gorge	EIU003QL	QLD087	EIU	21536	B1, B2	1, 2
Innot Hot Springs	EIU004QL	QLD088	EIU	78	B1, B18	1
Lake Lucy Wetlands	EIU005QL	QLD089	EIU	1078	B2, B4, B6, B10, B14	1, 3
Laura Sandstone	EIU006QL	QLD090	EIU	1090	B5, B6, B13, B17	1
Minnamoolka Area	EIU007QL	QLD091	EIU	589	B2, B4, B6, B10	1, 2, 3
Poison Lake	EIU008QL	QLD092	EIU	785	B6	1
Spring Tower Complex	EIU009QL	QLD093	EIU	75	B2, B17, B19	1, 3
Undara Lava Tubes	EIU010QL	QLD094	EIU	1254	B19	1, 2, 3, 5, 6

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Valley of Lagoons	EIU011QL	QLD095	EIU	3645	B1, B2, B6, B10, B14, B17	1, 2, 3, 4, 6
Wairuna Lake	EIU012QL	QLD096	EIU	152	B2, B4, B6, B10, C2	1, 3
Walters Plains Lake	EIU013QL	QLD097	EIU	1548	B6	1
Cairncross Reef Complex	GBR001QL	QLD098		238	A1, A3, A4, A5, A7, A9	1, 3, 4, 5
Clack Reef Complex	GBR002QL	QLD099		1230	A1, A2, A3, A4, A5, A7, A9, B13	1, 3, 5, 6
Great Barrier Reef Marine Park	GBR003QL	QLD100		34250000	A1, A2, A3, A4, A5, A6, A7, A9	1, 2, 3, 4, 5, 6
Lawn Hill Gorge	GFU001QL	QLD101	GFU	1133	B1	1, 2, 3, 6
Bluebush Swamp	GUP001QL	QLD102	GUP	879	B10, B13	1, 2, 3
Buffalo Lake Aggregation	GUP002QL	QLD103	GUP	1909	B8	1, 2, 3
Dorunda Lakes Area	GUP003QL	QLD104	GUP	6801	B1, B2, B4, B6, B9, B10, B14	1, 2, 3
Forsyth Island Wetlands	GUP004QL	QLD105	GUP	6388	A1, A2, A3, A5, A7, A9	1, 3, 5, 6
Lignum Swamp	GUP005QL	QLD106	GUP	282	B2, B9, B10, B13	1, 2, 3
Macaroni Swamp	GUP006QL	QLD107	GUP	258	B6	1, 2, 3
Marless Lagoon Aggregation	GUP007QL	QLD108	GUP	167009	B6, B9, B10, B14	1, 2, 3
Mitchell River Fan Aggregation	GUP008QL	QLD109	GUP	714886	B1, B2, B4, B5, B6, B9, B10, B13, B14, C1	1, 2, 3, 4, 6
Musselbrook Creek Aggregation	GUP009QL	QLD110	GUP	45157	B2, B4, B10, B13, B14	1, 2, 3
Nicholson Delta Aggregation	GUP010QL	QLD111	GUP	63640	A6, A7, A8, A9, A10, A11, A12, B1, B2, B4, B5, B6, B9, B10, B14, C2	1, 2, 3
Smithburne–Gilbert Fan Aggregation	GUP011QL	QLD112	GUP	250320	B1, B2, B4, B5, B6, B10, B13, B14	1, 2, 3, 4
Southeast Karumba Plain Aggregation	GUP012QL	QLD113	GUP	336233	A1, A5, A6, A7, A8, A9, A10, A11, A12, C1	1, 2, 3, 4, 5, 6
Southern Gulf Aggregation	GUP013QL	QLD114	GUP	545353	A1, A2, A5, A6, A7, A8, A9, A10	1, 2, 3, 4, 5, 6
Stranded Fish Lake	GUP014QL	QLD115	GUP	67	A10	1, 2
Wentworth Aggregation	GUP015QL	QLD116	GUP	82430	A5, A6, A7, A8, A9, A10, A11, B1, B2, B4, B5, B9, B10, B13, B14	1, 2, 3, 4
Austral Limestone Aggregation	MGD001QL	QLD117	MGD	69395	B2, B6	1
Elizabeth Springs	MGD003QL	QLD118	MGD	400	B17	1, 3
Gregory River	MII001QL	QLD119	MII	26639	B1	1, 2, 3, 4
Lake Julius	MII002QL	QLD120	MII	1935	C1	1, 2, 3
Lake Moondarra	MII003QL	QLD121	MII	1742	C1	1, 2, 3

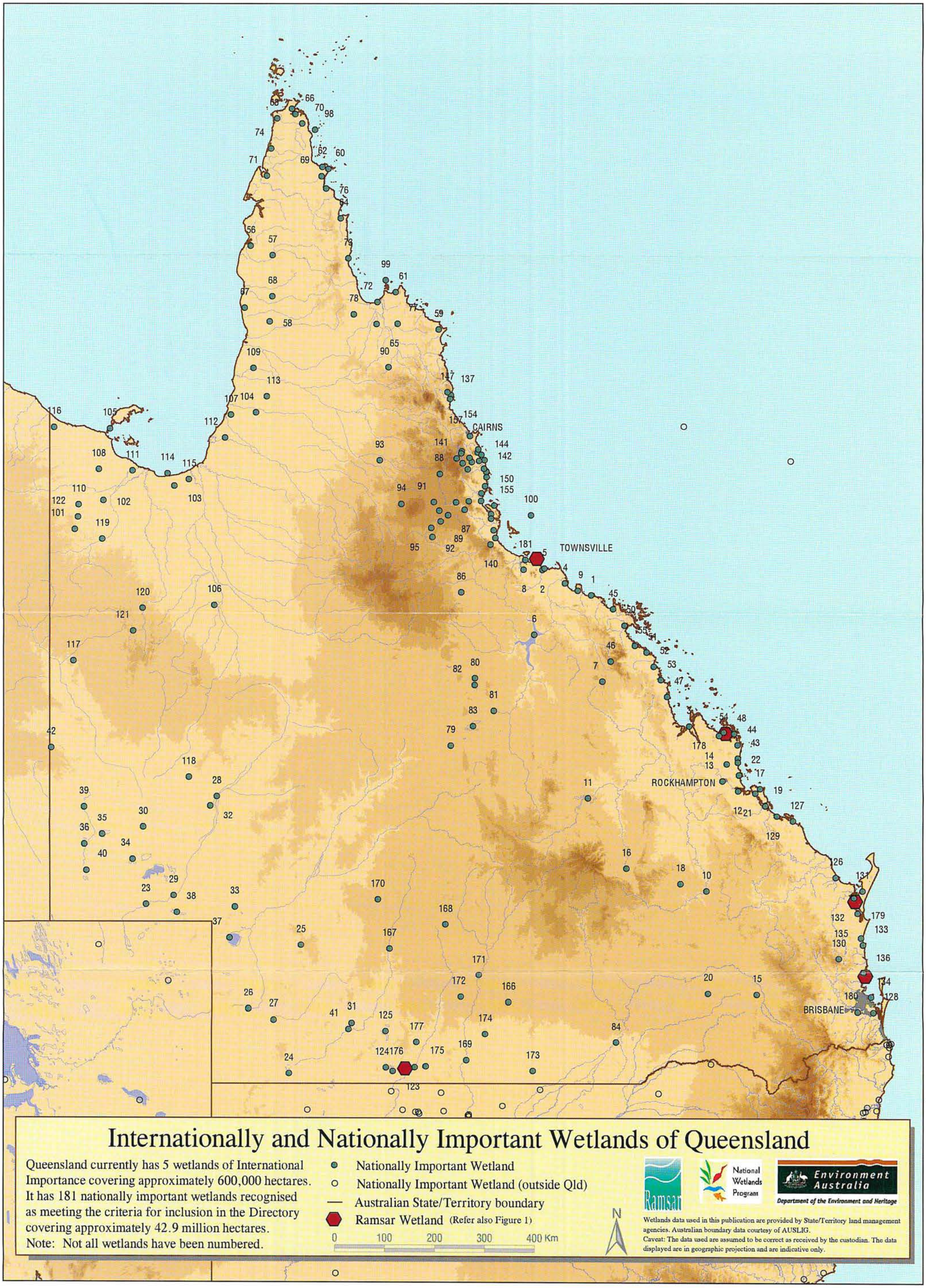
Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Thorntonia Aggregation	MII004QL	QLD122	MII	298888	B1, B2	1, 2, 3, 6
Lake Numalla Aggregation	ML002QL	QLD123	ML	10724	B2, B5, B6, B8	1, 2, 3, 4, 5, 6
Lake Wyara	ML003QL	QLD124	ML	6020	B2, B7, B8, B12	1, 2, 3, 4, 5, 6
Lakes Bindegolly and Toomaroo	ML004QL	QLD125	ML	9677	B4, B5, B6, B12	1, 2, 3, 5
Burrum Coast	SEQ001QL	QLD126	SEQ	15128	A1, A2, A5, A6, A7, A8, A9, A11, A12	1, 2, 3
Bustard Bay Wetlands	SEQ002QL	QLD127	SEQ	21850	A1, A2, A3, A4, A5, A6, A7, A8, A9, A11, A12	1, 2, 3, 5, 6
Carbrook Wetlands Aggregation	SEQ003QL	QLD128	SEQ	329	B9, B13, B14	1, 2
Colosseum Inlet—Rodds Bay	SEQ004QL	QLD129	SEQ	24307	A1, A2, A4, A5, A6, A7, A8, A9	1, 2, 3, 4, 5
Conondale Range Aggregation	SEQ005QL	QLD130	SEQ	1983	B1	1, 3, 4, 5
Fraser Island	SEQ006QL	QLD131	SEQ	163294	A4, A5, A6, A7, A8, A9, A11, B1, B5, B9, B13, B14, B15, B17	1, 2, 3, 4, 5, 6
Great Sandy Strait	SEQ007QL	QLD132	SEQ	93160	A1, A2, A5, A6, A7, A8, A9, A11, A12	1, 2, 3, 4, 5, 6
Lake Weyba	SEQ008QL	QLD133	SEQ	2860	A8, A10, A11, A12, B14, B15	1, 2, 3, 4, 5
Moreton Bay	SEQ009QL	QLD134	SEQ	300177	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, B1, B2, B4, B5, B7, B9	1, 2, 3, 4, 5, 6
Noosa River Wetlands	SEQ010QL	QLD135	SEQ	9945	A5, A6, A7, A8, A9, A11, A12, B1, B4, B5, B7, B9, B10, B14, B15	1, 2, 3, 4, 5, 6
Pumicestone Passage	SEQ011QL	QLD136	SEQ	9442	A1, A2, A5, A6, A7, A8, A9	1, 2, 4, 5
Alexandra Bay	WT001QL	QLD137	WT	841	A5, A6, A9, B14	1, 5
Alexandra Palm Forest	WT002QL	QLD138	WT	146	B1, B14	1, 2, 5
Bambaroo Coastal Aggregation	WT003QL	QLD139	WT	5360	A2, A5, A7, A9, A11, B1, B2	1, 3, 5
Birthday Creek	WT004QL	QLD140	WT	43	B1	1
Bromfield Swamp	WT005QL	QLD141	WT	63	B5, B15	1, 3, 6
Cowley Area[C]	WT006QL	QLD142	WT	8344	A1, A2, A5, A6, A7, A9, A12, B1, B2, B9, B10, B14	1, 3, 5
Edmund Kennedy Wetlands	WT007QL	QLD143	WT	11083	A5, A6, A7, A8, A9, A10, A11, A12, B1, B2, B4, B9, B10, B14	1, 2, 3, 4, 5, 6

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Ella Bay Swamp	WT008QL	QLD144	WT	1315	A5, A7, A8, A9, B1, B2, B14	1, 3, 5
Eubenangee–Alice River	WT009QL	QLD145	WT	1991	B1, B2, B4, B9, B10, B13, B14, B15	1, 3, 5
Herbert River Floodplain	WT010QL	QLD146	WT	44496	A1, A2, A5, A6, A7, A8, A9, A10, A11, B1, B2, B4, B5, B6, B7, B8, B9, B10, B11, B12, B14, C2, C5, C6, C7, C8	1, 2, 3, 4, 5
Hilda Creek Headwater	WT011QL	QLD147	WT	5	B1, B10, B13, B17	1, 2, 4, 5
Hinchinbrook Channel	WT012QL	QLD148	WT	30382	A1, A2, A4, A5, A7, A8, A9	1, 2, 3, 4, 5, 6
Innisfail Area	WT013QL	QLD149	WT	1220	B1, B4, B9, B14, B15	1, 5
Kurrimine Area	WT014QL	QLD150	WT	754	A1, A4, A5, A6, A9, B14	1, 3
Lake Barrine	WT015QL	QLD151	WT	99	B5	1, 2, 6
Lake Eacham	WT016QL	QLD152	WT	43	B5	1, 6
Licuala Palm Forest	WT017QL	QLD153	WT	232	B2, B14	1, 2, 3, 4, 5
Lower Daintree River	WT018QL	QLD154	WT	5276	A6, A9, B1, B14	1, 2, 3, 5
Missionary Bay	WT019QL	QLD155	WT	1129	A1, A2, A5, A6, A7, A8, B1, B2, B10, B14	1, 2, 3, 5, 6
Nandroya Falls	WT020QL	QLD156	WT	19	B1	1, 2, 5
Port of Cairns and Trinity Inlet	WT021QL	QLD157	WT	6389	A1, A2, A5, A6, A7, A8, A9, A10, A12, C6, C7, C8	1, 2, 3, 4
Russell River	WT022QL	QLD158	WT	2377	A5, A6, A9, A12, B1, B2, B14, B15	1, 5
Russell River Rapids	WT023QL	QLD159	WT	235	B1, B4, B9, B14	1, 2, 3, 5, 6
Sunday Creek, Broad-leaved Paperbark Site	WT024QL	QLD160	WT	39	B14	1, 2, 5
Tully River–Murray River Floodplains	WT025QL	QLD161	WT	39154	B1, B4, B5, B6, B9, B10, B14, B15, C2, C6, C7, C8	1, 2, 3, 4, 5, 6
West Mulgrave Falls	WT026QL	QLD162	WT	7	B1	1, 5
Wyvuri Swamp	WT027QL	QLD163	WT	1492	B9, B14	1
Yuccabine Creek	WT028QL	QLD164	WT	529	B1	1, 6
Zillie Falls	WT029QL	QLD165	WT	16	B1, B14	1, 3, 5
Wyandra–Cunnamulla Claypans Aggregation		QLD166	ML	30000	B6, B10, B13	1, 2, 3

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Quilpie (Bulloo River Floodplain) Waterholes		QLD167	ML	30	B2, B4, B5, B6, B10, B13, B14	1, 2, 3
Lake Dartmouth Area		QLD168	ML	10000	B2, B4, B6, B9, B10, B13, B14	1, 2, 3
Warrego River Distributary System		QLD169	ML	12000	B2, B4, B5, B6, B9, B10, B13, B14, C1	1, 2, 3
Mitchell Swamp		QLD170	ML	5000	B6, B10, B13	1
Warrego River Waterholes (Charleville–Wyandra)		QLD171	ML	500	B2, B4, B5, B6, B9, B10	1, 2, 3
"Old Bando" Swamp		QLD172	ML	2000	B6, B10, B13	1
"Myola" –"Mulga Downs" Salt Lake and Claypans		QLD173	ML	8000	B8, B10, B12, B13	1
"Murrawondah" Lakes		QLD174	ML	2500	B6, B10, B13	1
Lake Wombah–Kungie Lake Group		QLD175	ML	20000	B2, B6, B8, B10, B12, B13	1, 2, 3, 5
Paroo River Waterholes ("Caiwarro" Area)		QLD176	ML	25	B2, B4, B5, B6, B9, B10, B13, B14	1, 2, 3, 6
Eulo Artesian Springs Supergroup		QLD177	ML	30	B17	1, 2, 3, 4, 5
Shoalwater Bay Training Area Overview [C]		QLD178	CMC	454000	A1, A2, A4, A6, A7, A8, A9, A10, A11, A12, B2, B5, B15	1, 2, 3, 5
Wide Bay Military Training Area [C]		QLD179	SEQ	19990	A2, A5, A6, A9	1, 2, 3, 4, 5
Greenbank Army Training Area [C]		QLD180	SEQ	4665	B1, B4	1, 5
RAAF Townsville [C]		QLD181	BBN	300	B2, B4, B9, B10	2, 3

C *wetlands occurring in part on land owned or managed by the Commonwealth (eight sites).*

Note: *area figures for the above tables are approximate only.*


CAIRNS
TOWNSVILLE
ROCKHAMPTON
BRISBANE
Internationally and Nationally Important Wetlands of Queensland
Queensland currently has 5 wetlands of International Importance covering approximately 600,000 hectares. It has 181 nationally important wetlands recognised as meeting the criteria for inclusion in the Directory covering approximately 42.9 million hectares.
Note: Not all wetlands have been numbered.
Nationally Important Wetland
Nationally Important Wetland (outside Qld)
Australian State/Territory boundary
Ramsar Wetland (Refer also Figure 1)
0 100 200 300 400 Km
N
Ramsar
National Wetlands Program
Environment Australia
Department of the Environment and Heritage
Wetlands data used in this publication are provided by State/Territory land management agencies. Australian boundary data courtesy of AUSLIG.
Caveat: The data used are assumed to be correct as received by the custodian. The data displayed are in geographic projection and are indicative only.

9. South Australia

Introduction

Josephine Morelli and Mark C. de Jong, Department of Natural Resources and Environment
(abridged from the second edition)

THE STATE OF SOUTH AUSTRALIA (SA), ENCOMPASSING SOME 984,000 KM^2, IS BY FAR THE DRIEST OF ALL AUSTRALIAN STATES WITH 75% RECEIVING LESS THAN 200 MM OF RAINFALL. In spite of this being the driest State in the driest continent, SA contains an array of significant wetlands. The arid interior is notable for its mound springs, salt lakes and pristine freshwater river-floodplain systems of the Lake Eyre Basin. The coastline is 4,000 km long containing two Gulf regions; notable features include sheer cliffs, sandy beaches for thousands of shorebirds, coastal embayments, and several mangrove/samphire and estuarine mud flat systems. Notable in the South East are the coastal salt lakes, freshwater ponds and shallow lagoons, peat fens and marshes. The Riverland region is noted for its freshwater swamps, channels, lakes and floodplains.

Since European settlement, many wetlands, particularly in the southern agricultural regions, have been significantly altered through stock grazing, vegetation clearance, pollution, urban development or hydrological changes. Even so, there are some magnificent areas of wetlands remaining, areas which are highly valued for wildlife, of cultural, scientific and historical interest, and possessing great aesthetic and recreational appeal.

In the first edition of *A Directory of Important Wetlands in Australia* (ANCA 1993), 43 wetlands were listed. Most of these wetlands have been retained and updated while others, such as Serpentine Lakes, Ooldea Soak and Warbla Cave Lakes, have been omitted from the Directory mainly because they either lack site information or no longer meet the criteria for inclusion. The Directory now contains a total of 69 South Australian wetland sites (refer to Figure 7); four of which have been nominated as Ramsar sites. No new sites have been nominated by the State since the second edition of the Directory was published (ANCA 1996), however, one site on Commonwealth land has been added.

The selected sites are categorised according to the Wetland Classification System (see Chapter 2) and described by their physical, hydrological and biological attributes. At present, knowledge of the Riverland, South East, and coastal wetlands is relatively adequate. Work is currently underway to investigate wetlands on the Eyre and Yorke Peninsulas, North Adelaide Plains, and Kangaroo Island. The least known wetland areas remain within the southern Mt Lofty Ranges, Flinders Ranges, Great Victoria Desert and far north-eastern desert and gibber plains.

In the site descriptions, common and scientific names of waterbirds follow Christidis and Boles (1994). The taxonomy of other vertebrates is from Watts (1990). Current botanical names for dominant wetland plant species follow Jessop (1993). Wetlands that support native plant and animal species which are listed as rare, vulnerable or endangered at the State level were identified according to the species scheduled in the *South Australian National Parks and Wildlife Act, 1972* as amended at July 1988. Nationally threatened vertebrate fauna were determined using the ANZECC *List of Endangered Vertebrate Fauna April 1991*. The status of threatened flora species was determined from the *Threatened Australian Flora June 1993* listing prepared by ANZECC.

Conservation and Management

Management of wetlands in South Australia has largely been through the establishment of reserves under the *National Parks and Wildlife Act, 1972*. In recent years there has been an increased recognition by private landholders of the values and roles of wetlands and this has resulted in the protection and management of a number of wetland sites outside the reserve system, particularly in the South East region. So far, there are approximately 120 wetlands in the State's reserve system. Management plans have been prepared for most of these areas. Much of the River Murray floodplain contained within the Riverland Ramsar site (Chowilla, Calperum) is included in the Bookmark Biosphere Reserve. It is noteworthy that the four Ramsar sites within the State are entirely or partially designated as formal nature reserves.

Future Research

While the establishment of a reserve system provides a basis for wetland protection and management, the lack of data available for some wetlands highlights the need for systematic inventories, biological surveys and research programs in many areas of the State. In this Directory the lack of systematic broadscale surveys shows in the gaps of information presented and in the omission of some poorly known yet potentially important sites. This chapter of the Directory remains incomplete until these gaps are filled. It is recommended that a statewide survey be conducted to compare with the results of Lloyd and Balla (1986). Special attention should be given to the bioregions of the Great Victoria Desert, Flinders and Olary Ranges and Nullarbor since present survey information is severely inadequate. One of the obvious gaps in this Directory is the lack of nominations from the Flinders Ranges, therefore future work should be directed towards obtaining information on the wetlands that occur in this bioregion. Any future revisions of the Directory should also include the supplementary list of wetlands included in the second edition (ANCA 1996) that meet one or more of the criteria but remain too poorly known for inclusion at this stage.

Acknowledgments

The South Australian entries in *A Directory of Important Wetlands in Australia* were compiled by Josephine Morelli and Mark C. de Jong, for the then South Australian Department of Environment and Natural Resources (DENR). Funds for this work were provided by the then Australian Nature Conservation Agency through the National Wetlands Program. Many people contributed information or expertise in compiling the South Australian entries in the Directory, and their contribution is acknowledged once again.

Summary analysis

The Directory describes 69 nationally important wetlands in South Australia. The distribution of nationally important wetlands in SA (including Ramsar wetlands) is shown in Figure 7. A list compiling data on bioregion, site area, wetland type and criteria for inclusion for each wetland is provided at the end of this chapter.

Of the 15 bioregions in South Australia, 11 are shared with adjacent jurisdictions and only eight contain nationally important wetlands (refer to Table 9.1). Of these eight, only four have more than three nationally important wetlands listed. The four bioregions with more extensive listings all occur in the more humid south and east of the State. Lofty Block bioregion, in which Adelaide is located, has 18 (26%) of the wetlands listed in the State. An overview of the IBRA regionalisation and a map of IBRA regions is included in Appendix 2.

Table 9.1 Number and area of nationally important wetlands in SA by IBRA region

IBRA Region	IBRA code	No. of Sites	Area (ha)
Broken Hill Complex	BHC	0	0
Central Ranges	CR	0	0
Channel Country	CHC	3	1,980,000
Eyre and Yorke Blocks	EYB	16	38,238
Finke	FIN	0	0
Flinders and Olary Ranges	FOR	1	—
Gawler	GAW	0	0
Great Victoria Desert	GVD	0	0
Hampton	HAM	0	0
Lofty Block	LB	18	50,750
Murray-Darling Depression	MDD	14	44,927
Naracoorte Coastal Plain	NCP	13	293,073
Nullarbor	NUL	0	0
Simpson-Strzelecki Dunefields	SSD	2	1,798,000
Stony Plains	STP	2	19,000
Total	15	69	2,205,750

Note: area figure for Flinders and Olary Ranges not available.

A total of 30 of the 40 wetland types are represented in South Australia (refer to Table 9.2). Most commonly included is type A7—Intertidal mud, sand or salt flats (n=17), followed by A1—Marine waters (n=16), B4—Riverine floodplains (n=15) and B6—Seasonal/intermittent freshwater lakes (n=15). The Wetland classification system and Criteria for inclusion in the Directory are explained in Chapter 2.

Table 9.2 Number of SA sites in each Wetland type

A—Marine and Coastal Zone wetlands

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
Total	16	11	0	4	13	12	17	13	9	3	3	0

B—Inland wetlands

	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19
Total	11	6	1	15	10	15	10	9	7	5	4	4	7	4	7	0	4	0	2

C—Human-made wetlands

	C1	C2	C3	C4	C5	C6	C7	C8	C9
Total	1	0	0	3	0	1	0	0	0

Unlike most other jurisdictions, the majority of South Australian wetlands are included in the Directory because they are important as habitat for animal taxa at a vulnerable stage in their life cycles, or as a refuge during adverse conditions (Criterion 3, n=61) (refer to Table 9.3).

Table 9.3 Number of SA sites included under each Criterion

	1	2	3	4	5	6
Total	54	25	61	5	33	24

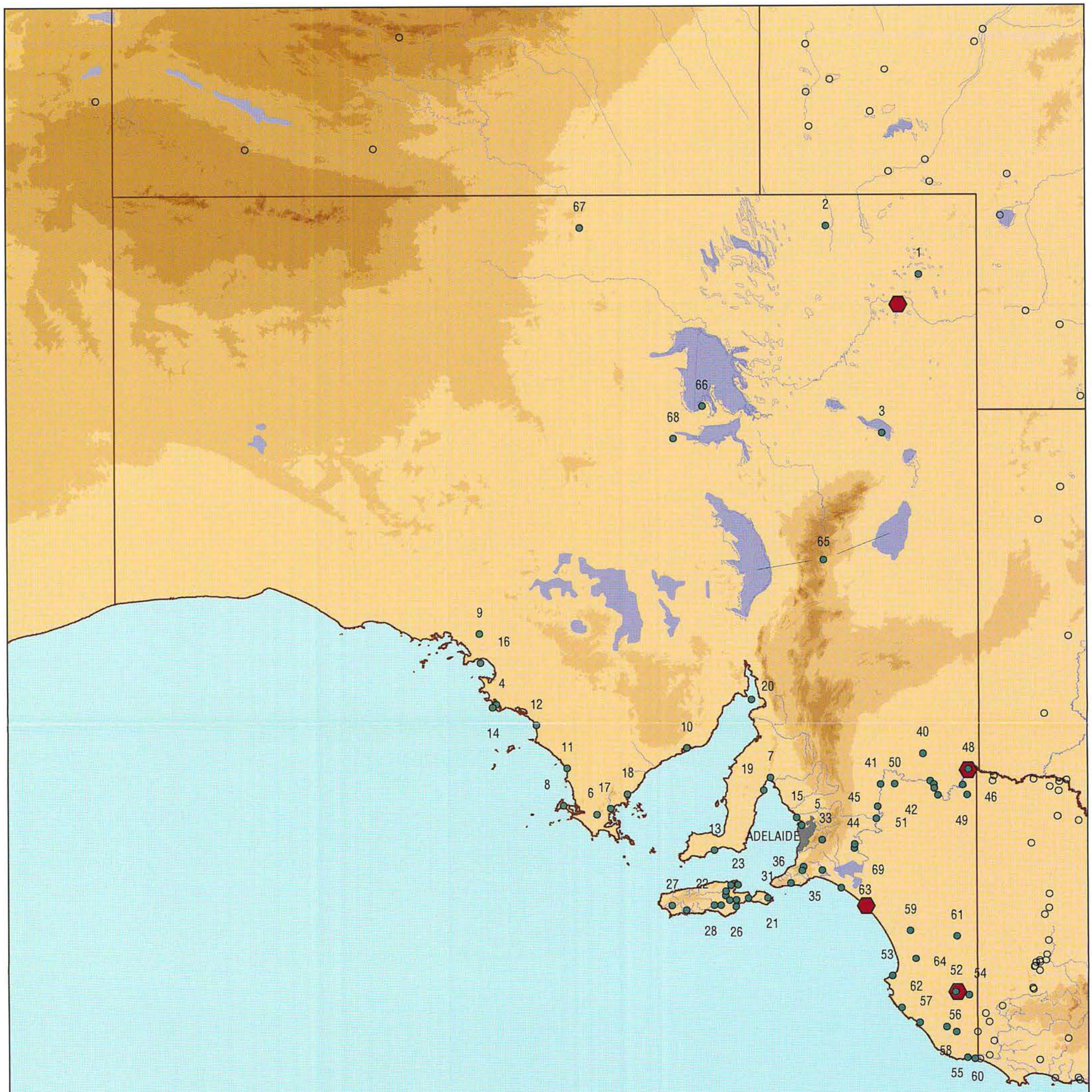
List of nationally important wetlands in South Australia

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Coongie Lakes	CHC004SA	SA001	CHC	1980000	B2, B4, B6	1, 2, 3, 4, 5, 6
Diamantina River Wetland System	CHC010SA	SA002	CHC	—	B1, B2, B4, B13	1, 2, 3
Strzelecki Creek Wetland System	CHC024SA	SA003	CHC	—	B2, B4, B6	1, 2, 3
Baird Bay	EYB001SA	SA004	EYB	250	A1, A4, A5, A7, A8	3
Barker Inlet & St Kilda	EYB002SA	SA005	EYB	—	A1, A2, A6, A7, A8, A9, C4	1, 2, 3, 5, 6
Big Swamp	EYB003SA	SA006	EYB	200	B6	1, 3
Clinton	EYB004SA	SA007	EYB	1964	A1, A2, A6, A7, A8, A9	1, 3
Coffin Bay Coastal Wetland System	EYB005SA	SA008	EYB	—	A1, A4, A5, A7	3, 5, 6
Davenport Creek	EYB006SA	SA009	EYB	—	A1, A4, A5, A7, A8, A9	1, 3, 5, 6
Franklin Harbour	EYB007SA	SA010	EYB	1500	A1, A2, A6, A7, A8, A9	1, 3, 6
Lake Hamilton	EYB008SA	SA011	EYB	2000	B8	1
Lake Newland	EYB009SA	SA012	EYB	8448	B7	1, 3, 5
Point Davenport	EYB010SA	SA013	EYB	181	A10	1, 3, 5
Point Labatt	EYB011SA	SA014	EYB	147	A4, A5	3, 5
Port Gawler & Buckland Park Lake	EYB012SA	SA015	EYB	434	A1, A2, A6, A7, A8, A9, C4, B6	1, 3, 5, 6
Streaky Bay	EYB013SA	SA016	EYB	—	A1, A2, A5, A7, A8, A9	3, 5
Tod River Wetland System	EYB014SA	SA017	EYB	21240	A6, A7, B1, C1	1, 2, 3
Tumby Bay	EYB015SA	SA018	EYB	1000	A1, A2, A5, A6, A7, A8, A9	1, 3
Wills Creek	EYB016SA	SA019	EYB	874	A1, A2, A7, A8, A9, C4	1, 3
Upper Spencer Gulf	FOR001SA	SA020	FOR	—	A1, A2, A6, A7, A8, A9	1, 3, 5, 6
American River Wetland System	LB001SA	SA021	LB	2000	A1, A2, A5, A7, A8, A10	1, 3, 5, 6
Birchmore Lagoon	LB002SA	SA022	LB	150	B7	3
Busby and Beatrice Islets	LB003SA	SA023	LB	1525	A1, A5, A7	3
Cygnet Estuary	LB004SA	SA024	LB	1300	A1, A5, A6, A7, A8	1, 2, 3, 5
Cygnet River	LB005SA	SA025	LB	—	B1, B4	1, 2, 3
D'Estrees Bay	LB006SA	SA026	LB	140	A1, A2, A5, A7	3, 5
Flinders Chase River Systems	LB007SA	SA027	LB	40450	B1, B6, B13, B17	1, 2, 3, 5
Grassdale Lagoons	LB008SA	SA028	LB	135	A6, A11	1, 3, 5
Lake Ada	LB009SA	SA029	LB	994	B7	1, 3
Lanacoona Road Swamps	LB010SA	SA030	LB	30	B15	1, 5
Lashmar Lagoon	LB011SA	SA031	LB	130	A6, A11	3, 5
Murrays Lagoon	LB012SA	SA032	LB	2200	B7	3, 5
Onkaparinga Estuary	LB013SA	SA033	LB	60	A1, A2, A6, A7, A8	1, 3, 6
Tookayerta & Finniss Catchments	LB014SA	SA034	LB	300	B9, B15	1, 3, 5, 6
Upper Hindmarsh River Catchment	LB015SA	SA035	LB	6	B15	1, 2, 5

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Upper Tunkalilla Creek Swamps	LB016SA	SA036	LB	50	B9, B15	1, 2, 5
Waidrowski Lagoon	LB017SA	SA037	LB	530	B7	1, 3, 5
White Lagoon Wetland System	LB018SA	SA038	LB	750	B6, B7	1, 3, 5
Banrock Swamp Wetland Complex	MDD001SA	SA039	MDD	1220	B1, B4, B5, B6	1, 2, 3
Gurra Lakes Wetland Complex	MDD006SA	SA040	MDD	660	B1, B4, B5	3
Irwin Flat	MDD010SA	SA041	MDD	50	B4, B5, B6	1, 3
Loch Luna Wetland Complex	MDD019SA	SA042	MDD	1905	B1, B4, B5	1, 2, 3, 6
Loveday Swamps	MDD020SA	SA043	MDD	479	B2, B4, B5, B6, B7, B8	1, 2, 3, 6
Lower Murray Swamps	MDD022SA	SA044	MDD	155	B4, B5, B9	1, 2, 3
Marne River Mouth	MDD024SA	SA045	MDD	40	B2, B3, B4	1, 2, 3
Noora Evaporation Lakes	MDD027SA	SA046	MDD	500	B7, B11	3
Pike–Mundic Wetland Complex	MDD028SA	SA047	MDD	6700	B1, B4, B5	1, 3, 6
Riverland Wetland Complex	MDD032SA	SA048	MDD	30600	B1, B4, B5, B6, B13, B14	1, 2, 3, 4, 6
Spectacle Lakes	MDD034SA	SA049	MDD	427	B2, B4, B6	1, 2, 3
Stockyard Plain	MDD035SA	SA050	MDD	1870	A5, B7, B11	3, 5
Swan Reach Wetland Complex	MDD036SA	SA051	MDD	250	B1, B4, B6, B9	1, 2, 3
Bool & Hacks Lagoons	NCP001SA	SA052	NCP	3221	B5, B10, B13	1, 2, 3, 4, 6
Butchers & Salt Lakes	NCP002SA	SA053	NCP	40	A5, B8, B12	1, 3, 5
Deadmans Swamp	NCP003SA	SA054	NCP	545	B9, B10	1, 3
Ewens Ponds	NCP004SA	SA055	NCP	5	B1, B9, B15, B19	1, 5, 6
Honans Scrub	NCP006SA	SA056	NCP	842	B10, B14	1, 5
Lake Frome & Mullins Swamp	NCP007SA	SA057	NCP	3216	B8, B11, B12	1, 2, 3
Marshes Swamp	NCP010SA	SA058	NCP	665	B10, B13, B15	1, 3, 5
Naen Naen Swamp & Gum Lagoon	NCP012SA	SA059	NCP	335	B6, B8, B10, B13	3, 5
Piccaninnie Ponds	NCP013SA	SA060	NCP	300	A5, B9, B15, B19	1, 5, 6
Poocher & Mundulla Swamps	NCP014SA	SA061	NCP	300	B5, B6, B14	2, 6
South East Coastal Salt Lakes	NCP015SA	SA062	NCP	137444	A6, B8, B17	1, 3, 6
The Coorong, Lake Alexandrina & Lake Albert	NCP016SA	SA063	NCP	140500	A10, A11, B8, B12	1, 2, 3, 4, 5, 6
Watervalley Wetlands	NCP017SA	SA064	NCP	5660	B6, B7, B11, B12, B13, B14	1, 3, 4
Inland Saline Lakes	SSD001SA	SA065	SSD	829000	B8	1, 2, 3, 6
Lake Eyre	SSD002SA	SA066	SSD	969000	B8	1, 2, 3, 6
Dalhousie Springs	STP001SA	SA067	STP	19000	B17	1, 3, 6
Lake Eyre Mound Springs	STP002SA	SA068	STP	–	B17	1, 2, 3, 5, 6
Murray Bridge Army Training Area Wetlands[C]		SA069	MDD	71	C6	3, 5

C wetlands occurring in part on land owned or managed by the Commonwealth (one site).

Note: area figures for the above tables are approximate only and are not available for all wetlands.



Internationally and Nationally Important Wetlands of South Australia

South Australia currently has 4 wetlands of International Importance covering approximately 2.36 million hectares. It has 69 nationally important wetlands recognised as meeting the criteria for inclusion in the Directory covering pproximately 4.2 million hectares.
Note: Not all wetlands have been numbered.

- Nationally Important Wetland
- Nationally Important Wetland (outside SA)
- Australian State/Territory boundary
- Ramsar Wetland (Refer also Figure 1)

0 100 200 300 400 Km

N

Ramsar

National Wetlands Program

Environment Australia
Department of the Environment and Heritage

Wetlands data used in this publication are provided by State/Territory land management agencies. Australian boundary data courtesy of AUSLIG.
Caveat: The data used are assumed to be correct as received by the custodian. The data displayed are in geographic projection and are indicative only.

10. Tasmania

Introduction

Stewart A. Blackhall, Anne C. McEntee and Elizabeth Rollins, Tasmania Parks and Wildlife Service

DESPITE ITS SIZE OF 68,330 KM^2, THE ISLAND OF TASMANIA (TAS) HAS A WIDE DIVERSITY OF HABITATS. The great geographic and altitudinal variation found on the island means that rainfall varies from 700 to 2,300 mm per annum. There are also wide variations in topography, geology, soil fertility, and other ecological factors such as fire frequency and the presence of light-robbing tannin in the water. This ecological variation, together with Tasmania's placement in the path of the Roaring Forties trade winds and its long coastline of approximately 3,200 km, including offshore islands, has resulted in an unusually rich abundance and diversity of wetlands at all altitudes (Hill and Orchard 1999). Tasmania has representatives of almost every wetland type in the classification system, except for coral reefs and mangroves.

Tasmania's wetlands contain a high proportion of endemic species (eg Bowling *et al.* 1993; Kirkpatrick and Tyler 1988), as well as a disproportionately large percentage of all of the State's vascular species (Kirkpatrick and Harris 1999). Tasmania also provides a significant link in the understanding of southern hemisphere biogeographic processes, with the biota showing elements of its Gondwanan heritage, not evident on the mainland of Australia, as well as distinctly Australian elements (Jackson 1999). Wetlands, including ancient wetlands, provide one of the primary reservoirs of palaeogeographic information (Hill *et al.* 1999). Limnological studies of Tasmanian wetlands have also revealed some unique lentic environments (eg Bowling and Tyler 1988, Edgar *et al.* 1996) and scientific mysteries (eg Cheng and Tyler 1976). In combination, these factors create the unusually high scientific and biological value of Tasmania's wetlands.

Tasmanian wetlands also provide an important resource for many significant migratory birds. Tasmania is the southern-most area in Australia where these birds can rest and feed during their annual migration from the high Arctic.

Tasmania has 89 wetlands listed in *A Directory of Important Wetlands in Australia.* The location of each of the listed sites is illustrated in Figure 8. In this edition, a very significant area including Boullanger Bay and Robbins Passage has been added. A nomination is being prepared to list this area on the Convention on Wetlands (Ramsar, Iran, 1971). Currently Tasmania has ten sites listed under this Convention. Twenty-eight sites are known to host species listed on the Japan—Australia Migratory Bird Agreement (JAMBA) and/or the China—Australia Migratory Bird Agreement (CAMBA).

The 89 sites listed here represent only a fraction of the State's wide range of wetlands. There are at least 800 sites listed on the inventory of Tasmanian wetlands (about one quarter of the estimated number in Tasmania), and it remains the case that much of our knowledge of these wetlands is inadequate or outdated. As discussed by Blackhall *et al.* (1996), about half the State's land area is yet to be investigated for wetlands. In particular, many flowing, artificial and marine waters are still awaiting investigation.

The wetlands are included under a number of Criteria (see Chapter 2), primarily relating to flora and fauna, but some are also listed for significant hydrological or cultural values. Further investigation and increasing recognition of the values of the State's wetlands will undoubtedly lead to the listing of more nationally or internationally significant sites. Sadly, new information has also lead to the de-listing of some wetlands that have been severely disturbed or destroyed. Three sites previously included because they were thought to support threatened taxa have been removed from the Directory because no further work has been done to confirm their presence.

As in other States, Tasmania continues to lose wetlands, primarily to agricultural land clearing, urban development and hydro-electric development. The original extent of wetlands is unknown, and therefore the loss is difficult to quantify. With a small human population of approximately 454,000, the impact has probably been less than in some more populous areas. None-the-less, the inventory of Tasmanian wetlands shows that in 1981 some 51% of known wetlands were disturbed, and 12% were severely disturbed or destroyed (Kirkpatrick and Harwood 1981).

In Tasmania, development has largely concentrated on the relatively fertile North and East coasts, with large, relatively undisturbed areas on the South and West coasts where hydro-electric power generation and logging have been the only industrial activities. This trend has resulted in certain vegetation types such as grasslands being threatened and poorly reserved. Doubtless, this has also led to disproportionate vulnerability of wetland types which predominantly occur in the North and East coasts, and Central Highlands of Tasmania.

Few of the listed wetlands are afforded protection in reserves under the Tasmanian *National Parks and Wildlife Act 1970* or *Crown Lands Act 1976*. These forms of legal "protection" are also often ineffective, as existing buffer zones are frequently inadequate to protect the wetlands from adjacent land use, and the reserve status and corresponding proscriptions are often not adequate to prevent damage. Proscriptions have commonly been ignored by adjacent landowners or other land users with activities such as grazing, clearing and four-wheel driving extending into reserved areas, often to the shoreline. Activities occurring within a wetland's catchment, for example siltation, eutrophication, introduction of weeds etc. pose difficult management problems. Many of these activities in and near the wetlands are generally not monitored, due to shortage of policing resources, and the location of most wetlands near or within private land.

The diversity of Tasmania's wetlands itself poses a management challenge. Important wetlands are widely distributed geographically and very varied in nature. Land managers, planners and developers are sometimes unaware of the existence, form or function of wetlands. The Tasmanian Wetland Inventory (Atkinson 1991) has been useful in timely provision of informed advice in response to development proposals, but is desperately in need of information gathering and updating, and the funds to do so.

Some promising developments include an enhanced interest in "off reserve conservation"; with programs such as Landcare, Coastcare, Rivercare, Bushcare, Land for Wildlife, and

Whole Farm Planning providing support for, and education about, conservation on private land. Catchments are now widely regarded as the basic minimum unit for ecological management, and much of the conservation/management funding is catchment oriented. The Natural Heritage Trust has enabled the formation of a number of catchment management groups that are now preparing plans that should greatly benefit wetlands in the future.

Implementation of the Regional Forest Agreement (RFA—an agreement between the Tasmanian and Commonwealth governments) and subsequent State legislation has led to reservation of new areas, and upgrading of some existing reserves, with the aim of providing a "Comprehensive, Adequate and Representative Reserve System" for forest communities. Many of these areas are, and will remain, in private hands. However, the implementation of the RFA on private land is leading to new, more flexible, more consultative mechanisms for conservation and appropriate management by landowners, as well as (minimal) compensation and legal mechanisms of protection (eg covenants). As monitoring and policing of activities within and around reserves has been and continues to be, one of the main problems of wetland conservation, mechanisms such as extension, compensation and consultation which are inclusive of stakeholders should lead to more effective conservation.

Acknowledgments

The update and addition of information for this edition of *A Directory of Important Wetlands in Australia* was made possible by funding through the National Wetlands Program of Environment Australia. Two people were employed to carry out the work and many others gave freely of their time and made information available for inclusion. In particular, Mrs Priscilla Park of Birds Tasmania provided records from that organisation for many of the sites. Michael Pemberton, Senior Earth Scientist with the Nature Conservation Branch of the Department of Primary Industries, Water and Environment provided much of the information used in the site descriptions and Stephen Harris, Senior Botanist provided information on vegetation.

We also wish to thank Brendan Edgar, Sarah Young, Geoff Larmour and Belinda Thorpe of the Wetlands Section for their support and guidance during the project.

Note: Grid references are given in the site information, as well as latitudes and longitudes, and the TASMAP No. refers to the appropriate 1:100 000 series map (available from the Tasmanian Department of Primary Industries, Water and Environment, http://www.tas.gov.au). The Department of Primary Industries, Water and Environment, which includes the Parks and Wildlife Service, has previously been known by a number of names. The National Parks and Wildlife Service (NPWS) and Lands Department became the Department of Lands Parks and Wildlife, then the Departments of Parks, Wildlife and Heritage (PWH), and Environment and Planning, then the Department of Environment and Land Management (DELM).

Summary analysis

The Directory describes 89 nationally important wetlands in Tasmania. The distribution of nationally important wetlands in Tas (including Ramsar wetlands) is shown in Figure 8. A list compiling data on bioregion, site area, wetland type and criteria for inclusion for each wetland is provided at the end of this chapter.

Eight bioregions occur in Tasmania, with Furneaux the only one that is shared with neighbouring Victoria. All bioregions contain nationally important wetlands (refer to Table 10.1). The six smallest bioregions are found in Tasmania and the remaining two are among the smallest. The second smallest bioregion of D'Entrecasteaux covers 4,203 km^2 but has only three wetlands listed, covering an approximate area of 61 ha. The largest of the Tasmanian bioregions, West and South West, covers 18,269 km^2 and has seven wetlands listed. An overview of the IBRA regionalisation and a map of IBRA regions is included in Appendix 2.

Table 10.1 Number and area of nationally important wetlands in Tas by IBRA region

IBRA Region	IBRA code	No. of Sites	Area (ha)
Ben Lomond	BEN	15	281
Central Highlands	CH	12	2,420
D'Entrecasteaux	DE	3	61
Freycinet	FRE	8	7,650
Furneaux	FUR	14	3,729
Tasmanian Midlands	TM	20	2,128
West and South West	WSW	7	66
Woolnorth	WOO	10	35,179
Total	**8**	**89**	**51,514**

Nineteen of the 40 wetland types are represented in Tasmania, with a majority of these Marine and Coastal Zone wetlands (refer to Table 10.2). Apart from the ACT and the islands of the External Territories, Tasmanian wetlands exhibit the smallest range of Inland wetland types, with only seven represented. The most commonly listed type is A11—Freshwater lagoons and marshes in the coastal zone (n=20), and the next most common types are A10—Brackish to saline lagoons and marshes (n=13) and B15—Peatlands (n=13).
The Wetland classification system and Criteria for inclusion in the Directory are explained in Chapter 2.

Table 10.2 Number of Tas sites in each Wetland type

A—Marine and Coastal Zone wetlands

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
Total	4	2	0	3	2	5	1	4	1	13	20	0

B—Inland wetlands

	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19
Total	11	0	0	0	9	2	3	2	3	0	0	0	0	0	13	0	0	0	0

C—Human-made wetlands

	C1	C2	C3	C4	C5	C6	C7	C8	C9
Total	1	0	0	2	0	0	0	0	0

Unlike all other jurisdictions, Tasmanian wetlands are most often included in the Directory because they support taxa or communities that are nationally threatened (Criterion 5, n=74). The next most important reason for inclusion is because they are good examples of a wetland type within a particular bioregion (Criterion 1, n=31) (refer to Table 10.3).

Table 10.3 Number of Tas sites included under each Criterion

	1	2	3	4	5	6
Total	31	6	9	4	74	6

List of nationally important wetlands in Tasmania

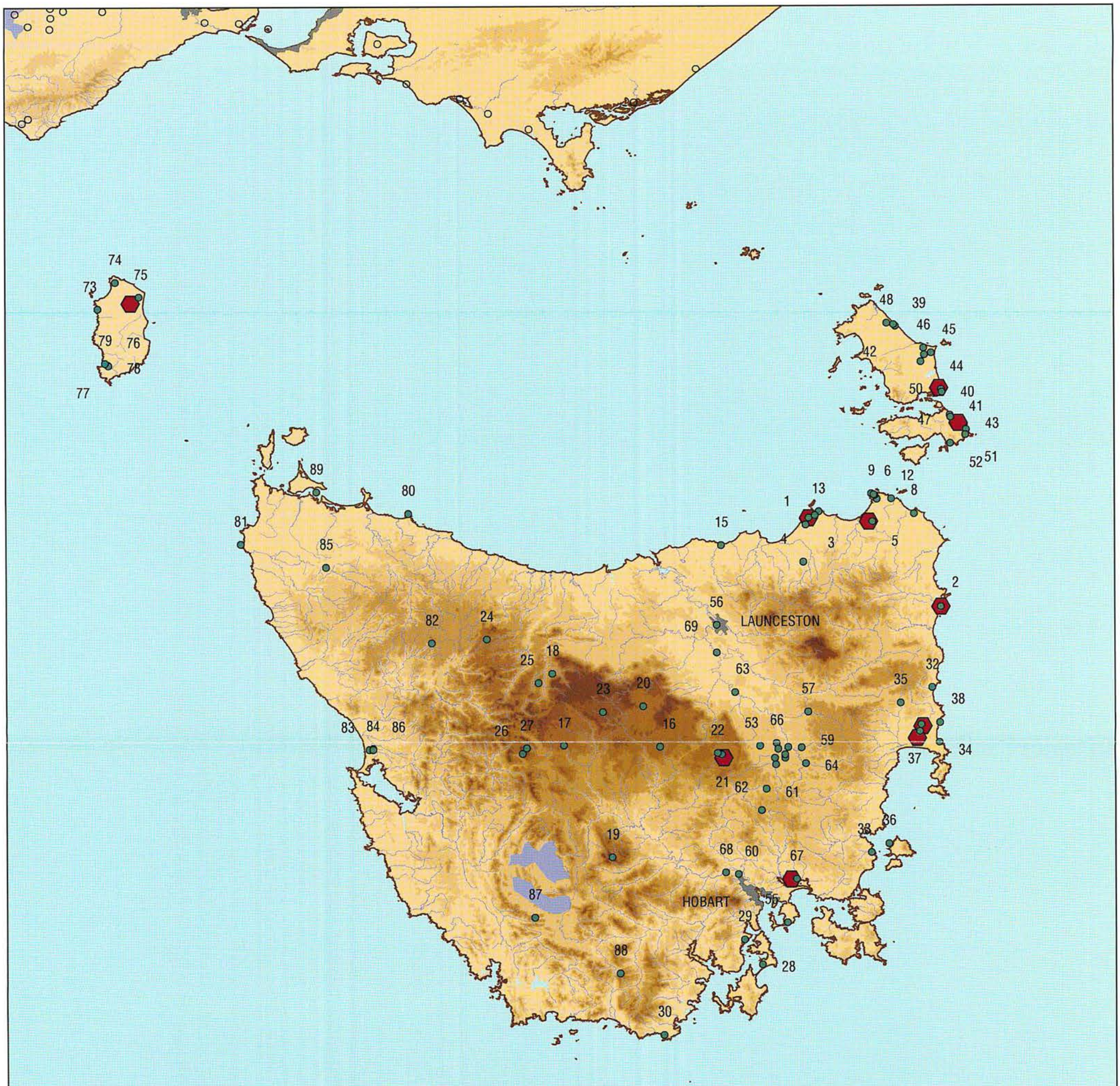
Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Blackmans Lagoon	BEN001TA	TAS001	BEN	28	A11	5
Jocks Lagoon	BEN002TA	TAS002	BEN	19	A11	5
Little Waterhouse Lake	BEN003TA	TAS003	BEN	56	A11	1, 5
Surveyors Creek	BEN004TA	TAS004	BEN	10	B1	5
The Chimneys (Lower Ringarooma River floodplain)	BEN005TA	TAS005	BEN	90	A11	5
Tregaron Lagoons 1	BEN006TA	TAS006	BEN	16	A11	5
Tregaron Lagoons 2	BEN007TA	TAS007	BEN	20	A10	5
Unnamed Wetland	BEN008TA	TAS008	BEN	1	A11	5
Unnamed Wetland	BEN009TA	TAS009	BEN	7	A10	5
Unnamed Wetland	BEN010TA	TAS010	BEN	2	A8	5
Unnamed Wetland	BEN011TA	TAS011	BEN	10	A10	5
Unnamed Wetland	BEN012TA	TAS012	BEN	5	A6	5
Unnamed Wetland	BEN013TA	TAS013	BEN	12	A8	5
Unnamed Wetland	BEN014TA	TAS014	BEN	2	A11	5
Unnamed Wetland	BEN015TA	TAS015	BEN	3	B15	5
Allwrights Lagoons	CH001TA	TAS016	CH	6	B15	5
Clarence Lagoon	CH002TA	TAS017	CH	100	B5	5
Dublin Bog	CH003TA	TAS018	CH	1	B15	5
Eagle Tarn Sphagnum	CH004TA	TAS019	CH	1	B15	5
Great Lake	CH005TA	TAS020	CH	1400	C1	5
Interlaken Lakeside Reserve (Lake Crescent)	CH006TA	TAS021	CH	519	B5	1, 3, 5
Kemps Marsh (Lake Sorell)	CH007TA	TAS022	CH	230	B15	2, 3, 5
Lake Kay	CH008TA	TAS023	CH	60	B5	5
Lake Lea	CH009TA	TAS024	CH	100	B5	1
Maggs Mountain Sphagnum	CH010TA	TAS025	CH	1	B15	5
Mt Rufus Sphagnum	CH011TA	TAS026	CH	1	B15	1, 5
Shadow Lake Sphagnum	CH012TA	TAS027	CH	1	B15	1, 5
D'Arcy's Lagoon	DE001TA	TAS028	DE	26	A11	5
Oyster Cove	DE002TA	TAS029	DE	25	A1	6
South East Cape Lakes	DE003TA	TAS030	DE	10	A11	1, 5
Apsley Marshes	FRE001TA	TAS031	FRE	865	A11	2, 5
Douglas River	FRE002TA	TAS032	FRE	100	B1	1, 5
Earlham Lagoon	FRE003TA	TAS033	FRE	220	A5, A10	5

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Freshwater Lagoon	FRE004TA	TAS034	FRE	14	A10	5
Hardings Falls Forest Reserve	FRE005TA	TAS035	FRE	1009	B1	5
Maria Island Marine Reserve	FRE006TA	TAS036	FRE	1500	A1, A2, A4	1, 3
Moulting Lagoon	FRE007TA	TAS037	FRE	3930	A6	1, 3, 6
Unnamed Wetland	FRE008TA	TAS038	FRE	12	A11	5
Fergusons Lagoon	FUR001TA	TAS039	FUR	75	A11	5
Flyover Lagoon 1	FUR002TA	TAS040	FUR	18	A10	5
Flyover Lagoon 2	FUR003TA	TAS041	FUR	24	A10	5
Hogans Lagoon	FUR004TA	TAS042	FUR	85	A11	5
Little Thirsty Lagoon	FUR005TA	TAS043	FUR	30	A10	5
Logan Lagoon	FUR006TA	TAS044	FUR	2172	A11	1, 2, 3, 5
Sellars Lagoon	FUR007TA	TAS045	FUR	1200	A10	5
Stans Lagoon	FUR008TA	TAS046	FUR	20	B15	5
Syndicate Lagoon	FUR009TA	TAS047	FUR	1	A10	5
Thompsons Lagoon	FUR010TA	TAS048	FUR	55	B15	5
Unnamed wetland	FUR011TA	TAS049	FUR	25	B15	5
Unnamed wetland	FUR012TA	TAS050	FUR	4	B15	5
Unnamed wetland	FUR013TA	TAS051	FUR	2	A10	5
Unnamed wetland	FUR014TA	TAS052	FUR	18	A11	5
Bells Lagoon	TM001TA	TAS053	TM	80	B7	1, 6
Blackman River 1	TM002TA	TAS054	TM	1	B1	1
Calverts Lagoon	TM003TA	TAS055	TM	46	A10	1
Cataract Gorge	TM004TA	TAS056	TM	1	B1	5, 6
Elizabeth River Gorge	TM005TA	TAS057	TM	1	B1	5
Folly Lagoon	TM006TA	Deleted				
Glen Morey Saltpan	TM007TA	TAS058	TM	15	C4	1
Glen Morriston Rivulet 1	TM008TA	TAS059	TM	1	B1	1, 5
Goulds Lagoon	TM009TA	TAS060	TM	3	A10	3
Lake Dulverton	TM010TA	TAS061	TM	200	B6	5
Lake Tiberias	TM011TA	TAS062	TM	900	B6	5
Macquarie River 2	TM012TA	TAS063	TM	1	B1	5
Macquarie River 4	TM013TA	TAS064	TM	1	B1	5
Mona Vale Saltpan	TM014TA	TAS065	TM	26	C4	1
Near Lagoon	TM015TA	TAS066	TM	15	B8	1, 5
Pitt Water and Orielton Lagoon	TM016TA	TAS067	TM	265	A8	3, 4, 5
River Derwent	TM017TA	TAS068	TM	550	A6	5

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
South Esk River 1	TM018TA	TAS069	TM	1	B1	5
Tin Dish Rivulet 1	TM019TA	TAS070	TM	1	B1	1, 5
Township Lagoon	TM020TA	TAS071	TM	10	B7	1, 4, 5
White Lagoon	TM021TA	TAS072	TM	10	B8	1, 6
Bungaree Lagoon	WOO001TA	TAS073	WOO	11	B7	5
Lake Flannigan	WOO002TA	TAS074	WOO	150	B5	5
Lavinia Nature Reserve (Lake Martha Lavinia, Sea Elephant Wildlife Sanctuary, Nook Swamps	WOO003TA	TAS075	WOO	6904	A6, A9, B5	3, 4, 5
Pearshape Lagoon 1	WOO004TA	TAS076	WOO	6	A11	1
Pearshape Lagoon 2	WOO005TA	TAS077	WOO	2	A11	1
Pearshape Lagoon 3	WOO006TA	TAS078	WOO	1	A11	1, 5
Pearshape Lagoon 4	WOO007TA	TAS079	WOO	2	A11	1, 5
Rocky Cape Marine Area	WOO008TA	TAS080	WOO	100	A1, A4	1, 5
Unnamed wetland	WOO009TA	TAS081	WOO	3	A11	5
Hatfield Sphagnum	WSW001TA	TAS082	WSW	1	B15	1, 5
Lake Ashwood	WSW002TA	TAS083	WSW	12	B5	1, 5
Lake Bantick	WSW003TA	TAS084	WSW	5	B9	1, 5
Lake Chisholm	WSW004TA	TAS085	WSW	5	B9	2
Lake Garcia	WSW005TA	TAS086	WSW	8	B9	1, 5
Lake Surprise	WSW006TA	TAS087	WSW	25	B5	5
Lake Sydney	WSW007TA	TAS088	WSW	10	B5	2
Little Bellinger	WSW008TA	Deleted				
Unnamed wetland	WSW009TA	Deleted				
Boullanger Bay—Robbins Passage		TAS089	WOO	28000	A1, A2, A4, A5, A6, A7, A8	1, 2, 3, 4, 5, 6

Note: area figures for the above tables are approximate only.

Internationally and Nationally Important Wetlands of Tasmania



Tasmania currently has 10 wetlands of International Importance covering approximately 26,000 hectares. It has 89 nationally important wetlands recognised as meeting the criteria for inclusion in the Directory covering approximately 51,500 hectares.
Note: Not all wetlands have been numbered.

- Nationally Important Wetland
- Nationally Important Wetland (outside Tasmania)
- Australian State/Territory boundary
- Ramsar Wetland (Refer also Figure 1)

0 50 100 150 Km

N

Ramsar

National Wetlands Program

Environment Australia
Department of the Environment and Heritage

Wetlands data used in this publication are provided by State/Territory land management agencies. Australian boundary data courtesy of AUSLIG.
Caveat: The data used are assumed to be correct as received by the custodian. The data displayed are in geographic projection and are indicative only.

11. Victoria

Introduction

Janet Holmes, Department of Natural Resources and Environment

THE THIRD EDITION OF THE DIRECTORY LISTS 159 NATIONALLY IMPORTANT WETLANDS FOR VICTORIA (VIC). The location of each of these sites is illustrated in Figure 9. The wetland entries provide a valuable resource aimed at raising awareness in the Victorian community about the values of important wetlands. The information on individual wetlands also provides a basis for community organisations, water and land managers, planners in local government, and catchment management authorities to undertake actions that will contribute towards the conservation of the wetlands listed.

Victoria, located in south-eastern Australia, is one of the smaller States with an area of 227,600 km^2. The State has a relatively high population density by Australian standards. Wetlands in Victoria are diverse and range from alpine bogs, riverine wetlands, fresh and saline lakes, coastal estuaries, shores and bays to human-made impoundments, sewage ponds and farm dams.

Wetlands are concentrated in the following bioregions: the Naracoorte Coastal Plain, the Victorian Volcanic Plain, the South East Coastal Plain, the Riverina and the southern and northern parts of the Murray-Darling Depression and the Victorian Embayments marine bioregion. In bioregions of higher relief (the Australian Alps and the South Eastern Highlands), and in the north west of the State in the mallee dunefields of the Murray Darling Depression, wetlands are much less common.

The largest areas of wetlands are in the south-east of the State where there are extensive areas of intertidal flats, including Western Port, Corner Inlet and the Gippsland Lakes. In addition, large freshwater wetlands occur along the lower reaches of rivers discharging into the Gippsland Lakes. Large numbers of smaller wetlands predominate in the south-west of the State with extensive areas of shallow freshwater marshes and meadows. Major riverine wetlands exist along the Murray and Goulburn Rivers in the north of the State. Human-made wetlands of significance include current or former saltworks near Melbourne and Geelong and sewage treatment plants servicing Melbourne.

Wetland classification and mapping was undertaken across Victoria from 1980 onwards culminating in a Statewide wetland inventory and publication of a report assessing Victoria's wetlands in 1992 (DCE and OOE 1992) and completion of a geospatial wetlands layer in 1994. The inventory lists approximately 13,000 naturally occurring wetlands (over one hectare in size) covering about 635,000 hectares. These have been classified into six categories: freshwater meadows, shallow freshwater marshes, deep freshwater marshes,

permanent open freshwater wetlands, semi-permanent saline wetlands and permanent saline wetlands. The inventory also records the extent of wetlands in these categories at the time of European settlement. In addition, it also lists approximately 3,600 human-made wetlands. These form about 100,000 hectares of mainly permanent open freshwater wetland, sewage ponds and salt works habitats.

The Victorian wetland classification system differs from that used in the Directory in that the latter covers a wider range of wetland types. Wetland types in Victoria covered by the Directory definition of wetlands but not listed in the inventory include:

- beaches
- rocky marine shores
- subtidal aquatic beds and marine waters, including bays
- rivers and streams
- freshwater springs
- subterranean karst wetlands
- excavations
- irrigated land and irrigation channels
- alpine wetlands; and
- farm ponds (less than one hectare).

A significant proportion of wetland area in Victoria (about 75%) is on public land and is managed for a variety of public purposes such as biodiversity conservation, forestry, irrigation and water supply, wastewater treatment and recreation. Public land wetlands mostly include the large and more permanent wetlands, which make up only about 20% of the total number. The remaining 80% of wetlands are on private land and tend to be smaller and less permanent and are mostly located on land used for agriculture. One hundred and sixty four species of vertebrates and 841 species of vascular plants have been recorded in Victoria's wetlands.

European settlement and development has had serious impacts on wetlands. The Victorian inventory shows that thirty-seven percent of wetland area has been lost, mainly due to drainage. The impact has been greatest for natural freshwater meadows (43% of original area lost), shallow freshwater marshes (60% of original area lost) and deep freshwater marshes (70% of original area lost). Over 90% of the wetland area lost was on private land. Areas most affected by drainage are south-west Victoria and the irrigation areas around Kerang and Shepparton.

Additional threats to the hydrological regime of wetlands result from changes to local or regional water tables, use of wetlands for water storage or wastewater disposal and river regulation. Salinisation also presents a significant threat to wetlands where irrigation and land clearing have resulted in raised saline water tables, where saline irrigation tailwaters are disposed into wetlands, or where estuaries are artificially opened to the sea. Other threats include increased nutrient loads from runoff in urban and agricultural areas, sedimentation, dredging in coastal wetlands and invasion by pest plants and animals.

A number of the actions have contributed to the identification of important wetlands for inclusion in the Directory. These include:

- establishment of criteria and a process to identify high value wetlands in Victoria and identification of 104 such wetlands or wetland systems by the end of 1993;
- completion of a Statewide inventory of wetlands in 1994;

- inclusion of most high value wetlands and some additional wetlands in the first edition of the Directory (with Commonwealth funding assistance);
- review and updating of the first edition Directory entries and addition of alpine and subalpine wetlands (with Commonwealth funding assistance) to the second edition of the Directory in 1996;
- addition of 21 wetlands in north-west, south-west Victoria and east Gippsland and 17 rivers and streams for the third edition.

The Directory in its current form is the result of many years' work by Department of Natural Resources and Environment (NRE) staff, field naturalists and many other individuals. It provides an informative and practical summary of the State's significant wetlands. NRE is currently planning a project to map Directory wetlands on a geospatial layer.

This revised edition of the Directory largely completes the representation of wetland categories in the Victorian inventory across Victoria and the representation of alpine wetlands and rivers and streams. Wetlands in other categories covered by the Directory but not the Victorian inventory will be considered for addition to the Directory as resources permit.

Summary analysis

The Directory describes 159 nationally important wetlands in Victoria. The distribution of nationally important wetlands in Vic (including Ramsar wetlands) is shown in Figure 9. A list compiling data on bioregion, site area, wetland type and criteria for inclusion for each wetland is provided at the end of this chapter.

Victoria comprises 11 bioregions, eight of which it shares with adjacent States and the ACT (refer to Table 11.1). The only bioregion not having any nationally important wetlands listed is Furneaux, the smallest of all the bioregions, 17.8% of which occurs in Victoria. Most wetlands are listed for Murray-Darling Depression bioregion (n=32) in the north-west of the State, and Riverina (n=30) in the north central area. A number of the newly added Victorian rivers traverse more than one bioregion; only the first listed bioregion for these sites is used for the analysis below on the assumption that this is where the larger part of the river lies. An overview of the IBRA regionalisation and a map of IBRA regions is included in Appendix 2.

Table 11.1 Number and area of nationally wetlands in Vic by IBRA region

IBRA Region	IBRA code	No. of Sites	Area (ha)
Australian Alps	AA	3	13
Furneaux	FUR	0	0
Murray-Darling Depression	MDD	32	143,693
NSW South Western Slopes	NSS	2	18,525
Naracoorte Coastal Plain	NCP	7	8,120
Riverina	RIV	30	86,661
South East Coastal Plain	SCP	23	154,284
South East Corner	SEC	14	74,244
South Eastern Highlands	SEH	14	16,610
Victorian Midlands	VM	8	8,631
Victorian Volcanic Plain	VVP	26	47,107
Total	11	159	557,888

Twenty-nine of the 40 wetland types used to categorise sites are represented in Victoria, with the greatest number included being types B10—Seasonal/intermittent freshwater ponds and marshes (n=30), and B7—Permanent saline/brackish lakes (n=27) (refer to Table 11.2). The Wetland classification system and Criteria for inclusion in the Directory are explained in Chapter 2.

Table 11.2 Number of Vic sites in each Wetland type

A—Marine and Coastal Zone wetlands

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
Total	6	6	0	3	8	7	9	16	3	14	13	0

B—Inland wetlands

	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19
Total	25	6	0	23	20	19	27	22	5	30	3	16	11	17	8	0	0	0	0

C—Human-made wetlands

	C1	C2	C3	C4	C5	C6	C7	C8	C9
Total	8	2	0	5	0	2	0	0	3

Victoria's 159 wetlands are most often included in the Directory because they are good examples of a wetland type within the bioregion (Criterion 1, n=132) or because they provide habitat for taxa at a vulnerable stage of their lives (Criterion 3, n=122) (refer to Table 11.3).

Table 11.3 Number of Vic sites included under each Criterion

	1	2	3	4	5	6
Total	132	73	122	50	52	38

List of nationally important wetlands in Victoria

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Caledonia Fen	AA003VI	VIC001	AA	6	B15	1
Davies Plain	AA005VI	VIC002	AA	–	B15	3, 5
Mount Buffalo Peatlands	AA008VI	VIC003	AA	7	B15	1
Belsar Island	MDD002VI	VIC004	MDD	2500	B4	2
Beveridge Island	MDD003VI	VIC005	MDD	1018	B4	2, 3
Bunguluke Wetlands, Tyrrell Creek & Lalbert Creek Floodplains	MDD004VI	VIC006	MDD	530	B2, B14	1, 2
Hattah Lakes	MDD007VI	VIC007	MDD	1018	B6, B14	1, 2, 3, 6
Heards Lake	MDD008VI	VIC008	MDD	135	B8	4
Heywoods Lake	MDD009VI	VIC009	MDD	228	B6	6
Kings Billabong Wetlands	MDD011VI	VIC010	MDD	502	B4	1, 6
Lake Albacutya	MDD012VI	VIC011	MDD	5700	B4, B6	1, 2, 3, 4
Lake Hindmarsh	MDD013VI	VIC012	MDD	15600	B5	1, 2, 3, 6
Lake Lalbert	MDD014VI	VIC013	MDD	500	B6, B14	1, 2, 6
Lake Ranfurly	MDD015VI	VIC014	MDD	265	B7	3, 4
Lake Tyrrell	MDD016VI	VIC015	MDD	20860	B8, C4	1, 2
Lake Wallawalla	MDD017VI	VIC016	MDD	828	B6	1, 3
Lindsay Island	MDD018VI	VIC017	MDD	15000	B4	1, 2, 3
Major Mitchell Lagoon	MDD023VI	VIC018	MDD	9	B5	6
Mitre Lake	MDD025VI	VIC019	MDD	784	B8	1, 2, 3, 4
Natimuk Lake, Natimuk Creek & Lake Wyn Wyn	MDD026VI	VIC020	MDD	1170	B6, B8	1, 3, 4
Pink Lake (Lochiel)	MDD029VI	VIC021	MDD	106	B8	1
Pink Lakes	MDD030VI	VIC022	MDD	393	B8	1, 6
Raak Plain	MDD031VI	VIC023	MDD	550	B8	1, 5
Saint Marys Lake	MDD033VI	VIC024	MDD	113	B5	3
Wallpolla Island	MDD037VI	VIC025	MDD	9200	B4	1, 2, 3
Wargan Basins (Meridian Lakes)	MDD038VI	VIC026	MDD	690	C4	1, 2, 3
White Lake	MDD039VI	VIC027	MDD	620	B8	2, 3, 4
Glenelg Estuary	NCP005VI	VIC028	NCP	98	A10	1, 2, 3, 5, 6
Lindsay–Werrikoo Wetlands	NCP008VI	VIC029	NCP	1785	B10	1, 2, 3
Long Swamp	NCP009VI	VIC030	NCP	764	A11	1, 3, 5, 6
Mundi–Selkirk Wetlands	NCP011VI	VIC031	NCP	2032	B10	1, 2, 3
Lake Hume	NSS001VI	VIC032	NSS	18465	C1	1, 2, 6
Ryans Lagoon	NSS003VI	VIC033	NSS	60	B4, B10, B14	1, 6

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Barmah—Millewa Forest	RIV001VI	VIC034	RIV	29500	B1, B2, B4	1, 2, 3, 5
Black Swamp	RIV003VI	VIC035	RIV	176	B14	1, 3
Broken Creek	RIV005VI	VIC036	RIV	2500	B4	1, 2, 3
Cemetery Swamp	RIV006VI	VIC037	RIV	89	B4	1, 2
First Marsh (The Marsh)	RIV008VI	VIC038	RIV	780	B6	2, 3
Fosters Swamp	RIV009VI	VIC039	RIV	219	B8	2, 3
Gunbower Island	RIV011VI	VIC040	RIV	19500	B4, B14	1, 2, 3
Hird's Swamp	RIV012VI	VIC041	RIV	344	B10	1, 2, 3
Johnson's Swamp	RIV013VI	VIC042	RIV	411	B10	1, 2, 3
Kanyapella Basin	RIV014VI	VIC043	RIV	2581	B10, B14	1, 2, 3
Kow Swamp	RIV016VI	VIC044	RIV	2724	B5, C1	1, 2, 3, 6
Lake Bael Bael	RIV018VI	VIC045	RIV	648	B5	1, 2, 3
Lake Charm	RIV020VI	VIC046	RIV	520	B5, C1	2, 3
Lake Cullen	RIV021VI	VIC047	RIV	632	B8	1, 2, 3, 4, 6
Lake Kelly & Stevensons Swamp	RIV022VI	VIC048	RIV	320	B8, C4	1, 3, 4
Lake William	RIV024VI	VIC049	RIV	96	C4	3, 4
Little Lake Charm, Kangaroo Lake & Racecourse Lake	RIV025VI	VIC050	RIV	1332	B5, C1	2, 3
Lower Broken River	RIV026VI	VIC051	RIV	1268	B1, B4	3, 6
Lower Goulburn River Floodplain	RIV027VI	VIC052	RIV	13000	B4, B14	1, 2
Muckatah Depression	RIV032VI	VIC053	RIV	2909	B4, B10	1, 2
Second Marsh (Middle Marsh)	RIV033VI	VIC054	RIV	233	B14	2, 3
Tang Tang Swamp	RIV034VI	VIC055	RIV	103	B6, B14	1, 2, 3, 6
Third Marsh (Top Marsh)	RIV035VI	VIC056	RIV	946	B14	1, 2, 3
Third, Middle and Reedy Lakes	RIV036VI	VIC057	RIV	598	B5, C1	1, 2, 3
Town Swamp	RIV037VI	VIC058	RIV	80	B10	1, 2
Tragowel Swamp (McPhails Swamp)	RIV038VI	VIC059	RIV	262	B6	3
Wallenjoe Wetlands	RIV041VI	VIC060	RIV	303	B14	1, 2, 3
Woolshed Swamp	RIV043VI	VIC061	RIV	353	B6, B14	1, 3
Anderson Inlet	SCP001VI	VIC062	SCP	2230	A1, A5, A6, A7, A9	2, 3, 4
Bald Hills State Wildlife Reserve	SCP002VI	VIC063	SCP	1	B9	1, 3, 5
Billabong Reserve	SCP003VI	VIC064	SCP	23	B10	1, 5
Bosses/Nebbor Swamp	SCP004VI	VIC065	SCP	235	B10	1, 3
Corner Inlet	SCP005VI	VIC066	SCP	51500	A1, A2, A4, A5, A7, A8, A9	1, 3, 4, 5
Deep Water Morass	SCP006VI	VIC067	SCP	30	B1, B10, B13	1, 3, 5

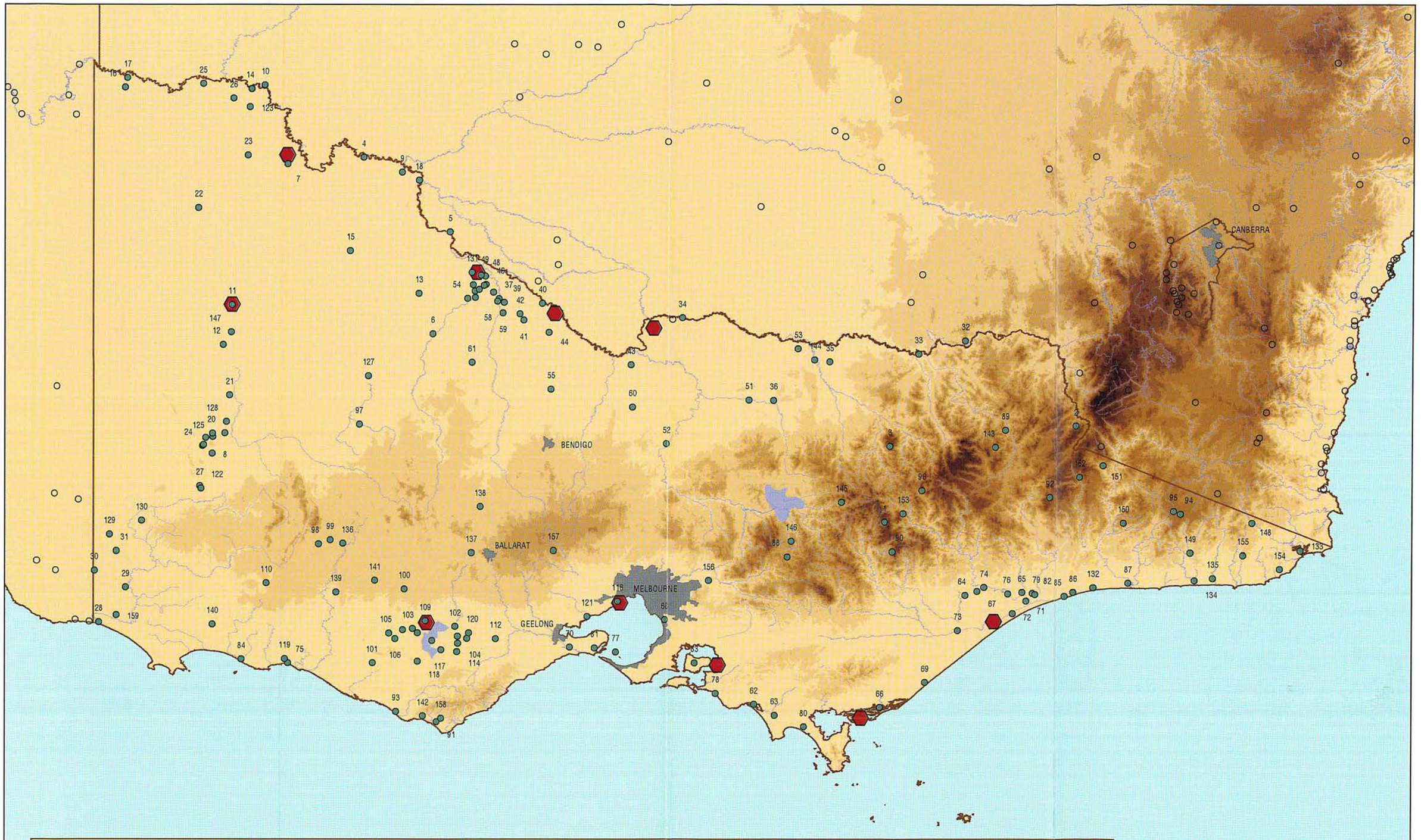
Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Edithvale—Seaford Wetlands	SCP007VI	VIC068	SCP	215	B4, B7, B8, B9, B10, B13	1, 3, 6
Jack Smith Lake State Game Reserve	SCP008VI	VIC069	SCP	2730	A10	1, 3, 5
Lake Connewarre State Wildlife Reserve	SCP009VI	VIC070	SCP	3100	A6, A8, B4, B5, B10	1, 2, 3, 4, 5
Lake King Wetlands	SCP010VI	VIC071	SCP	7100	A8, A10, A11	1, 2, 3, 4, 5
Lake Victoria Wetlands	SCP011VI	VIC072	SCP	10850	A8, A10	1, 2, 3, 5, 6
Lake Wellington Wetlands[C]	SCP012VI	VIC073	SCP	18000	A11, B1, B4, B7, B8, B13	1, 2, 3, 4, 5, 6
Lindenow Wildlife Sanctuary	SCP013VI	VIC074	SCP	26	B9, C6	1, 3
Lower Merri River Wetlands	SCP014VI	VIC075	SCP	146	A10, A11	1, 2 ,3 ,5
Macleod Morass	SCP015VI	VIC076	SCP	520	A11	1, 3
Mud Islands	SCP016VI	VIC077	SCP	656	A2, A5, A7, A8	1, 2, 3, 4, 5
Powlett River Mouth	SCP017VI	VIC078	SCP	—	A6, A8, A10	6
Russells Swamp	SCP018VI	VIC079	SCP	125	A10	3
Shallow Inlet Marine & Coastal Park	SCP019VI	VIC080	SCP	1342	A1, A2, A5, A7, A8	1, 3, 4
Swan Bay & Swan Island[C]	SCP020VI	VIC081	SCP	2800	A1, A2, A7, A8	1, 2, 3, 4, 5
Tambo River (Lower Reaches) East Swamps	SCP021VI	VIC082	SCP	33	A10, A11	3
Western Port[C]	SCP022VI	VIC083	SCP	52325	A1, A2, A4, A5, A7, A8, A9	1, 2, 3, 4, 5, 6
Yambuk Wetlands	SCP023VI	VIC084	SCP	297	A8, A10	1, 2, 3, 5
Lake Bunga	SEC003VI	VIC085	SEC	460	A10	1, 5
Lake Tyers	SEC004VI	VIC086	SEC	1186	A10	1, 3, 5
Lower Snowy River Wetlands System	SEC005VI	VIC087	SEC	2000	A7, A8, A11, B13	1, 2, 3, 5
Central Highlands Peatlands	SEH005VI	VIC088	SEH	33	B15	1
Lake Dartmouth	SEH011VI	VIC089	SEH	5990	C1	6
Lake Tali Karng	SEH013VI	VIC090	SEH	16	B5	1, 3, 6
Lower Aire River Wetlands	SEH014VI	VIC091	SEH	84	A10, A11	1, 2, 3
Nuniong Plateau Peatlands	SEH017VI	VIC092	SEH	10	B15	1
Princetown Wetlands	SEH019VI	VIC093	SEH	119	A8, A10, A11	1, 2, 3
Rooty Break Swamp	SEH020VI	VIC094	SEH	1	B15	1
Tea Tree Swamp (Delegate River)	SEH021VI	VIC095	SEH	52	B15	1, 3, 5
Wongungarra River	SEH023VI	VIC096	SEH	—	B1	1, 3, 4, 5
Creswick Swamp	VM001VI	VIC097	VM	16	B10	1, 3, 5
Lake Muirhead	VM002VI	VIC098	VM	330	B10	1, 3, 4
Mount William Swamp	VM003VI	VIC099	VM	635	B10	1, 3, 4

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Banongill Network	VVP001VI	VIC100	VVP	59	B10	1
Cobden—Terang Volcanic Craters	VVP002VI	VIC101	VVP	613	B5, B7, B10, B13	1
Cundare Pool/Lake Martin	VVP003VI	VIC102	VVP	3730	B7, B12, C1	1, 3, 4
Kooraweera Lakes	VVP004VI	VIC103	VVP	427	B5, B7, B8, B12	1, 2, 4, 5
Lake Beeac	VVP005VI	VIC104	VVP	662	B7, B12	1, 3, 4, 5
Lake Bookaar	VVP006VI	VIC105	VVP	500	B7, B12	1, 3, 5
Lake Colongulac	VVP007VI	VIC106	VVP	1400	B7	1, 3
Lake Corangamite	VVP008VI	VIC107	VVP	23300	B7, B12	1, 2, 3, 4, 5
Lake Cundare	VVP009VI	VIC108	VVP	395	B7	1, 3, 4
Lake Gnarpurt	VVP010VI	VIC109	VVP	2350	B7, B12	1, 2, 3
Lake Linlithgow Wetlands	VVP011VI	VIC110	VVP	1432	B5, B7, B8	1, 3, 4, 5
Lake Milangil	VVP012VI	VIC111	VVP	125	B7	1, 2, 3, 5
Lake Murdeduke	VVP013VI	VIC112	VVP	1550	B7, B12	1, 2, 3
Lake Terangpom	VVP014VI	VIC113	VVP	208	B7	1, 2, 3
Lower Lough Calvert & Lake Thurrumbong	VVP015VI	VIC114	VVP	878	B6, B7, B8, B10, B12	1, 2
Middle Lough Calvert	VVP016VI	VIC115	VVP	578	B7, B8, B12	1, 2, 3, 4
Point Cook & Laverton Saltworks[C]	VVP017VI	VIC116	VVP	900	A1, A2, A4, A5, A6, A7, A8, A11, B1, B5, B7, B10, B12, C4	1, 2, 3, 4, 5
Red Rock Lakes & The Basins	VVP018VI	VIC117	VVP	223	B5, B7, B8, B10	1, 6
Stonyford—Bungador Wetlands	VVP019VI	VIC118	VVP		B10, B15	1
Tower Hill	VVP020VI	VIC119	VVP	311	B5, B8	1, 3, 6
Upper Lough Calvert	VVP021VI	VIC120	VVP	824	B7, B12	1, 2, 3
Werribee—Avalon Area	VVP022VI	VIC121	VVP	5460	A7, A8, C6	1, 3, 4, 5
Bitter Swamp		VIC122	MDD	32	B6	1, 3
Cardross Lake		VIC123	MDD	296	B5, B7	1, 3, 5
Friedman's Salt Lake		VIC124	MDD	55	B8	1
Grass Flat (Telfer's) Swamp		VIC125	MDD	34	B7, B12	1, 3
Hately's Lake (Swamp)		VIC126	MDD	267	B7, B11	1, 3
Lake Buloke Wetlands		VIC127	MDD	8270	B6, B8, B12, B14, C2	1, 3, 4, 5, 6
Oliver's Swamp (Lake)		VIC128	MDD	400	B7	1, 3, 4
Boiler Swamp System		VIC129	NCP	193	B6, B9, B10, B12, B13, C9	1, 2
Dergholm (Youpayang) Wetlands		VIC130	NCP	228	B2, B9, B10, B13	1, 3
Avoca Floodway (Tutchewop Plains)		VIC131	RIV	484	B12, B13, C9	1, 2, 3
Ewing's Marsh (Morass)		VIC132	SEC	1326	A11, B10, B13	1, 5

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Mallacoota Inlet Wetlands		VIC133	SEC	3797	A5, A6, A11, B1, B4, B10, B11, B13, B14	1, 3, 5, 6
Sydenham Inlet Wetlands		VIC134	SEC	1216	A6, A8, A10	1, 3, 5
Tamboon Inlet Wetlands		VIC135	SEC	669	A5, A6, A8, A11, B1, B2	1, 3, 5
Lake Buninjon		VIC136	VM	287	B7, B12	1, 3, 5
Lake Wendouree		VIC137	VM	224	B5	1, 3, 6
Merin Merin Swamp		VIC138	VVP	215	B6, B10, B14	1, 3
Woorndoo–Hopkins Wetlands		VIC139	VM	584	B6, B7, B8, B10, B11, B12, C1, C2, C9	1, 2
Lake Condah		VIC140	VVP	82	B2, B6, B13	1, 6
Nerrin Nerrin Wetlands		VIC141	VVP	526	B5, B6, B10, B14	1, 3, 4, 5
Widderin Swamps		VIC142	VVP	359	B10	1, 3, 4, 6
Mitta Mitta River		VIC143	SHE and AA	2400	B1	3, 4, 5, 6
Ovens River		VIC144	RIV and VM	3750	B1	3, 4, 6
Howqua River		VIC145	SHE and AA	1520	B1	1, 2, 3, 4, 5, 6
Big River		VIC146	SHE and AA	1465	B1	2, 3, 4, 5, 6
Wimmera River		VIC147	MDD	56020	B1, B2, B5, B6	1, 2, 3, 4, 5, 6
Genoa River		VIC148	SEC	1080	B1	1, 3, 4, 5, 6
Bemm, Goolengook, Arte and Errinundra Rivers		VIC149	SEC	5920	B1	1, 2, 3, 4
Snowy River		VIC150	SEC and AA	46690	B1	1, 3, 4, 5, 6
Suggan Buggan and Berrima Rivers		VIC151	SEC and AA	1840	B1	2, 3, 4
Upper Buchan River		VIC152	SEC and AA	1780	B1	1, 2, 3, 4, 5
Wonnangatta River		VIC153	SHE and AA	4100	B1, B4	1, 2, 3, 4, 5, 6
Benedore River		VIC154	SEC	3360	B1, B4	1, 2, 3, 4, 5
Thurra River		VIC155	SEC	2920	B1, B4	1, 3, 5
Yarra River		VIC156	VM and SEH	1065	B1	1, 3, 4
Lerderderg River		VIC157	VM and VVP	5490	B1, B4	3, 4, 5, 6
Aire River		VIC158	SHE	820	B1, B4	1, 3, 4
Glenelg River		VIC159	NCP	3020	B1	1, 3, 4

C *wetlands occurring in part on land owned or managed by the Commonwealth (four sites).*

Note: *area figures for the above tables are approximate only and are not available for all wetlands.*



Internationally and Nationally Important Wetlands of Victoria

Victoria currently has 10 wetlands of International Importance covering approximately 330,000 hectares. It has 159 nationally important wetlands recognised as meeting the criteria for inclusion in the Directory covering approximately 560,000 hectares.

Note: Not all wetlands have been numbered.

- Nationally Important Wetland
- Nationally Important Wetland (outside Victoria)
- Australian State/Territory boundary
- Ramsar Wetland (Refer also Figure 1)

0 50 100 150 200 Km

N

Ramsar

National Wetlands Program

Environment Australia
Department of the Environment and Heritage

Wetlands data used in this publication are provided by State/Territory land management agencies. Australian boundary data courtesy of AUSLIG.
Caveat: The data used are assumed to be correct as received by the custodian. The data displayed are in geographic projection and are indicative only.

12. Western Australia

Introduction

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The nature of Western Australia and its wetlands

THE MAINLAND PART OF WESTERN AUSTRALIA (WA) lies between latitudes 14° and 35° South and longitudes 113° and 129° East and has an area of 2,525,500 km^2. The highest point in the State is 1,245 m ASL, most land is below 500 m ASL. The coastline is 12,500 km; notable features are escarpment-edged coast in the far north, mangrove in the north and north-west, long sandy beaches and granite headlands in the south-west and precipitous cliff in the south-east and central west. A major ocean current of tropical origin (the Leeuwin Current) influences marine environments along the west coast, south of 22° S. There are several thousand islands around the coast but few support other than marine wetlands.

There are three main climatic regimes. A monsoonal regime, with hot wet summer and warm dry winter, affects the north of the State and a Mediterranean regime, with warm to hot dry summer and cool wet winter, affects the south-west. The remainder experiences hot dry summers and cool to warm dry winters. Rainfall ranges from less than 250 mm (with high variability) over most of the interior, to more than 1,000 mm (with low variability) in extreme south-western and northern parts.

Most of the 40 wetland types recognised in this Directory occur in WA. Notable in the far north are the State's only substantial riverine floodplains and several major estuarine mudflat and mangrove systems. The south-west is notable for its many estuaries with intermittent (sand-barred) connections to the sea and for its thousands of freshwater (and many salinised) lakes, swamps and damplands. The arid interior is notable for its palaeodrainage systems, now occupied by salt lakes, its many rockholes and for the karst drainage of the Nullarbor Plain.

Maximum depths of natural wetlands are generally less than a few metres but in some wetlands of higher rainfall areas may be up to 10 m; artificial Lake Argyle is up to 45 m deep. While most of the coast experiences a tidal range of a few metres or less, parts of the north-west and north experience tides more than 9 m.

Some of the longest river systems are, from north to south, the Ord, Fitzroy, Fortescue, Gascoyne, Murchison, Swan—Avon and Blackwood. The largest marine embayments are

King Sound and Shark Bay. Lakes notable for their size are Lake Argyle (largest artificial freshwater lake), Lake MacKay (largest saline lake) and Lake Jasper (largest natural freshwater lake). The most extensive intertidal mudflats are in the north; some exceed 10 km in width.

Wetland plant communities in WA include seagrass beds, mangroves, freshwater woodlands/shrublands, sedgelands and samphire (chenopod) shrublands; peat swamp and freshwater grassland communities occur but are not common. At least 2,000 wetland plant species occur in WA and endemism is relatively high, especially in ephemeral wetlands of the south-west.

The State's wetland fauna includes crocodiles (2 spp.), freshwater turtles (~ 6 spp.), waterbirds (~ 150 spp.), inland fishes (~ 55 spp.) and frogs (~ 60 wetland spp.). Endemism is high among all major groups of wetland vertebrate fauna except waterbirds. Thus 3 species of freshwater turtles, at least 30 wetland frogs and approximately 28 inland fishes are found only in Western Australia. The macroinvertebrate fauna of inland waters of the south-west is relatively species poor (250–300 taxa in some wetland suites) compared with eastern Australia, but is also characterised by a high level of endemism.

Human utilisation of wetlands in Western Australia

Aboriginal people used freshwater and tidal wetlands as sources of water, food and other resources before European settlement and continue to do so in some parts of Western Australia. The Aboriginal Sites Register for WA includes a number of wetland sites, notably stone fish traps and major campsites.

The earliest European impacts on WA wetlands were in the south-west, near Albany and Perth, where clearing of natural vegetation for agriculture began in the 1830s. European land management practices have since impacted upon most WA wetlands, apart from some of those in major conservation reserves, in the deserts and in parts of the north that are not readily accessible to livestock.

The human population of WA in December 1999 was 1.87 million and growing rapidly. Most live in the south-west where the most extensive impacts on wetlands have been clearing and drainage of coastal plain swamps and winter-wet areas; salinisation and excessive inundation of wetlands following clearance of catchments; and eutrophication due to leaching of agricultural fertilisers. Some wetlands face localised threats, eg rubbish dumping and landfill, too frequent wildfire and some insect (mosquito or midge) control measures. Other threats include extraction of groundwater for domestic or agricultural use, weed invasion and the spread of introduced fauna such as fish and molluscs. Elsewhere in the State, pastoral grazing has impacted upon wetlands through damage to river banks and riparian vegetation, degradation of catchments and associated increases in erosion, runoff and siltation.

Most of WA's nationally and internationally significant (and many regionally significant) wetlands are in existing or proposed conservation reserves managed by the WA Department of Conservation and Land Management (CALM). The WA Water and Rivers Commission also has a substantial role in managing wetlands, both directly and indirectly through water allocation. The WA Environmental Protection Authority has a major influence on the management of wetlands through statutory environmental protection policies and environmental impact assessments. Land use planning by the WA Ministry for Planning and by local government also impacts on wetlands. Most WA wetlands are on privately owned

land or pastoral leases and their conservation depends upon positive community attitudes towards both wetlands and landcare in general.

In Western Australia there is substantial community interest in wetlands, especially near Perth and other parts of the south-west. Recent research by, or funded by, Commonwealth, State and Local Government, universities, natural history and conservation groups, companies and individuals has added significantly to our knowledge of the wetlands, their types and distribution, their values and the processes that sustain or threaten them.

Purpose, scope and content of the Western Australian part of the Directory

The purpose of the Western Australian chapter of the Directory is to present a summary of existing knowledge of important wetland sites in WA and of their values. No systematic survey of wetlands or wetland values across the entire State has yet been conducted. In the current Directory this is manifest in gaps in the information presented and in the omission of some poorly known, yet potentially important, sites. This chapter of the Directory is therefore not definitive. It is hoped that the document will stimulate and guide any search for missing information, especially of poorly studied regions, sites and taxa.

Site accounts for Western Australia were compiled mainly from published and unpublished reports, from databases held by CALM and from consultations with wetland scientists, managers and others with relevant knowledge. The terminology and categories of Semeniuk (1987) and Semeniuk *et al.* (1990) have been used to describe certain physical, hydrological (salinity) and structural (vegetation) characteristics of the wetlands.

The 120 site accounts for WA cover several hundred discrete wetlands, which is a small fraction of the total (and unknown) number of wetlands in the State. Because most is known about south-west wetlands, half (60) of the sites included in the WA chapter of the Directory are from this region. However, most major wetland types occurring in WA are represented in the range of sites that has been selected.

In preparing the second edition of the Directory, most effort was directed towards increasing the representation of wetlands in bioregions (Thackway and Cresswell 1995) from which few or no wetlands had previously been selected. In the main, these were in remote arid areas such as the Central Ranges, Gascoyne, Gibson Desert, Great Victoria Desert and Little Sandy Desert. This proved to be a time consuming, though rewarding, process as much of the information needed to select and adequately describe suitable sites was found only in the knowledge, notebooks and unpublished reports of scientists, State government field officers, wildlife consultants, nature tour operators, Aboriginal linguists and naturalists scattered widely across the State. In the course of this work we (Lane, J and Lynch, R) became much more aware of the great significance of the many rockholes of the deserts for Aboriginal inhabitants, early European explorers and wildlife. For many thousands of years life in the deserts has revolved around these very small but vital sources of permanent and semi-permanent freshwater. While dependence on these water features for survival is now much reduced, many Aboriginal people still retain strong cultural ties to these sites.

Other new sites of particular interest include the mound springs (Bunda-Bunda and Willie Creek) of Dampierland, the gorges of the Pilbara and Gascoyne, the Banded Stilt breeding sites of Lakes Ballard and Marmion (Murchison), the tidally influenced microbialite communities of Lake Thetis (Swan Coastal Plain), the frog swamps of Mount Soho and the freshwater snail site at Cape Leeuwin (Warren).

Preparation of the third edition has largely been limited to updating descriptions of the 110 sites of the second edition, plus the addition of four new State sites. These are Big Springs (Dampierland), Gladstone Lake (Central Kimberley), Mount Bruce Coolibah–Lignum Flats (Pilbara) and Lake Bryde—East Lake Bryde (Mallee). An additional six wetlands occurring on land owned or managed by the Commonwealth have also been included, bringing the total number of nationally important WA wetlands to 120.

With the completion of the third edition, all but three (Hampton, Nullarbor and Ord-Victoria Plains) of the 26 bioregions of Western Australia (eight shared with SA and/or NT) now have wetlands included in the Directory. Representation is generally limited to two to four sites per bioregion, however, and more field work is needed to ensure that the great diversity of wetlands in this western one-third of the continent is truly represented in future editions. Government funding for formal wetland inventory and evaluation is limited and information will continue to be collected by other means. For the next edition, we encourage readers to advise one of us (Lane, J., c/o CALM, Busselton) of any new information that would add usefully to descriptions of the 120 existing sites and to bring to our attention any additional wetlands of outstanding significance.

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The Western Australian chapter of *A Directory of Important Wetlands in Australia* (first edition) was compiled by Roger Jaensch, with general guidance from Jim Lane of the Western Australian Department of Conservation and Land Management (CALM), in 1992–1993. The second edition was prepared by Romeny Lynch and Jim Lane in 1995 and the third by Sue Elscot and Jim Lane in 1999–2000.

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Summary analysis

The Directory describes 120 nationally important wetlands in Western Australia. The distribution of nationally important wetlands in WA (including Ramsar wetlands) is shown in Figure 10. A list compiling data on bioregion, site area, wetland type and criteria for inclusion for each wetland is provided at the end of this chapter.

As the largest State, Western Australia has the most bioregions in 26, eight of which it shares with South Australia and the Northern Territory. All but three of the 26 bioregions contain nationally important wetlands (refer to Table 12.1). By far the greatest number of sites is in the Swan Coastal Plain bioregion (n=29), the only region that contains more than eight sites. Seven bioregions contain only one or two nationally important wetlands. An overview of the IBRA regionalisation and a map of IBRA regions is included in Appendix 2.

Table 12.1 Number and area of nationally important wetlands in WA by IBRA region

IBRA Region	IBRA code	No. of Sites	Area (ha)
Avon Wheatbelt	AW	5	7274
Carnarvon	CAR	8	537.801
Central Kimberley	CK	3	121
Central Ranges	CR	1	1
Coolgardie	COO	1	550
Dampierland	DL	8	168.252
Esperance Plains	ESP	8	19.960
Gascoyne	GAS	4	153.627
Geraldton Sandplains	GS	3	4.154
Gibson Desert	GD	2	501
Great Sandy Desert	GSD	4	112.606
Great Victoria Desert	GVD	1	71.000
Hampton	HAM	0	0
Jarrah Forest	JF	7	27.068
Little Sandy Desert	LSD	2	154.202
Mallee	MAL	3	13,348
Murchison	MUR	6	304.630
Nullarbor	NUL	0	0
Northern Kimberley	NK	4	589.540
Ord-Victoria Plains	OVP	0	0
Pilbara	PIL	6	126.912
Swan Coastal Plain	SWA	29	30.470
Tanami	TAN	1	38.700
Victoria Bonaparte	VB	4	206.200
Warren	WAR	8	11.015
Yalgoo	YAL	2	585
Total	**26**	**120**	**2.578.517**

Thirty of the 40 wetland types are present in the 120 sites currently listed in Western Australia. Like the Northern Territory the most numerous types are B14—Freshwater swamp forest (n=28), and B10—Seasonal/intermittent freshwater ponds and marshes (n=25) (refer to Table 12.2).

Table 12.2 Number of WA sites in each Wetland type

A—Marine and Coastal Zone wetlands

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
Total	3	5	0	2	5	9	14	10	10	5	0	1

B—Inland wetlands

	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19
Total	18	18	0	6	12	15	19	23	8	25	2	16	13	28	11	0	11	0	5

C—Human-made wetlands

	C1	C2	C3	C4	C5	C6	C7	C8	C9
Total	3	0	0	2	1	0	1	0	0

WA wetlands are most often included in the Directory because they are good examples of their types within their bioregion (Criterion 1, n=102), or because of their historical or cultural significance (n=94) (refer to Table 12.3). The Wetland classification system and Criteria for inclusion in the Directory are explained in Chapter 2.

Table 12.3 Number of WA sites included under each Criterion

	1	2	3	4	5	6
Total	102	65	82	51	27	94

List of nationally important wetlands in Western Australia

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Coyrecup Lake	AW001WA	WA001	AW	500	B7, B12	2, 3, 4, 6
Dumbleyung Lake	AW002WA	WA002	AW	5561	B7	2, 3, 4, 6
Toolibin Lake	AW003WA	WA003	AW	437	B14	1, 2, 3, 6
Yealering Lakes System	AW004WA	WA004	AW	775	B8	2, 3, 4, 5, 6
Yorkrakine Rock Pools	AW005WA	WA005	AW	1	B10	1, 2, 6
Cape Range Subterranean Waterways [C]	CAR001WA	WA006	CAR	175000	B19	1, 2, 3, 4, 6
Exmouth Gulf East	CAR002WA	WA007	CAR	120000	A2, A7, A8, A9	1, 2, 3
Hamelin Pool	CAR003WA	WA008	CAR	90000	A1, A5, A7	1, 6
Lake MacLeod	CAR004WA	WA009	CAR	150000	A9, B7, B8, B10, B11, B12, B19, C4	1, 2, 3, 4, 6
McNeill Claypan System	CAR005WA	WA010	CAR	2500	B6, B13	1
Shark Bay East	CAR006WA	WA011	CAR	—	A1, A2, A7, A8, A9	1, 2, 3, 4, 5, 6
Tunnel Creek	CK001WA	WA012	CK	1	B19	1, 6
Windjana Gorge	CK002WA	WA013	CK	20	B1	1, 3, 6
Rock Pools of the Walter James Range	CR001WA	WA014	CR	1	B17	1, 3, 6
Rowles Lagoon System	COO001WA	WA015	COO	550	B6, B10, B13	1, 2, 6
Bunda-Bunda Mound Springs	DL001WA	WA016	DL	22	B17	1, 6
Camballin Floodplain (Le Lievre Swamp System)	DL002WA	WA017	DL	30000	B1, B2, B4, B6, B10, B14, C1, C7	1, 2, 3, 4, 6
Eighty Mile Beach System	DL003WA	WA018	DL	40000	A5, A7, B4, B10	1, 2, 3, 4, 5, 6
Geikie Gorge	DL004WA	WA019	DL	130	B1	1, 2, 6
Roebuck Bay	DL005WA	WA020	DL	50000	A2, A4, A5, A7, A8, A9	1, 2, 3, 4, 5, 6
Roebuck Plains System	DL006WA	WA021	DL	48000	B4, B5, B6, B10	1, 2, 3, 4, 6
Willie Creek Wetlands	DL007WA	WA022	DL	20	B8, B9	1, 3, 6
Balicup Lake System	ESP001WA	WA023	ESP	1400	B8, B12	1, 4, 5
Culham Inlet System	ESP002WA	WA024	ESP	11349	B1, B7, B12	1, 3, 4, 6
Fitzgerald Inlet System	ESP003WA	WA025	ESP	1200	A10, B2, B8, B12	1, 3, 5, 6
Lake Gore System	ESP004WA	WA026	ESP	1500	B7, B8, B12, B14	2, 3, 4, 5, 6
Lake Warden System	ESP005WA	WA027	ESP	1200	B7, B12	1, 2, 3, 4, 5, 6
Mortijinup Lake System	ESP006WA	WA028	ESP	750	B7, B10, B14	1, 3, 6
Pink Lake	ESP007WA	WA029	ESP	1061	B7	1, 5, 6
Yellilup Yate Swamp System	ESP008WA	WA030	ESP	1500	B7, B14	1, 2, 3, 6
Kookhabinna Gorge	GAS001WA	WA031	GAS	125	B2, B14	1, 3

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Lake Carnegie System	GAS002WA	WA032	GAS	153100	B8	1, 3
Windich Springs	GAS003WA	WA033	GAS	2	B17	1, 3, 6
Yadjiyugga Claypan	GAS004WA	WA034	GAS	400	B6	1, 3, 6
Hutt Lagoon System	GS001WA	WA035	GS	3000	B6, B8, B10, B12	1, 6
Lake Logue–Indoon System	GS002WA	WA036	GS	529	B6 (Lake Logue), B7 (Lake Indoon), B2, B10	1, 3, 5
Murchison River (Lower Reaches)	GS003WA	WA037	GS	625	A6, B1, B2	1, 6
Gibson Desert Gnamma Holes	GD001WA	WA038	GD	1	B17	1, 6
Lake Gruszka	GD002WA	WA039	GD	500	B6, B14	1, 6
Dragon Tree Soak	GSD001WA	WA040	GSD	5	B9, B15, B17	1, 6
Lake Dora (Rudall River) System	GSD004WA	WA041	GSD	32600	B1, B2, B8	1, 2, 6
Mandora Salt Marsh	GSD005WA	WA042	GSD	80000	B1, B8, B12, B15, B17	1, 3, 6
Rock Pools of the Breaden Hills	GSD006WA	WA043	GSD	1	B17	1, 6
Yeo Lake/Lake Throssell	GVD001WA	WA044	GVD	71000	B2, B8	1, 6
Avon River Valley	JF001WA	WA045	JF	320	B2	6
Byenup Lagoon System	JF002WA	WA046	JF	5000	B5, B7, B13, B14, B15	1, 2, 3, 4, 5, 6
Chittering–Needonga Lakes	JF003WA	WA047	JF	248	B7, B14	1, 2, 3, 4, 6
Lake Muir	JF004WA	WA048	JF	4600	B8, B12	1, 2, 3, 4, 5, 6
Lake Pleasant View System	JF005WA	WA049	JF	550	B9, B15	1, 3, 6
Moates Lake System	JF006WA	WA050	JF	750	B5, B7, B9	1, 3, 4, 6
Oyster Harbour	JF007WA	WA051	JF	15600	A2, A6, A7, A8	1, 2, 3, 6
Lake Disappointment (Savory Creek) System	LSD001WA	WA052	LSD and GAS	154200	B2, B8	1, 3
Pools of the Durba Hills	LSD002WA	WA053	LSD	2	B17	1, 3, 6
Lake Cronin	MAL001WA	WA054	MAL	13	B10, B13	1, 3, 6
Lake Grace System	MAL002WA	WA055	MAL	13200	B8, B12	1, 3, 4, 5
Anneen Lake (Lake Nannine)	MUR001WA	WA056	MUR	12000	B8, B12	1, 2, 3
Breberle Lake	MUR002WA	WA057	MUR	750	B6, B14	1
Lake Ballard	MUR003WA	WA058	MUR	60000	B8	1, 3, 4
Lake Barlee	MUR004WA	WA059	MUR	194380	B8	1, 2, 3, 4, 6
Lake Marmion	MUR005WA	WA060	MUR	35300	B8	1, 3, 4
Wooleen Lake	MUR006WA	WA061	MUR	2200	B6	1, 3
Drysdale River	NK001WA	WA062	NK	5100	B1	1, 2, 3, 4, 6
Mitchell River System	NK002WA	WA063	NK	4140	A6, A7, A8, A9, B1, B2	1, 2, 3, 4, 6
Prince Regent River System	NK003WA	WA064	NK	14300	A6, A7, A9, B1, B2	1, 2, 3, 4, 6
De Grey River	PIL001WA	WA065	PIL	13600	A6, A7, A8, B1, B2, B9	1, 2, 6

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Fortescue Marshes	PIL002WA	WA066	PIL	100000	B4, B6	1, 2, 3, 6
Karijini (Hamersley Range) Gorges	PIL003WA	WA067	PIL	80	B2, B17	1, 6
Leslie (Port Hedland) Saltfields System	PIL004WA	WA068	PIL	13000	A7, A8, A9, C4	1, 2, 3, 4, 5, 6
Millstream Pools	PIL005WA	WA069	PIL	150	B1, B9, B17	1, 2, 3, 6
Barraghup Swamp	SWA001WA	WA070	SWA	25	B14	1, 2, 3, 6
Becher Point Wetlands	SWA002WA	WA071	SWA	10	B10, B14	1, 6
Benger Swamp	SWA003WA	WA072	SWA	572	B10, B14	3, 4, 6
Booragoon Lake	SWA004WA	WA073	SWA	13	B5, B14	1, 2, 3, 6
Brixton Street Swamps	SWA005WA	WA074	SWA	30	B13	1, 5, 6
Chandala Swamp	SWA006WA	WA075	SWA	100	B14	1, 2, 3, 4, 6
Ellen Brook Swamps System	SWA007WA	WA076	SWA	20	B13	1, 3, 4, 5, 6
Forrestdale Lake	SWA008WA	WA077	SWA	250	B8	1, 2, 3, 4, 5, 6
Gibbs Road Swamp System	SWA009WA	WA078	SWA	70	B13, B14	1, 2, 3, 6
Guraga Lake	SWA010WA	WA079	SWA	350	B7, B12	1, 2, 3, 4, 6
Herdsman Lake	SWA011WA	WA080	SWA	250	B5, B10, B14, B15	2, 3, 4, 6
Joondalup Lake	SWA012WA	WA081	SWA	530	B5	1, 2, 4, 6
Karakin Lakes	SWA013WA	WA082	SWA	600	B10	2
Lake McLarty System	SWA014WA	WA083	SWA	400	B12, B13, B14	1, 2, 3, 4, 6
Lake Thetis	SWA015WA	WA084	SWA	7	B7	1, 6
Loch McNess System	SWA016WA	WA085	SWA	255	B5, B9, B14, B15, B19	1, 3, 6
McCarley's Swamp (Ludlow Swamp)	SWA017WA	WA086	SWA	25	B14	1, 2, 3, 6
Peel–Harvey Estuary	SWA018WA	WA087	SWA	14000	A6, A7, A8	1, 2, 3, 4, 5, 6
Perth Airport Woodland Swamps [C]	SWA019WA	WA088	SWA	23	B10, B14, C5	1, 3, 5, 6
Rottnest Island Lakes	SWA020WA	WA089	SWA	180	B7, B8, B12	1, 2, 3, 6
Spectacles Swamp	SWA021WA	WA090	SWA	142	B10, B14	1, 2, 3, 6
Swan–Canning Estuary	SWA022WA	WA091	SWA	3300	A6, A7, A8	1, 2, 3, 4, 5, 6
Thomsons Lake	SWA023WA	WA092	SWA	213	B8	1, 2, 3, 4, 6
Vasse–Wonnerup Wetland System	SWA024WA	WA093	SWA	1000	A10, B8, B11	2, 3, 4, 5, 6
Wannamal Lake System	SWA025WA	WA094	SWA	470	B6, B7, B13	2, 3, 4, 5, 6
Yalgorup Lakes System	SWA026WA	WA095	SWA	5600	B7	1, 2, 3, 4, 5, 6
Lake Gregory System	TAN001WA	WA096	TAN	38700	B2, B7, B8	1, 2, 3, 4, 6
Lake Argyle	VB001WA	WA097	VB	100000	C1	2, 3, 4, 6
Lake Kununurra	VB002WA	WA098	VB	2500	B1, B9, C1	2, 3, 4, 6
Ord Estuary System	VB004WA	WA099	VB	94700	A6, A7, A8, A9	1, 2, 3, 6
Parry Floodplain	VB005WA	WA100	VB	9000	B1, B2, B4, B6, B10, B14, B17	1, 2, 3, 4, 6

Wetland name	Old Reference No.	New Reference No.	IBRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Blackwood River (Lower Reaches) and Tributaries System	WAR001WA	WA101	WAR	620	B1, B2	1, 3, 4, 5, 6
Broke Inlet System	WAR002WA	WA102	WAR	4865	A10, B1, B2, B6, B10, B13, B15	1, 2, 3, 6
Cape Leeuwin System	WAR003WA	WA103	WAR	20	B10, B17	5
Doggerup Creek System	WAR004WA	WA104	WAR	2524	B1, B2, B4, B5, B10, B15	1, 2, 3, 4, 6
Gingilup–Jasper Wetland System	WAR005WA	WA105	WAR	1600	B5, B10, B13, B14, B15	1, 2, 3, 4, 6
Maringup Lake	WAR006WA	WA106	WAR	286	B5, B15	1, 2, 4, 6
Mt. Soho Swamps	WAR007WA	WA107	WAR	50	B15	4, 6
Owingup Swamp System	WAR008WA	WA108	WAR	1050	B1, B5, B10, B14	1, 2, 3, 4, 6
Thundelarra Lignum Swamp	YAL001WA	WA109	YAL	135	B13	1, 2, 3
Wagga Wagga Salt Lake	YAL002WA	WA110	YAL	450	B8, B12	1
Gladstone Lake		WA111	CK	100	B5	1, 3, 6
Lake Bryde–East Lake Bryde		WA112	MAL	135	B13	4, 5
Mt. Bruce Coolibah–Lignum flats		WA113	PIL	82	B6	1
Big Springs		WA114	DL	80	A9, A12, B17	1
Yampi Sound Training Area [C]		WA115	NK	566000	A1, A2, A4, A5, A6, A7, A9, A10	1, 5
Learmonth Air Weapons Range –Saline Coastal Flats [C]		WA116	CAR	300	A10	1
Bundera Sinkhole [C]		WA117	CAR	1	B19	1, 5
Palmer Barracks, Guildford [C]		WA118	SWA	5	B10, B14	1, 2
Lancelin Defence Training Area [C]		WA119	SWA	2000	A5, B10, B14	1, 2
RAAF Caversham [C]		WA120	SWA	30	B10, B14	2, 3

C *wetlands occurring in part on land owned or managed by the Commonwealth (eight sites).*

Note: *area figures for the above tables are approximate only and are not available for all wetlands.*

Internationally and Nationally Important Wetlands of Western Australia

Western Australia currently has 12 wetlands of International Importance covering approximately 515,000 hectares. It has 120 nationally important wetlands recognised as meeting the criteria for inclusion in the Directory covering approximately 2.58 million hectares. Note: Not all wetlands have been numbered.

- Nationally Important Wetland
- Nationally Important Wetland (outside WA)
- Australian State/Territory boundary
- Ramsar Wetland (Refer also Figure 1)

0 100 200 300 400 Km

N

Ramsar

National Wetlands Program

Environment Australia
Department of the Environment and Heritage

Wetlands data used in this publication are provided by State/Territory land management agencies. Australian boundary data courtesy of AUSLIG.
Caveat: The data used are assumed to be correct as received by the custodian. The data displayed are in geographic projection and are indicative only.

13. External Territories

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Introduction

THE SECOND EDITION OF *A DIRECTORY OF IMPORTANT WETLANDS IN AUSTRALIA* IN 1996 CONTAINED INFORMATION ON SIX WETLANDS in Australia's External Territories (Usback 1996). Information on these wetlands has been updated for this edition, including the bioregional classification used. In the intervening period the majority of wetlands on land owned or managed by the Commonwealth have been examined in detail, many for the first time. A significant number of these sites meet the Criteria for inclusion and have been included in the Directory (refer Table 1.1).

Three new wetlands in the External Territories have been added in this edition: Mermaid Reef, "The Dales" on Christmas Island, and Heard and McDonald Islands. The location of each of the listed sites is illustrated in Figure 11.

The External Territories wetlands occur across a wide range of Biospheres, located as they are in the Indian, Pacific and Southern Oceans, and are subject to different climatic and oceanic influences that have shaped the characteristics of the wetlands present. The islands or reefs themselves originate from oceanic, continental and coralline influences. The wetlands therefore contain a diversity of wetland types and associated physical, hydrological and ecological values.

The variety of the wetlands in the External Territories is well illustrated by comparing Heard Island in the south and Ashmore Reef in the tropics. Heard Island contains the only active volcano on Australian soil, is 80% covered by ice and is actively shaped by glaciers, whereas Ashmore Reef has a monsoonal climate and has close biological affinities with Indonesia in the coral fauna it supports.

One of the wetland types least well represented in the Directory, A3—Coral reefs, is well represented in the Commonwealth wetlands of the External Territories.

Most of the External Territories areas were originally proclaimed and protected under the *National Parks and Wildlife Conservation Act 1975*, in recognition of their high conservation value. All of these are now protected under the *Environment Protection and Biodiversity Conservation Act 1999*, and some sites, such as Heard and McDonald Islands, have specific legislation that also applies. All of the sites in the External Territories are managed for the Commonwealth by the Department of the Environment and Heritage.

The Department of the Environment and Heritage is required to prepare management plans for these wetlands or the protected areas that contain them. The plans identify and outline strategies for dealing with both current and potential threats that would adversely affect their values, including the ecological character of the wetlands.

Summary analysis

The Directory describes 9 nationally important wetlands in the External Territories. The distribution of nationally important wetlands in the External Territories (including Ramsar wetlands) is shown in Figure 11. A list compiling data on bioregion, site area, wetland type and criteria for inclusion for each wetland is provided at the end of this chapter.

The bioregional information for nationally important wetlands in the External Territories has been updated since the second edition of the Directory. The bioregional framework introduced by the Interim Marine and Coastal Regionalisation for Australia (IMCRA) version 3.3, has been used to replace bioregional information previously derived from the IUCN regional classification (Kelleher *et al.* 1995). Further information on IMCRA version 3.3 is available in the ANZECC report Interim Marine and Coastal Regionalisation for Australia (Thackway and Cresswell 1998). The number and area of nationally important wetlands occurring in IMCRA regions is detailed in Table 13.1.

Table 13.1 Number and area of nationally important wetlands in the External Territories occurring in IMCRA Regions

IMCRA Region	IMCRA code	No. of Sites	Area (ha)
Oceanic Shoals	OSS	2	112,284
Norfolk Province	NorfP	1	188,000
Sunda Province	SunP	3	22,123
Kerguelen Province	KergP	1	1,860
Group 16	Group 16	2	844,160
Total		**9**	**1,168,427**

Fourteen of the 40 wetland types are found in the External Territories, with the majority of these being Marine and Coastal Zone wetland types (refer to Table 13.2). The most commonly represented types are A3—Coral reefs (n=6) and A6—Estuarine waters (n=6). Only five of the Inland wetland types and no Human-made wetlands are represented. The Wetland classification system and Criteria for inclusion in the Directory are explained in Chapter 2.

Table 13.2 Number of External Territories sites in each Wetland type

A—Marine and Coastal Zone wetlands

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
Total	1	3	6	2	6	0	2	0	1	1	1	0

B—Inland wetlands

	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19
Total	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	2	0	0

C—Human-made wetlands

	C1	C2	C3	C4	C5	C6	C7	C8	C9
Total	0	0	0	0	0	0	0	0	0

The most common reason for inclusion in the Directory is because these wetlands are good examples of their types within their biogeographic region (Criterion 1, n=8) (refer to Table 13.3).

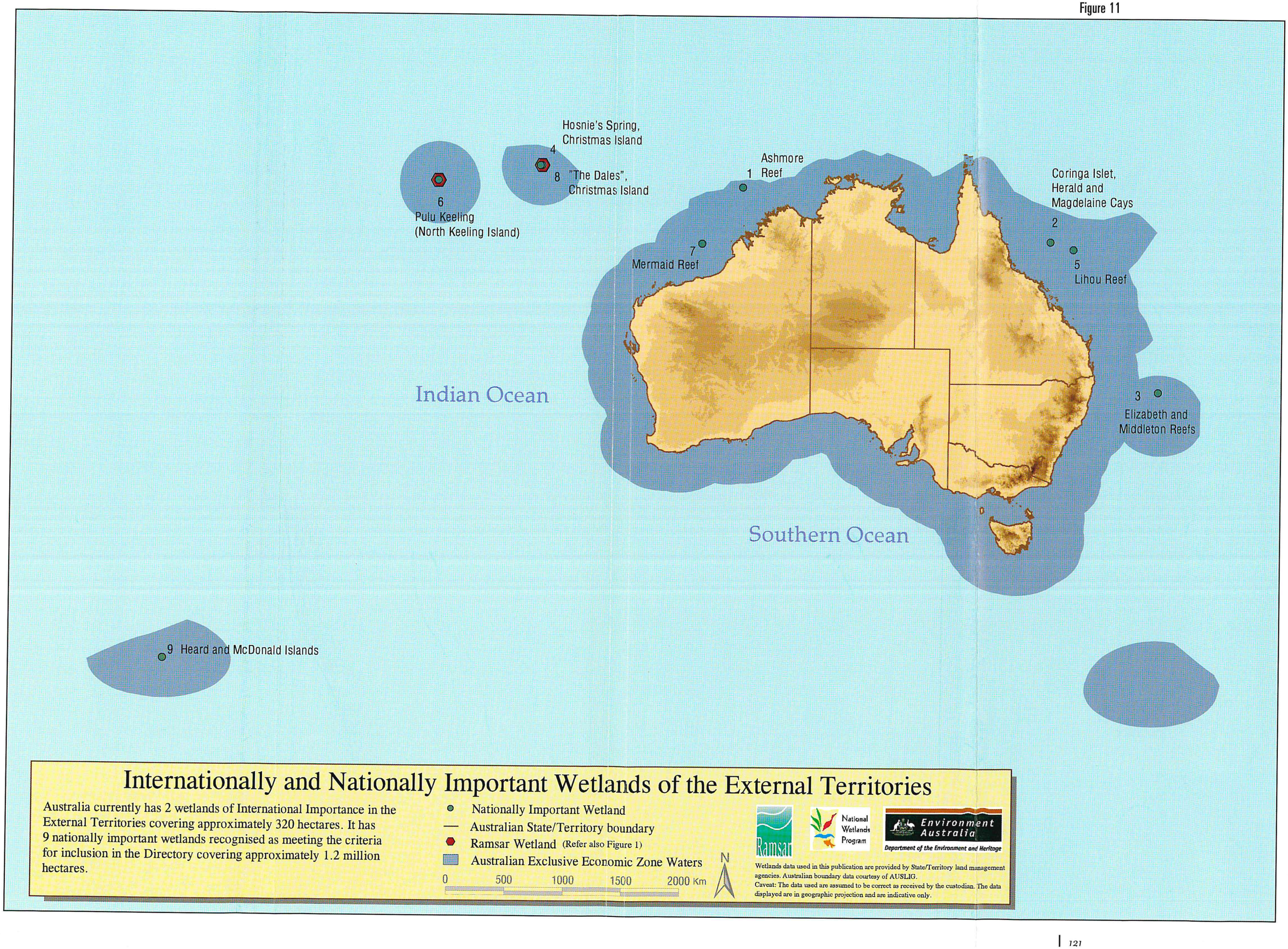
Table 13.3 Number of External Territories sites included under each Criterion

	1	2	3	4	5	6
Total	8	5	6	6	7	3

List of nationally important wetlands in the External Territories

Wetland name	Old Reference No.	New Reference No.	IMCRA Region	Area (ha)	Wetland type(s)	Criteria for inclusion
Ashmore Reef	XT001CO	EXT001	OSS	58300	A2, A3, A4, A5, A7	1, 3, 4, 5
Coringa Islet, Herald and Magdelaine Cays	XT002CO	EXT002	Group 16	160	A3, A5	2, 3, 4, 5
Elizabeth and Middleton Reefs	XT003CO	EXT003	Norf P(b)	188000	A3	1, 4, 5, 6
Hosnie's Spring, Christmas Island	XT004CO	EXT004	SunP(b)	1	A9, B14, B17	1, 2, 5, 6
Lihou Reef	XT005CO	EXT005	Group16	844000	A3, A5	1, 2, 3, 4, 5
Pulu Keeling National Park	XT006CO	EXT006	SunP(a)	122	A2, A3, A4, A5	1, 3, 5, 6
Mermaid Reef		EXT007	OSS	53984	A1, A2, A3, A5, A7	1, 2, 3
"The Dales", Christmas Island		EXT008	SunP(b)	22000	B17	1, 4
Heard and McDonald Islands		EXT009	KergP	1860	A5, A10, A11, B6, B15, B16	1, 2, 3, 4, 5

Note: area figures for the above tables are approximate only.



Internationally and Nationally Important Wetlands of the External Territories

Australia currently has 2 wetlands of International Importance in the External Territories covering approximately 320 hectares. It has 9 nationally important wetlands recognised as meeting the criteria for inclusion in the Directory covering approximately 1.2 million hectares.

- Nationally Important Wetland
- Australian State/Territory boundary
- Ramsar Wetland (Refer also Figure 1)
- Australian Exclusive Economic Zone Waters

0 500 1000 1500 2000 Km

N

Ramsar

National Wetlands Program

Environment Australia
Department of the Environment and Heritage

Wetlands data used in this publication are provided by State/Territory land management agencies. Australian boundary data courtesy of AUSLIG.
Caveat: The data used are assumed to be correct as received by the custodian. The data displayed are in geographic projection and are indicative only.

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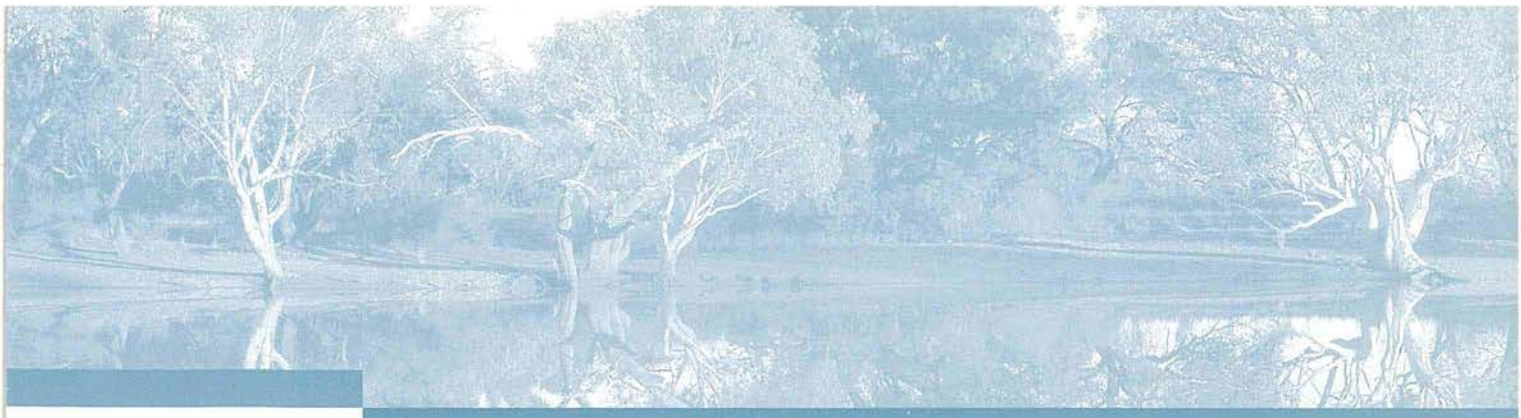
Abbreviations

ACT	Australian Capital Territory
ANCA	Australian Nature Conservation Agency (now Environment Australia)
ANZECC	Australian and New Zealand Environment and Conservation Council
ASL	above sea level
CALM	Department of Conservation and Land Management (Western Australia)
CAMBA	China—Australia Migratory Bird Agreement
COMM	Commonwealth Government of Australia
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Directory	*A Directory of Important Wetlands in Australia*
EPA	Environmental Protection Agency (Queensland)
EPBC	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ERIN	Environmental Resources Information Network (Environment Australia)
EXT	External Territories (Australia)
GIS	geographic information system
ha	hectare(s)
IBRA	Interim Biogeographic Regionalisation for Australia
IMCRA	Interim Marine and Coastal Regionalisation for Australia
IUCN	World Conservation Union (formerly International Union for the Conservation of Nature and Natural Resources)
JAMBA	Japan—Australia Migratory Bird Agreement
km	kilometre(s)
km^2	square kilometre(s)

m	metres
mm	millimetres
NHT	Natural Heritage Trust (initiative of the Commonwealth Government)
NRE	Department of Natural Resources and Environment (Victoria)
NSW	New South Wales
NT	Northern Territory
pH	measure of acidity/alkalinity of a solution
PWCNT	Parks and Wildlife Commission of the Northern Territory
Qld	Queensland
RAAF	Royal Australian Air Force
Ramsar	Convention on Wetlands (Ramsar, Iran, 1971)
RFA	Regional Forest Agreement
RIS	Ramsar Information Sheet
SA	South Australia
spp.	more than one species
Tas	Tasmania
Vic	Victoria
WA	Western Australia



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Appendix 1. Summary analysis of Directory sites by Wetland types and Criteria for inclusion

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Wetland Types

THE WETLAND CLASSIFICATION SYSTEM USED IN THE DIRECTORY, which identifies 40 different wetland types in three categories: A—Marine and Coastal Zone wetlands, B—Inland wetlands, and C—Human-made wetlands, is described in Chapter 2.

The sites listed in the Directory may be of only one wetland type, but more often they comprise a number of wetland types; 505 of the 851 wetlands (59.3%) exhibit multiple wetland types (refer to Table A1.1). This is the case for all jurisdictions except the ACT, where five out of 13 (38.5%) wetlands show multiple types, and Tasmania, where five out of 89 (5.6%) sites listed show multiple wetland types. Amongst the other jurisdictions the average proportion of listed sites with multiple wetland types is 70.2%.

Table A1.1 Number of Directory sites in each jurisdiction with multiple Wetland types

	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	EXT	Total
Total no. sites	13	178	33	181	69	89	159	120	9	851
No. sites with multiple wetland types	5	97	27	154	54	5	78	78	7	505
% sites with multiple wetland types	38.5	54.5	81.8	85.1	78.3	5.6	49.1	65.0	77.8	59.3

All 40 wetland types are represented in the Directory. Queensland (37) and New South Wales (36) have the most comprehensive range of wetland types. The Australian Capital Territory (8) and the External Territories (14) have the least by virtue of size and geographical location.

Of the three categories, the Inland wetlands are the most recorded, being represented 1570 times in the wetlands listed in the Directory. Marine and Coastal Zone wetlands occur 1088 times, and Human-made wetlands occur least, being recorded 90 times. The four most commonly reported types are all Inland wetlands. The breakdown of sites in each wetland type by jurisdiction is detailed in Tables A1.2, A1.3 and A1.4.

Table A1.2 Number of Directory sites in each Wetland type by jurisdiction: A—Marine and Coastal Zone wetlands

State	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
ACT	0	0	0	0	0	0	0	0	0	0	0	0
NSW	3	20	1	9	13	31	24	33	31	16	23	15
NT	3	4	1	0	1	14	13	11	13	1	1	0
QLD	43	42	11	22	52	51	56	51	64	28	35	23
SA	16	11	0	4	13	12	17	13	9	3	3	0
TAS	4	2	0	3	2	5	1	4	1	13	20	0
VIC	6	6	0	3	8	7	9	16	3	14	13	0
WA	3	5	0	2	5	9	14	10	10	5	0	1
EXT	1	3	6	2	6	0	2	0	1	1	1	0
Total	**80**	**93**	**19**	**45**	**100**	**129**	**136**	**138**	**132**	**81**	**96**	**39**

The most common of the 12 Marine and Coastal Zone wetland types are A8—Intertidal marshes (n=138), A7—Intertidal mud, sand or salt flats (n=136), A9—Intertidal forested wetlands (n=132) and A6—Estuarine waters (n=129) (refer to Table A1.2). These four wetland types account for 49% of the total of 1088 representations of Marine and Coastal Zone wetlands. The least well represented wetland type in this category is A3—Coral reefs (n=19), which accounts for just 1.75% of the representation. The other two poorly represented wetland types are A12—Non-tidal freshwater forested wetlands (n=39, 3.6%) and A4—Rocky marine shores (n=45, 4.1%).

Table A1.3 Number of Directory sites in each Wetland type by jurisdiction: B—Inland wetlands

State	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19
ACT	3	1	0	1	0	0	0	0	3	6	0	0	0	0	3	0	0	0	0
NSW	10	25	2	23	16	44	7	8	18	34	1	2	31	26	26	2	1	0	0
NT	14	7	1	11	1	12	0	2	6	15	0	0	9	17	0	0	2	0	0
QLD	49	72	0	56	40	54	5	13	45	65	2	9	48	62	10	0	13	1	2
SA	11	6	1	15	10	15	10	9	7	5	4	4	7	4	7	0	4	0	2
TAS	11	0	0	0	9	2	3	2	3	0	0	0	0	0	13	0	0	0	0
VIC	25	6	0	23	20	19	27	22	5	30	3	16	11	17	8	0	0	0	0
WA	18	18	0	6	12	15	19	23	8	25	2	16	13	28	11	0	11	0	5
EXT	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	2	0	0
Total	**141**	**135**	**4**	**135**	**108**	**164**	**71**	**79**	**95**	**180**	**12**	**47**	**119**	**155**	**79**	**3**	**33**	**1**	**9**

Amongst the 19 Inland wetland types, the three most numerous are B10—Seasonal/intermittent freshwater ponds and marshes (n=180), B6—Seasonal/intermittent freshwater lakes (n=164), and B14—Freshwater swamp forest (n=155) (refer to Table A1.3). These three types make up 31.8% of the total of 1570 representations of inland wetlands in the Directory. The least represented type is B18—Geothermal wetlands with just one site in Queensland. In addition to B18, four other wetland types are represented by less than 1%: B3—Inland deltas (permanent) (n=4), B11—Permanent saline/brackish marshes (n=12),

B16—Alpine and tundra wetlands (n=3), and B19—Inland, subterranean karst wetlands (n=9). Wetland type B17—Freshwater springs, oases and rock pools is also under-represented (n=33, 2.1%).

Table A1.4 Number of Directory sites in each Wetland type by jurisdiction: C—Human-made wetlands

State	C1	C2	C3	C4	C5	C6	C7	C8	C9
ACT	1	0	0	0	0	1	0	0	0
NSW	7	1	0	1	1	1	1	1	0
NT	2	1	0	0	0	0	0	0	0
QLD	15	9	2	1	1	3	3	3	0
SA	1	0	0	3	0	1	0	0	0
TAS	1	0	0	2	0	0	0	0	0
VIC	8	2	0	5	0	2	0	0	3
WA	3	0	0	2	1	0	1	0	0
EXT	0	0	0	0	0	0	0	0	0
Total	38	13	2	14	3	8	5	4	3

Of the three wetland categories, Human-made wetlands are the least often recorded, accounting for just 3.3% of the representation of all wetland types. The most numerous is type C1—Water storage areas (n=38, 42%), followed by C4—Salt exploitation (n=14) and C3—Aquaculture ponds (n=13) (refer to Table A1.4). These three types account for 72% of the representation of human-made wetlands.

Criteria for determining important wetlands

The six Criteria for determining nationally important wetlands are described in Chapter 2.

To be considered nationally important a wetland need only meet one of the criteria, but the majority of the wetlands listed (83.3%) meet more than one of the criteria for inclusion in the Directory (refer to Table A1.5). The only jurisdiction where the majority of wetlands listed meet only one of the criteria is Tasmania, where 31.5% of sites were assessed as meeting multiple criteria.

Table A1.5 Number of Directory sites in each jurisdiction meeting multiple Criteria for inclusion

	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	EXT	Total
Total no. sites	13	178	33	181	69	89	159	120	9	851
No. sites with multiple criteria	7	158	32	162	63	28	139	111	9	709
% sites with multiple criteria	53.8	88.8	97.0	89.5	91.3	31.5	87.4	92.5	100.0	83.3

Table A1.6 details the number of sites meeting the criteria for inclusion by jurisdiction. Most wetlands are included in the Directory under Criterion 1—*"a good example of a wetland type occurring within a biogeographic region in Australia"* (n=702). This criterion is the most recorded or equally most recorded in all jurisdictions except South Australia and Tasmania, where it ranked second.

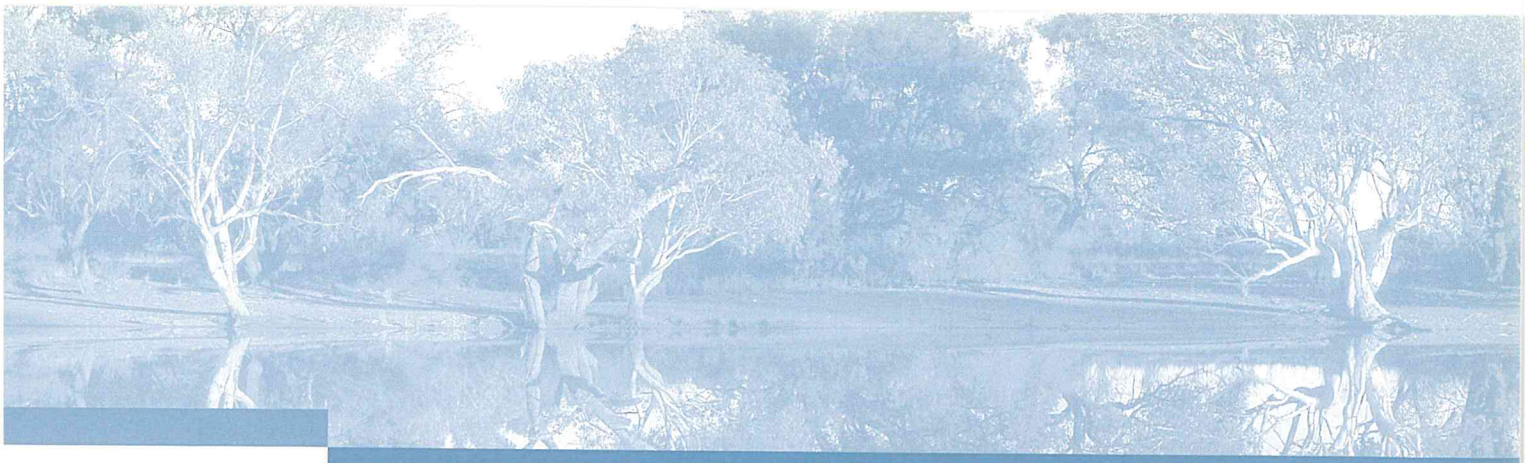
Table A1.6 Number of Directory sites included under each Criterion by jurisdiction

	1	2	3	4	5	6
ACT	9	3	2	1	3	7
NSW	159	76	106	34	82	42
NT	27	27	27	18	11	18
QLD	180	117	135	48	85	43
SA	54	25	61	5	33	24
TAS	31	6	9	4	74	6
VIC	132	73	122	50	52	38
WA	102	65	82	51	27	94
EXT	8	5	6	6	7	3
Total	**702**	**397**	**550**	**217**	**374**	**275**

The next most common is Criterion 3—*"a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail"* (n=550). This was the most important criterion in South Australia, equal most important in the Northern Territory, and ranked second in New South Wales, Queensland and Victoria.

By far the most common reason for inclusion in Tasmania was Criterion 5—*"wetland supports native plant or animal taxa or communities which are considered endangered or vulnerable at the national level"* (n=74).

The least common reason for inclusion overall is Criterion 4—*"The wetland supports 1% or more of the national populations of any native plant or animal taxa"* (n=217), which is among the most difficult to accurately apply as it is heavily data dependent and assumes a high level of confidence in the estimation of population numbers.



Appendix 2.
The Interim Biogeographic Regionalisation for Australia

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Introduction

As part of an ongoing process, Environment Australia has worked with the States and Territories since 1994 in the cooperative development of the Interim Biogeographic Regionalisation for Australia (IBRA). IBRA is a nationwide framework employed by Australia's nature conservation agencies to define the major ecosystems in continental Australia.

The term "biogeographic region" is used to denote landscapes containing ecosystems that have a high level of similarity. Biogeographic regions are defined according to specified environmental and biological attributes, including combinations of terrain, climate, geology, soil, vegetation and information on flora and fauna. Based as they are on environmental and biological attributes, they are not confined by political boundaries and often extend across State and Territory borders. As implied by the use of the word "interim" in its title, the nature of IBRA is such that it will continue to be refined and improved as additional information on these attributes becomes available.

IBRA version 4.0 (Thackway and Cresswell 1995) divides Australia into 80 distinct biogeographic regions (see Figure 12) which can be further divided into smaller sub-regions, based strongly on geomorphology, but also using vegetation and other data. As such it can provide a regional planning framework within which inventory requirements can be systematically prioritised.

One of the difficulties faced in applying the criteria for determining "important" wetlands in the first edition of the Directory was in assessing the representativeness or uniqueness of sites. In the first edition, this required the comparison of a site relative to those of similar wetland types across Australia.

The ANZECC Wetlands Network agreed in August 1994 that a biogeographic approach would greatly assist in making such assessments less subjective and more meaningful. Indeed, this was the approach adopted by the Queensland Department of Environment and Heritage in preparing the first edition. While various systems of biogeographic regions have been developed, the Network agreed that IBRA was the preferred model as it had the widest acceptance nationally.

Accordingly, the criteria for determining nationally important wetlands were amended to allow a site to be selected as important on the basis of it being "a good example of a wetland type occurring within a biogeographic region in Australia."

Of the 80 bioregions identified by IBRA 4.0, 29 cross jurisdictional boundaries, and a total of 25 bioregions within this category contain wetlands listed in the Directory. The application of the above criterion during the assessment process has enabled neighbouring State and Territory agencies to consult in order to ensure adequate consideration is given to wetlands occurring in shared bioregions. A summary of the environmental characteristics for each of the 80 IBRA regions is given in Thackway and Cresswell (1995) and is also available online at http://www.environment.gov.au/bg/nrs/ibraimcr/ibra_95/index2.htm

During the course of compiling information for this edition of the Directory agreement was reached on a revised version of IBRA. IBRA version 5.1 (Environment Australia 2000) defines 85 bioregions, adding another 5 to the total, and more accurately defines the boundaries of the remaining bioregions. Further information on IBRA 5.1 can also be found at the Internet address above.

All wetlands in the Directory except those in the External Territories have been described according to IBRA 4.0, and subsequent analyses included in this publication used these data. This description remains valid even though a revised version has been introduced. It is anticipated that wetland information will be updated where required using the revised IBRA boundaries.

IBRA summary

Table A2.1 lists all bioregions defined in IBRA 4.0 and their codes, which have been used to identify areas in Figure 12. It also gives the number and area of nationally important wetlands occurring in each bioregion at the time of publication.

In total, 71 out of the 80 bioregions are represented in this Directory (refer to Table A2.1). Seven bioregions contain only one important wetland, while the highest number of nationally important wetlands identified are found in the Mulga Lands (n=57), Murray-Darling Depression (n=48) and Riverina (n=46) bioregions.

Table A2.1 Number and area of Directory sites by IBRA region

IBRA Region	IBRA code	Area of bioregion (km^2)	No. of wetlands	Area of wetlands (ha)
Australian Alps	AA	11,718	16	1,012
Avon Wheatbelt	AW	94,148	5	7,274
Ben Lomond	BEN	8,645	15	281
Brigalow Belt North	BBN	112,780	10	475,697
Brigalow Belt South	BBS	279,496	14	247,754
Broken Hill Complex	BHC	57,055	0	0
Burt Plain	BRT	71,809	0	0
Cape York Peninsula	CYP	115,477	23	2,429,936
Carnarvon	CAR	91,960	8	537,801
Central Arnhem	CA	36,898	0	0
Central Highlands	CH	11,032	12	2,420
Central Kimberley	CK	76,907	3	121
Central Mackay Coast	CMC	14,343	14	703,220
Central Ranges	CR	97,061	1	1
Channel Country	CHC	305,543	25	3,057,435
Cobar Peneplain	CP	73,501	0	0
Coolgardie	COO	125,398	1	550
D'Entrecasteaux	DE	4,203	3	61
Daly Basin	DAB	20,921	1	1,650
Dampierland	DL	89,595	8	168,252
Darling Riverine Plains	DRP	105,511	8	424,566
Desert Uplands	DEU	68,816	5	50,560
Einasleigh Uplands	EIU	128,075	13	132,170
Esperance Plains	ESP	35,370	8	19,960
Eyre and Yorke Blocks	EYB	60,661	16	38,238
Finke	FIN	75,157	1	30,000
Flinders and Olary Ranges	FOR	77,490	1	—
Freycinet	FRE	6,414	8	7,650
Furneaux	FUR	2,372	14	3,729
Gascoyne	GAS	181,273	4	153627
Gawler	GAW	60,308	0	0
Geraldton Sandplains	GS	38,272	3	4,154
Gibson Desert	GD	155,530	2	501
Great Sandy Desert	GSD	394,599	5	216,306
Great Victoria Desert	GVD	423,751	1	71,000
Gulf Coastal	GUC	27,807	3	303,890

IBRA Region	IBRA code	Area of bioregion (km^2)	No. of wetlands	Area of wetlands (ha)
Gulf Fall and Uplands	GFU	118,975	2	1,233
Gulf Plains	GUP	211,584	15	2,221,612
Hampton	HAM	12,235	0	0
Jarrah Forest	JF	46,078	7	27,068
Little Sandy Desert	LSD	109,613	2	154202
Lofty Block	LB	23,752	18	50,750
MacDonnell Ranges	MAC	36,986	1	10
Mallee	MAL	79,874	3	13,348
Mitchell Grass Downs	MGD	319,788	8	402,885
Mount Isa Inlier	MII	66,586	4	329,204
Mulga Lands	ML	257,850	57	897,435
Murchison	MUR	278,360	6	304,630
Murray-Darling Depression	MDD	197,480	48	657,620
NSW North Coast	NNC	60,794	23	232,209
NSW South Western Slopes	NSS	84,278	7	41,400
Nandewar	NAN	27,322	0	0
Naracoorte Coastal Plain	NCP	28,905	20	301,193
New England Tableland	NET	29,347	3	588
Northern Kimberley	NK	87,017	4	589,540
Nullarbor	NUL	194,946	0	0
Ord-Victoria Plains	OVP	125,177	2	25,000
Pilbara	PIL	179,287	6	126,912
Pine-Creek Arnhem	PCA	51,576	2	1,376,090
Riverina	RIV	90,534	46	204,031
Simpson-Strzelecki Dunefields	SSD	277,876	4	1,803,816
South East Coastal Plain	SCP	18,813	23	154,284
South East Corner	SEC	27,477	29	82,364
South Eastern Highlands	SEH	82,576	31	34,874
South Eastern Queensland	SEQ	68,726	13	667,130
Stony Plains	STP	181,591	2	19,000
Sturt Plateau	STU	99,719	0	0
Swan Coastal Plain	SWA	15,181	29	30,470
Sydney Basin	SB	36,655	43	93,745
Tanami	TAN	316,656	2	39,500
Tasmanian Midlands	TM	7,762	20	2,128
Top End Coast	TEC	68,681	12	978,900
Victoria Bonaparte	VB	72,970	6	1,086,200

IBRA Region	IBRA code	Area of bioregion (km²)	No. of wetlands	Area of wetlands (ha)
Victorian Midlands	VM	37,025	8	8,631
Victorian Volcanic Plain	VVP	22,139	26	47,107
Warren	WAR	10,420	8	11,015
West and South West	WSW	18,269	7	66
Wet Tropics	WT	18,497	29	163,079
Woolnorth	WOO	9,645	10	35,179
Yalgoo	YAL	36,115	2	585
Great Barrier Reef			3	34,251,468
Total	**80**	7,685,033	842*	56,556,317

* *the nine External Territories wetlands are not included in this table.*

Note: area figures for wetlands are approximate only and are not available for all wetlands.

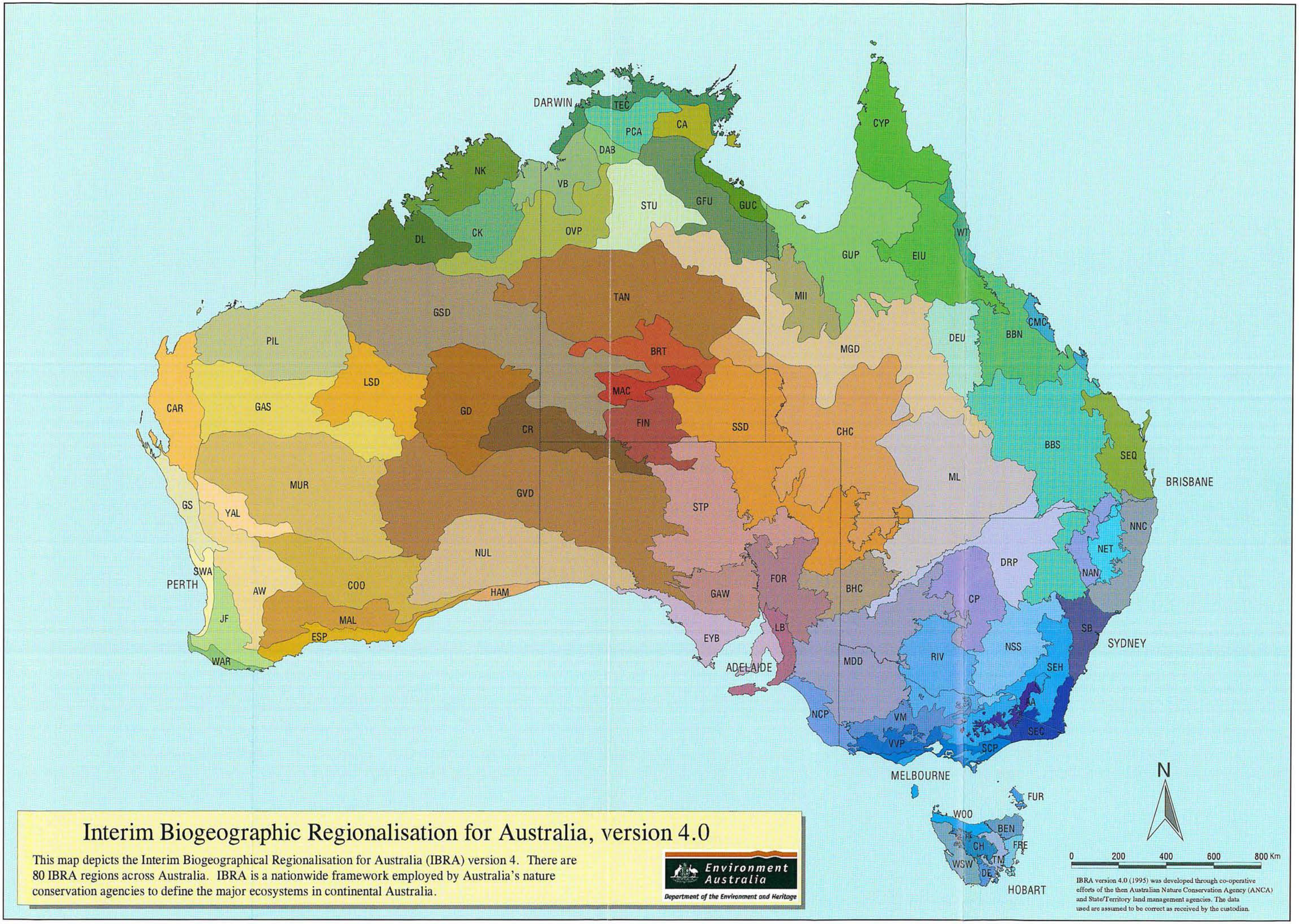
References

Thackway, R and Cresswell, I.D. (Eds) 1995. *An Interim Biogeographic Regionalisation for Australia: A framework for setting priorities in the national reserves system cooperative program, Version 4.0*. Australian Nature Conservation Agency, Canberra.

Environment Australia (2000). *Revision of the Interim Biogeographic Regionalisation of Australia (IBRA) and Development of Version 5.1—Summary Report*. Environment Australia, Canberra.

Table A2.2 Interim Biogeographic Regionalisation for Australia, version 4.0

IBRA code	IBRA Region	IBRA code	IBRA Region
AA	Australian Alps	LSD	Little Sandy Desert
AW	Avon Wheatbelt	LB	Lofty Block
BEN	Ben Lomond	MAC	MacDonnell Ranges
BBN	Brigalow Belt North	MAL	Mallee
BBS	Brigalow Belt South	MGD	Mitchell Grass Downs
BHC	Broken Hill Complex	MII	Mount Isa Inlier
BRT	Burt Plain	ML	Mulga Lands
CYP	Cape York Peninsula	MUR	Murchison
CAR	Carnarvon	MDD	Murray-Darling Depression
CA	Central Arnhem	NNC	NSW North Coast
CH	Central Highlands	NSS	NSW South Western Slopes
CK	Central Kimberley	NAN	Nandewar
CMC	Central Mackay Coast	NCP	Naracoorte Coastal Plain
CR	Central Ranges	NET	New England Tableland
CHC	Channel Country	NK	Northern Kimberley
CP	Cobar Peneplain	NUL	Nullarbor
COO	Coolgardie	OVP	Ord-Victoria Plains
DE	D'Entrecasteaux	PIL	Pilbara
DAB	Daly Basin	PCA	Pine-Creek Arnhem
DL	Dampierland	RIV	Riverina
DRP	Darling Riverine Plains	SSD	Simpson-Strzelecki Dunefields
DEU	Desert Uplands	SCP	South East Coastal Plain
EIU	Einasleigh Uplands	SEC	South East Corner
ESP	Esperance Plains	SEH	South Eastern Highlands
EYB	Eyre and Yorke Blocks	SEQ	South Eastern Queensland
FIN	Finke	STP	Stony Plains
FOR	Flinders and Olary Ranges	STU	Sturt Plateau
FRE	Freycinet	SWA	Swan Coastal Plain
FUR	Furneaux	SB	Sydney Basin
GAS	Gascoyne	TAN	Tanami
GAW	Gawler	TM	Tasmanian Midlands
GS	Geraldton Sandplains	TEC	Top End Coast
GD	Gibson Desert	VB	Victoria Bonaparte
GSD	Great Sandy Desert	VM	Victorian Midlands
GVD	Great Victoria Desert	VVP	Victorian Volcanic Plain
GUC	Gulf Coastal	WAR	Warren
GFU	Gulf Fall and Uplands	WSW	West and South West
GUP	Gulf Plains	WT	Wet Tropics
HAM	Hampton	WOO	Woolnorth
JF	Jarrah Forest	YAL	Yalgoo



Interim Biogeographic Regionalisation for Australia, version 4.0

This map depicts the Interim Biogeographical Regionalisation for Australia (IBRA) version 4. There are 80 IBRA regions across Australia. IBRA is a nationwide framework employed by Australia's nature conservation agencies to define the major ecosystems in continental Australia.

Environment Australia
Department of the Environment and Heritage

IBRA version 4.0 (1995) was developed through co-operative efforts of the then Australian Nature Conservation Agency (ANCA) and State/Territory land management agencies. The data used are assumed to be correct as received by the custodian.

Appendix 3.
Summary analysis of Directory sites by Drainage Basin

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ANALYSIS OF THE DISTRIBUTION AND REPRESENTATION OF NATIONALLY IMPORTANT WETLANDS IN DRAINAGE BASINS WAS UNDERTAKEN VIA GIS, using the Australian Water Resources Commission Drainage Division and Basins coverage. The coverage defines 245 drainage basins in continental Australia. The coverage of nationally important wetlands produced to generate the State and Territory maps for this publication uses centroids to identify sites, hence these are represented as points not areas, and wetlands were assigned to only one drainage basin. As a result there are some limitations with this analysis.

Some coastal sites that had centroids offshore were assigned to drainage basins manually. In some instances this involved a subjective assessment and was somewhat arbitrary; for example Moreton Bay receives input from five drainage basins, only one of which (Brisbane River) was included.

The coverage of Drainage Divisions and Basins is shown at Figure 13. Table A3.4 can be used to refer to Drainage Division and Drainage Basin numbers given on the map.

Of the 245 drainage basins, 189 contain nationally important wetlands (refer to Table A3.1). Sixteen "offshore" wetlands are not included in this analysis: the nine External Territories sites; three Great Barrier Reef sites in Queensland; Five Islands Nature Reserve, Solitary Islands Marine Park and Cook Island Nature Reserve in New South Wales; and Mud Islands in Victoria, hence the total of 835 wetlands.

Table A3.1 Number and area of sites in Drainage Basins containing nationally important wetlands

Drainage Basin	Drainage Basin No.	Drainage Division No. and Name		No. sites	Area (ha)
Adelaide River	17	VIII	Timor Sea	2	239,800
Albany Coast	2	VI	South-west Coast	6	26,108
Archer River	22	IX	Gulf of Carpentaria	1	149,761
Arthur River	12	III	Tasmania	1	5
Ashburton River	6	VII	Indian Ocean	3	607
Avoca River	8	IV	Murray-Darling	10	25,752
Avon River	15	VI	South-west Coast	5	14,124
Baffle Creek	34	I	North-east Coast	2	46,157
Barkly	9	XII	Western Plateau	5	328,000
Barron River	10	I	North-east Coast	1	43
Barwon River	33	II	South-east Coast	3	7,450
Bega River	19	II	South-east Coast	5	1,583
Bellinger River	5	II	South-east Coast	1	367
Benanee	13	IV	Murray-Darling	2	7,102
Blackwood River	9	VI	South-west Coast	6	8,438
Blyth River	24	VIII	Timor Sea	1	35,500
Border Rivers	16	IV	Murray-Darling	1	460
Brisbane River	43	I	North-east Coast	2	304,842
Broken River	4	IV	Murray-Darling	4	66,904
Broughton River	7	V	South Australian Gulf	3	3,019
Brunswick River	2	II	South-east Coast	2	1,327
Bulloo River	1	XI	Bulloo-Bancannia	7	279,587
Bunyip River	28	II	South-east Coast	2	52,540
Burdekin River	20	I	North-east Coast	12	171,582
Burrum River	37	I	North-east Coast	1	15,128
Busselton Coast	10	VI	South-west Coast	2	1,025
Calliope River	32	I	North-east Coast	1	31,264
Cape Leveque Coast	1	VIII	Timor Sea	4	98,042
Clarence River	4	II	South-east Coast	8	28,816
Clyde River-Jervis Bay	16	II	South-east Coast	13	53,789
Coleman River	20	IX	Gulf of Carpentaria	2	182,444
Collie River	12	VI	South-west Coast	1	572
Condamine-Culgoa Rivers	22	IV	Murray-Darling	20	288,002
Cooper Creek	3	X	Lake Eyre	11	2,418,502
Curtis Island	31	I	North-east Coast	2	30,442
Daintree River	8	I	North-east Coast	3	6,122
Daly River	14	VIII	Timor Sea	3	161,100
Darling River	25	IV	Murray-Darling	3	314,000
De Grey River	10	VII	Indian Ocean	1	13,600
Derwent River	4	III	Tasmania	13	4,016
Diamantina River	2	X	Lake Eyre	6	79,224
Don River	21	I	North-east Coast	2	16,243
Drysdale River	7	VIII	Timor Sea	1	5,100
Ducie River	26	IX	Gulf of Carpentaria	3	197,619
East Alligator River	21	VIII	Timor Sea	2	165,500
East Coast	2	III	Tasmania	12	7,940
East Gippsland	21	II	South-east Coast	7	18,962
Esperance Coast	1	VI	South-west Coast	5	15,860

Drainage Basin	Drainage Basin No.	Drainage Division No. and Name		No. sites	Area (ha)
Eyre Peninsula	12	V	South Australian Gulf	4	22,440
Finke River	5	X	Lake Eyre	2	19,010
Finniss River	15	VIII	Timor Sea	3	131,700
Fitzroy River (Qld)	30	I	North-east Coast	8	169,295
Fitzroy River (WA)	2	VIII	Timor Sea	3	30,230
Fleurieu Peninsula	1	V	South Australian Gulf	2	56
Flinders River	15	IX	Gulf of Carpentaria	2	349
Flinders-Cape Barren Islands	1	III	Tasmania	14	3,729
Fortescue River	8	VII	Indian Ocean	3	100,230
Forth River	15	III	Tasmania	1	100
Fraser Island	39	I	North-east Coast	1	163,294
Gairdner	1	XII	Western Plateau	6	10,845
Gascoyne River	4	VII	Indian Ocean	1	2,500
Gawler River	5	V	South Australian Gulf	1	434
Georgina River	1	X	Lake Eyre	9	414,785
Gilbert River	17	IX	Gulf of Carpentaria	3	251,832
Glenelg River	38	II	South-east Coast	6	6,863
Gordon River	8	III	Tasmania	2	26
Goulburn River	5	IV	Murray-Darling	6	18,902
Goyder River	25	VIII	Timor Sea	1	71,400
Greenough River	1	VII	Indian Ocean	1	3,000
Gwydir River	18	IV	Murray-Darling	1	102,120
Harvey River	13	VI	South-west Coast	3	20,000
Hastings River	7	II	South-east Coast	2	18,642
Haughton River	19	I	North-east Coast	2	181,738
Hawkesbury River	12	II	South-east Coast	10	5,222
Herbert River	16	I	North-east Coast	6	72,086
Hinchinbrook Island	15	I	North-east Coast	1	1,129
Holroyd River	21	IX	Gulf of Carpentaria	1	1,114,324
Hopkins River	36	II	South-east Coast	9	3,491
Hunter River	10	II	South-east Coast	4	4,971
Huon River	6	III	Tasmania	2	—
Isdell River	4	VIII	Timor Sea	1	566,000
Jacky Jacky Creek	1	I	North-east Coast	4	89,457
Jardine River	27	IX	Gulf of Carpentaria	1	17,239
Jeannie River	6	I	North-east Coast	2	49,514
Johnstone River	12	I	North-east Coast	6	10,416
Kangaroo Island	13	V	South Australian Gulf	13	50,304
Karuah River	9	II	South-east Coast	3	64,820
Keep River	10	VIII	Timor Sea	2	103,700
Kent River	4	VI	South-west Coast	2	1,100
Kiewa River	2	IV	Murray-Darling	1	60
King Edward River	6	VIII	Timor Sea	1	4,140
King Island	13	III	Tasmania	7	7,076
King-Henty Rivers	9	III	Tasmania	3	25
Kingston Coast	5	III	Tasmania	2	51
Lachlan River	12	IV	Murray-Darling	8	52,120
Lake Bancannia	2	XI	Bulloo-Bancannia	2	5,816
Lake Corangamite	34	II	South-east Coast	16	35,824

Drainage Basin	Drainage Basin No.	Drainage Division No. and Name		No. sites	Area (ha)
Lake Frome	4	X	Lake Eyre	4	1.798.000
Lake George	11	IV	Murray-Darling	1	15.000
Leichhardt River	13	IX	Gulf of Carpentaria	3	549.030
Lennard River	3	VIII	Timor Sea	3	101
Lockhart River	3	I	North-east Coast	2	60.516
Loddon River	7	IV	Murray-Darling	18	28.282
Logan-Albert Rivers	45	I	North-east Coast	1	329
Lower Murray River	26	IV	Murray-Darling	10	175.147
Lyndon-Minilya Rivers	5	VII	Indian Ocean	6	535.301
Mackay	6	XII	Western Plateau	7	197.402
Macleay River	6	II	South-east Coast	4	8.497
Macquarie-Bogan Rivers	21	IV	Murray-Darling	1	200.000
Macquarie-Tuggerah Lakes	11	II	South-east Coast	4	832
Mallee	14	IV	Murray-Darling	16	41.320
Mambray Coast	8	V	South Australian Gulf	1	—
Manning River	8	II	South-east Coast	1	1.500
Maroochy River	41	I	North-east Coast	1	9.442
Mary River (Qld)	38	I	North-east Coast	1	1.983
Mary River (NT)	18	VIII	Timor Sea	1	127.600
McArthur River	7	IX	Gulf of Carpentaria	2	119.090
Mersey River	16	III	Tasmania	2	2
Millicent Coast	39	II	South-east Coast	14	155.262
Mitchell River (Vic)	24	II	South-east Coast	6	11.776
Mitchell River (WA)	19	IX	Gulf of Carpentaria	3	1.051.194
Moorabool River	32	II	South-east Coast	1	5.460
Moore-Hill Rivers	17	VI	South-west Coast	5	3.486
Morning Inlet	14	IX	Gulf of Carpentaria	1	1.909
Mornington Island	11	IX	Gulf of Carpentaria	1	6.388
Moruya River	17	II	South-east Coast	1	50
Moyle River	13	VIII	Timor Sea	1	48.100
Mulgrave-Russell Rivers	11	I	North-east Coast	9	14.051
Murchison River	2	VII	Indian Ocean	4	15.575
Murray River (Qld)	14	I	North-east Coast	4	80.658
Murray River (WA)	14	VI	South-west Coast	4	390
Murray-Riverina	9	IV	Murray-Darling	3	44.484
Murrumbidgee River	10	IV	Murray-Darling	29	205.789
Myponga River	2	V	South Australian Gulf	1	30
Namoi River	19	IV	Murray-Darling	1	6.385
Nicholson River	12	IX	Gulf of Carpentaria	7	603.345
Noosa River	40	I	North-east Coast	4	125.955
Normanby River	5	I	North-east Coast	5	518.208
O'Connell River	24	I	North-east Coast	2	26.263
Olive-Pascoe Rivers	2	I	North-east Coast	2	22.033
Onkaparinga River	3	V	South Australian Gulf	1	60
Ord River	9	VIII	Timor Sea	3	111.500
Otway Coast	35	II	South-east Coast	4	1.382
Ovens River	3	IV	Murray-Darling	4	6.842
Paroo River	24	IV	Murray-Darling	33	779.561
Pieman River	10	III	Tasmania	1	1

Drainage Basin	Drainage Basin No.	Drainage Division No. and Name		No. sites	Area (ha)
Piper-Ringarooma Rivers	19	III	Tasmania	12	256
Plane Creek	26	I	North-east Coast	3	42,447
Port Hedland Coast	9	VII	Indian Ocean	1	13,000
Portland Coast	37	II	South-east Coast	2	379
Proserpine River	22	I	North-east Coast	2	21,444
Roper River	3	IX	Gulf of Carpentaria	1	100
Rosie River	6	IX	Gulf of Carpentaria	2	3,081
Salt Lake	4	XII	Western Plateau	8	514,832
Sandy Desert	5	XII	Western Plateau	7	306,808
Settlement Creek	10	IX	Gulf of Carpentaria	1	82,430
Shannon River	6	VI	South-west Coast	5	17,275
Shoalhaven River	15	II	South-east Coast	4	5,170
Shoalwater Creek	28	I	North-east Coast	3	788,714
Smithton-Burnie Coast	14	III	Tasmania	3	28,103
Snowy River	22	II	South-east Coast	14	54,254
South Alligator River	20	VIII	Timor Sea	1	1,375,940
South Gippsland	27	II	South-east Coast	7	68,653
South-west Coast	7	III	Tasmania	1	10
Spencer Gulf	11	V	South Australian Gulf	1	1,500
Staaten River	18	IX	Gulf of Carpentaria	1	6,801
Swan Coast	16	VI	South-west Coast	17	6,094
Sydney Coast-Georges River	13	II	South-east Coast	8	25,404
Tamar River	18	III	Tasmania	14	164
Tambo River	23	II	South-east Coast	6	2,049
Thomson River	25	II	South-east Coast	4	18,045
Torrens River	4	V	South Australian Gulf	1	–
Towamba River	20	II	South-east Coast	3	1,500
Towns River	4	IX	Gulf of Carpentaria	1	184,800
Tully River	13	I	North-east Coast	1	232
Tuross River	18	II	South-east Coast	3	1,265
Tweed River	1	II	South-east Coast	2	267
Upper Murray River	1	IV	Murray-Darling	5	26,885
Victoria River	11	VIII	Timor Sea	1	871,000
Warrego River	23	IV	Murray-Darling	6	1,146
Water Park Creek	29	I	North-east Coast	5	45,707
Watson River	23	IX	Gulf of Carpentaria	1	29,911
Werribee River	31	II	South-east Coast	2	6,390
Wimmera-Avon Rivers	15	IV	Murray-Darling	16	89,322
Wiso	8	XII	Western Plateau	2	5,890
Wollongong Coast	14	II	South-east Coast	4	3,451
Wooramel River	3	VII	Indian Ocean	1	–
Yarra River	29	II	South-east Coast	1	1,065
Yarra Yarra Lakes	18	VI	South-west Coast	2	585
			Total	**835**	**22,294,655**

Note: area figures are approximate only and are not available for all wetlands.

The 22 drainage basins with ten or more nationally important wetlands hold 337 or 40.3% of the 835 continental wetlands, with an approximate area of 4.6 million hectares (refer to Table 1.4). The number of drainage basins containing listed wetlands, but with less than ten, is shown below in Table A3.2.

Table A3.2 Number of Drainage Basins with less than ten nationally important wetlands

	No. of Drainage Basins	No. of wetlands	Area of wetlands (ha)
9 wetlands	3	27	432,327
8 wetlands	5	40	790,467
7 wetlands	7	49	1,481,833
6 wetlands	12	72	783,154
5 wetlands	9	45	971,128
4 wetlands	17	68	2,346,611
3 wetlands	24	72	3,907,092
2 wetlands	35	70	1,693,364
1 wetland	55	55	5,288,566
Total	**167**	**498**	**17,694,542**

Note: area figures are approximate only and are not available for all wetlands.

The fifty-six drainage basins listed in Table A3.3 do not currently contain wetlands recognised as nationally important, reflecting in most instances gaps in primary information.

Table A3.3 Drainage Basins with no nationally important wetlands

Drainage Basin	Drainage Basin No.	Drainage Division No. and Name	
Bathurst and Melville Islands	16	VIII	Timor Sea
Black River	17	I	North-east Coast
Boyne River	33	I	North-east Coast
Buckingham River	26	VIII	Timor Sea
Burnett River	36	I	North-east Coast
Burt	7	XII	Western Plateau
Calvert River	9	IX	Gulf of Carpentaria
Campaspe River	6	IV	Murray-Darling
Castlereagh River	20	IV	Murray-Darling
Coal River	3	III	Tasmania
Denmark River	3	VI	South-west Coast
Donnelly River	8	VI	South-west Coast
Embley River	24	IX	Gulf of Carpentaria
Endeavour River	7	I	North-east Coast
Fitzmaurice River	12	VIII	Timor Sea
Frankland River	5	VI	South-west Coast
Goomadeer River	22	VIII	Timor Sea
Groote Eylandt	29	IX	Gulf of Carpentaria
Hay River	7	X	Lake Eyre
Kolan River	35	I	North-east Coast

Drainage Basin	Drainage Basin No.	Drainage Division No. and Name	
Koolatong River	1	IX	Gulf of Carpentaria
Lake Torrens	10	V	South Australian Gulf
Latrobe River	26	II	South-east Coast
Limmen Bight River	5	IX	Gulf of Carpentaria
Liverpool River	23	VIII	Timor Sea
Maribyrnong River	30	II	South-east Coast
Moonie River	17	IV	Murray-Darling
Mossman River	9	I	North-east Coast
Ninghan	19	VI	South-west Coast
Norman River	16	IX	Gulf of Carpentaria
Nullarbor	2	XII	Western Plateau
Onslow Coast	7	VII	Indian Ocean
Pentecost River	8	VIII	Timor Sea
Pine River	42	I	North-east Coast
Pioneer River	25	I	North-east Coast
Preston River	11	VI	South-west Coast
Prince Regent River	5	VIII	Timor Sea
Richmond River	3	II	South-east Coast
Robinson River	8	IX	Gulf of Carpentaria
Ross River	18	I	North-east Coast
Rubicon River	17	III	Tasmania
Sandy Cape Coast	11	III	Tasmania
South Coast	46	I	North-east Coast
Stewart River	4	I	North-east Coast
Stradbroke Island	44	I	North-east Coast
Styx River	27	I	North-east Coast
Todd River	6	X	Lake Eyre
Torres Strait Islands	28	IX	Gulf of Carpentaria
Wakefield River	6	V	South Australian Gulf
Walker River	2	IX	Gulf of Carpentaria
Warburton	3	XII	Western Plateau
Warren River	7	VI	South-west Coast
Wenlock River	25	IX	Gulf of Carpentaria
Whitsunday Island	23	I	North-east Coast
Wildman River	19	VIII	Timor Sea
Willochra Creek	9	V	South Australian Gulf

Table A3.4 Australia's Drainage Divisions and Basins

I NORTH-EAST COAST

1 Jacky Jacky Creek
2 Olive-Pascoe Rivers
3 Lockhart River
4 Stewart River
5 Normanby River
6 Jeannie River
7 Endeavour River
8 Daintree River
9 Mossman River
10 Barron River
11 Mulgrave-Russell Rivers
12 Johnstone River
13 Tully River
14 Murray River (Qld)
15 Hinchinbrook Island
16 Herbert River
17 Black River
18 Ross River
19 Haughton River
20 Burdekin River
21 Don River
22 Proserpine River
23 Whitsunday Island
24 O'Connell River
25 Pioneer River
26 Plane Creek
27 Styx River
28 Shoalwater Creek
29 Water Park Creek
30 Fitzroy River (Qld)
31 Curtis Island
32 Calliope River
33 Boyne River
34 Baffle Creek
35 Kolan River
36 Burnett River
37 Burrum River
38 Mary River (Qld)
39 Fraser Island
40 Noosa River
41 Maroochy River
42 Pine River
43 Brisbane River
44 Stradbroke Island
45 Logan-Albert Rivers
46 South Coast

II SOUTH-EAST COAST

1 Tweed River
2 Brunswick River
3 Richmond River
4 Clarence River
5 Bellinger River
6 Macleay River
7 Hastings River
8 Manning River
9 Karuah River
10 Hunter River
11 Macquarie-Tuggerah Lakes
12 Hawkesbury River
13 Sydney Coast-Georges River
14 Wollongong Coast
15 Shoalhaven River
16 Clyde River-Jervis Bay
17 Moruya River
18 Tuross River
19 Bega River
20 Towamba River
21 East Gippsland
22 Snowy River
23 Tambo River
24 Mitchell River (Vic)
25 Thomson River
26 Latrobe River
27 South Gippsland
28 Bunyip River
29 Yarra River
30 Maribyrnong River
31 Werribee River
32 Moorabool River
33 Barwon River
34 Lake Corangamite
35 Otway Coast
36 Hopkins River
37 Portland Coast
38 Glenelg River
39 Millicent Coast

III TASMANIA

1 Flinders-Cape Barren Islands
2 East Coast
3 Coal River
4 Derwent River
5 Kingston Coast
6 Huon River
7 South-west Coast
8 Gordon River
9 King-Henty Rivers
10 Pieman River
11 Sandy Cape Coast
12 Arthur River
13 King Island
14 Smithton-Burnie Coast
15 Forth River
16 Mersey River
17 Rubicon River
18 Tamar River
19 Piper-Ringarooma Rivers

IV MURRAY-DARLING

1 Upper Murray River
2 Kiewa River
3 Ovens River
4 Broken River
5 Goulburn River
6 Campaspe River
7 Loddon River
8 Avoca River
9 Murray-Riverina
10 Murrumbidgee River
11 Lake George
12 Lachlan River
13 Benance
14 Mallee
15 Wimmera-Avon Rivers
16 Border Rivers
17 Moonie River
18 Gwydir River
19 Namoi River
20 Castlereagh River
21 Macquarie-Bogan Rivers
22 Condamine-Culgoa Rivers
23 Warrego River
24 Paroo River
25 Darling River
26 Lower Murray River

V SOUTH AUSTRALIAN GULF

1 Fleurieu Peninsula
2 Myponga River
3 Onkaparinga River
4 Torrens River
5 Gawler River
6 Wakefield River
7 Broughton River
8 Mambray Coast
9 Willochra Creek
10 Lake Torrens
11 Spencer Gulf
12 Eyre Peninsula
13 Kangaroo Island

VI SOUTH-WEST COAST

1 Esperance Coast
2 Albany Coast
3 Denmark River
4 Kent River
5 Frankland River
6 Shannon River
7 Warren River
8 Donnelly River
9 Blackwood River
10 Busselton Coast
11 Preston River
12 Collie River
13 Harvey River
14 Murray River (WA)
15 Avon River
16 Swan Coast
17 Moore-Hill Rivers
18 Yarra Yarra Lakes
19 Ninghan

VII INDIAN OCEAN

1 Greenough River
2 Murchison River
3 Wooramel River
4 Gascoyne River
5 Lyndon-Minilya Rivers
6 Ashburton River
7 Onslow Coast
8 Fortescue River
9 Port Hedland Coast
10 De Grey River

VIII TIMOR SEA

1 Cape Leveque Coast
2 Fitzroy River (WA)
3 Lennard River
4 Isdell River
5 Prince Regent River
6 King Edward River
7 Drysdale River
8 Pentecost River
9 Ord River
10 Keep River
11 Victoria River
12 Fitzmaurice River
13 Moyle River
14 Daly River
15 Finniss River
16 Bathurst and Melville Islands
17 Adelaide River
18 Mary River (NT)
19 Wildman River
20 South Alligator River
21 East Alligator River
22 Goomadeer River
23 Liverpool River
24 Blyth River
25 Goyder River
26 Buckingham River

IX GULF OF CARPENTARIA

1 Koolatong River
2 Walker River
3 Roper River
4 Towns River
5 Limmen Bight River
6 Rosie River
7 McArthur River
8 Robinson River
9 Calvert River
10 Settlement Creek
11 Mornington Island
12 Nicholson River
13 Leichhardt River
14 Morning Inlet
15 Flinders River
16 Norman River
17 Gilbert River
18 Staaten River
19 Mitchell River (WA)
20 Coleman River
21 Holroyd River
22 Archer River
23 Watson River
24 Embley River
25 Wenlock River
26 Ducie River
27 Jardine River
28 Torres Strait Islands
29 Groote Eylandt

X LAKE EYRE

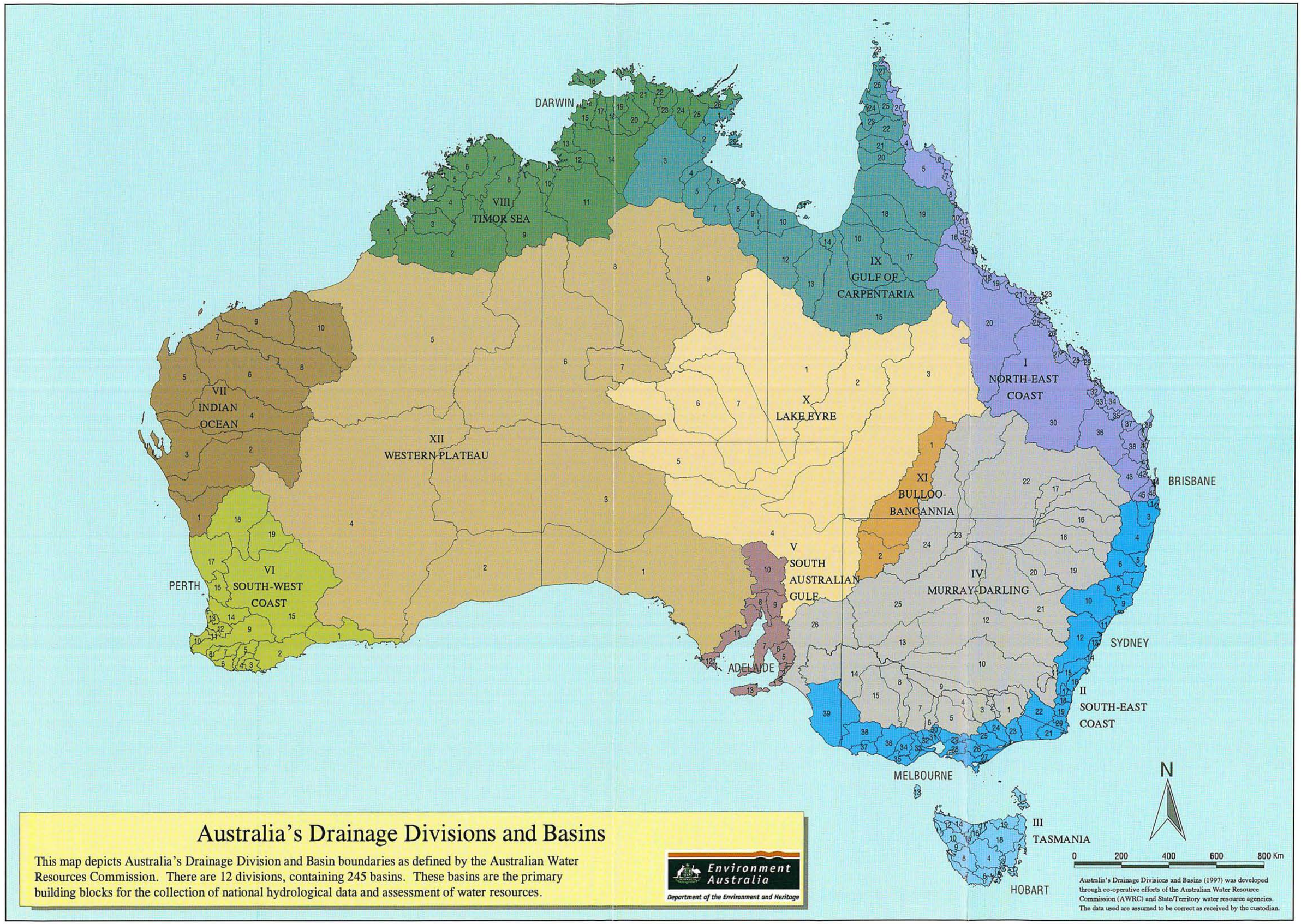
1 Georgina River
2 Diamantina River
3 Cooper Creek
4 Lake Frome
5 Finke River
6 Todd River
7 Hay River

XI BULLOO-BANCANNIA

1 Bulloo River
2 Lake Bancannia

XII WESTERN PLATEAU

1 Gairdner
2 Nullarbor
3 Warburton
4 Salt Lake
5 Sandy Desert
6 Mackay
7 Burt
8 Wiso
9 Barkly



Australia's Drainage Divisions and Basins

This map depicts Australia's Drainage Division and Basin boundaries as defined by the Australian Water Resources Commission. There are 12 divisions, containing 245 basins. These basins are the primary building blocks for the collection of national hydrological data and assessment of water resources.

Environment Australia
Department of the Environment and Heritage

Australia's Drainage Divisions and Basins (1997) was developed through co-operative efforts of the Australian Water Resource Commission (AWRC) and State/Territory water resource agencies. The data used are assumed to be correct as received by the custodian.

Appendix 4.
Ramsar Classification System for Wetland Type

The Ramsar Convention definition of "wetland" and classification system for wetland type

Definition

Under the Convention on Wetlands (Ramsar, Iran, 1971) "wetlands" are defined by Articles 1.1 and 2.1 as shown below:

Article 1.1:

"For the purpose of this Convention wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres."

Article 2.1 provides that wetlands:

"may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands".

Ramsar Classification System for Wetland Type

The codes are based upon the Ramsar Classification System for Wetland Type as approved by Recommendation 4.7 and amended by Resolution VI.5 of the Conference of the Contracting Parties. The categories listed herein are intended to provide only a very broad framework to aid rapid identification of the main wetland habitats represented at each site.

Marine/Coastal Wetlands

A Permanent shallow marine waters in most cases less than six metres deep at low tide; includes sea bays and straits.

B Marine subtidal aquatic beds; includes kelp beds, sea-grass beds, tropical marine meadows.

C Coral reefs.

D Rocky marine shores; includes rocky offshore islands, sea cliffs.

E Sand, shingle or pebble shores; includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks.

F Estuarine waters; permanent water of estuaries and estuarine systems of deltas.

G Intertidal mud, sand or salt flats.

H Intertidal marshes; includes salt marshes, salt meadows, saltings, raised salt marshes; includes tidal brackish and freshwater marshes.

I Intertidal forested wetlands; includes mangrove swamps, nipah swamps and tidal freshwater swamp forests.

J Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea.

K Coastal freshwater lagoons; includes freshwater delta lagoons.

Zk(a) Karst and other subterranean hydrological systems, marine/coastal

Inland Wetlands

L Permanent inland deltas.

M Permanent rivers/streams/creeks; includes waterfalls.

N Seasonal/intermittent/irregular rivers/streams/creeks.

O Permanent freshwater lakes (over 8 ha); includes large oxbow lakes.

P Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes.

Q Permanent saline/brackish/alkaline lakes.

R Seasonal/intermittent saline/brackish/alkaline lakes and flats.

Sp Permanent saline/brackish/alkaline marshes/pools.

Ss Seasonal/intermittent saline/brackish/alkaline marshes/pools.

Tp Permanent freshwater marshes/pools; ponds (below 8 ha), marshes and swamps on inorganic soils; with emergent vegetation water-logged for at least most of the growing season.

Ts Seasonal/intermittent freshwater marshes/pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.

U Non-forested peatlands; includes shrub or open bogs, swamps, fens.

Va Alpine wetlands; includes alpine meadows, temporary waters from snowmelt.

Vt Tundra wetlands; includes tundra pools, temporary waters from snowmelt.

W	Shrub-dominated wetlands; shrub swamps, shrub-dominated freshwater marshes, shrub carr, alder thicket on inorganic soils.
Xf	Freshwater, tree-dominated wetlands; includes freshwater swamp forests, seasonally flooded forests, wooded swamps on inorganic soils.
Xp	Forested peatlands; peatswamp forests.
Y	Freshwater springs; oases.
Zg	Geothermal wetlands
Zk(b)	Karst and other subterranean hydrological systems, inland

Note : "floodplain" is a broad term used to refer to one or more wetland types, which may include examples from the R, Ss, Ts, W, Xf, Xp, or other wetland types. Some examples of floodplain wetlands are seasonally inundated grassland (including natural wet meadows), shrublands, woodlands and forests. Floodplain wetlands are not listed as a specific wetland type herein.

Human-made wetlands

1	Aquaculture (e.g., fish/shrimp) ponds
2	Ponds; includes farm ponds, stock ponds, small tanks; (generally below 8 ha).
3	Irrigated land; includes irrigation channels and rice fields.
4	Seasonally flooded agricultural land (including intensively managed or grazed wet meadow or pasture).
5	Salt exploitation sites; salt pans, salines, etc.
6	Water storage areas; reservoirs/barrages/dams/impoundments (generally over 8 ha).
7	Excavations; gravel/brick/clay pits; borrow pits, mining pools.
8	Wastewater treatment areas; sewage farms, settling ponds, oxidation basins, etc.
9	Canals and drainage channels, ditches.
Zk(c)	Karst and other subterranean hydrological systems, human-made

Reprinted from Appendix A of the Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance (refer to http://ramsar.org)

A Directory of Important Wetlands in Australia is now online at:

http://www.environment.gov.au/water/wetlands