

Information Sheet on Ramsar Wetlands (RIS)

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

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

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

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

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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

November 2003

3. Country:

Australia

4. Name of the Ramsar site:

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

Forrestdale and Thomsons Lakes, Western Australia

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

Forrestdale and Thomsons Lakes, Western Australia was designated on 7 June 1990

The previous RIS was dated 1998.

This RIS is for (tick one box only):

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

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

a) Site boundary and area

The Ramsar site boundary and site area are unchanged: ☐

or

If the site boundary has changed:

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

and/or

If the site area has changed:

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

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

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

7. Map of site:

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

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

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

b) Describe briefly the type of boundary delineation applied:

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

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

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

Forrestdale Lake

Latitude: (approx.) 32° 10' S Longitude: (approx.) 115° 56' E

Thomsons Lake

Latitude: (approx.) 32° 09' S Longitude: (approx.) 115° 50' E

9. General location:

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

Forrestdale Lake is located in the City of Armadale (local authority, population c. 55 000 in 2003) and Thomsons Lake is located in the City of Cockburn (local authority, population c. 73 000 in 2003), both of which are within the southern Perth metropolitan area, in the State of Western Australia (population c. 1.95 million in 2003). Thomsons Lake is situated 1 km west of the suburb of Success, 7 km south-west of Jandakot Airport, while Forrestdale Lake is situated immediately south of the suburb of Forrestdale, 8 km south-east of Jandakot Airport.

10. Elevation: (in metres: average and/or maximum & minimum)

Forrestdale Lake: 22 m Australian Height Datum

Thomsons Lake: 12 m Australian Height Datum

11. Area: (in hectares)

Forrestdale Lake: 246 ha

Thomsons Lake: 538 ha

12. General overview of the site:

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

Thomsons and Forrestdale Lakes are the best remaining examples of brackish, seasonal lakes with extensive fringing sedgeland typical of the Swan Coastal Plain, and in a regional context, they constitute a major breeding, migration stop-over and semi-permanent drought refuge area for waterbirds. Within the Swan Coastal Plain, Thomsons Lake is one of the few remaining refuges (in Western Australia) of the threatened Australasian Bittern *Botaurus poiciloptilus*.

13. Ramsar Criteria:

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

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

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

The site continues to meet the criteria for which it was listed, plus an additional (**Criterion 5**) which was omitted in the original Ramsar nomination.

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

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

Thomsons and Forrestdale Lakes are the best remaining examples of brackish, seasonal lakes with extensive fringing sedgeland typical of the Swan Coastal Plain. While these types of wetland were formerly common, extensive development of the Swan Coastal Plain has resulted in the loss of many of these wetlands, and most of the remaining wetlands of this type have been degraded through drainage, eutrophication and the loss of fringing vegetation.

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.

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

Thomsons Lake is one of the last remaining refuges within the Swan Coastal Plain for the threatened Australasian Bittern *Botaurus poiciloptilus*, is one of few known breeding localities for Baillon's Crake *Porzana pusilla*, and is the only remaining wetland within the Perth metropolitan area where Marsh Harrier *Circus aeruginosus* still breeds

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

[Criterion 3(a) under the Pre-1999 Criteria - was omitted in the original Ramsar nomination for this site].

More than 20,000 water birds have been recorded on both Thomsons Lake (21,083 in February 1987) and Forrestdale Lake (22,196 in January 1986). Annual data on water depth indicates that conditions at both lakes are suitable for use by more than 20,000 waterbirds at least several times within a 25 year period; in the context of wetland availability in Western Australia, this is considered sufficient evidence of regular use by 20,000 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.

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

Thomsons Lake regularly supports more than 1% of the national population of four shorebirds: Red-capped Plover *Charadrius ruficapillus* (up to 1000, February 1986); Black-winged Stilt *Himantopus himantopus* (3000 summer 1986); Red-necked Avocet *Recurvirostra novaehollandiae* (3000 summer 1986); and Curlew Sandpiper *Calidris ferruginea* (2500, March 1983). Forrestdale Lake regularly supports more than 1% of the national population of five shorebirds: Red-capped Plover (up to 1300); Black-winged Stilt (3840); Red-necked Avocet (1113); Long-toed Stint *Calidris subminata* (up to 80); and Curlew Sandpiper (2000, January 1983).

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

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

a) biogeographic region:

Swan Coastal Plain

b) biogeographic regionalisation scheme (include reference citation):

Interim Biogeographic Regionalisation for Australia (IBRA) Version 5.1 (Cummings and Hardy 2000)

16. Physical features of the site:

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

Forrestdale and Thomsons Lakes are fresh/brackish, seasonal wetlands: Forrestdale Lake usually dries out by mid-summer whereas Thomsons Lake retains water longer and in some years does not dry completely. Both lakes are predominantly groundwater-fed lakes and surface run-off probably had little effect on their depth when they were in an undisturbed condition. Both lakes contain large areas of open water but are fringed by rushes and bulrushes, behind which are belts of trees tolerant of seasonal water-logging. The higher ground around the lakes supports open woodland.

Forrestdale Lake is situated on the eastern edge of the gently undulating Bassendean Dune System, which is a predominantly leached grey-white siliceous sands (DCLM 2003a). The lake is a deflation basin rimmed by low sand ridges up to five metres high. On the north-eastern margin of the lake a rocky outcrop of lithified sandstone is present. The lake bed sediments are up to two metres thick and include silt, clay, peat, diatomite, marl and freshwater limestone (ERM Mitchell McCotter 2000).

Thomsons Lake occupies a depression between two sand dune systems – the Bassendean Dune System to the east, and the younger Spearwood System to the west (DCLM 2003b). The two dune systems have occurred as a result of accumulation and subsequent distribution of beach sands and successive shorelines, and the major factors influencing their formation are thought to be a series of marine transgressions and prevailing westerly winds. Paleobotany studies have revealed that the sediments of Thomsons Lake are between 30 000 and 40 000 years old, making them the oldest lake sediments discovered in Western Australia to date.

17. Physical features of the catchment area:

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

The lakes are located within the southern Perth metropolitan area and are surrounded by medium density urban developments and some agricultural land. The lakes are situated in the Perth Basin, on the Swan Coastal Plain, on the eastern edge of the gently undulating Bassendean Dune System (Forrestdale Lake), and in the junction between the Bassendean Dune System and the Spearwood Dune System (Karrakatta unit – deep yellow sand over limestone – Thomsons Lake).

18. Hydrological values:

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

Forrestdale and Thomsons Lakes are examples of interdunal groundwater wetlands. Both lakes are situated on the Jandakot Groundwater Mound which is a region of elevated groundwater table beneath the Swan Coastal Plain. Groundwater discharges from the mound into low lying depressions that support groundwater dependant vegetation and extensive wetland systems, the most notable of which are Forrestdale and Thomsons Lakes (DCLM 2003a, 2003b). The water levels in both lakes respond to events which cause variations in local groundwater supply, including natural processes such as seasonal rainfall, and as a result of modified land-uses within the catchment, particularly groundwater abstraction, drainage and urban development (DCLM 2003a, 2003b). Forrestdale Lake receives also a small amount of drainage from adjacent residential areas. A drainage scheme diverts water from residential subdivisions to the east of Thomsons Lake away from the lake. Strict criteria have been imposed for water level management in both lakes (see item 27; Water and Rivers Commission 2001).

19. Wetland Types

a) presence:

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

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

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

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

b) dominance:

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

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20. General ecological features:

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

The lakes provide important habitat for waterbirds on the Swan Coastal Plain with 72 species of waterbird occurring at the two lakes and 21 of them breeding. Sixty-six waterbird species have been recorded at Forrestdale Lake, with 21 of these protected by the Japan-Australia Migratory Bird Agreement (JAMBA) and the China-Australia Migratory Bird Agreement (CAMBA), while 69 species have been recorded at Thomsons Lake, including 21 species that are protected by JAMBA and CAMBA (DCLM 2003a, 2003b). All migratory species listed under JAMBA and CAMBA are specially protected by the Commonwealth *Environment Protection and Biodiversity Conservation Act* (1999). The highest number of waterbirds counted at Forrestdale Lake was 21 083 in February 1987 and at least 10 000 have been recorded in most years, however only 1 400 were recorded in 1998 after several years of below-average rainfall (Bamford and Bamford 1999). In some years, Forrestdale Lake supports more than 10 000 ducks with the following species being particularly abundant:

Australian Shelduck	<i>Tadorna tadornoides</i>	1 650	Jan 1985
Pacific Black Duck	<i>Anas superciliosa</i>	5 500	Mar 1987
Grey Teal	<i>A. gracilis</i>	9 000	Mar 1987
Australasian Shoveler	<i>A. rhynchotis</i>	2 000	Jan 1984
Hardhead	<i>Aythya australis</i>	1 053	Oct 1982

The highest number of waterbirds counted at Thomsons Lake was 22 196 in January 1986, and more than 10 000 waterbirds often occur. In 1998, at least 3863 waterbirds were present at the lake, despite several years of below average rainfall. The most abundant duck species at Thomsons Lake are:

Australian Shelduck	<i>Tadorna tadornoides</i>	1 600	Nov 1982
Pacific Black Duck	<i>Anas superciliosa</i>	4 500	Dec 1985
Grey Teal	<i>A. gracilis</i>	6 000	Feb 1986
Eurasian Coot	<i>Fulica atra</i>	7 000	Feb 1987
Australasian Shoveler	<i>A. rhynchotis</i>	2 000	Mar 1982

Other species occurring in significant numbers at Forrestdale Lake are:

Eurasian Coot	<i>Fulica atra</i>	7 670	Jan 1987
Red-necked Stint	<i>Calidris ruficollis</i>	3 000	Mar 1982
Clamorous Reed Warbler	<i>Acrocephalus stentoreus</i>	77	Nov 1982
Hoary-headed Grebe	<i>Poliocephalus poliocephalus</i>	3 400	
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>	180	
Spotless Crake	<i>Porzana tabuensis</i>	51	
Purple Swamphen	<i>Porphyrio porphyrio</i>	87	
Marsh Sandpiper	<i>Tringa stagnatilis</i>	60	

Other species occurring in significant numbers at Thomsons Lake are:

Hoary-headed Grebe	<i>Poliocephalus poliocephalus</i>	1 500	Nov 1982
Australian Crake	<i>Porzana fluminea</i>	20	Jan 1983
Purple Swamphen	<i>Porphyrio porphyrio</i>	451	
Glossy Ibis	<i>Plegadis falcinellus</i>	24	
Blue-billed Duck	<i>Oxyura australis</i>	367	
Baillon's Crake	<i>Porzana pusilla</i>	22	
White-winged Tern	<i>Chlidonia leucoptera</i>	150	
Little Grassbird	<i>Megalurus gramineus</i>	51	

All waterbird count data are from Crook and Evans (1981), Curry et al. (1983), Bartle et al. (1987), Jaensch et al. (1988), Storr and Johnstone (1988) and Royal Australian Ornithologists Union (now Birds Australia) and Western Australian Department of Conservation and Land Management ground and aerial surveys conducted between 1981 and 1991.

Although waterbirds are the main feature of both lakes, the margins of both lakes support a large number of terrestrial birds, and other vertebrate species including the uncommon skink *Lerista lineata*. Forrestdale Lake supports six wetland frog species and at least 62 aquatic invertebrate taxa also occur. Thomsons lake also supports six wetland frog species and up to 80 aquatic invertebrate taxa have been recorded (including 22 Coleoptera, 15 Crustacea, 9 Odonata and 8 Hemiptera) (Davis and Rolls 1987; Davis et al. 1983; and Balla and Davis 1993). Freshwater Tortoises *Chelonia oblonga* are also present in both lakes.

There is often a dense mat of *Chara* sp, *Potamogeton pectinatus*, and *Ruppia polycarpa* in the water at Lake Forrestdale. Around the waters edge there is an almost continuous belt of *Typha orientalis*, behind which *Baumea articulata*, *B. juncea*, *Juncus pallidus*, *Bolboschoenus caldwellii* and *Gahnia trifida* sometimes grow. Beyond these is a belt of trees, principally *Melaleuca raphiophylla*, with some *M. preissiana*, *M. incana*, *M. cuticularis*, *M. lateritia* and *Banksia littoralis* also present. *Acacia saligna* and *Eucalyptus rudis* occur on the landward side of this zone. The higher sandy ground on the eastern side of Forrestdale Lake supports open woodland dominated by *Banksia attenuata*. A total of 343 vascular flora taxa from 77 families have been recorded within Forrestdale Lake Nature Reserve (Keighery 1999a). Of these, 84 taxa are introduced weeds. Twenty six species of algae have also been recorded within the lake.

Myriophyllum sp. grows prolifically in the water at Thomson Lake. *Typha orientalis* and *Baumea articulata* grow around the edge of the lake. As water levels drop, *Bolboschoenus caldwellii* becomes established on the newly exposed mudflats inside the fringing zone. Behind the fringing zone is a belt of *Baumea juncea* and *B. articulata* with emergent *Viminaria juncea* and *Acacia saligna* shrubs. This gives way to a belt of trees, *Eucalyptus rudis* and *Melaleuca preissiana*, and the shrub *Jacksonia furcellata*. As the ground rises these are replaced by open forest or woodland dominated by *Eucalyptus marginata*, *Banksia menziesii* and *B. attenuata*. A total of 476 vascular flora taxa from 81 families have been recorded in Thomsons Lake Nature Reserve (Keighery 1999b). Of these, 133 are introduced weeds.

21. Noteworthy flora:

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

There are no nationally rare, threatened or endemic species known from either lake. Bulrush *Typha orientalis* first appeared at Forrestdale Lake in 1976 and at Thomsons Lake in the 1980s. Since that time it has established and now covers expansive areas of the waters edge. Pampas grass *Cortaderia selloana* and Arum Lily *Zantedeschia aethiopica* are problematic weeds which have also established at both lakes. A total of 84 introduced weeds have been recorded in the Forrestdale Lake Nature Reserve while 133 introduced weeds have been recorded in Thomsons Lake Nature Reserve.

22. Noteworthy fauna:

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

Two rare Australasian Bittern *Botaurus poiciloptilus* were recorded at Thomsons Lake in six of seven years (1981-1988), inhabiting tall sedgeland with enclosed areas of shallow open water or low sedges.

They were not recorded to be breeding, however conditions were probably suitable. Australasian Bittern are listed as a vulnerable species in the 2003 IUCN Red List of Threatened Species.

Long-toed Stint *Calidris subminuta* occur regularly at Thomsons and Forrestdale Lakes when mudflats become exposed in summer/autumn. The highest counts of 80 at Forrestdale Lake (summer 1980) and 20 at Thomsons Lake (in February 1991) represent at least 1% of the regional population - the total Australian population is only a few hundred. Another four shorebirds have been regularly recorded at both Lakes in numbers greater than 1% of the national population: Red-capped Plover *Charadrius ruficapillus*; Black-winged Stilt *Himantopus himantopus*; Red-necked Avocet *Recurvirostra novaehollandiae*; and Curlew Sandpiper *Calidris ferruginea*.

Forrestdale Lake is one of the few sites in Western Australia where Little Ringed Plover *Charadrius dubius* and Little Stint *Calidris minuta* have been recorded more than once, and it is the only location in Western Australia where White-rumped Sandpiper *C. fuscicollis* have been recorded.

Pectoral Sandpiper *Calidris melanotos* (up to four) and Ruff *Philomachus pugnax* (one) occur at Thomsons Lake in some years. Thomsons Lake is one of few known breeding localities for Baillon's Crake *Porzana pusilla*, and the only remaining wetland within the Perth metropolitan area where Marsh Harrier *Circus aeruginosus* still breeds.

23. Social and cultural values:

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

Forrestdale Lake was an important tortoise hunting site for Aboriginal people from as far away as Pinjarra (50 km south), and campsites at the Lake were occupied for extended periods. The Lake is associated with a powerful Waugal (an important Aboriginal mythological being). Both lakes are used for bird-watching, nature walks, horse riding and general recreation by surrounding residents.

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

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

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

24. Land tenure/ownership:

a) within the Ramsar site:

The wetland area at Forrestdale Lake is in Nature Reserve 24781 vested in the Conservation Commission of Western Australia and managed by the Department of Conservation and Land Management. The area at Thomson Lake is in Nature Reserve 15556 and has the same vesting and management.

b) in the surrounding area:

Both lakes are surrounded by freehold residential, rural and semi-rural (rural residential) land. Adjoining the eastern side of Forrestdale Lake Nature Reserve is reserve (27165) vested in the City of Armadale for the purpose of recreation, part of which is leased for use as a golf course. Adjoining the south-western side of Forrestdale Lake Nature Reserve is a parcel of bushland owned by the Western Australian Planning Commission. Both of these areas have been proposed for future addition to the Nature Reserve (see item 28).

25. Current land (including water) use:

a) within the Ramsar site:

Thomsons Lake Nature Reserve is fenced to exclude feral predators. Both lakes are used principally for bird-watching, nature walks, horse-riding and general recreation by surrounding residents.

b) in the surroundings/catchment:

The area to the north-east of Forrestdale Lake is urban and houses occur within 50 m of the lake. Land to the west of the lake has been developed for agricultural or housing purposes to within about 100 m of the lake edge. There is a substantial area of natural open woodland on the eastern side of the lake, which is used for horse-riding. There is a much larger area of bush around Thomsons Lake than remains around Forrestdale Lake; however both lakes are islands of natural vegetation in a sea of agricultural and urban land.

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

a) within the Ramsar site:

Nutrient levels are high in both Forrestdale and Thomsons Lakes and their biological value may decline if high levels of nutrient input continue. The need to use pesticides to control chironomids (non-biting midges) in Forrestdale Lake (emerging adults can be a severe nuisance to nearby residents) is a potential threat to aquatic invertebrate and bird life. In 1984, approximately 220 waders were killed at Forrestdale Lake as a result of pesticide spraying to control midges (Keeling and McNee 1984). Over the past 20 years the area of *Typha* spp. in the fringing vegetation of both lakes has increased substantially and poses a threat to their ecological character by changing floristics and reducing the amount of open water. Excessive disturbance of waterbirds by humans and dogs may occur, especially in late summer/autumn when the lake is drying out. Increasing urbanisation of the catchment of Forrestdale Lake may result in changes to the water balance or nutrient status of the lake. The water and nutrient balance in both lakes need to be regularly monitored.

b) in the surrounding area:

Increased groundwater abstraction may impact on lake water levels.

27. Conservation measures taken:

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

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

Both lakes are included on the Register of the National Estate and are protected by the Western Australian Environmental Protection Authority's Swan Coastal Plain Lakes Environmental Protection Policy (1992).

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

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

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

Management plans for Thomsons Lake and Forrestdale Lake were published in 1981 and 1987, respectively. New plans have been prepared for both lakes and draft plans were released for public comment in October 2003 (DCLM 2003a, 2003b). The major management issues identified in the draft plans are:

- (1) Maintenance of water quality. Nutrient levels in the lakes are fairly high, especially in Forrestdale Lake (possibly because of rural land use including intensive animal feed-lots, commercial crop and domestic garden fertilisers, and possibly sewage leaching), and water levels may change because of groundwater extraction for domestic and agricultural purposes or increased drainage discharge from nearby urban areas.
- (2) Preventing the spread of *Typha orientalis* throughout the lakes.
- (3) The need to control chironomid numbers in Forrestdale because they can be an extreme nuisance to nearby residents.
- (4) The deterioration of the wetland and woodland vegetation at Forrestdale because of over-use by visitors.

Forrestdale Lake is part of the 'Bush Forever' Site 345 – 'Forrestdale Lake and adjacent Bushland, Forrestdale' (Government of Western Australia 2000).

d) Describe any other current management practices:

In 1992, Environmental Water Provisions (EWP) were set for both lakes under Section 46 of the Western Australian Environmental Protection Act (1986). The EWP defined a preferred minimum water level and an absolute minimum water level for each lake. For Forrestdale Lake the statutory preferred minimum water levels are between 21.2 – 21.6 m AHD, and 21.1 m AHD has been set as the absolute minimum level (DCLM 2003a). The statutory preferred minimum water level for Thomsons Lake is 11.3 m AHD, with an absolute minimum of 10.8 m AHD. These levels have been breached a number of times at Forrestdale Lake but not at Thomsons Lake (DCLM 2003a, 2003b).

28. Conservation measures proposed but not yet implemented:

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

The City of Armadale Reserve 27165, which adjoins the eastern side of Forrestdale Lake Nature Reserve, and bushland owned by the Western Australian Planning Commission adjoining the south-western side of the Nature Reserve have been proposed for future addition to the Nature Reserve (DCLM 2003a).

29. Current scientific research and facilities:

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

Murdoch University has undertaken extensive studies of the water chemistry, aquatic invertebrate fauna and midge problem of both lakes (Balla and Davis 1995; Davis and Rolls 1997; Davis et al. 1993; McGuire and Davis 1999; Pinder et al. 1991, Wild et al. 2003). The Department of Conservation and Land Management has undertaken studies to determine the factors influencing waterbird usage of both lakes, including water chemistry, extent of vegetation and water levels.

DCLM, with assistance from the Friends of Forrestdale community group, undertakes regular monitoring of water levels, nutrients and chemistry in both lakes.

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

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

A brochure on Forrestdale Lake was prepared by the Department of Conservation and Land Management and interpretive shelters have been installed at both lakes. A boardwalk was installed at Forrestdale Lake in 1994; however it was destroyed by a fire in early 2003. The Department of Conservation and Land Management is currently investigating options for its replacement.

31. Current recreation and tourism:

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

Both lakes are used for passive recreation including bushwalking and bird-watching. Horse-riding and mountain-bike riding occur regularly along a multi-purpose limestone path ('the Forrestdale Trail') located around the perimeter of Forrestdale Lake Nature Reserve (DCLM 2003a). There is a well-established network of fire-breaks and management access tracks within Thomsons Lake Nature Reserve which are regularly used as bushwalking trails while horse-riding is only permitted along a narrow trail on the outside perimeter of the vermin-proof fence (DCLM 2003b).

32. Jurisdiction:

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

Territorial: Government of Western Australia

Functional: Conservation Commission of Western Australia (vesting) and the Western Australian Department of Conservation & Land Management (management on behalf of the Conservation Commission).

33. Management authority:

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

Department of Conservation and Land Management
Swan Region
PO Box 1167
Bentley Delivery Centre
WA, 6983.

34. Bibliographical references:

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

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