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:

FOR OFFICE USE ONLY.

DD MM YY

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

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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.

Lakes Argyle and Kununurra, Western Australia

5. Designation of new Ramsar site or update of existing site:
"Lakes Argyle and Kununurra, 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:

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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.

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8. Geographical coordinates (latitude/longitude, in degrees and minutes):
Provide the coordinates of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas.

Latitude: (approx.) 15° 48' S to 16° 50' S; Longitude: (approx.) 128° 28' E to 129° 00' E

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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.

Lakes Argyle and Kununurra are in the Shire of Wyndham – East Kimberley (local authority) in the State of Western Australia (population ca. 1.95 million in 2003). Lake Kununurra is located in and near the town of Kununurra (population ca. 6000 in 2003). Lake Argyle is immediately upstream.

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10. Elevation: (in metres: average and/or maximum & minimum)
Lake Argyle – approximately 95 m Australian Height Datum
Lake Kununurra – approximately 41 m Australian Height Datum

11. Area: (in hectares)
117 495 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.

A large system of two man-made reservoirs and associated wetlands that is used extensively by waterbirds, especially during the dry season when up to 200 000 waterbirds have been counted.

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
❑	☑	☑	☑	☑	❑	❑	❑	❑

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 Criteria under which "Lakes Argyle and Kununurra" was originally nominated as a Ramsar Site were:
2a (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.)
3a (It regularly supports 20,000 waterfowl.)

Since that time, the Criteria have been further developed and re-numbered by Ramsar Conferences of Contracting Parties. Furthermore, a re-assessment indicates that the following Criteria are applicable to the Site:

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.
The Site supports a large population of the vulnerable Freshwater Crocodile *Crocodylus johnstoni*, which is specially protected by the Western Australian *Wildlife Conservation Act* (1950) and the Commonwealth of Australia's *Environment Protection and Biodiversity Conservation Act* (1999).

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.
At least 15 species of freshwater fishes (mainly catfishes, grunters and gudgeons) are know to occur at the Site, while four fishes (two catfish *Arius spp.*, Strawman *Quirichthys stramineus*, and Giant Glassfish *Parambassis gulliveri*) are known in Western Australia only from the Site and other parts of the Ord River System. Three species of freshwater turtle are known from the Site and one of these, *Emydura australis,* is restricted to the Kimberley – Victoria River 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.
Lakes Argyle and Kununurra are important dry-season refuges for waterbirds.

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

The Site regularly supports very large numbers of waterbirds. In August 1986, Lake Argyle supported more than 180,000 while in September 1978, 12,000 were recorded using Lake Kununurra.

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

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

a) biogeographic region:

Victoria Bonaparte

b) biogeographic regionalisation scheme (include reference citation):

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

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16. Physical features of the site:

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

Lakes Argyle and Kununurra were formed by damming of the Ord River in 1963 (Lake Kununurra) and 1972 (Lake Argyle). Many of the associated wetlands which are connected to the lakes were seasonally inundated prior to the damming, however they are now permanent. When full, Lake Kununurra is approximately 25 m deep over the former river channel, with water levels exceeding 1 m in much of the swamp area. Lake Argyle is up to 50 m deep over the river channel and large areas in the west exceed 5 m while large areas in the south-east are less than 0.5 deep. Prior to 1995, Lake Argyle's water level occasionally fell below the spillway level e.g. briefly in 1979, 1985, 1991-92. In 1995-96, the spillway was raised from 86.7 m AHD to 92.2 m AHD to accommodate increased water use for hydro-electricity generation. As a result, Lake Argyle retains more nutrients and suspended sediment than previously, because the volume of surface water flushed from the lake has been substantially reduced. The new spillway has a foot valve which releases a small flow down spillway creek when the lake is below the overflow height (LeProvost Dames and Moore 1999).

Water levels in Lake Argyle have an annual fluctuation of about 4 metres. In the past, the water level in Lake Kununurra was lowered for about two weeks once or twice per year to drain the fringing swamps and thereby control weed growth. However, since the mid 1980s, water levels have been kept relatively constant to meet the needs of tour operators and rural landowners at Packsaddle. Water is fresh throughout the system. Large fluctuation in water levels has prevented the establishment of much vegetation on most of the shore of Lake Argyle, although in some sections dense belts of trees have grown. Many aquatic plants grow in shallow water at the edge of the lake. There are dead trees throughout the wetland system as a result of trees which previously grew in seasonally-inundated or dry areas now being permanently flooded. Because water levels have been stable in Lake Kununurra and the wetlands associated with it since the mid 1980s, they have well developed fringing vegetation consisting of grassland, *Typha* and other "rushes", or woodland. Savannah woodland grows around the wetland complex.

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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 Site experiences a dry tropical climate with Kununurra having an average annual rainfall of 779 mm per year. Rainfall is monsoonal and is usually restricted to a hot, humid wet season from November to March and, typical of dry-tropics, variability in rainfall between years is pronounced.

The dry season is characterised by warm, dry days with periods of steady south-easterly winds. Average maximum temperatures range from 38°C in December to 30°C in July.

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

The Site consists of dammed waterbodies which provide water supply to the Ord River Irrigation Area and the Argyle Diamond Mine (Lake Argyle).

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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.

6, O, M

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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.

Lakes Argyle and Kununurra are most important as dry-season refuges although 18 species have been recorded breeding in the Lake Kununurra wetlands. Very large numbers of waterbirds occur in the system, which regularly supports more than 20 000 waterbirds. Lake Kununurra and surrounding wetlands contained about 12 000 waterbirds in September 1978 and October 1979 and about 7 000 in November 1980. Lake Argyle contains some of the largest aggregations of waterbirds in northern Australia; 181 400 were counted in August 1986. Records for abundant species include:

Glossy Ibis	*Plegadis falcinellus*	6 000 Aug 1979
Magpie Goose	*Anseranas semipalmata*	10 500 Aug 1986
Wandering Whistling-Duck	*Dendrocygna arcuata*	11 000 Aug 1986
Plumed Whistling-Duck	*D. eytoni*	4 300 Jul 1981
Pacific Black Duck	*Anas superciliosa*	16 000 Nov 1979
Grey Teal	*A. gracilis*	17 200 Aug 1986
Pink-eared Duck	*Malacorhynchus membranaceus*	1 800 Sep 1980
Hardhead	*Aythya australis*	51 400 Aug 1986
Green Pygmy-goose	*Nettapus pulchellus*	1 524 Aug 1986
Eurasian Coot	*Fulica atra*	50 756 Aug 1986

The two lakes are the stronghold of the Comb-crested Jacana *Irediparra gallinacea* in Western Australia; 120 were counted along a small section of the shore of Lake Kununurra in May 1986, while 296 were recorded on aquatic plant mats in Lake Argyle in August 1986.

At least 15 species of freshwater fishes (mainly catfishes, grunters and gudgeons) are known to occur at the Site. The Archerfish *Toxotes chatareus* is abundant, while four fishes (two catfish *Arius spp.*, Strawman *Quirichthys stramineus*, Giant Glassfish *Parambassis gulliveri*) are known in Western Australia only from the Site and other parts of the Ord River System. The widespread freshwater crayfish *Macrobrachium rosenbergii* ('Cherrabun') also occurs at the Site. Three species of freshwater turtle are known from the Site, one of these, *Emydura australis,* is restricted to the Kimberley – Victoria River region.

Some of the wetlands associated with the lakes support lush growth of aquatic plants, including *Nymphoides indica*, *Nymphaea gigantea*, *Najas graminea*, *Hydrilla verticillata*, *tricarinatus, Myriophyllum verrucosum*, *Valisneria spiralis* and *Chara* sp. The main "rushes" are *Typha domingensis* and *Eleocharis* spp. Tree species growing on the shores of the lakes and wetlands are *Melaleuca viridiflora*, *Eucalyptus microtheca*, *E. camaldulensis*, *Nauclea orientalis*, *Sesbania formosa* and *Lophostemon grandiflorus*. The main species in the fringing grassland are *Eriachne sulcata*, *Echinochloa kimberleyensis*, *Oryza australiensis* and a large number of ephemeral herbs. The savannah woodland is dominated by *Eucalyptus* spp. and *Bauhinia cunninghamii*.

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 or threatened species known at the Site. Several endemic species of herbs have been found on the periphery of the Lakes, particularly the seasonal wetlands.

Several exotic plants have become established at the Site including: Leucaena *Leucaena leucocephala*, Date Palm *Phoenix dactylifera*, Rubber Tree *Calotropis procera* and Parkinsonia *Parkinsonia aculeata* at Lake Kununurra; and Parkinsonia, Rubber Tree and Bellyache Bush *Jatropha gossypifolia* at Lake Argyle.

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.*

The Site supports large numbers of the vulnerable Freshwater Crocodile *Crocodylus johnstoni* which is specially protected by State and Federal legislation, and is a major breeding area for this species. Breeding occurs predominantly in the upstream (southern) end of Lake Kununurra where soft, sandy substrates for nest excavation occur alongside the river. From surveys conducted in 1988, 1989 and 1994, the population of Lake Kununurra has been estimated to number 3000 – 5000 individuals. Estimates of the non-hatchling population of Freshwater Crocodiles in Lake Argyle have varied from 6,000-12,000 to 25,000 individuals; it is probably the largest population of this species in the world at one wetland.

Lake Argyle supports the highest number of the specially protected Radjah Shelduck *Tadorna radjah* counted in Western Australia (900 in May 1980).

The native Water Rat *Hydromys chrysogaster* also occurs at the site.

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:

Principal social values include water supply (for irrigation, domestic and commercial use) and both commercial and recreational fishing. The Lakes ensure a constant water supply to the Ord River Irrigation Area and water discharged at the base of the dam wall is used to generate electricity for the Argyle Diamond Mine and the towns of Kununurra and Wyndham. Plans for piping lake water to southern Australia have been promoted by some, but have not been adopted by Government due to the relatively high cost. The large population of Silver Cobbler *Arius midgleyi* in Lake Argyle supports a commercial fishery, with the annual potential catch of fish, including unmarketable species, being c. 4000 tonnes. The largest of these catfish are c. 20 kg. The crocodile industry has been issued permits to remove saltwater crocodiles and their eggs to stock farms. A pilot Barramundi *Lates calcarifer* aquaculture industry producing up to 100 tonnes per year in penned cages is based at Bamboo Cove in Lake Argyle (LeProvost Dames and Moore 1999). The Western Australian Department of Fisheries has initiated plans to develop an intensive Barramundi aquaculture industry in Lake Argyle capable of producing up to 2000 tonnes annually (LeProvost Dames and Moore 1999). Tourism is a substantial and growing use. All of these values are consistent with the maintenance of current ecological values.

Lakes Argyle and Kununurra are within the traditional lands of the Miriuwung and Gajerrong language groups. Past and present cultural significance of the Ord River to the traditional owners is evidenced by the Miriuwung and Gajerrong Native Title claim and hearings, currently before the Federal Court of Australia. Indigenous people have a complex and spiritual tie to the land and waters of the Ord River, and there are numerous significant cultural heritage sites associated with the river that are protected by the Western Australian Aboriginal Heritage Act (1972) (Lane 2003).

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

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

i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:

ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:

iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:

iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

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24. Land tenure/ownership:
a) within the Ramsar site:
Lake Argyle, Lake Kununurra and wetlands directly connected to them have been proposed as reserves for the purpose of water management, except in the case of the Packsaddle Swamps (and the seasonal wetlands south of them) which will also be reserved for nature conservation. All reserves except that containing Packsaddle Swamps and seasonal wetlands to the south will be vested in the Water Corporation of Western Australia; the latter reserve will be jointly vested in the Water

Corporation and the Conservation Commission of Western Australia. The reserves will be managed by the Water Corporation or the Water Corporation and the Department of Conservation and Land Management, according to vesting. The site is within a large area of the eastern Kimberley which is subject to a Native Title claim by the Miriuwung and Gajerrong people (LeProvost Dames and Moore 1999). This claim is awaiting determination by the Federal Court of Australia and outcomes are expected by 2005.

b) in the surrounding area:
The surrounding area includes freehold agricultural land and pastoral leases for rangeland grazing. The surrounding area is subject to Native Title claims by a number of Aboriginal groups including the Miriuwung and Gajerrong people.

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25. Current land (including water) use:
a) within the Ramsar site:
The lakes provide water for the Ord River Irrigation Area and for hydro-electricity generation for Argyle Diamond Mine and the towns of Kununurra and Wyndham, and their levels are managed for this purpose. Lake Kununurra and associated wetlands have a constant level while that in Lake Argyle (the primary water source) fluctuates according to the balance between rainfall, evaporation and requirements for irrigation.

There is recreational boating and a professional and amateur fishery in the lakes, which are increasingly being used for tourism. A float plane is based on Lake Kununurra and there are boat tours of both lakes. Approval has been granted to operate ten houseboats on Lake Kununurra (Watkins et al. 1997).

Diamond mining currently occurs within the wetland boundary (Bow River Project) and there are other tenements around the southern part of Lake Argyle and between the dam wall of Lake Argyle and Kununurra. Argyle Diamond Mine draws water from the lake near Smoke Creek.

b) in the surroundings/catchment:
The surrounding areas are used for irrigated agriculture and horticulture, cattle grazing and diamond mining.

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26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:
a) within the Ramsar site:
The Ord River Irrigation Area Stage 2 (ORIA Stage 2 – the M2 Channel) expansion proposal is currently undergoing feasibility studies. If implemented, it will draw water from Kununurra Dam to irrigate a further 30 500 ha of agricultural land in close proximity to the site (Wesfarmers Sugar Company et al 2000; EPA 2000, 2001).

To balance the environmental flow requirements of the Ord River with the water requirements of the ORIA (Stage 1 and 2) and other commercial users in the area (notably diamond mines), the Department of Environment (formerly the Water and Rivers Commission) is currently determining water allocations for the river (Water and Rivers Commission 1999a; EPA 1999; Doupe and Pettit 2002, Trayler et al. 2002, Water and Rivers Commission, 2003).

Past (including recent past) management of water levels has proved beneficial to waterbirds. However, it has created a eutrophic system in the wetlands which will probably result in continuing changes in floral composition, some of which may be undesirable. Some active management of the vegetation may be necessary in the future.

When Argyle Dam was originally designed, it was estimated that the average sediment load for the Ord River was 24 Mt per year. Survey work suggests that approximately 380 Mm^3 of sediment was deposited in Lake Argyle in the 16 years following construction of the dam, which represents a sediment transport rate of 24 Mt per year, as predicted (Water and Rivers Commission 1999b). After 23 years, the storage volume in the reservoir below the spillway level was been reduced by 3.3% (Water and Rivers Commission 1999b). Recent studies of severe gully erosion in the upper Ord River catchment have revealed that the area is characterised by very high natural erosion rates, and that gully erosion was a predominant feature of the catchment prior to European settlement, contrary to previous beliefs (Callow 2001; Sandercock 2003). These studies suggest that the revegetation strategy, including declaration of the Ord River Regeneration Area (see item 25) which was adopted to reduce erosion in the catchment, might not substantially reduce the rate of sedimentation in Lake Argyle.

It has been suggested that cultured Barramundi *Lates calcarifer* escaping from fish farms in Lake Argyle could threaten the genetic integrity of the wild population present in the site by interbreeding (Doupe and Lymbery 1999). Tighter controls are needed to minimise escapes from fish farms. Introduced Red Claw, which are also abundant in Lake Argyle, may compete with native species of crustaceans. Cane Toads *Bufo marinus* invading the Northern Territory and (potentially) Western Australia may also have a substantial impact on native wildlife.

b) in the surrounding area:
Exploration and mining for diamonds will continue, subject to appropriate environmental constraints that are consistent with maintenance of the ecological character of the Site.

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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.
The Lakes are listed on the Register of the National Estate.

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

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

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

d) Describe any other current management practices:
Some upstream pastoral leases have been relinquished to form the Ord River Regeneration Area to allow regeneration of vegetation in the upper catchment in the expectation that this would assist in reducing severe catchment erosion resulting in siltation of Lake Argyle.

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28. Conservation measures proposed but not yet implemented:
e.g. management plan in preparation; official proposal as a legally protected area, etc.

The proposed Carr Boyd National Park abuts Lake Argyle.

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29. Current scientific research and facilities:
e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

The impact of damming on the fluvial geomorphology of the lower Ord River, and the rapid siltation of the Ord River Estuary has recently been studied (Warman 1999; Wolanski et al. 2001). Other studies have focussed on the causes and nature of river channel changes and gully erosion in the upper

Ord River catchment (Callow 2001; Sandercock 2003). The hydrology of the Ord River and Lakes Argyle and Kununurra, including water quality, water availability, and current and future water demands has been investigated (Water and Rivers Commission 1999b). To assist in the assessment of the expansion of the ORIA, the Water and Rivers Commission undertook a series of studies into the hydrogeological regime of the ORIA including an airborne geophysical survey, installation of monitoring bores, pumping tests, chemical analyses and groundwater modelling (Water and Rivers Commission 2001).

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.

None.

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

The lakes are used for recreational fishing and boating, charter boat and float plane scenic tours, and bird-watching.

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

Territorial: State Government of Western Australia
Functional: The Water Corporation of Western Australia, the Department of Environment and the Department of Conservation and Land Management.

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.

The Lakes are managed by the Water Corporation which controls the supply of water for irrigation. The Department of Environment is responsible for water allocation, water quality aspects and also authorises other uses (tourism, recreation, and irrigation waste water treatment) (Watkins et al. 1997). The Department of Conservation and Land Management is responsible for maintenance of the Site's Ramsar values. There is a local management group, the Ord River Waterways Management Group (ORWMG) comprised of representatives of the Shire of Wyndham – East Kimberley, the Kimberley Regional Economic Aboriginal Corporation, the Department of Environment, the Water Corporation, Ord Land and Water, and the Department of Conservation and Land Management.

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

Callow, J.N. 2001. The Controls in Gully Erosion in the Upper Ord River Catchment, Northwestern Australia. Honours dissertation presented to the University of Western Australia, Perth.

Cummings, B. and Hardy, A. 2000. Revision of the Interim Biogeographic Regionalisation for Australia (IBRA) and Development of Version 5.1 – Summary Report. Environment Australia, Canberra. (Also available online at http://www.ea.gov.au/parks/nrs/ibra/version5-1/summary-report/index.html).

Doupe, R.G. and Lymbery, A.J. 1999. Escape of cultured barramundi (*Lates calcarifer* Bloch) into impoundments of the Ord River system, Western Australia. *Journal of the Royal Society of Western Australia*, 82, 131-136.

Doupe, R.G. and Pettit, N.E. 2002. Ecological perspectives on regulation and water allocation for the Ord River, Western Australia. *River Research and Applications* 18, 307-320.

EPA. 1999. Draft Interim Water Allocation Plan, Ord River: Advice to the Minister for the Environment from the Environmental Protection Authority under Part IV of the Environmental Protection Act 1986. Environmental Protection Authority, Perth. Bulletin 965.

EPA. 2000. Ord River Irrigation Area Stage 2 (M2 Supply Channel), Kununurra, Part 1 – Biodiversity Implications: Report and recommendations of the Environmental Protection Authority. Environmental Protection Authority, Perth, Western Australia. Bulletin 988.

EPA. 2001. Ord River Irrigation Area Stage 2 (M2 Supply Channel), Kununurra, Part 2 – Management: Report and recommendations of the Environmental Protection Authority. Environmental Protection Authority, Perth, Western Australia. Bulletin 1016.

Gowland, P.N. 1983. A guide to the ecology and management of bird pests of commercial agriculture in the Ord River Irrigation Area, No. 2. Waterbirds. Royal Australasian Ornithologists Union Microfiche Series M35.

Jaensch, R.P. and Vervest, R.M. 1990. Waterbirds at remote wetlands in Western Australia,1986-88. Part One: Lake Argyle and Lake Gregory. Royal Australasian Ornithologists Union Report 32, 1-25.

Lane, R. 2003. History, mobility and landuse of Aborigines and farmers in the East Kimberley in north west Australia. In: Stewart, P.J. and Strathern, A. (Eds.). *Landscape, History and Memory: Anthropological Perspectives*. Pluto Press, London. Pp 136-165.

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