

Information Sheet on EAA Flyway Network Sites (SIS) – 2017 version

Available for download from <http://www.eaaflyway.net/about/the-flyway/flyway-site-network/>

Categories approved by Second Meeting of the Partners of the East Asian-Australasian Flyway Partnership in Beijing, China 13-14 November 2007 - Report (Minutes) Agenda Item 3.13

Notes for compilers:

1. The management body intending to nominate a site for inclusion in the East Asian - Australasian Flyway Site Network is requested to complete a Site Information Sheet. The Site Information Sheet will provide the basic information of the site and detail how the site meets the criteria for inclusion in the Flyway Site Network. When there is a new nomination or an SIS update, the following sections with an asterisk (*), from Questions 1-14 and Question 30, must be filled or updated at least so that it can justify the international importance of the habitat for migratory waterbirds.
2. The Site Information Sheet is based on the Ramsar Information Sheet. If the site proposed for the Flyway Site Network is an existing Ramsar site then the documentation process can be simplified.
3. Once completed, the Site Information Sheet (and accompanying map(s)) should be submitted to the Flyway Partnership Secretariat. Compilers should provide an electronic (MS Word) copy of the Information Sheet and, where possible, digital versions (e.g. shapefile) of all maps.

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2. Date this sheet was completed*:

30/06/2017

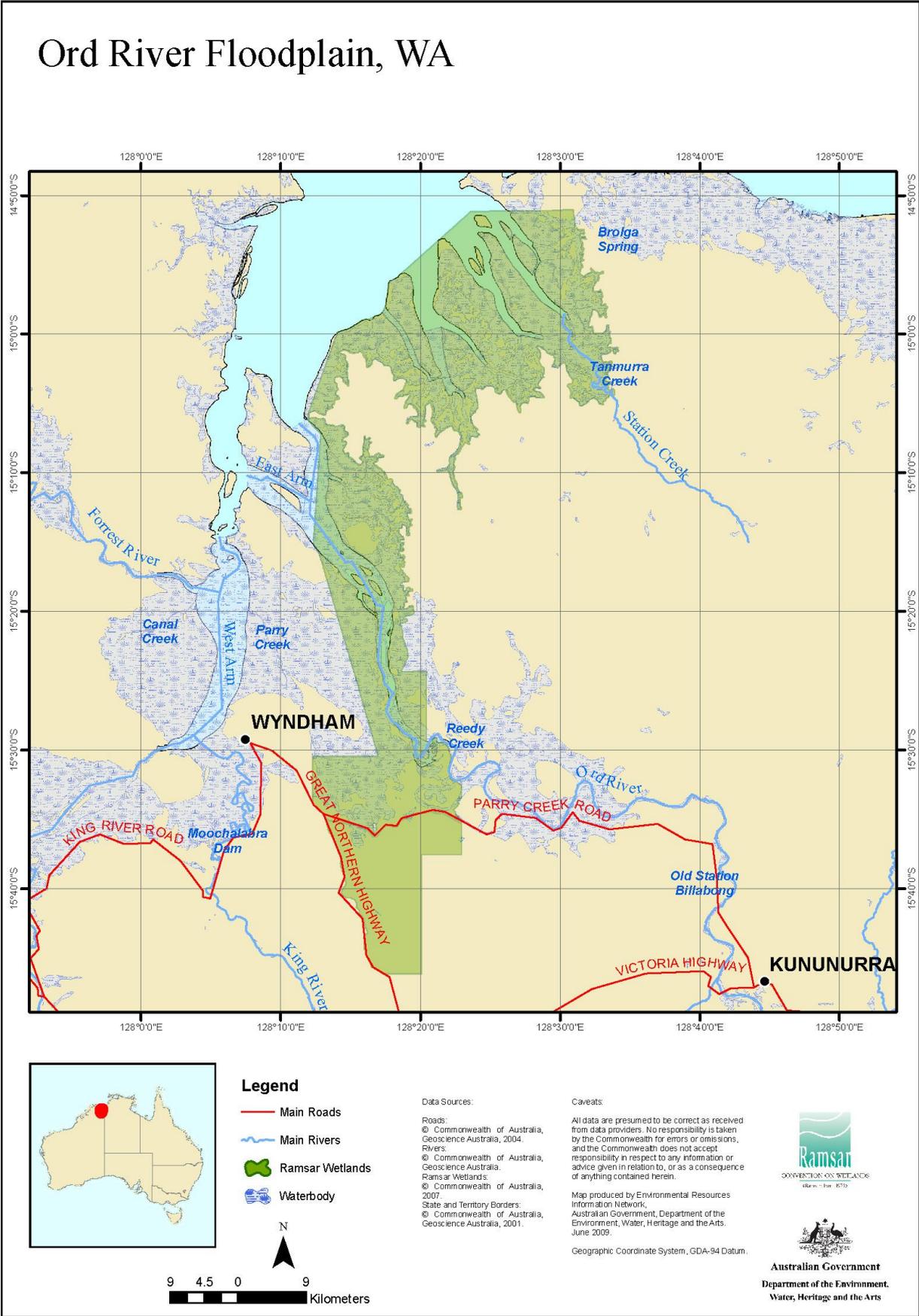
3. Country*:

Australia

4. Name of the Flyway Network site*:

Ord River Floodplain

5. Map of site*:



6. Geographical coordinates* (latitude/longitude, in decimal degrees):

Latitude: 14° 51' S to 15° 46' S; Longitude: 128° 12' E to 128° 33' E

Ord River Floodplain is in the Shire of Wyndham-East Kimberley (local authority) in the State of Western Australia. It is 8 km east of the town of Wyndham.

7. Elevation*:

Approximately at sea level.

8. Area*:

140,766 ha

9. General overview of the site*:

The Ord River Floodplain Ramsar site is an extensive system of river, seasonal creek, tidal mudflat and floodplain wetlands. The site represents the best example of wetlands associated with the floodplain and estuary of a tropical river system in the Kimberley region of Western Australia. The site includes the False Mouths of the Ord, which comprises vast areas of mudflats, mangrove communities and a maze of tidal creeks. The site also includes small but potentially important freshwater forested swamps. Of the 19 species of mangrove found in Western Australia, 15 have been recorded within the Ramsar site. The site is also important because of the presence of mangrove dependent bird species and the provision of habitat for the regionally protected Saltwater Crocodile (*Crocodylus porosus*) (Hale 2008).

The Ramsar site is a nursery, feeding and/or breeding ground for migratory birds, waterbirds, fish, crabs, prawns and crocodiles. Over 200 bird species have been recorded within the site (including 105 waterbird species), over 300 species of vascular plants, 35 reptile species and 17 species of bats. The site supports Freshwater Sawfish (*Pristis microdon*), Green Sawfish (*Pristis zijsron*) and the Australian Painted Snipe (*Rostratula australis*), which are listed threatened under the national 'Environment Protection and Biodiversity Conservation Act 1999'. The site is also one of only two known habitats in Western Australia of the nationally endangered Northern River Shark (*Glyphis garricki*). The site regularly supports 1% of the population of Plumed Whistling Duck (*Dendrocygna eytoni*) and Little Curlew (*Numenius minutes*). A Flatback Turtle (*Natator depressus*) rookery is located at Cape Domett, immediately north of the Ramsar site.

10. Justification of Flyway Site Network criteria*:

The Ord River Floodplain is the best example in Western Australia of an extensive system of wetlands (e.g. grass-dominated wetland) associated with the floodplain and estuary of a major tropical river.

The Site includes the most biologically diverse, contiguous floodplain and mangroves system in Western Australia. The Site's mangrove system is the largest (in terms of plant size), most species diverse and structurally complex mangrove system in the Kimberley (to date, 15 of the 19 species of mangrove found in Western Australia have been recorded). Large numbers of waterbirds from most waterbird families, particularly ducks and shorebirds, use the Site (between 13,000 – 20,000 individuals from up to 54 species have been recorded). In good rainfall years, Parry Lagoons and other seasonal wetlands constitute one of the major breeding areas for waterbirds in the Kimberley region.

The seasonal wetlands on the Ord River floodplain support large numbers of waterbirds: totals of 13,000 in May 1979; 20,000 in March 1980; 15,000 in January 1981 and 27,000 in May 1986 have been recorded. They regularly contain more than 10,000 ducks: in May 1986 18,400 ducks were recorded there, including 6,500 Hardheads *Aythya australis* and 6,000 Grey Teal *Anas gracilis*, and in November 1986 15,000 Plumed Whistling Duck *Dendrocygna eytoni* (max count 15,000; 1% = 10,000) were seen in the Parry Lagoons.

More recent surveys at Parry Lagoons by BirdLife Australia members (1998-2013) were undertaken during the dry season and were largely presence/absence observations with little quantitative data. Observational data from the BirdLife Australia surveys indicates that waterbird species composition has remained relatively stable from 1998 to 2013. Surveys from Parry Lagoons only (March 1980 – 20,000; March 1983 – >20,000; May 1986 – 20,670; May 1988 – 18,914).

The lagoons are also an important site for migratory shorebirds: several thousand Little Curlews *Numenius minutus* (max count 2500; 1% = 1,800), Sharp-tailed Sandpiper (may support >1%, max count 1,500; 1% = 1,600) and Oriental Pratincoles *Glareola maldivarum* and hundreds of Wood Sandpipers *Tringa glareola* have been counted. The Parry Lagoons are probably the most important site in Australia for Wood Sandpipers and Marsh Sandpipers *Tringa stagnatilis*. In years when local rainfall is good the lagoons and other seasonal wetlands constitute one of the major breeding areas for waterbirds in the Kimberley and an enormous number and diversity can be seen. Fifty-four species were recorded in May 1986. Up to 77 species of waterbirds have been identified in habitats associated with Parry Creek, and over 200 bird species have been recorded within the site to date (DCLM 2012).

11. Wetland Types*:

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)

12. Jurisdiction*:

Territorial: The State Government of Western Australia.

Functional: The Conservation and Parks Commission (vesting) and the Western Australian Department of Biodiversity, Conservation and Attractions (management).

13. Management authority*:

The Kimberley Region (based in Kununurra) of the Western Australian Department of Environment and Conservation.

14. Bibliographical references*:

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15. Physical features of the site:

The Site is comprised of depositional floodplain and estuarine environments associated with the mouth of the Ord River and Cambridge Gulf. There are three relatively distinct wetland units conserved within the Site. The southern part of the Site is dominated by Parry Creek, including a 20 km length of seasonally flowing creek running through upland environments, and an alluvial floodplain complex. The floodplain is inundated to varying degrees during the wet season and when the rain ceases, except for a few permanent and semi-permanent waterholes associated with incised channels and claypans, it quickly dries out. The upstream (southern) portion of the floodplain is freshwater while the lower (northern) sections, if not inundated by saline water, are surrounded by salty soils.

Extending north from the floodplain of Parry Creek to the Cambridge Gulf is the lower reaches of the Ord River. The upstream reaches of the Ord River within the Site are permanently fresh, however the downstream reaches, when not in flood, quickly become saline due to tidal influence. The tidal amplitude at the coast can be up to 8 m. The upstream end of the river channel is around 150 m wide, increasing to over 5 km wide at the mouth. Processes of sediment deposition dominate along the entire length of the river on the Site, with broad sandy or gravelly spits occurring along the upstream reaches while unstable mud bars and islands are common near the mouth.

North from the mouth of the Ord River, the Site extends for some distance around the coast to include the False Mouths of the Ord, which consist of a deltaic maze of channels, tidally inundated coastal mudflats and islands. Only the northernmost channel in this complex receives much freshwater input, which comes from the relatively small and ephemeral Emu, Station and Tanmurra Creeks.

The seasonal wetlands south of the Ord River are fresh and sometimes fringed by low shrubs or trees. They are surrounded by a flat, grass-covered plain. The mud flats along the river and the eastern side of Cambridge Gulf support patches of *Sporobolus* grassland and samphire. They are incised by numerous creeks and channels, along which extensive stands of mangroves grow. Mangroves also grow along the Ord River and the seaward side of the mudflats.

16. Physical features of the catchment area:

The Ord River Floodplain Ramsar site is located at the lower edges of the 53,000km² Ord River catchment within the Cambridge Gulf Lowlands. The majority of the Ramsar site comprises of alluvium and coastal silt / evaporite deposits of Quaternary origin. However, the area surrounding Parry's Lagoons is comprised of black soils also formed in the Quaternary.

The climate is semi-arid, monsoonal with a prolonged dry season. More than 80% of the rainfall falls in the summer, wet season (December to February). Annual average rainfall at Wyndham (1968-2014) is in the order of 820 mm per year. However, there is high inter-annual variation with annual rainfalls ranging from < 460mm to 1620mm (Bureau of Meteorology 2014) in the 40 years of records from this site. Temperatures range from warm to hot year round, with average wet season maximum temperatures between 36 and 40 °C and average dry season maximum temperatures are slightly cooler between 31 – 36 °C. Evaporation exceeds rainfall on average 11 months a year.

17. Hydrological values:

The floodplain of the lower Ord River is a complex network of intermittent (and occasionally permanent) streams. The major sources of freshwater directly into the site are from the Ord River itself, Parry Creek (into Parry Lagoons) and the major tributaries of the False Mouths of the Ord; Emu, Tanamurra and Station Creeks.

Large floods occur predominantly in the wet season, however, median flows are only slightly greater in the wet than the dry season, as constant releases from the Ord River Dam over the dry season ensure that the river is a permanent system. Peak flows in the lower Ord River are now predominantly governed by inflows from the unregulated Dunham River and localised catchments. It is only during very wet years that releases from the dams contribute to flood flows. These flood flows are important for a number of reasons including inundation of Parry Lagoons as well as for flushing the estuary and removing the build-up of deposited silt.

During the wet season, surface waters from the floodplain flow into the estuary towards the ocean. With the exception of Parry Lagoons, the majority of the site is tidally influenced. Groundwater flows to the lower Ord have not been quantified.

18. General ecological features:

Ten main vegetation associations have been identified within the Site including: dune systems, mudflats, mangals, grassland, low woodland (subdivided into a further 7 associations), sandstone range open woodland, riverine woodland (subdivided into 5 associations), rainforest (aquifer forest) and spring vegetation, major rivers and lagoons (permanent and ephemeral), and savanna woodland (CALM 1998). A total of 335 native vascular plants from 89 families have been recorded from the Site, and another 16 introduced species are also present (CALM 1998).

Mangroves are the most extensive vegetation community in the Ord River Floodplain Ramsar site. They cover approximately 26,800 hectares and extend from the False Mouths of the Ord to the upstream sections of the estuary within the Ramsar boundary. The majority of the mangroves exist as narrow fringing bands along the intertidal areas, with saltmarsh on higher elevations.

There are fifteen species of mangrove that have been recorded within the boundaries of the Ramsar site (Johnstone 1990; Semeniuk and Semeniuk 2000) which is considered to be the greatest diversity of mangrove species in the Kimberley region and potentially Western Australia (Pedretti and Paling 2001). In the northern part of the Ramsar site zonation is evident in the mangrove community fronting onto Cambridge Gulf. Mangrove species in the seaward zone, a woodland about 8 m high, include *Sonneratia alba*, *Avicennia marina* and *Aegiceras corniculatum*. Behind this, in a woodland 10 m high, grow *Bruguiera parviflora*, *Avicennia marina* and *Aegiceras corniculatum*, then there is a belt of *Rhizophora stylosa* 12-15 m high. On the landward edge is a 4 m high thicket of *Avicennia marina*, *Ceriops tagal* and *Aegialitis annulata*. Patches of *Sporobolus virginicus* grassland and samphire grow on the mudflats behind the mangroves. Other species of mangrove occur occasionally in the northern section or along the creeks and the Ord River. These include: *Xylocarpus moluccensis*, *Excoecaria agallocha* and *Camptostemon schultzei*. The mangroves support at least six species of insectivorous bat, Black Flying-foxes *Pteropus alecto* and an undescribed species of mozaic-tailed rat *Melomys*.

Saltmarsh within the Ramsar site is less extensive and less well documented. There are a small number of halophytic species that have been described in association with the mangrove communities. These include: *Halosarcia* spp., *Batis argillicola*, *Salsola kali*, *Sesuvium portulacastrum*, *Sporobolus virginicus* and *Suaeda* sp. (Thoms et al. 1974).

The floodplain of Parry Lagoons is dominated by sedge/grassland communities, which are reported to be the most extensive in Western Australia (CALM 1998). Wetland annual grasses Australian Wild Rice (*Oryza australiense*) and Beetle Grass (*Diplachne parviflora*) dominate the grasslands of the Parry Lagoons floodplain. The permanent wetlands within the Ramsar site contain a diverse aquatic flora community including water lilies (*Nymphaea gigantea*, *Nymphoides indica* and *Nymphoides crenata*) and other aquatics.

Permanent waterholes are fringed with a variety of trees, including *Barringtonia acutangula*, *Melaleuca argentea* and *Terminalia platyphylla*. *Pandanus spiralis* occurs around Palm Spring.

The seasonal wetlands on the Ord River floodplain support large numbers of waterbirds and are also an important site for shorebirds: several thousand Little Curlews (*Numenius minutus*) and Oriental Pratincoles (*Glareola maldivarum*) and hundreds of Wood Sandpipers (*Tringa glareola*) have been counted. The Parry Lagoons are probably the most important site in Australia for Wood Sandpipers and Marsh Sandpipers (*Tringa stagnatilis*). In years when local rainfall is good the lagoons and other seasonal wetlands constitute one of the major breeding areas for waterbirds in the Kimberley and an enormous number and diversity can be seen. A total of 105 wetland dependent bird species have been recorded and sixteen species have been observed breeding within the Ramsar site.

The mangroves of Cambridge Gulf and the False Mouths of the Ord provide extensive habitat for a wide range of bird species. Johnstone (1990) listed 21 mangrove bird species within these areas, of which two could be considered waterbirds (Striated (Mangrove) Heron, Chestnut Rail) and a further seven terrestrial species considered totally reliant on mangrove habitat in this area including the Black Butcher Bird (*Cracticus quoyi*) and the Collared Kingfisher (*Halcyon chloris*).

The site is predicted to support over 50 species of fish including freshwater, marine and estuarine species. This includes the commercially and recreationally important Barramundi (*Lates calcarifer*), Blue Threadfin Salmon (*Eleutheronema tetradactylum*) and Giant Threadfin Salmon (*Polydactylus macrochir*). A significant proportion (30%) of the fish species recorded or predicted to use the Ord River Floodplain Ramsar site have diadromous life cycles. The majority of these are catadromous, spending their adult life in freshwater and migrating to the ocean to breed. The site provides an important migratory route for approximately 15 species.

19. Noteworthy flora:

There are no nationally rare, threatened or endemic plants known at the Site. However, several species that are under consideration for declaration as "rare flora" at State level occur at the Site, notably *Utricularia aurea*.

Infestations of the exotic weeds Noogoora burr *Xanthium pungens* and *Parkinsonia aculeata* trees are present within the site.

20. Noteworthy fauna:

A total of 105 species of wetland birds have been recorded in the Ord River Floodplain Ramsar site including 32 species that are listed under the international migratory agreements JAMBA, CAMBA and ROKAMBA as well as an additional 29 Australian migratory species that are listed under the Commonwealth *Environment*

Biodiversity and Conservation Act 1999 (EPBC). The site regularly supports > 20,000 waterbirds. There is a paucity of data from this site, however, records include: March 1980; March 1983 and May 1986 (Jaensch and Vervest 1990) with counts strongly linked to substantial floodplain inundation.

The Ord River Floodplain Ramsar site supports > 1% of the population of two species of waterbird:

- Plumed Whistling Duck – maximum count 15,000 (1% = 10,000); and
- Little Curlew – maximum count 2,500 (1% = 1800).

In addition, due to the size and wealth of habitats and abundant waterbirds, the Ramsar site is likely to support > 1% of the population size of at least several more species. This includes the Red-Kneed Dotterel and the Sharp-tailed Sandpiper. The 1% threshold for Red-kneed Dotterel was set at 260 in Watkins (1993) but revised to a more general range class, without a 1% threshold, in WPE 4th Edition (WI 2006) due to more recent general evidence of large but uncounted numbers across inland Australia. If the 1993 estimate was applied, then the Ramsar site would be clearly of international importance for this species but the more recent publication compels a more cautious approach. Similarly, the counts for the Sharp-tailed Sandpiper are just below the 1% level and as these undoubtedly represent only a partial count of the total number present, it is likely that the Ramsar site is also significant for this species.

The populations of the mangrove birds, the Black Butcher Bird and the Collared Kingfisher, within the Ramsar site are considered significant due to their isolation from other populations of these species (Johnstone 1990). In addition, the site also supports the Australian Painted Snipe (*Rostratula australis*), which is listed under the EPBC Act as endangered and under the Western Australian threatened species legislation (*Wildlife Conservation Act 1950*) as rare or likely to become extinct.

The Ord River Floodplain Ramsar site supports at least six species of fish that are considered threatened at the national and / or international levels:

- Freshwater Sawfish (*Pristis microdon*) - critically endangered (IUCN Red List); vulnerable (EPBC Act);
- Queensland Gropser (*Epinephelus lanceolatus*) – vulnerable (IUCN Red List);
- Freshwater Whipray (*Himantura chaophraya*) – vulnerable (IUCN Red List);
- Northern River Shark (*Glyphis* sp. C) – critically endangered (IUCN Red List) endangered (EPBC Act);
- Green Sawfish (*Pristis zijsron*) – critically endangered (IUCN Red List); vulnerable (EPBC Act); and
- Bull Shark (*Carcharinus leucas*) – lower risk/near threatened (IUCN Red List).

Little is known about the ecology, lifecycle, breeding and population sizes of these species. However, the Queensland Gropser and Freshwater Whipray are listed as vulnerable predominantly due to threats on their

habitats in other countries and are not considered to be threatened within Australia (<http://www.iucnredlist.org/search/details.php/7858/all>).

The site also supports feeding and breeding of significant populations of two species of crocodile:

- Saltwater Crocodile (*Crocodylus porosus*); and
- Freshwater Crocodile (*Crocodylus johnstoni*)

21. Social, economic and cultural values:

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

The Lower Ord River and the False Mouths of the Ord are popular destinations for locals and visitors for recreational fishing, crabbing and boating. The Parry Lagoons Nature Reserve is also important for passive recreational activities such as bird watching and bush walking. Nature based commercial tourism is an important source of income for the region (CALM 1998).

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?

The Ord River Floodplain Ramsar Site lies within the boundaries of six indigenous language groups: Miriuwung, Gajerrong, Dulbung, Guluwaring, Djangade and Baimbarr. The Ramsar site was part of a Native Title Claim by the Miriuwung and Gajerrong people, which commenced in the 1990s. The Ord Native Title Agreement (2007), however, extinguishes Native Title over the existing conservation reserves, including those that comprise the Ord River Ramsar Site. Despite this the Ord River Floodplain is of great cultural significance to local indigenous people. There are a significant number of Aboriginal sites within the Ord River Floodplain Ramsar Site including (CALM 1998):

- Burial sites
- Artefact Scatters
- Mythological Sites
- Quarries
- Paintings
- Ceremonial Sites; and
- Grinding / grooves

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:

22. Land tenure/ownership:

- a) Within the Flyway Network site:

The Ramsar site is entirely located within conservation reserves vested with the Western Australian Conservation and Parks Commission and managed by the Department of Biodiversity, Conservation and Attractions. Marine areas are non-reserved. The area was subject to a claim by the Miriuwung Gajerrong people, however, title over all existing Nature Reserves was extinguished in the Ord Final Agreement in 2007. Despite the extinguishment of native title, there are obligations for cooperative management of conservation areas with indigenous people.

- b) In the surrounding area:

Surrounding areas are mostly pastoral leasehold land (notably Carlton Hill and Ivanhoe leases), government reserves (e.g. Reserve 20623), and non-reserved marine and estuarine areas.

23. Current land (including water) use:

- a) Within the Flyway Network site:

The seasonal wetlands are visited regularly by tourists and local residents from Wyndham, which is about 15 km west of Parry Lagoons. The remainder of the reserve area is used for nature conservation and attracts little human usage.

- b) In the surroundings/catchment:

The surrounding land is leased for the grazing of cattle, and the area immediately upstream of Parry Lagoons is proposed for irrigation development under ORIA 2. Mining tenements are held over the majority of the area and exploration for alluvial diamonds is in progress.

24. 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 Flyway Network site:

Current threatening activities within the Ramsar site include introduced species. Weed infestations of “sleeper” weeds such as *Leucaena leucocephala* and *Jatropha gossypifolia* have been recorded elsewhere in the lower Ord River riparian zones (Start 2000) but the presence or threat to the Ramsar site is unknown. A quarantine area has been established in the Ord River Floodplain for Noogoora Burr (*Xanthium occidentale*). Perhaps the most serious weed threat, however, is from the shrub *Parkinsonia (Parkinsonia aculeate)*, which has formed extensive stands in riparian and floodplain areas (CALM 1998).

Redclaw Crayfish (*Cherax quadricarinatus*) have been recorded in Lake Kununurra (Doupe et al. 2004) and the Lower Ord River. Although the origins of this “wild” population are uncertain, there are no endemic freshwater crayfish in the Kimberley and the population is the result of either escapes from aquaculture facilities or from release by fisherman who commonly use this species for bait (Doupe et al. 2004). The impact of this species on the ecology of the Lower Ord River and Ramsar site is not known. However, Doupe et al. (2004) indicate potential impacts as: food web alterations via predation and grazing pressure, habitat alterations, and disease introductions.

Cane toads pose the greatest threat from an introduced species to the site. Cane toads first entered Western Australia in February 2009 from across the border with the Northern Territory. The westward movement of cane toads into the Kimberley is continuing and the front is moving at an average of approximately 55 kilometres per year. The Government of Western Australia released *Cane Toad Strategy for Western Australia 2009-2019* in order understand the issue, minimise impacts and propose long-term management solutions. The main impacts of cane toads to the native fauna species of the Ramsar site include poisoning through ingestion, predation, and competition for habitat and food.

The majority of the recreational activities the site offers are considered passive (e.g. bird watching, bush walking). However, there is the potential for impacts to the ecological character of the site from more active recreational activities. CALM (1998) indicates that the driving of four-wheel drive vehicles off designated tracks and roads is a major problem within the Parry Lagoons. This has resulted in compaction of the soil, trampling of native vegetation and unsightly tracks.

b) In the surrounding area:

The major threatening activities in the surrounding area that may impact on the ecological character of the Ramsar site are:

- Water resource development;
- Agriculture;

- Commercial fishing; and
- Climate change.

The Ord River is the central water supply for large scale irrigated agriculture in the area. The Ord was first dammed in 1963, with the construction of the Lake Kununurra Diversion Dam, located approximately 70 km upstream of the extent of tidal influence. A second, larger structure, the Ord River Dam was completed in 1973 a further 55km upstream. The water held upstream of the Ord River Dam forms Lake Argyle and the waterbody between the two dams is Lake Kununurra; both of which are listed as “Wetlands of International Importance” under the Ramsar Convention. In 1995, to improve reliability of water for hydroelectric power generation, the spillway from Lake Argyle was raised by 6m.

The regulation of the river system by the installation of the two major dams and the use of the river as an irrigation delivery system had led to the following major hydrological changes by the time of listing in 1990 (Trayler et al. 2006):

- A 35% decrease in total annual flow;
- A change in the seasonality with a 440% increase in average dry season flows (prior to regulation the Ord River dried to a series of pools with little or no flow during the dry season);
- A reduction in the variability of flows; and
- A reduction in overbank flows and inundation of the Parry Lagoons area (prior to regulation floodplain inundation had an ARI of approximately 1 in 2 years (AEP of 50%) as opposed to between 1 in 10 and 1 in 20 years (AEP of 10 – 5%) by the time of listing.

Concentrations of pesticides on the lower Ord River upstream of the Ramsar site have been above ANZECC guideline levels (data from Water and Rivers Commission 2003b). There is evidence of fish kills within the river attributed to pesticides from the 1970s and more recently (Morrissey 2000). In addition, there is evidence of bioaccumulation of pesticides (DDT) in Barramundi (Morrissey 2000) and Freshwater Crocodiles (Yoshikane et al. 2006) in the lower Ord River.

25. Conservation measures taken:

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

Listed Ramsar site.

b) If appropriate, list the IUCN (1994) protected areas category/ies which apply to the site (tick the box or boxes as appropriate, see Annex 3):

Ia ; Ib ; II ; III ; IV ; V ; VI ; N/A

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

A management plan was finalised in 2012 and is being implemented.

https://www.dpaw.wa.gov.au/images/documents/parks/management-plans/decarchive/ord-river-and-parry-lagoons-nature-reserves-management-plan-2012_webversion.pdf

d) Describe any other current management practices:

Environmental Water Requirements for the Lower Ord River have been developed by the Department of Water and Environment (Brambridge and Malseed 2007). Although these included measures for the Parry Lagoons (and associated floodplains) the requirements of the estuary (which comprises the majority of the Ramsar site) were not considered.

Commercial and recreational fishing is managed under an agreement between the commercial fisherman and the local East Kimberley Regional Recreational Fishing Advisory Committee (Fisheries WA, unpublished). Under this agreement commercial catches of Barramundi are restricted from within the Ramsar site and areas upstream.

26. Conservation measures proposed but not yet implemented:

A management plan was finalised in 2012 and is being implemented.

https://www.dpaw.wa.gov.au/images/documents/parks/management-plans/decarchive/ord-river-and-parry-lagoons-nature-reserves-management-plan-2012_webversion.pdf

27. Current scientific research and facilities:

A long-term investigation into the response of the lower Ord River and estuary to changes in flow and sediment and nutrient loads by CSIRO has recently been completed (Robson et al. 2008). The Department of Water has an extensive monitoring network within and upstream of the catchment area. Surface and groundwater are monitored along with some rainfall gauging stations. The department has a [Water Information Reporting](#) tool available on its website that includes measurement information and data for numerous locations within the Ramsar site.

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

Walkways and bird viewing platforms have been constructed at Marlgu Lagoon. Interpretive signs about the Site were installed during 1998-99.

29. Current recreation and tourism:

There is a low level of tourist use, especially of Parry Lagoons. Recreational activities which take place at the Site include fishing, birdwatching, photography, boating and hunting, the last of which is illegal. Commercial tourism activities include scenic tours, birdwatching, fishing charters and Aboriginal tourism.

30. Threats*

Which of the following threats is present historically – when the threat stopped but the effects are still there (H), currently (C) or potentially (P)?

	Historically	Currently	Potentially
Residential and commercial development			
housing and urban areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
commercial and industrial areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
tourism and recreation areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Agriculture and aquaculture			
annual and perennial non-timber crops	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
wood and pulp plantations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
livestock farming and ranching	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
marine and freshwater aquaculture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Energy production and mining			
oil and gas drilling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
mining and quarrying	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
renewable energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transportation and service corridors			
roads and railroads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
utility and service lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
shipping lanes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
flight paths	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Biological resource use			
hunting and collecting terrestrial animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
gathering terrestrial plants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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logging and wood harvesting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
fishing and harvesting aquatic resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Human intrusions and disturbance			
recreational activities	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
war, civil unrest and military exercises	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
work and other activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Natural system modifications			
fire and fire suppression	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
dams and water management/use	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
other ecosystem modifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Invasive and other problematic species and genes			
invasive non-native/alien species	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
problematic native species	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
introduced genetic material	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pollution			
household sewage and urban waste water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
industrial and military effluents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
agricultural and forestry effluents	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
garbage and solid waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
air-borne pollutants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
excess energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Geological events			
volcanoes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
earthquakes/tsunamis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
avalanches/landslides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climate change and severe weather			
habitat shifting and alteration	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
droughts	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
temperature extremes	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
storms and flooding	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Please write here any additional threats and comments/queries you have on the threats.

Annex 1: Criteria for the inclusion of sites in the Flyway Site Network

(From the Partnership Text)

To be considered for inclusion in the Flyway Site Network, this Partnership adopts the following criteria:

- a. Convention on Wetlands (Ramsar, Iran, 1971) criteria for internationally important sites for migratory waterbirds. That is:
 - Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.
 - 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.

- b. The staging criteria as applied under the Asia - Pacific Migratory Waterbird Conservation Strategy. That is:
 - i. A staging site should be considered internationally important if it regularly supports 0.25% of individuals in a population of one species or subspecies of waterbirds on migration.
 - ii. A staging site should be considered internationally important if it regularly supports 5,000 or more waterbirds at one time during migration.

- c. Under exceptional circumstances a site can be nominated if it supports migratory waterbirds at a level or stage of their life cycle important to the maintenance of flyway populations. Justification of such nominations will be considered by the Partnership on a case by case basis.

Annex 2: 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 Resolutions VI.5 and VII.11 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.

To assist in identification of the correct Wetland Types to list in section 19 of the RIS, the Secretariat has provided below tabulations for Marine/Coastal Wetlands and Inland Wetlands of some of the characteristics of each Wetland Type.

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**

Annex 3: IUCN Protected Areas Categories System

IUCN protected area management categories classify protected areas according to their management objectives. The categories are recognised by international bodies such as the United Nations and by many national governments as the global standard for defining and recording protected areas and as such are increasingly being incorporated into government legislation.

Ia Strict Nature Reserve

Category Ia are strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphical features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values.

Ib Wilderness Area

Category Ib protected areas are usually large unmodified or slightly modified areas, retaining their natural character and influence without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition.

II National Park

Category II protected areas are large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible, spiritual, scientific, educational, recreational, and visitor opportunities.

III Natural Monument or Feature

Category III protected areas are set aside to protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature such as a cave or even a living feature such as an ancient grove. They are generally quite small protected areas and often have high visitor value.

IV Habitat/Species Management Area

Category IV protected areas aim to protect particular species or habitats and management reflects this priority. Many Category IV protected areas will need regular, active interventions to address the requirements of particular species or to maintain habitats, but this is not a requirement of the category.

V Protected Landscape/ Seascape

A protected area where the interaction of people and nature over time has produced an area of distinct character with significant, ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.

VI Protected area with sustainable use of natural resources

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Category VI protected areas conserve ecosystems and habitats together with associated cultural values and traditional natural resource management systems.