Bennelongia Environmental Consultants

Waterbird Monitoring at the Lake Argyle and Lake Kununurra Ramsar Sites, North-Eastern Kimberley Region

Prepared for
Department of Environment
and Conservation
by Bennelongia Pty Ltd

December 2007

Report 2007/15

Waterbird Monitoring at the Lake Argyle and Lake Kununurra Ramsar Sites, North-Eastern Kimberley Region

Bennelongia Pty Ltd
64 Jersey Street
Jolimont WA 6913
www.bennelongia.com.au
ACN 124 110 167

December 2007

Report 2007/15

Client – Department of Environment and Conservation

Report	Version	Prepared by	Checked by	Submitted to Client	
				Method	Date
Final report	Vers. 1	GP & SH	SH	email	10.xii.07

K:/Projects/DEC_05/Report/EK_Ramsar_monitoring_1.doc

1.0 Introduction

Lake Argyle and Lake Kununurra are dams on the Ord River in the eastern part of the Kimberley region in Western Australia. Lake Argyle is upstream and larger, releasing water into Lake Kununurra for distribution into the Ord Irrigation Area. Unlike most dams, both lakes have been used by substantial numbers of waterbirds in the past and were nominated in 1990 as a single wetland to the Ramsar list of Wetlands of International Importance by the Western Australian Government and in 1990 and ratified in 1991.

Waterbird use of Lake Aygyle during the dry season was historically (since 1972) at least an order of magnitude greater than at the smaller Lake Kununurra. Previous counts of Lake Argyle include a ground count 181,356 waterbirds of 59 species during a week in August 1986 (Jaensch & Vervest 1989), an aerial count of 4760 waterbirds of 34 species in April 1993 after extensive cyclonic rain through the Kimberley two months earlier (Halse & Pearson unpubl. data), and an aerial count over two days of 142,005 waterbirds of 44 species in November 2005 (Hassell et al. 2006).

Early records at Lake Kununurra include airboat counts of about 12 000 waterbirds in September 1978 and October 1979 and about 7000 in November 1980 (Gowland 1983). More recent records include an incomplete boat count of 209 waterbirds of 17 species in March 1988 (Halse & Pearson unpubl. data) and a boat count of 1088 waterbirds of 27 species on 1 December 2005 (Hassell et al. 2006).

2.0 Monitoring methodology

Waterbird monitoring was undertaken at Lakes Argyle and Kununurra between 9 and 12 November 2007. The objectives of monitoring were:

- to provide information on waterbird use of the two dams, and
- show whether the waterbird values on which Ramsar nomination was based are being maintained.

Information on waterbird use can be provided by an index of species use and waterbird abundance if the index is robust and reliably reflects changes across the waterbird community. Unless all waterbird use is focused in a small area, however, counts of only a small portion of a wetland rarely provide a satisfactory index. Therefore, the monitoring reported herein was undertaken over most of the two waterbodies. Except for a shorter period of time allocated to counting, the monitoring follows the recommendations of Hassell et al. (2006).

The main tool for assessing waterbird use of Lake Argyle was an aerial survey of all species identifiable from the air. This was conducted on the morning of 12 November in a Cessna 206 flying at 80 ft at a speed of about 80 knts. The plane flew about 30 m inside the water's edge, most of the time, with a front right observer (GP) counting birds on the shoreline and a right rear observer (SH) counting birds towards the middle of the wetland. The aim of this survey was to obtain an estimate of overall waterbird numbers and the relative abundances of ducks, coots, stilts, large wading birds, terns and cormorants. About 10 % of the lake shore (in the north east) was not surveyed because of time constraints but it considered that this sector contained relatively few birds. There were no passes over the middle of the lake.

Lake Aygyle is used by significant numbers of shorebirds during late spring and summer. Shorebirds are very difficult to survey at species level from the air and, if larger waterbirds are present, the overall

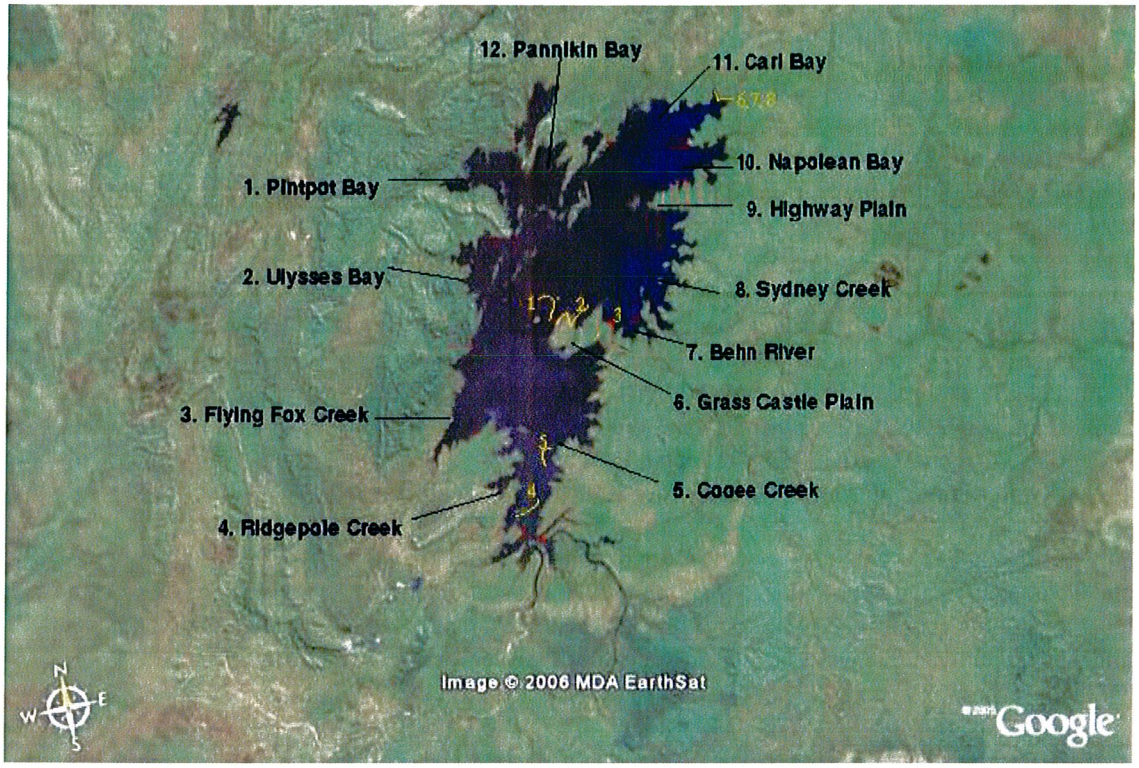

Fig. 2.1. Sites surveyed from boat and shore on Lake Argyle. Sites 4 and 5 (shown in yellow) were surveyed on 10 November, sites 3 and half of 1 surveyed on 11 November (see Table 2.1 for coordinates). Modified from Hassell et al. (2006)

abundance of shorebirds is vastly underestimated. Because of the significance of shorebirds in terms of international treaties, ground counts were undertaken at four sites in the south-eastern part of Lake Argyle to provide information about the shorebird species present, their relative abundances and the overall shorebird densities. However, this information is likely to be strongly influenced by the sites selected for monitoring and their condition at the time of survey. Comparisons across years may not be representative of what is happening in Lake Argyle as a whole. The ground surveys also provided more information about species use of Lake Argyle, with several species being better differentiated than they were from the air. This is particularly the case for egrets, grebes and jacanas.

The four sites where ground surveys were undertaken represented a sub-set of the sites surveyed by Hassell et al. (2006) in 2005. Sites 4 and 5 were surveyed on 10 November (see Fig. 2.1, Table 2.1) and sites 3 and half of 1 were surveyed on the morning of 11 November. At each site, except 1, we started surveying along the shore opposite Hassell et al.'s (2006) start point and proceeded along the shore to their finish point. Birds visible on the shore and in the water were identified and counted. As we approached the shore we counted on both sides of the start point but we stop walking as we approach the finish point and only counted birds on our side of it. At site 1 we surveyed about half the Hassell et al. (2006) transect and counted both sides of the start and finish points.

The survey of Lake Kununurra was done from a boat on the afternoon of 9 November (Lily Creek Lagoon and channel between the Ski Beach and Lily Creek Lagoon entrance) and on the afternoon of 11 November (Packsaddle Swamp, Everglades and eastern side of channel between Everglades and Lily

Table 2.1. Coordinates of ground counting sites in Lake Argyle (see Fig. 2.1). Position of sites will move up and down the shore between years according to the degree of flooding. Approximate straight line length of transects is given but shorelines meandered greatly on some transects, increased the effective length of the survey

Site	Start	Finish	Distance (km)
1	16°20'01.0" 128°41'35.0"	16°20'16.8" 128°41'25.5"	0.7
3	16°21'13.0" 128°48'00.0"	16°20'52.0" 128°48'39.0"	1.5
4	16°29'52.0" 128°42'37.5"	16°30'01.0" 128°44'04.5"	2.7
5	16°28'10.6" 128°44'36.5"	16°28'03.2" 128°45'08.0"	1.1

Creek Lagoon). An attempt was made to count all species present in these areas. The boat was supplied by DEC and was also used to access sites on Lake Argyle.

Results

A total of 244,765 waterbirds of 37 species were counted from the air at Lake Argyle (Appendix 1). A total of 17,681 waterbirds of 61 species were counted on the ground (Appendix 2). The species most likely to be under-counted from the air represented almost 19 % of the ground count (2912 shorebirds other than Black-winged Stilt, 257 Comb-crested Jacana and 133 small grebes) whereas they represented just over 8 % of the aerial count. It is difficult to interpret the significance of these figures, although they suggest undercounting of shorebirds by a factor of more than two, because ground counts were conducted in areas considered likely to have higher proportions of shorebirds. Altogether, 64 waterbird species were recorded on Lake Argyle.

A total of 1511 waterbirds of 26 species were counted at Lake Kununurra on 9 and 11 November (Appendix 3). Additionally, many Straw-necked Ibis were seen overhead.

3.0 Discussion

Funding constraints mean that this report merely presents data from the 2007 monitoring event and, in conjunction with the counts from 2005, provides a measure of current waterbird use of Lake Argyle and Lake Kununurra. There has been no attempt to interpret the data or describe significance of individual species counts.

With 64 species and 244,765 waterbirds counted in 2007, Lake Argyle clearly retains the outstanding dry season waterbird values for which it was nominated as part of the Lakes Argyle and Kununurra Ramsar wetland. The number of birds we recorded was similar to the 200,000 waterbirds of 58 species obtained by Hassell et al. (2006) using a series of multipliers to extrapolate their December 2005 count to what they believed was a more correct estimate. Our count was also an under-estimate because time constraints prevented about 10 % of the shoreline being flown (in the north-east) and there were no searches of the lake centre for rafts of waterbirds, especially cormorants, pelicans and Hardhead, that were likely to be present (see Appendix 2).

Our count of 1511 waterbirds of 26 species at Lake Argyle was also similar to Hassell et al.'s count of 1088 of 27 species in December 2005. Our count was enlarged by a group of about 800 Magpie Goose in an opened up area of *Typha* in the Everglades. Without these birds our count would have been about 300 birds lower than Hassell et al.'s counts, reflecting the smaller section of Lake Kununurra that we surveyed. Both the 2005 and 2007 counts suggest that Lake Kununurra no longer supports the large

numbers of waterbirds observed by Gowland (1983) in the late 1970s (e.g. 12,000 birds in September 1978) that formed the basis for nominating Lake Kununurra as part of the Ramsar wetland.

Future monitoring

Our intention was to build on the work of Hassell et al. (2006) to collect data suitable for monitoring the waterbird values of the Lakes Argyle and Kununurra Ramsar wetland.

Hassell et al. (2006) recommended the following survey effort:

- Lake Argyle. 3 days with 2-4 observers – 2 days for ground counting (from boat and quad bikes) and 1 for an aerial survey to be undertaken in October or November
- Lake Kununurra. 1 day with 2 observers for a ground count by boat either by DEC Region or by consultants in conjunction with Lake Argyle work.

We agree that the above level of effort is required and it is greater than we were able to apply. Costing of future monitoring should allow for 5-5.5 h of plane charter for aerial survey using a Cessna 206 or Cessna 182 and for provision of a boat (DEC provided us with a boat). Collation and interpretation of results will require extra funding.

Meaningful monitoring of waterbird use of the Lake Argyle could be achieved by the aerial survey alone. Aerial surveys by experienced observers provide reliable estimates of waterbird numbers and characterize the waterbird community in terms of species composition (Kingsford, Halse & Porter, in prep.) so that changes in waterbird use over time can be very effectively detected. However, aerial surveys will not provide detailed information about the composition of shorebird species and some other waterbird groups that many ornithologists will be wanting to see. Furthermore, the importance of migratory species to international treaties and the philosophy underlying Ramsar itself mean that a monitoring program that does not examine shorebirds, in a Ramsar wetland where they occur in significant numbers, is probably deficient. Therefore, our recommendation is that ground surveys, as well as an aerial survey, should occur.

4.0 References

Gowland, P.N. (1983) A guide to the ecology and management of bird pest species of commercial agriculture in the Ord River Irrigation Area, No.2. Waterbirds. *RAOU Microfiche Series M35.* Royal Australiasian Ornithologists Union, Melbourne.

Hassell, C., Rogers, D.I. & Holliday, S. (2006) Assessment of the current status of East Kimberley Ramsar sites: waterbird surveys of Lake Argyle and Kununurra, and Ord River Floodplain, July-Aug 2005 and Nov-Dec 2005. Chris Hassell, Broome, pp. 56.

Jaensch, R.P. & Vervest, R.M. (1990) Waterbirds at remote wetlands in Western Australia, 1968-8. Part one: Lake Argyle and Lake Gregory. Report 32. Royal Australasian Ornithologists Union, Perth pp. 25

Kingsford, R.K., Halse, S.A. & Porter, J.L. In prep. Aerial surveys of waterbirds – assessing wetland condition. Final report to National Land & Water Audit. University of New South Wales, Sydney

Appendix 1. Waterbirds counted from the air at Lake Argyle on 12 November 2007. Results for different sectors are shown (see Fig. 2.1)

	1	2	2	4	5,6,7	8,9,10,11	12	Total
Magpie Goose	5258	875	3976	32272	1325	25507	2608	71821
Plumed Whistling-Duck	462	50	120	879	0	50	164	1725
Wandering Whistling-Duck	6220	2153	6441	25927	1080	29823	2966	74610
Radjah Shelduck	38	14	23	811	0	226	21	1133
Green Pigmy-Goose	15	2	33	1876	90	605	0	2621
Pacific Black Duck	485	175	295	13458	43	1828	49	16333
Grey Teal	55	0	10	3676	50	492	17	4300
Pink-eared Duck	0	0	0	420	20	0	0	440
Hardhead	28	60	365	9369	0	2127	0	11949
Unidentified duck	110	0	50	2580	0	3600	21	6361
Australasian Grebe	0	0	0	21	0	26	0	47
Darter	32	28	36	237	5	155	24	517
Little Pied Cormorant	204	58	22	543	3	207	57	1094
Pied Cormorant	174	65	114	171	0	15	65	604
Little Black Cormorant	81	12	11	2005	0	112	29	2250
Unidentified cormorant	0	0	0	20	0	10	0	30
Australian Pelican	42	12	17	417	8	99	25	620
White-faced Heron	5	0	3	10	0	0	0	18
White-necked Heron	6	0	2	3	0	2	0	13
Pied Heron	12	1	2	20	0	1	6	42
Intermediate Egret	0	0	0	0	0	0	100	100
Cattle Egret	19	0	0	0	0	40	2	61
Unidentified egret	349	122	153	1599	129	1046	117	3515
Nankeen Night Heron	0	0	1	0	0	0	0	1
Glossy Ibis	396	68	870	1687	42	932	87	4082
Australian White Ibis	0	0	16	51	0	20	0	87
Royal Spoonbill	1	0	0	17	0	24	0	42
Yellow-billed Spoonbill	0	0	0	9	0	0	0	9
Black-necked Stork	7	3	6	22	0	12	5	55
Osprey	0	0	0	1	0	0	0	1
White-bellied Sea-eagle	0	0	0	1	0	1	0	2
Brolga	0	0	4	0	0	0	0	4
Eurasian Coot	0	20	8	9345	0	286	0	9659
Comb-crested Jacana	0	0	0	279	0	2	0	281
Black-winged Stilt	299	120	466	3518	150	1340	53	5946
Masked Lapwing	84	36	66	84	50	168	6	494
Unidentified pratincole	0	0	0	750	0	0	0	750
Unidentified wader	885	95	1269	11710	620	4249	87	18915
Caspian Tern	2	5	2	3	0	31	1	44
Whiskered Tern	2	24	55	459	0	1	3	
Unidentified tern	16	50	25	2560	27	893	70	3641
Total	15287	4048	14463	126812	3642	73930	6583	244765

Appendix 2. Waterbirds counted on the ground at Lake Argyle on 10-11 November 2007. Results for different sites are shown (see Fig. 2.1)

	open water	1	3	4	5	Total
Magpie Goose		672	470	1445	1436	4023
Plumed Whistling-Duck		0	0	32	65	97
Wandering Whistling-Duck		167	778	291	660	1896
Radjah Shelduck		2	6	62	60	130
Green Pigmy-Goose		36	69	107	102	314
Pacific Black Duck		85	40	338	242	705
Grey Teal		11	20	252	468	751
Pink-eared Duck		0	0	197	0	197
Hardhead	540	200	9	87	12	848
Australasian Grebe		17	9	79	14	119
Hoary-headed Grebe		7	0	5	2	14
Great Crested Grebe	3	0	0	0	0	3
Darter		7	4	8	6	25
Little Pied Cormorant	2	14	8	17	6	47
Pied Cormorant	75	4	0	1	20	100
Little Black Cormorant	1	9	4	0	1	15
Australian Pelican	5	6	4	3	13	31
White-faced Heron		0	2	0	1	3
Little Egret		1	0	10	9	20
White-necked Heron		1	2	2	1	6
Pied Heron		7	0	14	14	35
Great Egret		0	2	7	17	26
Intermediate Egret		4	9	6	11	30
Unidentified egret		0	0	141	0	141
Glossy Ibis		6	25	213	305	549
Royal Spoonbill		1	1	73	1	76
Yellow-billed Spoonbill		0	0	1	0	1
Black-necked Stork		0	0	3	0	3
Osprey		1	0	0	0	1
White-bellied Sea-eagle		1	0	0	0	1
Swamp Harrier		0	0	1	0	1
Brolga		0	0	5	0	5
Eurasian Coot		29	0	926	2234	3189
Black-tailed Godwit		0	0	0	26	26
Little Curlew		2	0	4	9	15
Marsh Sandpiper		13	24	29	33	99
Wood Sandpiper		10	3	17	0	30
Red-necked Stint		32	4	21	21	82
Long-toed Stint		3		1		4
Sharp-tailed Sandpiper		180	157	251	878	1466
Curlew Sandpiper		0	4	1	1	6
Broad-billed Sandpiper		4	0	0	0	4
Comb-crested Jacana		159	45	26	27	257
Black-winged Stilt		19	36	179	181	415
Pacific Golden Plover		0	0	3	0	3
Red-capped Plover		40	1	26	33	100
Grey Plover				1		1
Lesser Sand Plover		0	1	0	1	2
Oriental Plover		0	0	168	26	194
Black-fronted Dotterel		0	0	3	0	3
Red-kneed Dotterel		1	0	1	0	2
Masked Lapwing		12	13	55	41	121

	open water		1	3	4	5	Total
Oriental Pratincole			0	36	420	44	500
Australian Pratincole			0	57	181	114	352
Silver Gull			0	0	2	2	4
Gull-billed Tern			0	0	3	11	14
Caspian Tern		1	1	1	7	50	60
Whiskered Tern		3	229	44	147	20	443
Total		630	1993	1888	5948	7222	17681

Appendix 3. Waterbirds counted on the ground at Lake Kununurra on 10-11 November 2007. 1, Main channel from Ski Beach to Lily Creek Lagoon, western side; 2a, Lily Creek Lagoon, northern arm; 2b, Lily Creek Lagoon, southern arm; 3, Packsaddle Swamp; 4, Everglades; 5 main channel, Everglades to Lily Creek Lagoon, eastern side

	1	2a	2b	3	4	5	Total
Magpie Goose	17			70	721		**808**
Radjah Shelduck			2		7		**9**
Green Pigmy-Goose				4			**4**
Australasian Grebe				9			**9**
Darter	9	3	13	22	20	9	**76**
Little Pied Cormorant	22	12	12	27	15	6	**94**
Pied Cormorant	1		28	2	2		**33**
Little Black Cormorant	3		18	11	10		**42**
Australian Pelican	2		1	8	2		**13**
White-faced Heron				4			**4**
Little Egret				1			**1**
Pied Heron					1		**1**
Great Egret			1				**1**
Intermediate Egret	8	7	2	16	3	1	**37**
Cattle Egret	3	1		5	8		**17**
Nankeen Night Heron					19		**19**
Glossy Ibis					5		**5**
Australian White Ibis		1		2	64		**67**
Osprey				1			**1**
Baillon's Crake				1			**1**
Purple Swamphen			3		2		**5**
Comb-crested Jacana	32	10	29	58	33	1	**163**
Masked Lapwing			1		16		**17**
Caspian Tern	2				2		**4**
Whiskered Tern	2		9	16	1		**28**
Clamorous Reed-Warbler	1		6	28	13	4	**52**
Total	102	34	125	285	944	21	1511