Annual Waterfowl Counts in South-Western Australia - 1988/89

by

S.A. Halse[1], R.P. Jaensch[2], D.R. Munro[1] and G.B. Pearson[1]

[1] Department of Conservation and Land Management
Western Australian Wildlife Research Centre
P.O. Box 51 Wanneroo W.A. 6065

[2] Royal Australasian Ornithologists Union
218/15 Ogilvie Road
Canning Bridge W.A. 6153

Technical Report No. 25
September 1990

Published by the
Department of Conservation and Land Management
P.O. Box 104, Como, W.A. 6152

ISSN 0816-6757

Marianne Lewis ..... Editor
Raelene Hick and Jan Rayner ..... Page preparation
Carol Watson ..... Illustrations
CALM Public Affairs ..... Production and distribution

CONTENTS

ABSTRACT 1

INTRODUCTION 1

SURVEY DESIGN 2

- Species Counted 2
- Counting dates 2
- Wetland types 2
- Wetlands surveyed 2
- Survey methods 4

RAINFALL AND WETLAND CONDITIONS 4

RESULTS 5

- Number of birds 5
- Distribution between wetland types 5
- Distribution between regions 7
- Numbers of birds on individual wetlands 10
- Wetlands with high numbers of birds 10
- Amount of breeding 11
- Distribution of breeding between wetland types 12
- Distribution of breeding between regions 12

DISCUSSION 12

ACKNOWLEDGEMENTS 15

REFERENCES 16

APPENDICES

1. Master list for annual waterfowl counts 1988/89 - 1990/91. 18
2. The number of wetlands in which each native species occurred and the three wetlands supporting the highest number of each species in November 1988 and March 1989 42

FIGURES

1. The area surveyed in the annual waterfowl count and the regions recognized within the surveyed area 3
2. The aerial survey route 5
3. Rainfall (mm) in south-western Australia between January and November 1988 6
4. Decile ranges for the rainfall between January and November 1988 in south-western Australia 7
5. Number of birds in wetlands 11

6. The percentage of depth-gauged wetlands containing water in January 1986-89 and the number of birds per wetland unit in surveys during this period 14

7. Number of breeding records in wetlands supporting various numbers of birds 15

TABLES

1. Number of wetlands of each type actually surveyed in November 1988 and March 1989 compared with the number selected for survey in the annual waterfowl count program 4

2. Annual rainfall for 1988 in the five meteorological districts within the area of the annual waterfowl count 4

3. Number of birds, nests and broods for each waterfowl species counted in November 1988 and March 1989 8

4. Distribution of waterfowl species by wetland type in November 1988 and March 1989 8

5. Number of birds, nests and broods in each region in November 1988 and March 1989 9

6. Distribution of waterfowl species by region in November 1988 9

7. Distribution of waterfowl species by region in March 1989 10

8. The 15 wetlands supporting the highest number of waterfowl in November 1988 and March 1989 10

9. Distribution of breeding by waterfowl species amongst wetland types in November 1988 12

10. Distribution of breeding by waterfowl species amongst regions in November 1988 13

Annual Waterfowl Counts in South-Western Australia - 1988/89

Abstract

A total of 147 757 waterfowl were counted in 1017 wetlands in south-western Australia in November 1988 and 354 791 birds were counted in 1113 wetlands in March 1989 in a program conducted jointly by the Department of Conservation and Land Management and the Royal Australasian Ornithologists Union. A very rough extrapolation of the data suggests the actual number of waterfowl in the south-west was approximately 700 000 over the 1988/89 summer. Species counted were the Black Swan, Eurasian Coot, 11 species of native duck, and four species of exotic duck, geese and swan. The Australian Shelduck (75 599) was the most abundant species in November; the Grey Teal (134 899) was most abundant in March. In both counts the majority of birds occurred in lakes, mainly in the Swan Coastal Plain and the southern central wheatbelt.

Totals of 137 waterfowl nests and 1664 broods were recorded in November, mostly in lakes. Wetlands containing the largest numbers of birds did not necessarily support most breeding.

INTRODUCTION

In the late 1960s and early 1970s, annual counts of waterfowl made during aerial surveys in September or October were used to determine duration of the duck-hunting season and bag limits in Western Australia. In the late 1970s, depth gauges were installed in approximately 100 wetlands in the South-West and Eucla Land Divisions. Since then measurements of water depth in November have been used as the basis for determining duck-shooting regulations (Lane 1985; Lane and Munro 1983). Aerial surveys were discontinued after 1979. However, the need for annual counts of waterfowl for purposes of waterbird conservation, management of duck hunting, and identification of important wetlands was still recognized (Lane 1981). Therefore, from 1986 to 1988 inclusive the Department of Conservation and Land Management (CALM) funded March counts of ducks, swans and coots in south-western Australia by the Royal Australasian Ornithologists Union (RAOU) (Jaensch and Vervest 1988a, b). In that project volunteers surveyed a large number of wetlands from the ground while CALM staff surveyed some of the larger or more inaccessible wetlands from the air.

Three other waterfowl counting programs began elsewhere in Australia during the 1980s. At the instigation of the Council of Nature Conservation Ministers (CONCOM), the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in conjunction with the Australian National Parks and Wildlife Service and the nature conservation agencies of New South Wales, South Australia and Victoria began annual aerial surveys in eastern Australia in 1983 (Braithwaite *et al.* 1986). This project is now co-ordinated by the National Parks and Wildlife Service of New South Wales (Kingsford *et al.* 1989). In 1987 the RAOU began annual ground surveys in Victoria (Martindale 1988). Aerial surveys of major waterfowl habitats are also made annually in the northern part of the Northern Territory (Whitehead *et al.* 1988).

This report presents results from the first year of a three-year (1988/89 - 1990/91) extension of the CALM/RAOU waterfowl counting program in south-western Australia, describes the survey design and lists the wetlands that are being surveyed. The program is funded largely from duck-shooters' licence fees and, as in the 1986-88 program, uses approximately 150 RAOU-organized volunteers as well as CALM staff to conduct ground surveys of wetlands. In addition, CALM staff survey a large number of wetlands from the air. The rationale for the program is based on the following:

(1) As wetlands in south-western Australia are drained, altered or become increasingly saline, it is likely that waterbird numbers will decline. Ducks, swans and coots form the dominant component of the waterbird community and long-term monitoring of their abundance will provide an indication of

trends in overall waterbird numbers and of the regions most affected by habitat alteration.

(2) Because ducks are hunted, information on the population trends of game species is required for proper management.

The program has four specific objectives:

(1) to provide an index of annual abundance of ducks, swans and coots in south-western Australia;

(2) to examine regional distribution of these species each year in relation to rainfall;

(3) to compare regional distribution and types of wetlands used during the breeding season and in late summer;

(4) to estimate actual numbers of ducks, swans and coots in south-western Australia by extrapolating results from the wetlands surveyed.

SURVEY DESIGN

Species counted

As in the previous CALM/RAOU waterfowl counting project (Jaensch and Vervest 1988a,b), 13 native and four species of exotic waterfowl were counted:

Black Swan	*Cygnus atratus*
Freckled Duck	*Stictonetta naevosa*
Australian Shelduck	*Tadorna tadornoides*
Pacific Black Duck	*Anas superciliosa*
Grey Teal	*A. gibberifrons*
Chestnut Teal	*A. castanea*
Australasian Shoveler	*A. rhynchotis*
Pink-eared Duck	*Malacorhynchus membranaceus*
Hardhead	*Aythya australis*
Maned Duck	*Chenonetta jubata*
Blue-billed Duck	*Oxyura australis*
Musk Duck	*Biziura lobata*
Exotic ducks, geese and swan	mostly domestic varieties of *Anas platyrhynchos*; also *Cairina moschata, Anser anser* and *Cygnus olor*
Eurasian Coot	*Fulica atra*

It is difficult to distinguish female Chestnut Teal, and males in eclipse plumage, from Grey Teal. Therefore, most observers on the ground counted 'coloured' males and these counts were multiplied by two to obtain an estimate of the total number of Chestnut Teal in a wetland. The aerial observers were confident of identifying all flying Chestnut Teal and made direct counts.

Counting dates

Counts were made during nine-day periods (two weekends and the intervening week) at the end of the breeding season, *viz* 19-27 November 1988, and in early autumn when the birds were congregated in summer refuges, *viz* 11-19 March 1989.

Between 1986-88 annual counts in south-western Australia were made in March. A November count was incorporated into the current extension of the counting program to enable the extent of breeding to be assessed and the regional distribution and types of wetland used during the breeding season to be compared with the 'summer' pattern. Most of the species being counted lay eggs between July and November (Halse and Jaensch 1989) so that broods are usually plentiful in November and some birds are on nests. Australian Shelducks generally nest earlier than other species and frequently gather to moult in November (Jenkins 1976); November surveys help identify important moulting sites.

Wetland types

South-western Australia has wet winters and hot dry summers. Rainfall diminishes rapidly with distance from the coast. The distribution and type of wetlands reflect this climate and are described by Lane and McComb (1988). Most lakes are seasonal, with the proportion of seasonal lakes increasing with distance from the coast. Salinization is widespread in south-western Australia (Mulcahy 1978) and most lakes and rivers in inland agricultural areas have become saline in the past 50 years. On the eastern margin of the survey area and in some coastal areas, especially around Esperance (see Fig. 1), there are naturally-occurring salt lakes. More than 100 000 small dams occur on farms. These are usually fresh and comprise the dominant wetland type in many inland areas and in some parts of the extreme south-west. There is a sparse network of small seasonally-flowing rivers, some of which enter estuaries at the coast. Quantitative data on water levels and vegetation in the wetlands surveyed will be given in subsequent reports.

Wetlands surveyed

Using map co-ordinates, most of the South-West and the south-western part of the Eucla Land Divisions were divided into 20' blocks (Fig. 1). The inland limit of the blocks generally corresponded with the extent of predictably-filled wetlands in the

south-western part of the State. A fixed set of wetlands was selected for survey in each block during the current extension of the counting program.

As far as possible, each set consisted of two permanent lakes with potential as drought refuges, two lakes with potential as breeding sites (often seasonal), five farm dams and two sections of river. However, in some blocks not all wetland types were present so that fewer than 11 wetlands (sometimes none) were selected (Fig. 1). Where a block was particularly rich in one type of wetland and depauperate in others, we sometimes increased the sample size of one wetland type, e.g. river sections, but never exceeded a total of 11 wetlands in a block.

In addition to the lakes, dams and river sections selected, all major estuaries[1] between Perth and Esperance were surveyed because in some years they contain very large numbers of birds in March (Jaensch and Vervest 1988a,b). It is difficult to devise a satisfactory method of counting only some estuaries and yet obtaining a meaningful index of

1 We use the term 'estuary' in a colloquial sense to include several wetlands, most notably Vasse-Wonnerup Estuary, that are not truly estuarine.

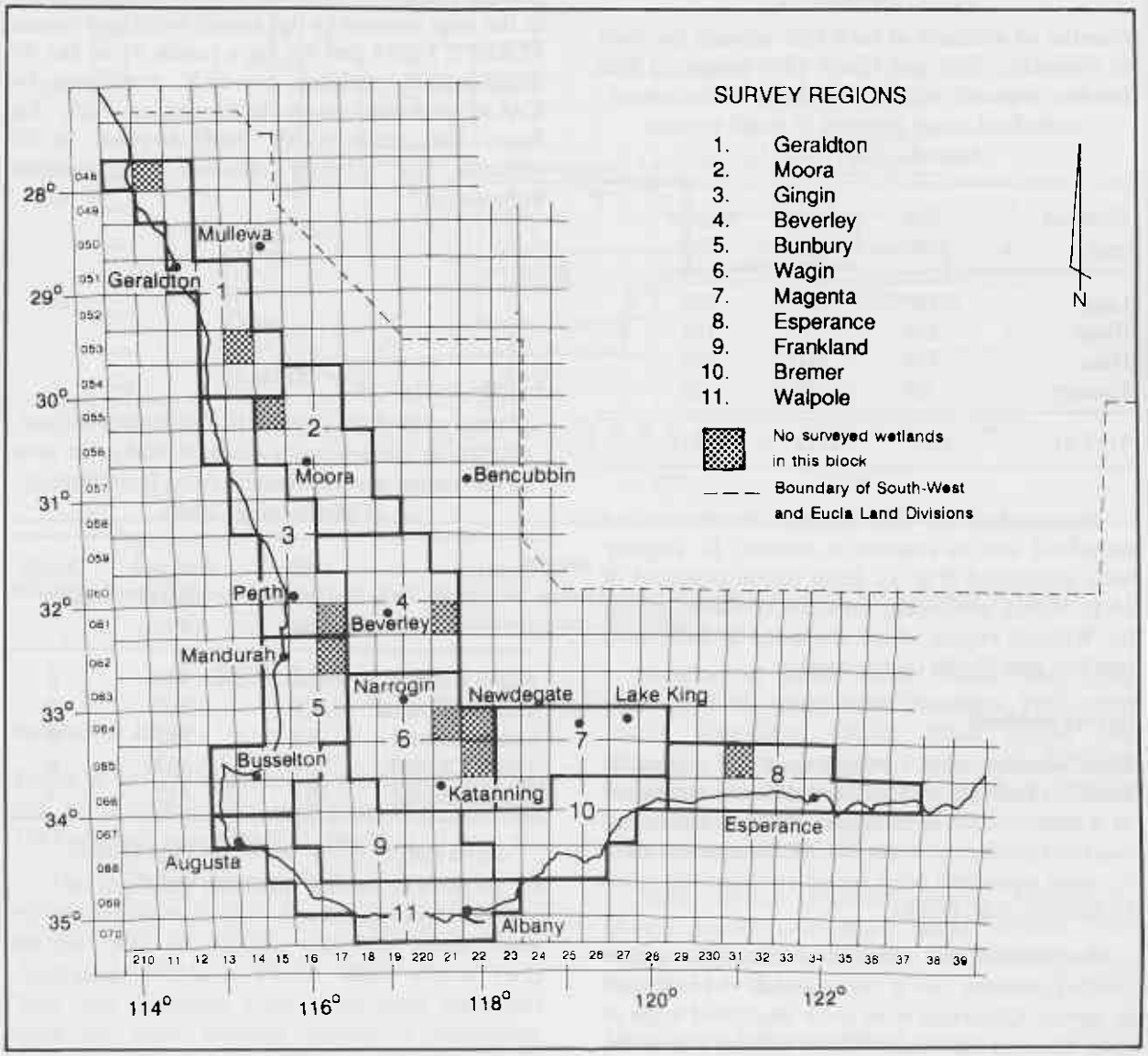


Figure 1
The area surveyed in the annual waterfowl count and the regions recognized within the surveyed area. The 20' blocks comprising the regions are marked.

waterfowl abundance in all estuarine systems [this problem is discussed by Braithwaite *et al.* (1987) in relation to large lakes]. For the same reason, insofar as block limits allowed, all wetlands shown by Jaensch and Vervest (1988a,b) to support large aggregations of waterfowl or high numbers of one species were included in the count.

The wetlands, including estuaries, chosen for survey and the blocks in which they are located are listed in Appendix 1. In November 1988 particularly, but also in March 1989, the coverage of selected wetlands was incomplete. Table 1 shows the number of wetlands intended for survey and the number actually counted on both dates.

Table 1

Number of wetlands of each type actually surveyed in November 1988 and March 1989 compared with number originally selected for survey in the annual waterfowl count program in south-western Australia (Appendix 1).

Wetland type	Nov 1988	Mar 1989	Master list
Lake	449	495	531
River	117	130	151
Dam	425	460	537
Estuary	26	28	28
TOTAL	1017	1113	1247

For analysis of the regional distribution of waterfowl and its relation to rainfall, 11 'regions' were delineated (Fig. 1). Each region consisted of 14-16 blocks containing surveyed wetlands, except for Walpole region, which contained 13 full blocks and five part blocks on the coast.

Survey methods

Most wetlands were surveyed from the ground by RAOU observers or CALM staff using binoculars or a telescope. In some cases a boat or canoe was used to traverse the wetlands. The techniques used to count waterfowl were based on those described by Jaensch *et al.* (1988).

Each block was allocated to one observer or divided between two if the wetlands were difficult to survey. Observers were given annotated maps of their block(s) showing wetlands allocated to them. Some of the larger inland lakes, some lakes and river sections with difficult access, and all the larger estuaries were surveyed from the air over a three-day period using a Cessna 182 flying at about 80 knots at a height of about 30-40 m. The aerial survey route is shown in Figure 2 and wetlands counted from the air are marked in Appendix 1.

In addition to number of birds, observers recorded the number of nests containing eggs and the number of broods that they found for each waterfowl species. This provided an index of breeding activity in lakes, dams, estuaries and rivers and information about the usefulness of particular sites and types of wetland for breeding.

RAINFALL AND WETLAND CONDITIONS

Annual rainfall in 1988 was slightly above average in the area covered by the annual waterfowl counts (Table 2; Figs 3 and 4). As a result, 71 of the 79 depth-gauged wetlands currently monitored by CALM contained water in November 1988; this figure was predicted to have dropped to 63 wetlands by January because of summer evaporation.[2]

Table 2

Annual rainfall for 1988 in the five meteorological districts in south-western Australia within the area of the annual waterfowl count (data from Bureau of Meteorology 1988).

District	1988 rainfall (mm)	Average rainfall (mm)	Decile range[(a)]
North Coastal	459	401	8
Central Coastal	891	860	7
South Coastal	984	926	8
North Central	359	363	6
South Central	457	442	7

[(a)]decile range 8-9 = above average rainfall
4-7 = average rainfall

2 Lane, J.A.K. and Munro, D.R. (1989). 1989 review of rainfall and wetland conditions in the south-west of Western Australia. Unpublished report, Department of Conservation and Land Managment (on file).

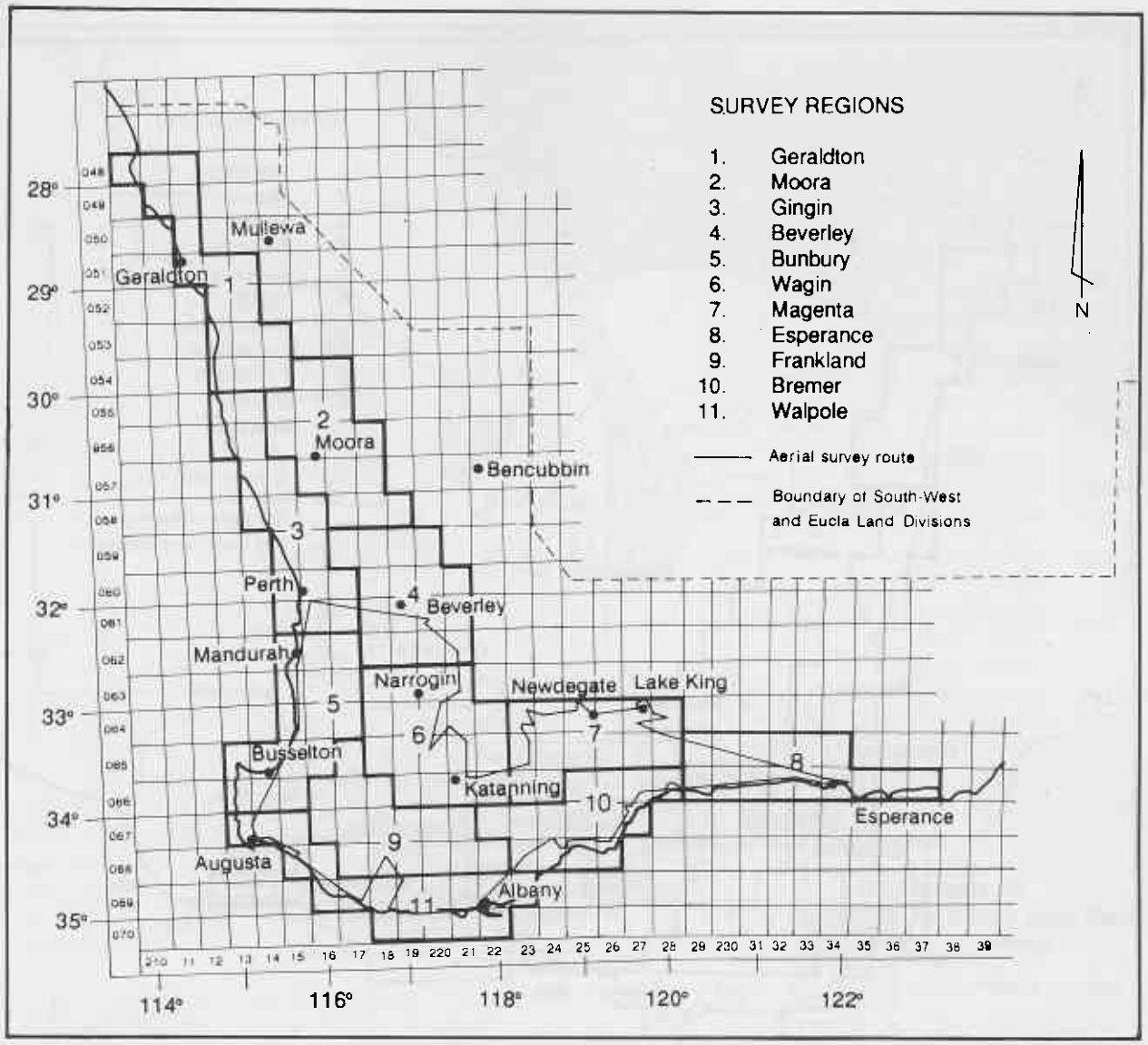


Figure 2
The route followed by CALM staff during the aerial survey component of the annual duck counts in south-western Australia

RESULTS

Number of Birds

Totals of 147 757 waterfowl in November 1988 and 354 791 in March 1989 were counted in 1017 and 1113 wetlands respectively (Table 3).

The five most abundant species, accounting for 92 per cent of waterfowl counted in November and 88 per cent in March, were the Black Swan, Australian Shelduck, Pacific Black Duck, Grey Teal and Eurasian Coot. Australian Shelducks were the most common species in November, accounting for just over 50 per cent of the birds counted. Forty per cent fewer Australian Shelducks were counted in March, when they comprised only 12 per cent of the total count (Table 3).

Numbers of Pacific Black Ducks, Grey Teal, Chestnut Teal, Australasian Shovelers, Pink-eared Ducks, Blue-billed Ducks, Musk Ducks and Eurasian Coots counted increased between November and March by factors of 3.8 - 11.5. Grey Teal comprised 38 per cent of birds counted in March compared with 18 per cent in November.

Black Swans, Freckled Ducks, Hardheads, Maned Ducks and exotic ducks showed little change in numbers between the counting dates (ratios of 1:1 - 1:1.9).

Distribution between wetland types

In both counts the majority of birds occurred on lakes but this trend was more pronounced in March, when 87 per cent of birds were counted there, than in November (76 per cent - Table 4).

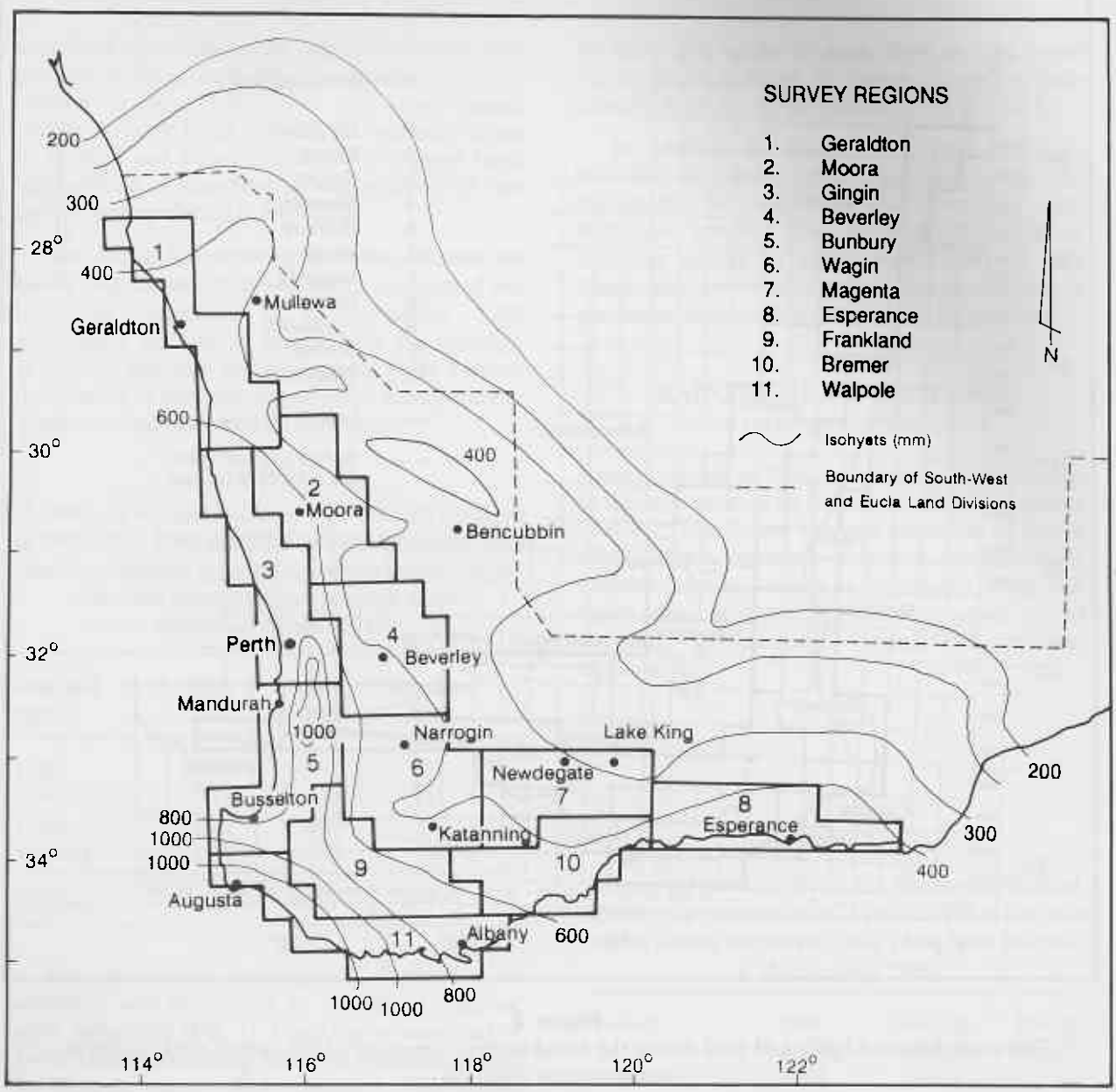


Figure 3
Rainfall (mm) in south-western Australia between January and November 1988.

Although the species composition on estuaries changed between counts, the number of birds remained static, which led to a decline in the proportion of birds found there from 18 per cent in November to 8 per cent in March. For rivers and dams there was an increase in number of birds counted in March that reflected the increase in overall number of waterfowl; proportions were similar in both counts (7 per cent and 5 per cent).

Results for particular species differed markedly from the pattern described above. In both counts more than 90 per cent of Freckled Ducks, Australasian Shovelers, Pink-eared Ducks, Hardheads, Blue-billed Ducks, Musk Ducks and Eurasian Coots occurred in lakes. Of these species only the Musk Duck occurred in estuaries in significant proportions (8 per cent in March) and, although several of the species occurred in rivers and dams, even the Hardhead, which utilized these habitats in the greatest proportions, was counted there fairly infrequently (7 per cent in November, 4 per cent in March - see Table 4).

Black Swans, Australian Shelducks, Pacific Black Ducks and Grey Teal occurred in greater numbers in lakes than in other wetland types but exhibited more catholic habitat preferences than the 'lake' birds. All four species occurred in significant numbers in estuaries (13-40 per cent of

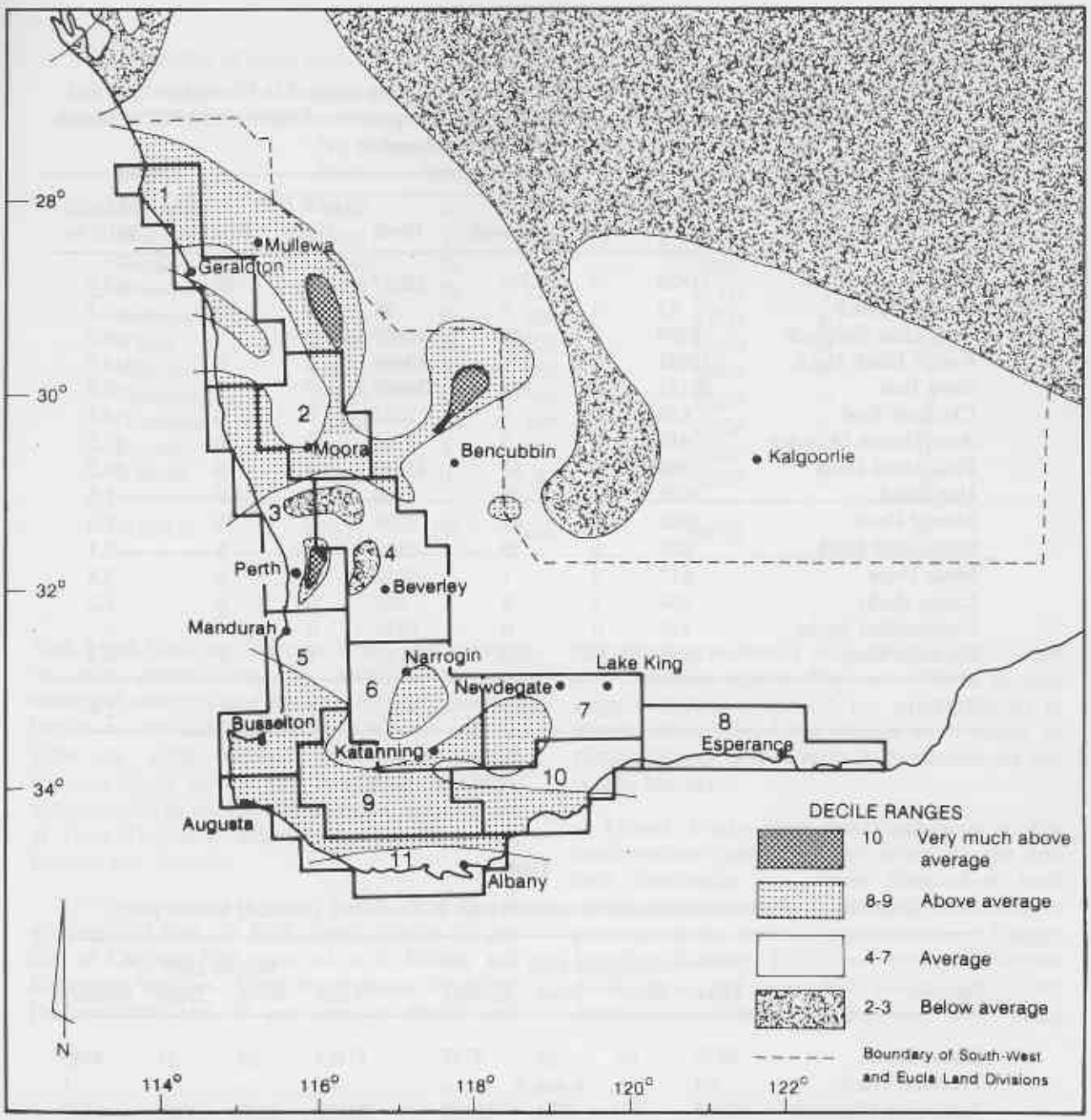


Figure 4
Decile ranges for the rainfall between January and November 1988 in south-western Australia.

birds in November, 6-20 per cent in March). Australian Shelducks, Pacific Black Ducks and Grey Teal also occurred in rivers and dams in significant numbers in at least one count (8-14 per cent). The proportion of Australian Shelducks in rivers and dams increased from 1.4 per cent to 8.6 per cent between November and March, mainly because of increased use of farm dams.

Maned Ducks showed a stronger preference for dams (35 per cent in both counts) and rivers (11 per cent in November, 14 per cent in March) than other native species.

Distribution between regions

The most important regions for waterbirds were Wagin, Bunbury and Gingin (Table 5). In November the Bunbury region contained 29 per cent of the birds counted, Wagin 15 per cent, Gingin 13 per cent and Esperance 12 per cent. Other regions each contained fewer than 6 per cent. In March there was a substantial increase in the proportion of birds in Wagin (28 per cent), Gingin (21 per cent) and Frankland (17 per cent).

There was a group of species - the Black Swan, Australian Shelduck, Pacific Black Duck, Grey

Table 3

Number of birds, nests and broods for each waterfowl species counted in November 1988 and March 1989. Changes in number of birds are shown as the quotient of number of birds in March (M) ÷ number of birds in November (N).

Species	November 1988			March 1989			M birds / N birds
	Birds	Nests	Broods	Birds	Nests	Broods	
Black Swan	11820	7	377	22037	0	36	1.9
Freckled Duck	63	1	5	68	0	0	1.1
Australian Shelduck	75599	0	49	41609	0	0	0.6
Pacific Black Duck	13832	1	354	63404	0	0	4.6
Grey Teal	26121	21	375	134899	0	9	5.2
Chestnut Teal	618	0	4	2533	0	0	4.1
Australasian Shoveler	410	0	5	4712	0	0	11.5
Pink-eared Duck	1500	28	62	15320	0	13	10.2
Hardhead	1028	1	26	1560	0	2	1.5
Maned Duck	7042	0	81	7324	0	21	1.0
Blue-billed Duck	420	6	20	1305	0	5	3.1
Musk Duck	617	4	7	2352	0	3	3.8
Exotic ducks	484	1	9	589	0	0	1.2
Unidentified ducks	153	0	0	6332	0	0	-
Eurasian Coot	8050	67	290	50747	1	2	6.3
TOTAL	147757	137	1664	354791	1	91	2.4

Table 4

Distribution of waterfowl species by wetland type in November 1988 and March 1989.

Species	November 1988				March 1989			
	Lake	River	Dam	Estuary	Lake	River	Dam	Estuary
Black Swan	6970	84	19	4747	17483	88	23	4443
Freckled Duck	63	-	-	-	67	-	-	1
Australian Shelduck	62065	766	272	12496	34432	2049	1511	3547
Pacific Black Duck	7356	1347	531	4598	53717	4529	1111	4047
Grey Teal	19975	2040	775	3331	118612	2733	394	12040
Chestnut Teal	96	108	5	409	957	149	3	1424
Australasian Shoveler	393	8	8	1	4673	14	10	15
Pink-eared Duck	1434	58	8	-	15196	48	76	-
Hardhead	954	17	57	-	1474	50	16	20
Maned Duck	3832	755	2440	15	3712	991	2583	38
Blue-billed Duck	413	7	-	-	1298	7	-	-
Musk Duck	575	9	19	14	2134	27	13	178
Exotic ducks	303	102	10	69	336	86	39	128
Unidentified ducks	70	41	18	24	6220	91	-	21
Eurasian Coot	7460	295	133	162	48275	872	506	1094
TOTAL	111959	5637	4295	25866	308586	11734	7475	26996

Table 5

Number of birds, nests and broods in each region surveyed in November 1988 and March 1989.

Region	November 1988			March 1989		
	Birds	Nests	Broods	Birds	Nests	Broods
Geraldton	2667	0	35	11380	0	1
Moora	7421	1	25	14971	0	0
Gingin	19339	75	398	73837	0	12
Beverley	9578	19	170	11341	1	0
Bunbury	43124	10	400	33731	0	0
Wagin	21990	18	279	97473	0	30
Magenta	6081	7	54	19087	0	1
Esperance	17029	4	66	15838	0	2
Frankland	8340	2	177	61636	0	29
Bremer	5807	1	23	6530	0	10
Walpole	6381	0	37	8967	0	6
TOTAL	147757	137	1664	354791	1	91

Teal, Musk Duck and Eurasian Coot - that showed the same general trends in distribution as total waterfowl numbers and were probably responding largely to wetland conditions (Tables 6 and 7). Even so, some regional 'preferences' existed amongst these species: few Australian Shelducks were counted in the Geraldton region and numbers of Grey Teal were relatively low in Esperance, Bremer and Walpole.

Other species showed more pronounced geographical bias. In both counts almost 90 per cent of Chestnut Teal occurred in the Bremer and Esperance regions. Most Australasian Shovelers (58 per cent and 71 per cent, in March and November respectively) were found in the Gingin and Esperance regions. Pink-eared Ducks became concentrated in Wagin (73 per cent of birds) in March. Most Blue-billed Ducks were found in Gingin (72 per cent of birds in November, 84 per cent in March).

Maned Ducks were most numerous in the south-western portion of the surveyed area and their distribution was almost identical in both counts. The only regions containing more than 10 per cent of the counted population were Gingin, Beverley, Bunbury, Wagin and Frankland. Exotic ducks, geese and swans also had a fairly stable distribution across both counts with birds being

Table 6

Distribution of waterfowl species (number of birds) by region in November 1988.

Species	REGION										
	Geraldton	Moora	Gingin	Beverley	Bunbury	Wagin	Magenta	Esperance	Frankland	Bremer	Walpole
Black Swan	52	157	1653	127	6056	1145	158	928	901	129	514
Freckled Duck	-	2	6	-	2	-	53	-	-	-	-
Australian Shelduck	303	3008	5594	4714	22643	11991	2088	14314	4308	3980	2656
Pacific Black Duck	502	350	2936	663	5540	208	195	649	628	134	2027
Grey Teal	1228	2698	1967	2682	5910	5782	2778	417	1350	692	617
Chestnut Teal	-	1	3	-	33	13	8	83	-	468	9
Australian Shoveler	9	-	102	4	63	32	53	134	8	5	-
Pink-eared Duck	95	216	244	33	44	452	335	56	6	16	3
Hardhead	39	65	543	63	174	81	18	33	6	2	4
Maned Duck	116	235	1306	908	1748	830	141	137	957	226	438
Blue-billed Duck	-	5	301	14	26	23	12	20	6	7	6
Musk Duck	7	9	180	20	155	36	5	105	13	32	55
Exotic ducks	32	84	297	62	8	-	-	-	1	-	-
Eurasian Coot	224	591	4155	288	704	1397	237	146	156	100	52

Table 7

Distribution of waterfowl species (number of birds) by region in March 1989

Species	REGION										
	Geraldton	Moora	Gingin	Beverley	Bunbury	Wagin	Magenta[a]	Esperance	Frankland	Bremer	Walpole
Black Swan	286	149	6234	330	1878	3079	404	1547	4215	736	3179
Freckled Duck	3	-	52	-	1	10	-	2	-	-	-
Australian Shelduck	395	5991	2745	2967	4105	9864	3960	4690	4548	1870	474
Pacific Black Duck	1535	694	19852	1459	7341	6113	51	2641	20221	951	2546
Grey Teal	5445	6882	18691	4445	17015	52187	7307	1417	18899	1315	1296
Chestnut Teal	4	-	37	3	5	28	17	1587	169	664	19
Australasian Shoveler	133	99	2162	38	71	652	15	1175	313	36	18
Pink-eared Duck	295	190	2292	123	132	11249	50	285	475	183	46
Hardhead	197	20	468	23	41	95	1	132	560	9	14
Maned Duck	110	72	1330	956	2047	821	40	198	838	298	614
Blue-billed Duck	-	-	1094	-	13	84	1	26	49	12	26
Musk Duck	37	21	652	20	672	69	1	226	323	26	305
Exotic ducks	1	63	394	106	25	-	-	-	-	-	-
Eurasian Coot	2833	790	17634	871	385	13222	1240	1892	11026	424	430

[a]6000 unidentified ducks in Magenta region

concentrated in the Gingin region, which includes the Perth metropolitan area. Only one bird was recorded south of the Bunbury region.

Numbers of birds on individual wetlands

Two changes in the numbers of birds occurring on individual wetlands were evident between November and March:

(1) the proportion of wetlands containing no birds increased from 31 per cent to 45 per cent (Fig. 5a) owing largely to the proportion of dry wetlands increasing;

(2) waterfowl became more concentrated with a greater proportion of the birds counted occurring in wetlands containing large numbers of birds (Fig. 5b). Only one wetland contained more than 10 000 birds in November but six did so in March.

Wetlands with high numbers of birds

The 15 wetlands containing the highest numbers of waterbirds in the November and March counts, respectively, are listed in Table 8. Vasse-Wonnerup Estuary contained the highest number of birds in November (11 720) and Lake Muir contained most in March (51 613). Lake Dumbleyung, Lake Muir, Peel-Harvey Estuary, Lake Guraga and Lake Forrestdale were in the top 15 wetlands in both counts.

Table 8

The 15 wetlands supporting the highest number of waterfowl in November 1988 and March 1989. Wetlands on private land are marked with an asterisk.

	NOVEMBER 1988				MARCH 1989			
	Wetland	Number	Region	Type	Wetland	Number	Region	Type
1	Vasse-Wonnerup Estuary	11720	Bunbury	E[a]	Lake Muir	51613	Frankland	L
2	Lake Preston	8990	Bunbury	L	Lake Dumbleyung	33415	Wagin	L
3	Lake Dumbleyung	8099	Wagin	L	*Bokaring Yate Swamp	14375	Wagin	L
4	Peel-Harvey Estuary	5196	Bunbury	E	Lake Cooloongup	11980	Gingin	L
5	*Lake Kubitch	5000	Esperance	L	Peel-Harvey Estuary	11788	Bunbury	E
6	Lake Muir	4302	Frankland	L	Lake Wannamal	10370	Gingin	L
7	Lake Gore	3928	Esperance	L	Lake Eganu	8628	Moora	L
8	Lake Guraga	3705	Gingin	L	Thomsons Lake	8332	Gingin	L
9	Lake Clifton	2811	Bunbury	L	Lake Coyrecup	8129	Wagin	L
10	Black Lakes	2616	Bunbury	R	Lake Forrestdale	7696	Gingin	L
11	Leschenault Inlet	1926	Bunbury	E	Lake Guraga	7351	Gingin	L
12	Lake Norring	1917	Wagin	L	Lake Logue	6420	Geraldton	L
13	Culham Inlet	1746	Bremer	E	*Skipseys Lake	6001	Magenta	L
14	Lake Forrestdale	1620	Gingin	L	Lake McLarty	4563	Bunbury	L
15	*Willoughby Swamp B	1531	Magenta	L	*Lake Bullingarra	4240	Gingin	L

[a]Wetland types: E = estuary, L = lake, R = river

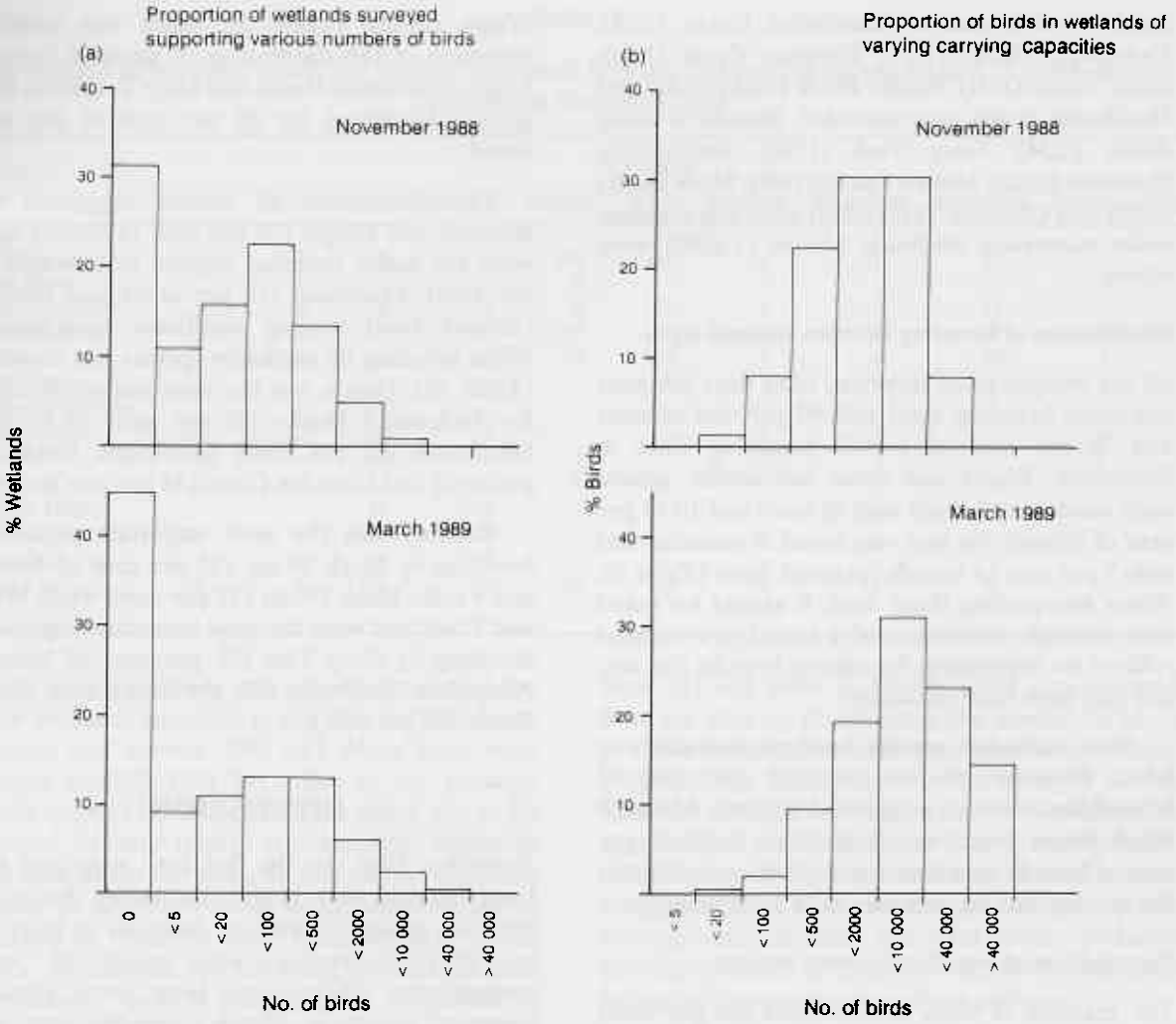


Figure 5
Number of birds in surveyed wetlands during the annual duck counts in south-western Australia. (a) The percentage of wetlands supporting various numbers of birds. (b) The percentage of birds in wetlands of various 'carrying capacities'.

Ten of the wetlands in the November list were lakes, four estuaries and one a river pool whereas fourteen of the March wetlands were lakes and only one an estuary. Bunbury was the region with the greatest number of wetlands with high bird counts in November (6), whereas Gingin contained most in March (6).

Wetlands with the three highest counts for each species in November and March, respectively, are listed in Appendix 2. Thirty-eight of the wetlands were lakes, nine were estuaries and two were river pools. All regions were represented on the list although there was a concentration of listed wetlands in Gingin (15), Bunbury (10) and Esperance (6). Twelve of the wetlands were privately-owned and Emu-Ballajura Lakes were partly man-made.

Amount of breeding

The majority of breeding was recorded in November when 137 nests and 1664 broods were found. Only one nest and 91 broods were counted in March (Table 3).

No nests of Australian Shelducks, Chestnut Teal, Australasian Shovelers or Maned Ducks were found in either count. The nests most commonly found in November belonged to Eurasian Coots, Pink-eared Ducks and Grey Teal.

In relation to the number of birds counted in November, more broods of Freckled Ducks (ratio of 1 brood:13 adults) were found than those of any other species. This undoubtedly reflects extra effort observers put into finding nests and broods after Freckled Ducks were sighted. Comparatively high

numbers of broods of Blue-billed Ducks (1:21), Pink-eared Ducks (1:24), Eurasian Coots (1:28), Black Swans (1:31), Pacific Black Ducks (1:39) and Hardheads (1:40) were recorded. Broods of exotic ducks (1:54), Grey Teal (1:70), Australasian Shovelers (1:82), Maned Ducks (1:87), Musk Ducks (1:88) and Chestnut Teal (1:154) were less common while Australian Shelduck broods (1:1540) were scarce.

Distribution of breeding between wetland types

Of the wetland types surveyed, lakes were the most important breeding areas with 95 per cent of nests and 76 per cent of broods occurring there in November. Rivers and dams had similar values, each containing 2-3 per cent of nests and 10-11 per cent of broods. No nest was found in estuaries and only 3 per cent of broods occurred there (Table 9). When interpreting these data, it should be noted that although occurrence of a brood in a wetland reflects its importance for raising broods, the nest site may have been elsewhere.

Most individual species bred predominantly in lakes. However, the majority (53 per cent) of Maned Duck broods were found in dams. Although Black Swans breed mainly in lakes, about 10 per cent of broods were found in estuaries to make this the species utilising estuaries most for breeding.

Distribution of breeding between regions

The majority of nests in November (89 per cent) were found in the Gingin, Beverley, Bunbury and Wagin regions (Table 5), which was mainly a reflection of the distribution of nests of Eurasian Coots, Pink-eared Ducks and Grey Teal since these species accounted for 85 per cent of the nests found.

The distribution of broods suggested that Bunbury and Gingin (24 per cent of broods each) were the major breeding regions with Wagin (17 per cent), Frankland (11 per cent) and Beverley (10 per cent) making significant contributions. When breeding by particular species was examined (Table 10), Gingin was the most important region for Pink-eared Ducks (42 per cent of broods), Hardheads (65 per cent), Blue-billed Ducks (85 per cent) and Eurasian Coots (44 per cent).

Bunbury was the most important region for breeding by Black Swans (35 per cent of broods) and Pacific Black Ducks (57 per cent) while Wagin and Frankland were the most important regions for breeding by Grey Teal (50 per cent of broods), Australian Shelducks (63 per cent) and Maned Ducks (65 per cent).

DISCUSSION

November 1988 was the first time waterfowl have been counted in a large-scale survey during the breeding season in Western Australia so there are no previous counts with which to make comparisons. There have been three previous 'summer' counts in March (1986-88) that used

Table 9

Distribution of breeding by waterfowl species among wetland types in south-western Australia in November 1988.

	Lake		River		Dam		Estuary	
	Nests	Broods	Nests	Broods	Nests	Broods	Nests	Broods
Black Swan	7	326	-	10	-	2	-	39
Freckled Duck	1	5	-	-	-	-	-	-
Australian Shelduck	-	40	-	1	-	8	-	-
Pacific Black Duck	-	232	-	87	1	25	-	10
Grey Teal	20	259	-	46	1	69	-	1
Chestnut Teal	-	1	-	3	-	-	-	-
Australasian Shoveler	-	2	-	3	-	-	-	-
Pink-eared Duck	28	62	-	-	-	-	-	-
Hardhead	1	26	-	-	-	-	-	-
Maned Duck	-	32	-	6	-	43	-	-
Blue-billed Duck	6	20	-	-	-	-	-	-
Musk Duck	4	7	-	-	-	-	-	-
Exotic ducks	1	4	-	5	-	-	-	-
Eurasian Coot	62	250	4	14	1	26	-	-
TOTAL	130	1266	4	175	3	173	-	50

Table 10

Distribution of breeding (nests and broods combined) by waterfowl species among regions in south-western Australia in November 1988.

Species	REGION										
	Geraldton	Moora	Gingin	Beverley	Bunbury	Wagin	Magenta	Esperance	Frankland	Bremer	Walpole
Black Swan	6	1	68	9	132	61	16	31	46	1	6
Freckled Duck	-	-	-	-	5	-	-	-	-	-	-
Australian Shelduck	-	2	6	1	4	19	4	-	12	-	1
Pacific Black Duck	-	3	81	49	179	10	-	4	11	1	16
Grey Teal	11	4	38	55	55	117	5	6	70	3	11
Chestnut Teal	-	-	-	-	-	3	-	-	-	1	-
Australasian Shoveler	3	-	2	-	-	-	-	-	-	-	-
Pink-eared Duck	10	6	26	3	-	2	8	3	-	4	-
Hardhead	-	-	17	-	3	-	-	-	-	6	-
Maned Duck	-	4	9	3	8	24	2	1	28	-	2
Blue-billed Duck	-	-	17	3	-	-	-	-	-	-	-
Musk Duck	-	-	2	3	1	-	-	-	-	1	-
Exotic ducks	-	-	4	5	-	-	-	-	-	-	-
Eurasian Coot	5	5	128	39	13	43	19	21	10	6	1

similar survey methods and examined most of the major wetlands included in the March 1989 count (Jaensch and Vervest 1988 a,b). More birds were counted in 1989 (354 791) than in the previous March counts (125 798 - 250 325), which was to be expected because rainfall was generally higher in 1988 than in earlier years. In wet winters a greater number of wetlands contain water, which would be expected to result in more breeding and, hence, higher populations the following summer/autumn. Furthermore, there is unlikely to be emigration of species such as Grey Teal in wet years (see Frith 1977).[3]

Because the sets of wetlands examined in the four March counts differed to some extent (especially the proportion of dams), it appeared, *a priori*, that comparisons of total counts might not be valid. Therefore, we also compared the number of birds counted per unit of each wetland type each year (Fig. 6).

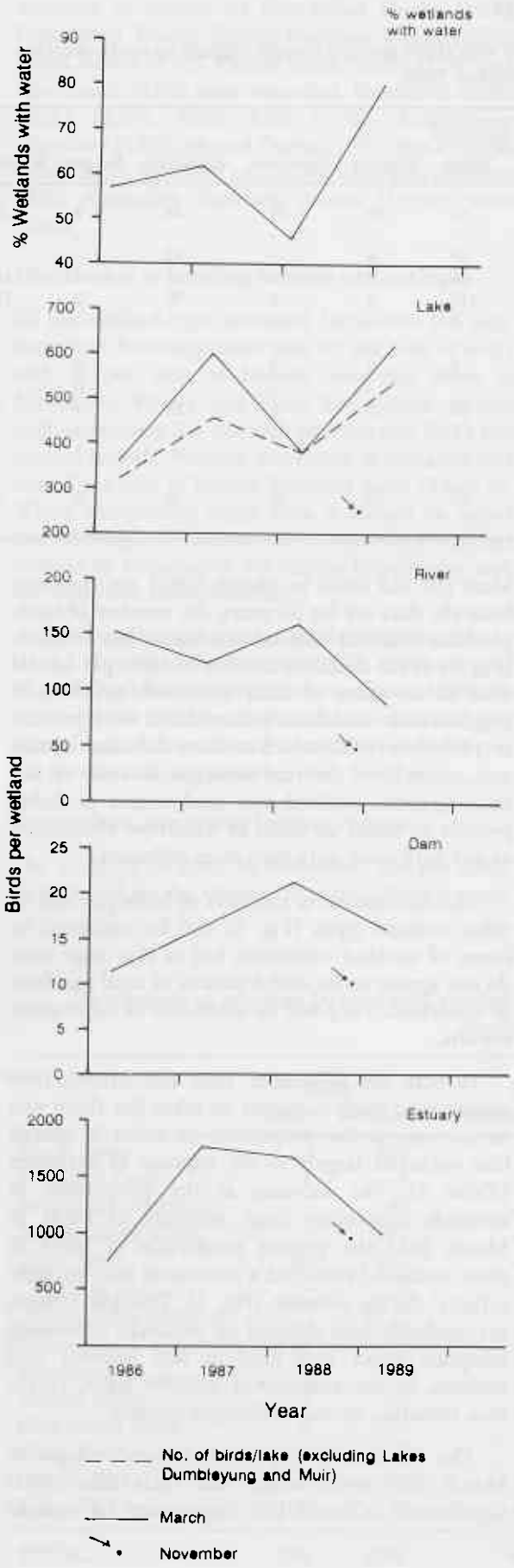
Number of birds per lake had a pattern roughly similar to the proportion of depth-gauged wetlands holding water in January except that the birds-per-lake values for March 1987 and 1989 were almost the same whereas substantially more wetlands held water in 1989. We believe the birds-per-lake figure was comparatively high in 1987 because the population was concentrated in a few major lakes. When Lake Dumbleyung (which contained 40 440 birds in March 1987) and Lake Muir (51 613 birds in March 1989) are removed from the data set for all years, the number of birds per lake reflected wetland conditions more closely (Fig. 6). If the modified number of birds per lake is used as an index of total waterfowl numbers, it suggests that considerably more birds were present in 1989 than 1987, which reflects the total counts and, we believe, the real situation. In spite of the heterogeneous wetland sets total counts probably provide as useful an index of waterfowl abundance as any until more data have been collected.

The fluctuations in numbers of birds per unit of other wetland types (Fig. 6) can be explained in terms of wetland conditions but at this stage they do not appear to be useful indices of total numbers of waterfowl. They will be discussed in subsequent reports.

In both the November 1988 and March 1989 counts most birds occurred on lakes but there was an increase in the proportion on lakes in March that occurred largely at the expense of estuaries (Table 3). The increase in the proportion of wetlands supporting large numbers of birds in March (and the greater proportion of birds in these wetlands) reflected a movement into 'drought refuges' during summer (Fig. 5). Drought refuges are probably best defined as wetlands containing adequate water and food in late summer and autumn. In the summer of 1988/89 lakes, rather than estuaries, served as drought refuges.

The three most important drought refuges in March 1989 were inland and their distribution significantly affected the importance of various

3 Halse, S.A., Diepeveen, D.R and Munro, D.R. (in prep.). Recoveries of Grey Teal and Pacific Black Ducks banded in south-western Australia 1952-76.



← **Figure 6**
The percentage of depth-gauged wetlands containing water in January 1986-89 (J.A.K. Lane and D.R. Munro unpublished data) and the number of birds per wetland unit in annual waterfowl counts during this period.

regions. The high numbers of birds recorded in the Wagin region was partly a result of the high count in Lake Dumbleyung and the results from the Frankland region were almost entirely attributable to Lake Muir. Interpretation of results from regions containing lakes with extremely high counts is difficult but it is vital that these lakes are counted because of their potential to affect most of the indices of waterfowl abundance that are likely to be used. This point is illustrated by results from the aerial surveys in eastern Australia where extremely low numbers of birds were counted in 1986: Lake Buchanan in Queensland, which is known to support hundreds of thousands of birds when conditions are suitable, was not surveyed although it contained water. If birds were present and the lake had been included in the count, the results for the 1986 survey would have been very different (Braithwaite *et al.* 1987).

There was not an obvious movement from inland areas towards drought refuges on the coast in 1988/89, such as is commonly believed to occur (Gentilli and Bekle 1983), although the proportion of birds increased in the Gingin region, which includes Perth and the northern Swan Coastal Plain, and this region contained six of the best 15 wetlands in March. The proportion of birds declined in several other coastal regions, including Bunbury (Table 5), which contains Peel-Harvey Estuary - the most important coastal drought refuge (Jaensch and Vervest 1988a,b).

Most breeding recorded in November occurred in lakes (or habitats not surveyed during the waterfowl count such as winter-wet areas) although rivers and dams were important for particular species (Table 9). Calculating the relative importance of lakes, rivers, dams and estuaries for breeding of the whole south-western Australian waterfowl population requires data on the extent of each wetland type but we would predict that rivers and dams are more important than the data in Table 9 suggest. Within the lake category, most breeding was recorded in lakes supporting 101-500 birds; lakes containing large numbers of birds supported less breeding per bird (Fig. 7).

The importance of different regions as breeding areas was only loosely related to the number of

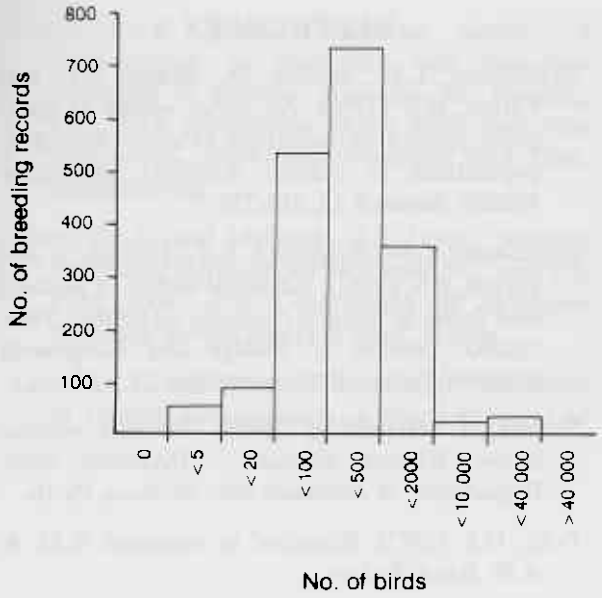


Figure 7
Number of breeding records during the November waterfowl count in wetlands supporting various numbers of birds.

birds they supported in November. More breeding records (26 per cent) came from Gingin than any other region yet it supported only 13 per cent of the waterfowl population (Table 5). The number of breeding records in the Bunbury and Wagin regions more-or-less reflected the number of waterfowl they supported but Esperance had few breeding records for its population size.

In summary, future November and March surveys in the waterfowl counting program should provide additional information about habitat preferences, regional distribution and breeding that will enable us to refine the ideas presented here. The November 1988 survey has highlighted the large-scale movement of Australian Shelducks into lakes and estuaries to moult and additional surveys will enable assessment of the importance of various lakes for this annual event.

Without a better inventory of the wetland resource than currently exists it is impossible to make a formal estimate of the number of waterfowl in south-western Australia but we would like to stress that the counts presented here are gross under-estimates of total numbers. The November count of Australian Shelduck, which was 1.8 times higher than the March count (and many birds would not have been counted in November) illustrates that substantial proportions of the populations of some common species occurred outside the surveyed wetlands in March. Because counts will be used, in the absence of other figures, as *de facto* estimates of waterfowl numbers, we extrapolated our data (using a fair amount of guessing) to provide a very approximate working figure for the number of waterfowl in south-western Australia in the summer of 1988/89. We took the count for estuaries as a realistic estimate of numbers in that habitat in March but we decided that there were over 10 times more waterfowl in dams than were counted, about five times more in rivers and one-and-a-half times as many in lakes. Thus, there were probably about 700 000 waterfowl (or twice the number counted in March) in the south-west in 1988/89.

The extent that counts under-estimate population sizes will vary between years; counts will be most accurate in dry years when birds are concentrated in the major drought refuges, most of which are counted.

ACKNOWLEDGEMENTS

Rob Turner was a very skilful pilot during the aerial surveys; Rodney Vervest prepared wetland maps and gave other valuable assistance; Chris Wilder entered the waterfowl data on computer; Jan Rayner and Raelene Hick typed drafts of the manuscript and prepared it for publication. Most of the funding for this project came from duck-shooters' licence fees (via the Nature Conservation and National Parks Trust Fund) and through observers meeting their own costs. We wish to thank the following team-leaders or observers.

Abbott, J.
Agar, G.
Allen, J.
Baker, G.
Barrett, B.
Beeck, N.
Bellairs, B.
Bentley, P.
Blayney, S.
Blewett, M. & J.
Blyth, J. & J.
Bougher, M.
Brace, P.
Bremner, M.
Broadhurst, L.
Brockman, N. *et al.*
Brockman, R.
Brooke, W.
Brouwer, D.
Buchanan, B. & A.
Burbidge, A.
Bush, T.
Carter, D.
Clarke, B.
Clay, P.
Collins, P.
Congreve, P. & D.
Coole, J.
Craig, M.
Crouch, R.
Curry, S.
Danks, A.
Davidson, J.
Daw, A.
Donohoe, J.
Drakes, D.
Duff, N.
Dyer, G.
Edwards, U.
Egerton-Warburton, P.
Evans, R.
Ewert, J.
Fairbairn, K.
Fermaner, H.

Fleay, J.
Godfrey, N.
Gordon, S.
Green, J.
Griffin, P.
Hamersley, A.
Hansen, J.
Hartley, B.
Hill, S.
Howden, P.
Hunt, J.
James, D.
Jones, A. & R.
Keogh, S.
Kingston, D.
Lane, J.
Little, G.
Lupton, L.
Mack, P.
Malone, B.
Masters, J.
McGuire, M.
Meredith, B.
Millar, W.
Moore, A.
Motteram, R.
Nash, D.
Nurick, J.
Parry, C.
Pegler, J.
Richter, C.
Roberts, V.
Rodda, J.
Roocke, A.
Rose, A.
Rowley, C.
Sedgwick, E.
Shadbolt, K.
Shannon, G.
Smith, L.
Spalding, V.
Start, J.
Taylor, A.
Trethowan, C.
Tyrer, N.
Vervest, R.
Walsh, G.
Welfare, M.
Wheeler, I.
Williamson, M. & W.
Wilson, B.
York, K.
Zadow, W.

Frederiksen, H. & K.
Goodale, R.
Graham, M.
Green, O.
Halse, N.
Hamilton, N.
Harrison, L.
Higham, M.
Hopkins, V.
Howell, J.
Hutchinson, J.
Jennings, P.
Kappelle, W.
King, R.
Kneebone, B.
Leighton, P.
Lodge, G.
Lyneham, T. & A.
Magill, J.
Marston, G.
Mattner, J. & C.
Mercer, C.
Metcalfe, E.
Moir, R.
Morgan, D.
Napier, C. & W.
Nash, M.
Parker, I.
Paynter, R.
Pitcher, M.
Ridley, B.
Robertson, P.
Rogers, J. & P.
Rooke, I.
Rose, L.
Salom, T.
Semeniuk, T.
Shannon, P.
Singleton, E.
Smith, R.
Standring, I.
Talbot, J.
Thomas, J.
Turpin, M.
Van Delft, R. & C.
Walsh, F.
Watkins, G. & R.
Welke, S.
Wilder, C.
Wilmot, P.
Wirrell, C. & W.
Young, S.
Zweck, A.

REFERENCES

Braithwaite, L.W., Maher, M., Briggs, S.V. and Parker, B.S. (1986). An aerial survey of three game species of waterfowl (Family Anatidae) populations in eastern Australia. *Australian Wildlife Research* **13**, 213-223.

Braithwaite, L.W., Kingsford, R.T., Holmes, J. and Parker, B.S. (1987). An aerial survey of wetland bird fauna in eastern Australia - October 1986. *CSIRO Division of Wildlife and Rangelands Research Technical Memorandum* 27, 1-68.

Bureau of Meteorology (1988). *Monthly weather review, Western Australia - December 1988.* Department of Administrative Services, Perth.

Frith, H.J. (1977). *Waterfowl in Australia.* A.H. & A.W. Reed, Sydney.

Gentilli, J. and Bekle, H. (1983). Modelling a climatically pulsating population: Grey Teal in south-western Australia. *Journal of Biogeography* **10**, 75-96.

Halse, S.A. and Jaensch, R.P. (1989). Breeding seasons of waterbirds in south-western Australia - the importance of rainfall. *Emu* **89**, 232-249.

Jaensch, R.P. and Vervest, R.M. (1988a). Ducks, swans and coots in south-western Australia: the 1986 and 1987 counts. *RAOU Report* 31, 1-32.

Jaensch, R.P. and Vervest, R.M. (1988b). Ducks, swans and coots in south-western Australia: the 1988 count and recommendations. *RAOU Report* 46, 1-26.

Jaensch, R.P., Vervest, R.M. and Hewish, M.J. (1988). Waterbirds in nature reserves of south-western Australia 1981-85 : reserve accounts. *RAOU Report* 30, 1-290.

Jenkins, C.F.H. (1976). Moulting Mountain Ducks on Lake Preston. *Western Australian Naturalist* **13**, 123-124.

Kingsford, R.T., Smith, J.D.B. and Lawler, W. (1989). An aerial survey of wetland birds in eastern Australia - October 1988. *New South Wales National Parks and Wildlife Service Occasional Paper* 8, 1-67.

Lane, J.A.K. (1981). Waterbird survey commissioned. *SWANS* **11**(3), 11-14.

Lane, J.A.K. (1985). Important aspects of duck-hunting in Australia, with particular reference to Western Australia. In: Bunning, L.J. (ed.), *Proceedings of the Birds and Man Symposium, 1983.* Witwatersrand Bird Club, Johannesburg.

Lane, J.A.K. and McComb, A.J. (1988). Western Australian wetlands. In: McComb, A.J. and P.S. Lake (eds), *The Conservation of Australian Wetlands.* Surrey Beatty & Sons, Sydney.

Lane, J.A.K. and Munro, D.R. (1983). 1982 review of rainfall and wetlands in the south-west of Western Australia. *Western Australian Department of Fisheries and Wildlife Report* 58, 1-41.

Martindale, J. (1988). Waterfowl count in Victoria, January 1987. *RAOU Report* 37, 1-35.

Mulcahy, M.J. (1978). Salinisation in the south-west of Western Australia. *Search* **9**, 269-272.

Whitehead, P.J., Bayliss, P. and Fox, R.E. (1988). Recreational waterfowl hunting activity and harvests in Northern Territory, Australia. *Australian Wildlife Research* **15**, 625-631.

Appendix 1

Master list for annual waterfowl counts 1988/89 - 1990/91. The wetlands are arranged in a north-south, east-west sequence according to survey blocks (see Fig. 1) and the numbers of waterfowl counted in November and March are shown (blanks indicate wetlands were not counted). Wetlands surveyed from the air are indicated by an asterisk.

Block	Wetland Name	Type	Nov Count	March Count
048-210	KALBARRI SEWERAGE PONDS	D	56	114
048-210	MURCHISON RIVER ESTUARY	E	8	161
048-210	WITTECARA SWAMP	L		0
048-212	FOUR-MILE POOL (MURCHISON RIVER)	R	63	54
048-212	TEN-MILE POOL (MURCHISON RIVER)	R	132	119
049-211	SEAVIEW SOUTH-WEST LAKES	L		155
049-211	URINA CREEK SWAMP	L		0
049-211	UTCHA SWAMP	L		259
049-212	BINNU WEST ROAD LAKE	L	16	15
049-212	WELD EAST LAKE	L		
050-212	BOWES RIVER MOUTH	R		131
050-212	DAM 1 050-212	D		2
050-212	DAM 2 050-212	D		
050-212	EASTBROOK POOL	R		10
050-212	MIAMA SOUTH-EAST LAKE	L		171
051-212	DAM 1 051-212	D		
051-212	DAM 2 051-212	D		
051-212	DAM 3 051-212	D		
051-212	FIG TREE SOUTH POOL	R	14	232
051-212	GREENOUGH ESTUARY	E	98	566
051-212	ROCKY POOL WEST	R	38	22
051-212	ROCKY POOL LAKE	L		20
051-213	BEETALYINNA POOLS	R	79	181
051-213	BLUE POOLS	R	64	
051-213	WHICHERINA DAM	D	7	0
051-213	DAM 1 051-213	D		
051-213	ELLENDALE POOL	R	18	274
051-214	LAKE COOLANGATTA	L	0	0
051-214	EVES LAKES	L		
051-214	HABITONS LAKES	L	0	0
051-214	NAGADE LAKES	L		
052-213	ALLANOOKA SWAMP	L	0	0
052-213	BOOKARA NORTH LAKE	L	166	0
052-213	BOOKARA LAKE	L	267	0
052-213	BUTCHER-HENRY SWAMP	L	0	0
052-213	ELLERY POOL	R	0	
052-213	MONDARRA SWAMP	L		
052-214	BURMA ROAD LAKE	L	0	0
052-214	DAM 1 052-214	D		9
052-214	DAM 2 052-214	D		
052-214	HEATON SWAMP	L	0	0
052-214	MENDARA POOL	R		
053-213	ARRAMALL LAKE	L		0
053-213	ARROWSMITH LAKE	L	0	0
053-215	DAM 1 053-215	D	0	0
053-215	DAM 2 053-215	D	0	0
053-215	RUBBISH TIP LAKE	L	0	0
053-215	YANDANOOKA LAKE A	L	149	131
053-215	YANDANOOKA LAKE B	L	173	0

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
053-215	YARRA YARRA POND 1	L	0	0
054-213	DAM 1 054-213	D	62	
054-213	GREEN LAKE	L	186	0
054-213	LAKE INDOON	L	64	2334
054-213	INDOON HOMESTEAD LAKE (RUSHY)	L	87	0
054-213	INDOON HOMESTEAD SWAMP	L	62	0
054-213	LAKE LOGUE	L	62	6420
054-213	SOUTH LOGUE SWAMP	L	12	0
054-213	WHITE LAKE (ENEABBA)	L	127	0
054-213	YANGET LAKE	L	340	0
054-214	ARRO LAKE	L	0	0
054-214	DAM 1 054-214	D	10	0
054-214	DAM 2 054-214	D	3	0
054-214	DAM 3 054-214	D	0	0
054-214	DAM 4 054-214	D	0	0
054-214	DAM 5 054-214	D	0	0
054-215	DAM 1 054-215	D		
054-215	DAM 2 054-215	D		
054-215	YARRA YARRA POND 2	L	50	0
054-215	YARRA YARRA POND 3	L	0	0
054-215	YARRA YARRA POND 4	L	254	0
054-216	CAPAMAURA SWAMPS	L	0	0
054-216	DAM 1 054-216	D		
054-216	DAM 2 054-216	D		
054-216	EGANU FIREBREAK NORTH LAKE	L	135	0
054-216	EGANU FIREBREAK SOUTH LAKE	L	179	0
054-216	TOUCHE SOUTH LAKE	L	439	0
054-216	TOUCHE NORTH LAKES	L	869	
054-216	TOUCHE SALT LAKE	L	5	0
054-216	WASH (COOROW) POOL	R	0	0
054-216	WINCHESTER WEST LAKES	L	0	0
054-217	BEAUTIFUL LAKE	L	15	0
054-217	DAM 1 054-217	D		
054-217	LITTLE NEDO LAKE	L	2	0
055-213	COCKLESHELL FIRST LAKE	L	278	0
055-213	DAM 1 055-213	D	0	0
055-213	DAM 2 055-213	D	8	0
055-213	JURIEN SWAMP	L	0	0
055-213	TYRERS SWAMP	L	147	0
055-214	BITTER POOL NORTH	R	0	0
055-214	CANOVER SWAMP	L	0	0
055-214	DAM 1 055-214	D	0	0
055-214	DAM 2 055-214	D	0	0
055-214	DAM 3 055-214	D	49	13
055-214	DAM 4 055-214	D	0	0
055-214	DAM 5 055-214	D	0	0
055-214	MUNBINEA NORTH SWAMP	L	12	10
055-214	MUNGAGARRA SWAMP	L	8	118
055-216	CALLEEN LAKE	L	68	290
055-216	DAM 1 055-216	D	8	19
055-216	DAM 2 055-216	D	0	0
055-216	LAKE EGANU	L	781	8628
055-216	GLENROY SOUTH LAKE	L	39	214

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
055-216	HUNTS LAKE	L	39	
055-216	LAKE PINJARREGA	L	0	0
055-216	SCOTTS SOUTH-WEST LAKE	L	252	676
055-216	WONJAN LAKE	L	0	0
055-217	DAM 1 055-217	D	0	0
055-217	DAM 2 055-217	D	0	0
055-217	DAM 3 055-217	D	0	0
055-217	DAM 4 055-217	D	0	0
055-217	DAM 5 055-217	D	0	0
055-217	KORODONG SWAMP	L	255	0
055-217	LAKE VIEW NORTH LAKES	L	96	0
055-217	MARTINJINNI EAST LAKE	L	0	0
055-217	WENDOUREE LAKE	L	0	0
056-213	THETIS LAKE	L	2	0
056-213	WEALACUTTA POOL	R		
056-214	BIBBY NORTH SWAMP	L	2	0
056-214	DAM 1 056-214	D	0	0
056-214	DAM 2 056-214	D	0	136
056-214	DAM 3 056-214	D	0	0
056-214	JETTY SOUTH SWAMP NORTH	L	0	0
056-214	JETTY SOUTH SWAMP SOUTH	L	265	0
056-214	TWYATA POOL	R	0	
056-215	DAM 1 056-215	D	0	0
056-215	DAM 2 056-215	D	0	0
056-215	DAM 3 056-215	D	0	20
056-215	DAM 4 056-215	D	0	0
056-215	DAM 5 056-215	D	2	0
056-215	WOLBA WOLBA WELL LAKE	L	99	202
056-215	YALLALIE WELL LAKE	L	62	819
056-216	COOMBERDALE WEST SWAMPS	L	430	0
056-216	DAM 1 056-216	D	0	0
056-216	DAM 2 056-216	D	0	0
056-216	DAM 3 056-216	D	28	0
056-216	NAMBAN RESERVE SWAMP	L	139	0
056-216	PRICE'S EAST AND WEST LAKES	L	152	404
056-216	PRICES ROAD LAKE	L		213
056-216	RACECOURSE LAKE	L	280	430
056-216	STREETS SWAMP NORTH	L	587	386
056-216	STREETS SWAMP SOUTH	L	401	0
056-216	STREETS WEST SWAMP	L		328
056-217	CARWOOLA NORTH-WEST LAKE	L	126	0
056-217	DAM 1 056-217	D	0	0
056-217	DAM 2 056-217	D	0	0
056-217	DAM 3 056-217	D	0	0
056-217	DAM 4 056-217	D	0	0
056-217	DAM 5 056-217	D	0	0
056-217	EDAWA LAKES	L	4	849
056-218	DAM 1 056-218	D		
056-218	DAM 2 056-218	D		
056-218	DAMBORING SIDING LAKE	L		
056-218	WANEARY LAKE	L		
057-214	CARO WEST POOL (MINYULO BROOK)	R	16	0
057-214	CARO SWAMP	L	58	17

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
057-214	GARBA CARO SWAMP	L	1	0
057-214	GARBA GARBA SWAMP	L	0	0
057-215	CRACKERS SWAMP	L	16	11
057-215	DAM 1 057-215	D	0	0
057-215	LAKE GURAGA	L	3705	7351
057-215	HURSTVIEW LAKE	L	800	577
057-215	MOOCHAMULLA POOLS	R	0	2
057-215	NAMMEGARRA ROAD EAST SWAMP	L	10	3
057-215	NAMMING LAKE	L	674	851
057-215	NAMMEGARRA ROAD WEST SWAMP	L	50	0
057-215	PETES POND	L	0	163
057-216	BARBERTON WEST SWAMP	L	77	0
057-216	BOXALL SWAMP	L	971	0
057-216	DAM 1 057-216	D	58	0
057-216	DAM 2 057-216	D	7	0
057-216	DAM 3 057-216	D	0	0
057-216	DAM 4 057-216	D	0	0
057-216	DAM 5 057-216	D	0	3
057-216	SANDHILLS DAM 057-216	D	3	0
057-216	KOODJEE SWAMP	L	74	0
057-217	DAM 1 057-217	D	2	
057-217	DAM 2 057-217	D	0	
057-217	DAM 3 057-217	D	14	
057-217	DAM 4 057-217	D	0	
057-217	DAM 5 057-217	D	0	
057-217	NOONDA LAKE	L	5	
057-217	SPREADALONG LAKES	L	0	0
057-218	DAM 1 057-218	D	0	0
057-218	DAM 2 057-218	D	0	0
057-218	DAM 3 057-218	D	2	57
057-218	DAM 4 057-218	D	0	0
057-218	HINDS LAKE	L	1	0
057-218	KONDUT EAST LAKES	L	151	0
057-218	NINAN LAKE	L	48	330
057-218	NINAN SOUTH SWAMP	L	0	0
057-218	RUPERT LAKES	L	26	0
058-214	KARAKIN NORTH LAKE	L	133	0
058-215	BARRETT-LENNARD LAKE	L	858	1323
058-215	BLYTHS LAKE	L	120	148
058-215	CALADENIA LAKE	L		6
058-215	DAM 2 058-215	D	0	0
058-215	DAM 1 058-215	D	0	5
058-215	GREENWOOD NORTH-EAST SWAMP	L		0
058-215	KAWIGIN POOL	R	12	3
058-215	LITTLE BOOTINE SWAMP	L		0
058-215	WANERIE ROAD SWAMP	L		295
058-215	WHITE LAKE (GINGIN)	L	663	0
058-215	YURINE SWAMP	L	72	9
058-216	BULLINGARRA LAKE	L	388	4240
058-216	CUMMUNGUP POOL	R	180	684
058-216	DAM 1 058-216	D	78	2
058-216	DAM 2 058-216	D	2	0
058-216	DAM 3 058-216	D	6	4

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
058-216	DAM 4 058-216	D	15	13
058-216	DAM 5 058-216	D	0	0
058-216	FOOTBALL LAKE	L	62	201
058-216	LOWER MOGUMBER POOL	R		0
058-216	TAYLORS LAKES	L	122	447
058-216	LAKE WANNAMAL	L	396	10370
058-217	DAM 1 058-217	D		2
058-217	DAM 2 058-217	D		2
058-217	REDGUM SWAMP	L		2
058-217	YARRAWINDAH POOL	R		
058-218	BOLGART EAST LAKE NORTH	L	138	
058-218	BOLGART - SMITH LAKE	L	10	547
058-218	DAM 1 058-218	D	0	0
058-218	DAM 2 058-218	D	0	0
058-218	DAM 3 058-218	D	0	0
058-218	DAM 4 058-218	D	0	0
058-218	DAM 5 058-218	D	0	2
058-218	RIFLE RANGE LAKE	L		118
058-218	WROTH LAKE	L	67	9
058-219	BOOKERBIDEY SWAMPS	L	84	159
058-219	DAM 1 058-219	D	0	0
058-219	DAM 2 058-219	D	0	0
058-219	DAM 3 058-219	D	0	2
058-219	DAM 4 058-219	D	0	0
058-219	DAM 5 058-219	D		260
058-219	KOOMBEKINE WEST LAKE	L	0	0
058-219	NAMBLING LAKE	L	0	0
058-219	TWINE EAST LAKE	L	0	0
058-219	LAKE WALYORMOURING	L	125	0
059-215	CHITNA ROAD DAM 059-215	D	37	10
059-215	DEEPWATER LAGOON	L	35	0
059-215	DIAMOND ISLAND REACH (MOORE RIVER)	R	0	2
059-215	LOCH MCNESS	L		244
059-215	LAKE NOWERGUP	L	490	1087
059-215	PIPIDINNY SWAMP	L	62	25
059-216	LAKE BAMBUN	L	88	993
059-216	LAKE CHANDALA	L	337	115
059-216	LAKE CHITTERING	L	824	774
059-216	DAM 1 059-216	D	0	0
059-216	DAM 2 059-216	D	1	12
059-216	DAM 3 059-216	D	0	0
059-216	DAM 4 059-216	D	0	0
059-216	DAM 5 059-216	D	0	0
059-216	GINNIBY EAST POOL	R	81	0
059-216	GOYAMIN POOL	R	32	14
059-216	LAKE MUNGALA	L		0
059-217	BIN-DEW LAKE	L	42	8
059-217	NINE-MILE DAM 059-217	D	3	6
059-217	SANDSPRING NORTH DAM 059-217	D	35	2
059-217	SINCLAIR DAM 059-217	D	25	40
059-217	STONEY-BROKE DAM 059-217	D	12	1
059-217	LONG POOL (AVON RIVER)	R	71	81
059-217	LOVERS LANE POOL (AVON RIVER)	R	0	5

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
059-217	REDBANK - MILLARD POOL (AVON RIVER)	R	194	15
059-217	SANDSPRING WEST LAKE	L	2	1
059-218	CLARKES LAKES A AND B	L	1308	298
059-218	GLEN AVON DAM A 059-218	D	70	109
059-218	GLEN AVON DAM B 059-218	D	43	8
059-218	GLEN AVON DAM C 059-218	D	39	9
059-218	LYNWOOD DAM 059-218	D	0	76
059-218	WOODENDALE TOP DAM 059-218	D	2	18
059-218	GALE - HAMERSLEY LAKE	L	11	92
059-218	HERRIDGE LAKE	L	70	36
059-218	KATRINE POOL (AVON RIVER)	R	237	734
059-218	NORTHAM WEIR POOL (AVON RIVER)	R	356	637
059-218	PARNHAMS LAKE	L	1331	33
059-219	COOKES DAM 059-219	D	2	50
059-219	DAM 1 059-219	D	0	0
059-219	DAM 2 059-219	D	0	0
059-219	DAM 3 059-219	D	0	0
059-219	DAM 4 059-219	D	0	0
059-219	HILLSIDE LAKES	L		902
059-219	MEENAAR LAKE	L	99	163
059-219	SADLER ROAD LAKE	L	227	94
059-220	DAM 1 059-220	D	0	
059-220	DAM 2 059-220	D	0	
059-220	DAM 3 059-220	D	0	
059-220	DAM 4 059-220	D	0	0
059-220	DAM 5 059-220	D	9	0
059-220	MASTERS LAKE	L	153	8
059-220	NOONYING LAKE	L	0	0
059-220	YOUERING SOUTH LAKE	L	0	0
060-215	LAKE CLAREMONT	L	200	246
060-215	ERINDALE ROAD POND	L	14	95
060-215	LAKE GWELUP	L	417	1214
060-215	HERDSMAN LAKE	L	410	490
060-215	LAKE JOONDALUP	L	288	897
060-215	MABEL TALBOT PARK LAKE	L	41	201
060-215	LAKE MARIGINIUP	L	0	35
060-215	LAKE MONGER	L	769	2246
060-215	PERRY LAKES	L	170	466
060-215	SHENTON PARK LAKE	L	168	393
060-215	WEEBILL - SPOONBILL PONDS	L	55	116
060-216	AITKEN - NEWBURN POND	L	94	177
060-216	AMIENS POOL	R	0	6
060-216	BAYSWATER SANCTUARY SWAMP	L	122	185
060-216	DOG SWAMP	L	28	
060-216	EMU - BALLAJURA LAKES	L	618	1087
060-216	HERNE LAKE	L	80	0
060-216	HYDE PARK LAKES	L	85	
060-216	JANDABUP LAKE	L	36	202
060-216	SWAN RIVER ESTUARY	E	532	1748
060-216	SYDNEY ROAD SWAMP	L	58	0
060-216	TOMATO LAKE	L		292
060-217	DAM 1 O60-217	R	8	15

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
060-217	DAM 2 060-217	D	2	51
060-217	DAM 3 060-217	D	11	39
060-217	DAM 4 060-217	D	0	26
060-217	DAM 5 060-217	D	16	154
060-217	LAKE LESCHENAULTIA	L	16	36
060-217	MANARING LAKE	L	3	0
060-217	RED SWAMP	L	46	
060-218	CHAPEL POOL (AVON RIVER)	R	65	656
060-218	COLD HARBOUR POOL (AVON RIVER)	R	5	
060-218	SPENCERS CREEK (WEISNER DAM) 060-218	D	96	432
060-218	DAM 1 060-218	D		
060-218	DAM 2 060-218	D		
060-218	HAMERSLEY POOL (AVON RIVER)	R	15	422
060-219	DAM 1 060-219	D	0	0
060-219	DAM 2 060-219	D	0	0
060-219	DAM 3 060-219	D	0	0
060-219	DAM 4 060-219	D	0	2
060-219	DAM 5 060-219	D	9	0
060-219	DUCK POOL	R	3	0
060-219	KELLY POOL	R	0	2
060-219	WONOBBING POOL	R	0	0
060-220	BADJALING NORTH POOL (SALT RIVER)	R	0	0
060-220	DAM 1 060-220	D	0	0
060-220	DAM 2 060-220	D	0	0
060-220	DAM 3 060-220	D	0	0
060-220	DAM 4 060-220	D	0	0
060-220	DAM 5 060-220	D	0	0
060-221	DAM 1 060-220	D	0	123
060-221	DAM 2 060-220	D	0	0
060-221	DAM 3 060-220	D	0	12
060-221	DAM 4 060-220	D	0	2
060-221	DAM 5 060-220	D	2	0
060-221	KEVILLS LAKES	L	305	464
060-221	KWOLYIN SOAK LAKE	L	0	0
060-221	SHACKLETON SOUTH-WEST LAKE	L	0	0
061-215	BIBRA LAKE	L	369	480
061-215	LAKE COOLOONGUP	L		11980
061-215	HOPE ROAD SWAMP	L		83
061-215	LAKE KOGOLUP	L	65	847
061-215	LITTLE RUSH LAKE	L		110
061-215	MANNING LAKE	L	117	105
061-215	MANDOGALUP (WATTLEUP) LAKE	L	124	467
061-215	NORTH LAKE	L	102	115
061-215	LAKE RICHMOND	L		329
061-215	THOMSONS LAKE	L	89	8332
061-215	YANGEBUP LAKE	L	818	1200
061-216	BLUE GUM LAKE	L		167
061-216	BOORAGOON LAKE	L		454
061-216	CANNING CITY OFFICE PONDS	L	202	334
061-216	CANNING RIVER (KENT-FOOTBRIDGE)	R	24	43
061-216	FORREST - LIDDELOW SWAMP	L		2
061-216	LAKE FORRESTDALE	L	1620	7696
061-216	GIBBS ROAD SWAMP	L	93	0

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
061-216	MARY CARROLL PARK LAKE	L	135	188
061-216	MCDOUGALL PARK LAKE	L	99	210
061-216	NICHOLSON - OXLEY SWAMP	L		0
061-218	BAYATYNE POOL	R	36	0
061-218	BURALONG POOL	R	2	10
061-218	BUTCHERS POOL (DALE RIVER)	R	0	15
061-218	DAM 1 061-218	D	22	4
061-218	DAM 2 061-218	D	35	8
061-218	DAM 3 061-218	D	3	0
061-218	DAM 4 061-218	D	0	118
061-218	DAM 5 061-218	D	0	29
061-218	OAKOVER POOL (AVON RIVER)	R	111	160
061-218	THOMAS SWAMP	L		336
061-219	BURNSIDE LAKE	L	225	0
061-219	CORBEDING SWAMP	L	102	83
061-219	DAM 1 061-219	D	1	0
061-219	DAM 2 061-219	D	8	4
061-219	DAM 3 061-219	D	11	0
061-219	DAM 4 061-219	D	128	0
061-219	DAM 5 061-219	D	20	38
061-219	MAITLAND SWAMP	L	63	532
061-219	MURRAYS SWAMP	L	48	808
061-219	OBINS POOL	R	55	32
061-219	WANNERING POOL	R	46	38
061-220	BEVERLEY LAKES*	L	1168	7
061-220	DAM 1 061-220	D	4	0
061-220	DAM 2 061-220	D	19	2
061-220	DAM 3 061-220	D	0	0
061-220	DAM 4 061-220	D	0	0
061-220	DAM 5 061-220	D	15	0
061-220	LAKE MEARS*	L	390	0
061-220	MILLS NORTH SWAMP	L	126	255
061-220	MILLS SOUTH SWAMP	L	221	31
061-220	MORBINING WEST LAKE	L	0	0
061-220	QUALEM DOWNS LAKE*	L	300	0
062-215	AMARILLO POOL (SERPENTINE RIVER)*	R	56	990
062-215	BARRAGHUP SWAMP	L	158	163
062-215	BEENYUP SWAMPS	L	117	69
062-215	BLACK LAKES (SE OF GEOGRUP)*	L	2616	653
062-215	CARRABURMUP SWAMP	L	175	21
062-215	YALBANBERUP NORTH-WEST DAM 062-215	D	0	0
062-215	GEOGRUP POOL (SERPENTINE RIVER)*	L	428	44
062-215	GREY ROAD SWAMP	L	534	0
062-215	GUANARUP POOL (SERPENTINE RIVER)	R	26	29
062-215	MURRAY RIVER (DELTA TO PINJARRA)	R	521	1553
062-215	PEEL-HARVEY ESTUARY*	E	5196	11788
062-215	YALBANERUP POOL (SERPENTINE RIVER)*	R	10	20
062-216	BIG SEC SWAMP	L	19	222
062-216	DAM 1 062-216	D	65	0
062-216	DAM 2 062-216	D	23	1
062-216	DAM 3 062-216	D	2	0
062-216	DAM 4 062-216	D	10	0
062-216	DAM 5 062-216	D	10	3

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
062-216	DAM 7 062-216	D	20	0
062-216	DAM 6 062-216	D	7	4
062-216	WEST CORIO SWAMP	L	236	2
062-216	YANGEDI SWAMP	L	43	10
062-218	DAM 1 062-218	D	0	6
062-218	DAM 2 062-218	D	22	42
062-218	DAM 3 062-218	D	1	2
062-218	DAM 4 062-218	D	1	6
062-218	DAM 5 062-218	D	0	0
062-218	DAM 6 062-218	D	22	3
062-218	GINBONGING POOL	R	0	0
062-219	DAM 1 062-219	D	0	2
062-219	DAM 2 062-219	D	21	2
062-219	DAM 3 062-219	D	0	0
062-219	HORSESHOE LAKE	L	53	0
062-219	NAPPING POOL	R	25	0
062-219	PUMPHREYS POOL	R	22	8
062-219	UAMBINE POOL	R	0	0
062-220	DAM 1 062-220	D	0	0
062-220	DAM 2 062-220	D	0	0
062-220	DAM 3 062-220	D	0	0
062-220	DAM 4 062-220	D	0	0
062-220	DAM 5 062-220	D	0	0
062-220	GLEN MORREL SWAMP	L	2	0
062-220	KALAROO EAST SWAMPS	L	243	26
062-221	LAKE BROWN*	L	239	0
062-221	DAM 1 062-221	D	4	
062-221	DAM 2 062-221	D	0	
062-221	DAM 3 062-221	D	7	
062-221	DAM 4 062-221	D	2	
062-221	DAM 5 062-221	D	0	
062-221	LAKE NONALLING*	L	329	0
062-221	LAKE YEALERING*	L	564	2893
063-215	LAKE CLIFTON*	L	2811	1799
063-215	DAM 1 063-215	D	99	10
063-215	DAM 2 063-215	D	0	0
063-215	EAST OF GOODALE LAKE	L	53	82
063-215	FISHERMANS WEST SWAMP	L	15	4
063-215	GOODALE SANCTUARY LAKES	L	11	3
063-215	HARVEY RIVER (LOWER REACH)*	R	62	35
063-215	LAKE MCLARTY*	L	817	4563
063-215	LAKE MEALUP*	L	258	626
063-215	PEPPERMINT EAST SWAMP	L	70	0
063-215	LAKE PRESTON*	L	8990	2755
063-216	BAKER STREET SWAMP	L	70	
063-216	COOLUP WEST LAKE A	L	34	53
063-216	COOLUP WEST LAKE B	L	63	0
063-216	CORNUCOPIA LAKE	L		0
063-216	DAM 1 063-216	D	19	126
063-216	DAM 2 063-216	D		94
063-216	HAMEL FOREST SWAMP	L	6	2
063-216	LOGUE NORTH POOL (YARLOOP)	D	119	40
063-217	CAMBALLING POOL	R	11	0

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
063-217	DAM 1 063-217	D	30	10
063-217	DAM 2 063-217	D	8	0
063-217	DAM 3 063-217	D	40	0
063-217	LOWER HOTHAM POOL	R	9	4
063-217	MURRAY RIVER POOL	R	4	2
063-217	SADDLEBACK SWAMP	L	6	0
063-218	DAM 1 063-218	D		0
063-218	DAM 2 063-218	D		0
063-218	DAM 3 063-218	D		15
063-218	DAM 4 063-218	D		53
063-218	DAM 5 063-218	D		0
063-218	DUMBITMOONY POOL	R		10
063-218	MORAMOCKING POOL	R		30
063-219	BOYAMUCKING POOL	R		
063-219	DAM 1 063-219	D		
063-219	DAM 2 063-219	D		
063-219	DAM 3 063-219	D		
063-219	DAM 4 063-219	D		
063-219	DAM 5 063-219	D		
063-220	CARRABENING POOL	R	0	0
063-220	DAM 1 063-220	D	45	48
063-220	DAM 2 063-220	D		0
063-220	DAM 3 063-220	D		0
063-220	DAM 4 063-220	D		0
063-220	DAM 5 063-220	D		2
063-220	NOMANS LAKE*	L	199	0
063-221	BILLY LAKE*	L	125	2127
063-221	BOKAN LAKE*	L	217	21
063-221	DAM 1 063-221	D	0	0
063-221	DAM 2 063-221	D	0	0
063-221	DAM 3 063-221	D	0	0
063-221	DAM 4 063-221	D	0	0
063-221	DAM 5 063-221	D	0	0
063-221	IBIS LAKE*	L	5	302
063-221	LAKE TAARBLIN*	L	0	0
063-221	LAKE TOOLIBIN*	L	438	0
063-221	LAKE WALBYRING*	L	95	56
064-215	BRUNSWICK RIVER (RIDLEY'S)	R	26	15
064-215	DAM 5 064-215	D		0
064-215	DAM 1 064-215	D	0	5
064-215	DAM 2 064-215	D	0	0
064-215	DAM 3 064-215	D	0	0
064-215	DAM 4 064-215	D	12	0
064-215	DUNN ROAD SWAMP	L	28	6
064-215	GUNYAH POOL	R	70	128
064-215	KEMERTON LAKES	L	9	54
064-215	LESCHENAULT INLET*	E	1926	501
064-215	ROSAMEL SWAMP	L	71	242
064-215	WELLESLEY ROAD SOUTH SWAMP	L	22	3
064-216	BENGER SWAMP	L	1007	21
064-216	HARVEY SEWERAGE PONDS	D	1	183
064-217	COLLIE NORTH-EAST POOL	R		2
064-217	DELAYNEY POOL	R		2

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
064-218	DAM 1 064-218	D	2	6
064-218	DAM 2 064-218	D	21	0
064-218	DAM 3 064-218	D	28	0
064-218	DAM 4 064-218	D	4	4
064-218	MEEKING WEST SWAMP A	L	42	0
064-218	MEEKING WEST SWAMP B	L	18	0
064-218	MEEKING NORTH LAKE	L	118	3745
064-218	NAMINE LAKE	L	107	1456
064-219	CARBERDINE POOL	R	2	29
064-219	DUFFS DAM 064-219	D	0	0
064-219	HALLS DAM 064-219	D	33	0
064-219	KAINS DAM 064-219	D	26	24
064-219	ROSES DAM 064-219	D	38	10
064-219	SARGEANTS DAM 064-219	D	47	126
064-219	DARDADINE SOUTH-EAST LAKE	L	372	0
064-219	KONDENING POOL	R	2	2
064-219	ROVIE LAKE	L	84	182
064-219	WANAKING POOL	R	0	2
064-219	WIESE LAKE	D	83	591
064-220	BALLAGIN POOL	R	35	42
064-220	BUNGON POOL	R	14	3
064-220	DAM 1 064-220	D	1	0
064-220	0DAM 2 064-220	D	3	0
064-220	DAM 3 064-220	D	12	0
064-220	DAM 4 064-220	D	0	0
064-220	DAM 5 064-220	D	0	0
064-220	LAKE GUNDARING*	L	611	3804
064-220	LITTLE WHITE LAKE*	L	26	0
064-220	WAGIN LAKE	L	302	877
064-220	WHITE LAKE (NARROGIN)*	L	0	0
064-223	BIG LAKE*	L	0	0
064-223	BM 282 LAKE*	L	0	0
064-223	CEMETRY LAKE*	L	100	900
064-223	DAM 1 064-223*	D	15	6
064-223	DAM 2 064-223*	D	2	0
064-223	DAM 3 064-223*	D	0	0
064-223	DAM 4 064-223*	D	0	0
064-223	DAM 5 064-223*	D	0	0
064-223	RUINS LAKE NORTH*	L	0	0
064-223	RUINS LAKE SOUTH*	L	585	0
064-224	DAM 1 064-224*	D	2	6
064-224	DAM 2 064-224*	D	0	0
064-224	DAM 3 064-224*	D	0	0
064-224	DAM 4 064-224*	D	0	0
064-224	DAM 5 064-224*	D	0	0
064-224	LAKELAND LAKE (MALLEE HILL ROAD)	L	4	0
064-224	RINGAMERE LAKE*	L	470	795
064-225	LAKE BIDDY*	L	515	473
064-225	DAM 1 064-225*	D	10	0
064-225	DAM 2 064-225*	D	0	0
064-225	DAM 3 064-225*	D	0	0
064-225	DAM 4 064-225*	D	0	0
064-225	DAM 5 064-225*	D	0	0

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
064-225	LAKE HILL*	L	0	0
064-225	RODGER LAKE*	L		580
064-226	DAM 1 064-226*	D	0	4
064-226	DAM 2 064-226*	D	0	8
064-226	DAM 3 064-226*	D	0	4
064-226	DAM 4 064-226*	D	0	0
064-226	DAM 5 064-226*	D	0	0
064-226	UPSON DOWNS LAKE*	L	2	0
064-227	BANGOR LAKE*	L	0	0
064-227	DAM 1 064-227*	D	0	1
064-227	DAM 2 064-227*	D	0	0
064-227	DAM 3 064-227*	D	0	0
064-227	DAM 4 064-227*	D	0	0
064-227	DAM 5 064-227*	D	0	0
064-227	DUNN ROCK SKI LAKE*	L	121	1120
064-227	KATHLEEN NATURE RESERVE LAKE*	L	0	0
064-227	LAKE PALLARUP*	L	0	0
064-227	SUGG LAKE*	L	0	0
064-228	BAANGAR HILL LAKE*	L	0	0
064-228	DAM 1 064-228*	D	0	40
064-228	DAM 2 064-228*	D	0	40
064-228	DAM 3 064-228*	D	0	50
064-228	DAM 4 064-228*	D	0	25
064-228	DAM 5 064-228*	D	0	35
064-228	STENNETS LAKE*	L	207	0
065-213	DAM 1 065-213	D		0
065-213	DAM 2 065-213	D		3
065-213	DUNN BAY LAKE	L		0
065-213	QUINDALUP SIDING LAKE	L		0
065-214	BUSSELTON POOL	R	46	463
065-214	NEW RIVER SWAMP	L	55	231
065-214	VASSE-WONNERUP ESTUARY*	E	11720	3309
065-215	CAPEL SOUTH SWAMPS	L	39	0
065-215	DAM 1 065-215	D		73
065-215	DAM 2 065-215	D		133
065-215	DAM 3 065-215	D		96
065-215	DARDANUP SOUTH-WEST SWAMP	L		132
065-215	DODSON POOL	R	52	129
065-215	MCCARLEYS SWAMP	L	377	681
065-215	PUNCHBOWL (BUNBURY BIG) SWAMP	L	168	128
065-215	WANERAGUP LAKE	L	438	400
065-216	DAM 1 065-216	D	48	
065-216	DAM 2 065-216	D	13	
065-216	DAM 3 065-216	D	53	
065-216	DAM 4 065-216	D		132
065-216	DAM 5 065-216	D		21
065-216	MINNINGUP POOL (COLLIE RIVER)	R	16	0
065-217	COLLIE BURN POOL	R		53
065-217	DAM 1 065-217	D		0
065-217	DAM 2 065-217	D		0
065-217	DUDERLING POOLS	R		2
065-217	NGARTIMINNY LAKES	L	102	203
065-218	BOONINUP NORTH POOL	R	89	32

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
065-218	CAPERCUP SOUTH LAKE	L		0
065-218	DAM 1 065-218	D	17	55
065-218	DAM 2 065-218	D	43	96
065-218	DAM 3 065-218	D	25	5
065-218	DAM 5052 065-218	D	21	3
065-218	DAM 5814 065-218	D	16	2
065-218	DURANILLIN SWAMP	L		0
065-218	GLENORCHY POOL	R		20
065-218	MOODIARRUP SWAMPS	L	360	0
065-218	LAKE TOWERRINNING	L	405	443
065-219	DAM 1 065-219	D	40	74
065-219	DAM 2 065-219	D	22	8
065-219	DAM 2992 065-219	D	5	3
065-219	DAM 3 065-219	D	39	2
065-219	DAM 4 065-219	D	5	0
065-219	DAM 5 065-219	D	8	22
065-219	DEADMANS LAKES	L	754	1223
065-219	FITZES SWAMP	L	418	2927
065-219	KOOLBOOKING SWAMP	L	331	0
065-219	SIX MILE POOL	R	19	22
065-219	WANDIBIRRUP POOL	R	23	27
065-220	BOKARING YATE SWAMP*	L	141	14374
065-220	DAM 1 065-220	D	2	2
065-220	DAM 2 065-220	D	20	3
065-220	DAM 3 065-220	D	0	13
065-220	LAKE FLAGSTAFF	L	506	2790
065-220	LAKE MARTINUP	L	183	1142
065-220	LAKE MIRIPIN	L	137	1067
065-220	LAKE NORRING*	L	1917	2056
065-220	LAKE PARKEYERRING*	L	474	3637
065-220	RIVERDALE WEST POOL	R		3
065-220	LAKE WARDERING	L	64	3870
065-221	CASUARINA LAKE*	L	276	180
065-221	COBLININE RIVER FLATS*	R	1253	1032
065-221	LAKE COOMELBERRUP	L		3405
065-221	CORACKINE LAKE	L	420	964
065-221	DAM 1 065-221	D		0
065-221	DAM 2 065-221	D		0
065-221	DAM 3 065-221	D		0
065-221	LAKE DUMBLEYUNG*	L	8099	33415
065-221	KAILAGUP LAKE	L		
065-222	DAM 1 065-222*	D	0	2
065-222	DAM 2 065-222*	D	0	2
065-222	DAM 3 065-222*	D	0	0
065-222	DAM 4 065-222*	D	0	0
065-222	DAM 5 065-222*	D	0	0
065-223	LAKE ALTHAM*	L	470	2145
065-223	DAM 1 065-223*	D	0	1
065-223	DAM 2 065-223*	D	0	0
065-223	DAM 3 065-223*	D	0	0
065-223	DAM 4 065-223*	D	0	0
065-223	DAM 5 065-223*	D	0	0
065-223	SKIPSEYS LAKE	L		6001

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
065-223	WILLOUGHBY SWAMP A*	L	487	1240
065-223	WILLOUGHBY SWAMP B*	L	1531	938
065-224	LAKE BRYDE	L	21	19
065-224	BRYDE NORTH SWAMP	L	45	52
065-224	CLAIRES LAKE	L		802
065-224	DAM 1 065-224	D	0	0
065-224	DAM 2 065-224	D	0	0
065-224	DAM 3 065-224	D	0	0
065-224	DAM 4 065-224	D	0	
065-224	DUNCOMBE BEND LAKE	L		0
065-224	NEVE ROAD LAKE	L		528
065-224	PINGARNUP LAKE	L	115	4
065-224	THOMAS ROAD LAKES	L		2614
065-225	SALT LAKE SOUTH-EAST OF LAKE BRYDE	L	3	0
065-225	DAM 1 065-225	D	0	0
065-225	DAM 2 065-225	D	0	0
065-225	DAM 3 065-225	D	0	0
065-225	EAST BRYDE NATURE RESERVE LAKE	L	21	34
065-225	GRANT - WILLIAMS EAST SWAMP	L	61	0
065-226	ANEMBE NORTH LAKE	L		0
065-226	COBHAM LAKE	L	0	0
065-226	DAM 1 065-226	D	11	0
065-226	DAM 2 065-226	D	0	0
065-226	DAM 3 065-226	D	0	6
065-226	PAGE - GILES LAKE	L	98	277
065-227	DAM 1 065-227	D	0	
065-227	DAM 2 065-227	D		0
065-227	NATURE RESERVE 31424 YATE SWAMP	L	0	0
065-227	WINDMESH NORTH-WEST LAKE	L		0
065-228	CARLINGUP POOL (JERDACUTTUP RIVER)	R	2	0
065-228	LAKE CHIDNUP*	L	63	0
065-228	DAM 1 065-228	D	0	0
065-228	DAM 2 065-228	D	0	0
065-228	DAM 3 065-228	D	0	0
065-228	DAM 4 065-228	D	0	
065-228	DAM 5 065-228	D	0	
065-229	DAM 1 065-229	D	0	0
065-229	DAM 2 065-229	D	0	0
065-229	DAM 3 065-229	D	0	0
065-229	FENCE EAST YATE SWAMP	L	0	0
065-230	DAM 1 065-230	D	0	0
065-230	DAM 2 065-230	D	2	0
065-230	DAM 3 065-230	D	0	3
065-230	WEST POINT YATE SWAMP	L	64	172
065-232	DAM 1 065-232	D	0	0
065-232	DAM 2 065-232	D	0	0
065-232	FIELDS - GRIFFITH MAIN SWAMP	L	64	0
065-232	FIELDS - GRIFFITH SOUTH SWAMP	L	1	0
065-233	DAM 1 065-233	D	20	0
065-233	DAM 2 065-233	D	0	0
065-233	DAM 3 065-233	D	0	0
065-233	GIBSON NORTH RUBBISH LAKE	L	9	
065-233	TEANO LAKE	L	0	0

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
065-234	CAMPBELLS ROAD NORTH LAKE	L	0	0
065-234	DAM 1 065-234	D	0	2
065-234	DAM 2 065-234	D	0	0
065-234	DAM 3 065-234	D	0	0
065-234	GIBSON ROAD (ESPERANCHO) SWAMP	L	13	0
065-234	JENABILLUP ROAD LAKE	L	0	0
066-213	DAM 1 066-213	D	15	4
066-213	DAM 2 066-213	D	8	72
066-213	DAM 3 066-213	D	5	6
066-213	DAM 4 066-213	D	18	10
066-213	DAM 5 066-213	D	16	91
066-213	DAM 6 066-213	D		13
066-213	DAM 7 066-213	D		74
066-214	THE BROADWATER	L	1063	0
066-214	DAM 1 066-214	D	38	35
066-214	DAM 2 066-214	D	8	0
066-214	DAM 3 066-214	D	0	0
066-214	DAM 4 066-214	D	4	60
066-214	LYNWOOD LAKE	L	571	0
066-214	NGAMBURNUP SWAMP	L	46	0
066-214	REINSCOURT FARM LAKES	L	1175	285
066-215	CAMBRAY POOL	R	1	
066-215	DAM 1 066-213	D		52
066-215	ELLIS POOL	R		
066-215	NANNUP NORTH-EAST SWAMP	L	14	0
066-215	NANNUP TOWN SWAMP	L	35	0
066-215	RUSHYS SWAMP	L	33	0
066-216	DAM 1 066-216	D		0
066-216	DAM 2 066-216	D		0
066-216	DAM 3 066-216	D		0
066-216	DAM 4 066-216	D		0
066-216	DAM 5 066-216	D		135
066-216	MARINUP POOL	R		2
066-216	QUONGUP POOL	R		0
066-216	SPRING GULLY SWAMP	L		0
066-217	DAM 1 066-217	D	5	20
066-217	DAM 2 066-217	D	18	2
066-217	DAM 3 066-217	D		2
066-217	DAM 4 066-217	D		7
066-217	DAM 5 066-217	D		38
066-217	MANDALUP POOL	R		23
066-217	WINNEJUP POOL	R	16	115
066-217	WOODSTOCK POOL	R	0	39
066-218	DAM 4 066-218	D	0	0
066-218	DAM 1 066-218	D		16
066-218	DAM 2 066-218	D		34
066-218	DAM 3 066-218	D		158
066-218	EULIN SOUTH LAKE	L	0	0
066-218	PENWORTHAM POOL	R	24	7
066-218	QUALEUP LAKES	L	0	0
066-218	TRIGWELL POOL	R	1	18
066-218	WILDHORSE SWAMP	L	221	946
066-219	CHANGERUP NORTH LAKE	L	188	1151

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
066-219	CHANGERUP POOL	R	8	90
066-219	DAM 1 066-219	D		0
066-219	DAM 2 066-219	D		0
066-219	DAM 3 066-219	D		0
066-219	DAM 4 066-219	D		88
066-219	DAM 5 066-219	D		56
066-219	FAIRFIELDS LAKES	L	27	0
066-219	MAYDALLING LAKES	L	250	0
066-219	MINNINUP POOLS (MURRIN BROOK)	R	2	0
066-219	RUSHY LAKE	L	85	0
066-220	CHERRY TREE POOL	R	0	0
066-220	CHADWICKS DAM 066-220	D	9	0
066-220	DAM 1 066-220	D	1	0
066-220	KANGAROO EAST DAM 066-220	D	18	2
066-220	WHITE GUM DAM 066-220	D	11	0
066-220	MARAGOONDA POOLS	R	11	0
066-220	NGOPITCHUP SWAMP	L	0	0
066-221	COYRECUP LAKE*	L	1122	8129
066-221	DAM 1 066-221	D	0	
066-221	DAM 3 066-221	D	3	0
066-221	DAM 2 066-221	D	23	0
066-221	DAM 4 066-221	D	9	0
066-221	DAM 5 066-221	D	32	0
066-221	EWLYAMARTUP LAKE*	L	126	1017
066-221	HOTKER-DOUGLAS WEST LAKE	L	151	0
066-221	MORLEY CREEK SWAMP	L	312	
066-221	PERINGILLUP POOLS	R		100
066-221	TWONKAWILLING POOL	R	47	17
066-222	CARALLEN NORTH-WEST SWAMP	L	117	16
066-222	DAM 1 066-222	D	0	
066-222	DAM 2 066-222	D	0	
066-222	DAM 3 066-222	D	14	
066-222	DAM 4 066-222	D	49	17
066-222	KWOBRUP EAST SWAMP	L	88	302
066-223	CARRAMAR LAKE	L		137
066-223	DAM 1 066-223	D		
066-223	DAM 2 066-223	D		
066-223	DAM 3 066-223	D		
066-223	WIGBORO NORTH SWAMP	L		10
066-223	WIGBORO SOUTH SWAMP	L		89
066-224	BISHOP WEST LAKE	L	304	
066-224	CAIRLOCUP WEST LAKE	L		
066-224	DAM 1 066-224	D	0	
066-224	DAM 2 066-224	D	0	
066-224	DAM 3 066-224	D	0	0
066-224	DAM 4 066-224	D	0	0
066-224	EL DORADO PARK SWAMP	L		55
066-224	MAGNER NORTH-EAST LAKE A	L	55	0
066-224	MAGNER NORTH-EAST LAKE B	L	92	29
066-224	ONGERUP ROAD SWAMP	L	15	11
066-224	YAALUP LAGOON	L	654	8
066-225	DAM 1 066-225	D	110	0
066-225	DAM 2 066-225	D		0

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
066-225	DAM 3 066-225	D		0
066-225	OLD JERRAMUNGUP POOL (GAIRDNER RIVER)	R	79	6
066-226	DAM 1 066-226	D	0	3
066-226	DAM 2 066-226	D		
066-226	FARAWAY LAKES	L		
066-227	DAM 1 066-227	D	0	0
066-227	DRUMMOND HILL LAKE EAST*	L	0	739
066-227	DRUMMOND HILL LAKE WEST*	L	0	0
066-228	CULHAM INLET*	E	1746	215
066-228	FOULDS DAM 066-228	D		150
066-228	HAMMERSLEY INLET*	E	169	79
066-228	PHILLIP RIVER (LOWER REACH)*	L	26	33
066-228	STEERE FORD SOUTH SWAMP	L		0
066-228	WITHAMS LAKE	L	60	266
066-229	DAM 1 066-229	D	3	0
066-229	DAM 2 066-229	D	46	0
066-229	DAM 3 066-229	D	30	0
066-229	DIAMOND NORTH-EAST SWAMP	L	1	0
066-229	DUNNS EAST SWAMP	L	6	4
066-229	HILLVIEW SOUTH LAKE	L		95
066-229	JERDACUTTUP RIVER (LOWER REACH)*	R	6	188
066-229	JERDERCUTTUP WEST LAKE*	L	724	1750
066-229	KUNDIP NORTH POOL (JERDACUTTUP RIVER)	R	3	9
066-229	MASON SOUTH LAKE A	L	1	
066-229	MASON SOUTH LAKE B	L	11	
066-230	COWERUP (SKI) LAKE	L	196	10
066-230	DAM 1 066-230	D	0	0
066-230	DAM 2 066-230	D	0	0
066-230	DAM 3 066-230	D	0	0
066-230	DAM 4 066-230	D	0	0
066-230	MIDDLE ROAD LAKE A	L	36	114
066-230	MIDDLE ROAD LAKE B	L	23	136
066-230	OLDFIELD (MUNGLINUP) ESTUARY*	E	4	31
066-230	PARRIUP CENTRAL LAKE*	L		1391
066-230	PARRIUP LAKE NORTH	L	3	43
066-230	LAKE SHASTER*	L	385	0
066-230	SPRINGBOARD POOL (OLDFIELD RIVER)	R	63	70
066-231	ALLORA LAKE	L		101
066-231	DAM 1 066-231	D		0
066-231	DAM 2 066-231	D		4
066-231	DAM 3 066-231	D		0
066-231	FUSS ROAD NATURE RESERVE SWAMP	L	75	0
066-231	NEDS CORNER - HIGHWAY LAKE	L	0	0
066-231	STOKES INLET*	E	40	1991
066-231	TORRADUP INLET*	E	44	70
066-231	TORRADUP NORTH LAKE*	L	82	258
066-232	BARKERS INLET*	E	0	0
066-232	COOMALBIDGUP SWAMP	L	47	59
066-232	DAM 1 066-232	D	0	0
066-232	DAM 2 066-232	D	0	0
066-232	DAM 3 066-232	D	0	0
066-232	LAKES GIDONG AND CARBUL*	L	267	316
066-232	HIGHWAY SOUTH POOL (LORT RIVER)	R	8	18

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
066-232	LAKE KUBITCH*	L	5000	0
066-232	LORT RIVER (LOWER REACH)*	R	0	25
066-232	QUAGI ROAD SWAMP	L	84	61
066-232	YOUNG RIVER (LOWER REACH)*	R	83	117
066-233	DAM 1 066-233	D	0	
066-233	DAM 2 066-233	D	9	
066-233	DAM 3 066-233	D	0	
066-233	DALYUP TC SWAMP	L	8	0
066-233	LAKE GORE*	L	3928	1876
066-233	GRAHAMS POOL (DALYUP WEST RIVER)	R	5	280
066-233	MAINBENUP WEST LAKE	L	295	495
066-233	MONJINUP LAKE	L	0	47
066-233	MORTIJINUP LAKE*	L	1225	2034
066-233	NAMBARUP WEST SWAMP	L	200	0
066-233	QUALLILUP LAKE AND SWAMPS*	L	435	396
066-234	BANNITUP LAKE*	L	948	0
066-234	DAM 1 066-234	D	0	0
066-234	HARLANDS DAM 066-234	D	34	0
066-234	MCKENZIES DAM 066-234	D	9	10
066-234	ESPERANCHO LAKE	L	56	199
066-234	MULLET LAKE*	L	1171	1204
066-234	PLOWMANS ROAD SOAK SWAMP	L	21	1
066-234	SHARK LAKE	L	12	145
066-234	LAKE WARDEN*	L	810	0
066-234	WHEATFIELD LAKE*	L	101	1790
066-234	WOODY LAKE*	L	34	228
066-235	BOYATUP SOUTH-EAST SWAMP	L	10	1
066-235	BOYATUP WEST SWAMP	L	6	0
066-235	COOLINUP SWAMP	L	83	13
066-235	DAM 1 066-235	D	0	0
066-235	DAM 2 066-235	D	0	0
066-235	DAM 3 066-235	D		
066-235	FISHERIES - OVENS SWAMP	L	0	0
066-235	FISHERIES - RANCHO LAKE	L	58	0
066-235	RANCHO SOUTH SWAMP	L	34	33
066-236	DAM 1 066-236	D	0	0
066-236	DAM 2 066-236	D	0	0
066-236	DAM 3 066-236	D	0	0
066-236	DANIELS - MERIVALE SWAMP	L	0	0
066-236	HOWICK LAKE	L	7	0
066-237	BOOLENUP LAKE	L	45	
066-237	MORTUP (EWARTS) LAKE	L	41	18
067-213	DAM 1 066-213	D	4	34
067-213	DAM 2 066-213	D	7	0
067-213	DAM 3 066-213	D	7	
067-213	DAM 4 066-213	D	57	0
067-213	DAM 5 066-213	D	0	0
067-213	DAM 6 067-213	D		50
067-213	HARDY INLET*	E	78	169
067-214	BLACKWOOD RIVER (LOWER REACH)*	R	114	2
067-214	SCHROEDER POOL	R	0	0
067-214	SCOTT RIVER (LOWER REACH)*	R	20	3
067-214	SWAN LAKE AND DEADWATER*	L	0	31

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
067-215	LINDSAYS DAM 067-215	D		0
067-215	DON SWAMP	L	20	0
067-215	FOUR - BLACK SWAMP	L	19	0
067-215	JALBARAGUP POOL	R	54	0
067-215	JALBARAGUP SWAMP	L	294	275
067-215	PEPPERMINT FLAT POOL	R	0	0
067-216	DAM 1 067-216	D	18	0
067-216	DAM 2 067-216	D	22	0
067-216	DAM 3 067-216	D	19	0
067-216	DAM 4 067-216	D	0	25
067-216	DAM 5 067-216	D		6
067-216	DAM 6 067-216	D		7
067-216	DAM 7 067-216	D		83
067-216	WILGARUP SWAMP	L	138	168
067-216	YORNUP WEST LAKES	L	60	0
067-217	CODARUP LAKES	L	72	93
067-217	CORBALUP SWAMP	L	20	
067-217	DAM 1 067-217	D	86	103
067-217	DAM 2 067-217	D	0	
067-217	DAM 3 067-217	D	0	11
067-217	DAM 4 067-217	D	0	0
067-217	DAM 5 067-217	D	28	
067-217	DAM 6 067-217	D	10	
067-217	DAM 7 067-217	D	1	
067-217	KEPALARUP LAKE	L	30	10
067-217	YACKERLUP SWAMP	L	4	
067-218	CAUSEWAY DAM 067-218	D	87	
067-218	COOTAYERUP DAM 067-218	D	22	
067-218	DAM 1 067-218	D	88	21
067-218	DAM 2 067-218	D	16	13
067-218	DAM 3 067-218	D	29	7
067-218	MINNINUP DAM 067-218	D	39	
067-218	MOORINUP LAKE	L		
067-218	MULLIDUP POOL	R	2	
067-218	TOLKERLUP WEST SWAMP	L		0
067-219	DAM 1 067-219	D	58	24
067-219	DAM 2 067-219	D	7	4
067-219	DAM 3 067-219	D	57	12
067-219	DAM 4 067-219	D	3	8
067-219	DAM 5 067-219	D	0	0
067-219	MANGELUP SWAMP	L	47	35
067-219	MONGETUP POOL	R	13	10
067-219	TAMBALLUP POOL	R	26	38
067-219	UPPER YERIMINUP POOL	R	49	122
067-219	WAUDELILLUP SWAMP	L	15	77
067-220	BOYACUP POOL	R	9	6
067-220	CAMPUP POOL	R	69	69
067-220	DAM 1 067-220	D	4	0
067-220	DAM 2 067-220	D	0	0
067-220	DAM 3 067-220	D	0	0
067-220	DAM 4 067-220	D	4	3
067-220	DAM 5 067-220	D	2	4
067-220	GORDON-SHAMROCK LAKE	L	37	207

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
067-220	LUSCOMBE LAKE	L	9	283
067-220	OLD TERLINGA POOL (GORDON RIVER)	R	17	36
067-220	TERLINGA WEST SWAMP	L	620	520
067-221	BOORAKUP NORTH LAKE	L		0
067-221	DAM 1 067-221	D		0
067-221	DAM 2 067-221	D		2
067-221	DAM 3 067-221	D		0
067-221	KYLOBUNUP POOL	R		30
067-221	MADJENAPURDAP LAGOONS	L		230
067-221	NEWTON SOUTH LAKE	L		136
067-221	RACECOURSE LAKE	L		760
067-221	TOM SOUTH LAKE	L		1755
067-221	WATERGARRUP POOL	R		12
067-222	LAKE ANDERSON	L	21	0
067-222	CHEEPANUP LAKE	L	192	822
067-222	DAM 1 067-222	D	3	0
067-222	DAM 2 067-222	D	0	0
067-222	DAM 4 067-222	D	7	154
067-222	ILLALONE NORTH LAKE	L	26	18
067-222	KYBELUP POOL	R	89	36
067-222	MABINUP SALT LAKE	L	7	0
067-222	NORTH STIRLING ROAD LAKE	L	10	219
067-222	OLIVERS WEST LAKE	L		643
067-222	YETEMERUP DAM LAKE	L		51
067-223	BLUE HILLS POOL	R		31
067-223	DAM 1 067-223	D		
067-223	DAM 2 067-223	D		
067-223	DAM 3 067-223	D		
067-223	MAILEEUP SOUTH POOL	R		
067-223	OMEEHANS POOL	R		
067-223	QUORBANDAMOONGERUP POOL	R		
067-223	SANDLEWOOD POOL	R		0
067-223	YARDUP NORTH POOL	R		
067-224	BOX-ONG POOL	R	0	
067-224	CAUSEWAY POOL	R	0	0
067-224	DAM 16 067-224 (NORMANS ROAD)	D	0	
067-224	DAM 17 067-224 (NORMANS ROAD)	D	0	
067-224	DAM 18 067-224 (SHEARERS ROAD)	D	6	16
067-224	DAM 19 067-224 (SHEARERS ROAD)	D	0	0
067-225	ARALINGA NORTH-EAST SWAMP*	L	8	0
067-225	AVOCA SWAMP	L	39	51
067-225	DAM 1 067-225	D	0	0
067-225	DAM 2 067-225	D	0	0
067-225	DAM 3 067-225	D	1	0
067-225	DAM 4 067-225*	D	0	12
067-225	DAM 5 067-225*	D	0	0
067-225	MINVALARA LAKE	L	82	51
067-225	YELLILUP SWAMP*	L	76	34
067-226	DAM 1 067-226	D	7	0
067-226	DAM 2 067-226	D	6	81
067-226	GORDON INLET*	E	610	437
067-226	MANDETTA POOL	R	7	10
067-226	MANDETTA SW SWAMP	L	19	4

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
067-226	MARLAMERUP POOL	R	2	8
067-227	CHARLES BAY INLET*	E	70	0
067-227	DEMPSTER INLET*	E	388	0
067-227	FITZGERALD INLET*	E	31	0
067-227	FITZGERALD RIVER (LOWER REACH)*	R	400	28
067-227	MARY RIVER ESTUARY*	E	12	3
068-215	DONNELLY RIVER ESTUARY*	R	11	15
068-215	LAKE JASPER*	L	43	3
068-215	LAKE QUITJUP (QUILLALJUP)*	L	6	0
068-215	LAKE SMITH*	L	0	0
068-215	LAKE WILSON*	L	0	0
068-216	DAM 1 068-216	D	2	16
068-216	DAM 2 068-216	D	11	187
068-216	DAM 3 068-216	D	50	123
068-216	DAM 4 068-216	D	37	17
068-216	DAM 5 068-216	D	29	8
068-216	DAM 6 068-216	D	3	206
068-216	NORTHCLIFFE SOUTH POND	L	10	0
068-216	YEAGARUP LAKE	L	0	0
068-217	BOONWINUP POOL	R	7	9
068-217	CHURBICUP SWAMP	L	58	37
068-217	CUTTING POOL	R	0	
068-217	DAM 1 068-217	D	2	34
068-217	DAM 2 068-217	D	2	0
068-217	DAM 3 068-217	D	1	4
068-217	DAM 4 068-217	D	50	0
068-217	UNBAP POOL	R	0	0
068-218	BYENUP LAGOON*	L	376	318
068-218	LITTLE UNICUP LAKE	L	1	0
068-218	LAKE MUIR*	L	4302	51613
068-218	TORDIT-GARRUP LAGOON*	L	267	1467
068-218	UNICUP LAKE	L	1	0
068-218	UNICUP SOUTH SWAMP	L	4	9
068-219	BANGALUP POOL	R	3	
068-219	BLACK WATTLE SWAMP	L	19	123
068-219	WEST VINEYARD DAM 068-219	D	0	0
068-219	HIGGINS DAM 068-219	D	70	24
068-219	MARRIOTS DAM 068-219	D	163	2
068-219	ROCKS PADDOCK DAM 068-219	D	8	6
068-219	TANK PADDOCK DAM 068-219	D	5	14
068-219	NETLEY - NARDARUP LAKE	L	26	44
068-219	TOOTANELLUP LAGOON	L	25	8
068-219	YARNUP LAGOON	L	1	
068-220	BIG POORRARECUP LAGOON	L	0	58
068-220	CARABUNDUP LAKE	L	205	14
068-220	DAM 1 068-220	D	0	0
068-220	DAM 2 068-220	D	0	19
068-220	DAM 3 068-220	D	0	0
068-220	DAM 4 068-220	D	9	24
068-220	KATHERINE LAKE	L	46	57
068-220	KWORNICUP LAKE	L	35	372
068-220	MURDELLUP LAGOON	L	9	75
068-220	NUNIUP LAKE	L	19	30

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
068-220	ORONGORUP NORTH SWAMP	L	272	192
068-221	DAM 1 068-221	D		
068-221	DAM 2 068-221	D	0	
068-221	DAM 3 068-221	D	0	
068-221	DAM 4 068-221	D		0
068-221	DAM 5 068-221	D		0
068-221	MARTAGALLUP LAKE	L	131	60
068-221	LAKE MATILDA	L	58	
068-221	MEENULUP WEST SWAMP	L	0	7
068-221	MOORILURRUP LAKE	L	21	23
068-221	ROUND SWAMP	L		138
068-221	SHELDERTON - STIRLINGS SWAMP	L	29	
068-222	CHILLINUP WEST LAKE	L		1
068-222	DAM 1 068-222	D		1
068-222	DAM 2 068-222	D		44
068-222	DAM 3 068-222	D		2
068-222	DAM 4 068-222	D		0
068-222	KAMBALLUP POOL	R		51
068-222	TAKALARUP POOL	R		
068-222	WOODLANDS NORTH LAKE	L		6
068-223	DAM 1 068-223	D	0	
068-223	DAM 2 068-223*	D	8	0
068-223	DAM 3 068-223*	D	0	0
068-223	DAM 4 068-223*	D	0	0
068-223	GNOWANGERUP 26264 SOUTH LAKE*	L	116	600
068-223	GNOWELLEN WEST SWAMP	L	16	
068-223	KOJANEERUP SWAMP*	L	11	0
068-223	KORUP SWAMP	L	66	
068-223	QUARDERWARUP LAKE*	L	7	0
068-223	TWO MILE LAKE*	L	0	0
068-223	TWO MILE WEST LAKE*	L	352	0
068-224	CHILLINUP POOL (PALLINUP RIVER)*	R	18	63
068-224	DAM 1 068-224	D	3	0
068-224	DAM 2 068-224*	D	0	20
068-224	DAM 3 068-224*	D	0	28
068-224	DAM 4 068-224*	D	0	26
068-224	DAM 5 068-224*	D	0	3
068-224	JUNCTION POOL (PALLINUP RIVER)*	R	1	2
068-224	MARRA POOL (PALLINUP RIVER)*	R	5	3
068-224	METTLER LAKE	L		8
068-224	PALLINUP RIVER (LOWER REACHES)*	R		71
068-224	YUNGUNUP POOL (PALLINUP RIVER)*	R	0	0
068-225	BEAUFORT INLET*	E	562	1255
068-225	COROMANDEL SOUTH LAKE*	L	51	0
068-225	DAM 1 068-225	D	0	0
068-225	DAM 2 068-225	D	0	0
068-225	LAKE HILLIUP*	L	0	9
068-225	JENNELLA EAST LAKE	L	43	11
068-225	JENNELLA NORTH LAKE	L	79	0
068-225	PARNAROO EAST SWAMP	L	14	10
068-225	TOOCALUP SWAMP	L		15
068-226	CARDIMINUP LAKE	L	132	38
068-226	DAM 3 068-226	D	0	0

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
068-226	DAM 1 068-225	D	0	0
068-226	DAM 2 068-225	D	0	0
068-226	GNORNBUP SWAMP	L		5
068-226	GRAVEL PIT LAKE	L	21	28
068-226	HUNTER RIVER INLET*	E		5
068-226	LAKE TORRUP (OCUMUP)*	L	0	25
068-226	TOZER SOUTH-WEST LAKE	L	9	73
068-226	WARRAMURRUP NORTH SWAMPS	L	17	12
068-226	WELLSTEAD ESTUARY*	E	3	20
069-216	CHALIGARUP LAKE	L	0	0
069-216	DAM 1 069-216	D	7	20
069-216	DAM 2 069-216	D	2	12
069-216	FLORENCE LAKE	L	5	0
069-216	SAMUEL LAKE	L	0	0
069-217	BROKE INLET*	E	1018	1239
069-217	LAKE MARINGUP*	L	31	16
069-218	DAM 1 069-218	D		3
069-218	DAM 2 069-218	D		10
069-218	DAM 3 069-218	D		6
069-218	HAZELVALE POOL	R		0
069-219	BREAK POOL	R	4	0
069-219	DAM 1 069-219	D	12	10
069-219	DAM 2 069-219	D	0	
069-219	DAM 3 069-219	D	0	1
069-219	DAM 4 069-219	D	4	22
069-219	IRWIN INLET*	E	729	278
069-219	NILE POOL	R	0	0
069-219	OWINGUP SWAMP*	L	365	150
069-219	SURPRISE LAKE*	L	0	0
069-219	UPPER BOW SWAMP	L		
069-220	BLUE LAKE	L	2	
069-220	BRYN AVON POOL	R	2	
069-220	DAM 1 069-220	D	3	
069-220	DAM 2 069-220	D	15	22
069-220	DAM 3 069-220	D	30	
069-220	DAM 4 069-220	D		28
069-220	DAM 5 069-220	D		13
069-220	DENMARK RIVER (LOWER REACH)	R	0	
069-220	RAINTREE LAKE	L	0	
069-220	WILSON INLET (INCL. EASTERN LAGOON)*	E	658	604
069-221	BAXTER SWAMP	L	84	77
069-221	CHORKERUP WEST LAKE	L	26	0
069-221	DAM 1 069-221	D		0
069-221	DAM 2 069-221	D		0
069-221	DAM 3 069-221	D		0
069-221	DAM 4 069-221	D		0
069-221	DAM 5 069-221	D		15
069-221	EYRIE LAKE	L	194	434
069-221	NYANDYEETUP LAKE	L	383	12
069-221	TOWNSEND SWAMP	L	0	332
069-221	YANNERLIP SWAMP	L	131	0
069-222	BENNETT - TAKENUP SWAMP	L		148
069-222	CORIMUP LAKE	L	8	12

Appendix 1 (*continued*)

Block	Wetland Name	Type	Nov Count	March Count
069-222	DAM 3 069-222	D	14	53
069-222	DAM 1 069-222	D		84
069-222	DAM 2 069-222	D		69
069-222	FISH TRACK LAKE	L	2	
069-222	GARDNER LAKE	L	72	41
069-222	KALGAN RIVER (LOWER REACH)	R		109
069-222	OYSTER HARBOUR*	E	151	1006
069-222	TEN MILE SWAMP	L	31	30
069-222	YAKAMIA SWAMP	L		164
069-222	YELLANUP LAKE	L		341
069-223	BUNDILLA SWAMP	L	4	3
069-223	DAM 1 069-223	D	33	0
069-223	DAM 2 069-223	D	0	0
069-223	DAM 3 069-223	D	0	7
069-223	KYEWONG SW SWAMP	L	1	14
069-223	MULLOCULLOP LAKES	L	13	20
069-223	NEWLANDS NORTH-EAST SWAMP	L	113	3
069-223	NEWLANDS SWAMP	L	2	6
069-223	LAKE PLEASANT VIEW	L		55
070-218	FRANKLAND RIVER (LOWER REACH)*	R	6	5
070-218	NORNALUP INLET*	E	12	18
070-219	BOAT HARBOUR LAKE	L	40	275
070-219	FICIFOLIA ROAD SWAMP	L	2	0
070-219	PARRY INLET*	E	61	399
070-220	NENAMUP SWAMP	L	522	59
070-220	SAIDE LAKE	L	4	118
070-221	DAM 1 070-221	D		4
070-221	DAM 2 070-221	D		
070-221	GRASMERE (LAKE POWELL)*	L	596	193
070-221	TORBAY LAKE AND DRAIN*	L	113	95
070-221	TORBAY INLET*	R		23
070-222	ALBANY PORT WETLAND (LOCKYER BAY)	E		104
070-222	SEPPINGS LAKE	L		66

Appendix 2

The number of wetlands in which each native species occurred (N) and the three wetlands supporting the highest number of each species in November 1988 and March 1989. Regions and wetland types are given below the main body of the table. Privately-owned wetlands are marked with an asterisk.

Species	N	1	2	3
November 1988				
Black Swan	213	Vasse-Wonnerup Estuary 2855	Leschenault Inlet 978	Lake Clifton 711
Freckled Duck	7	Yaalup Lagoon 53	Reinscourt Farm Lakes 2	Lake Wannamal 2
Australian Shelduck	319	Lake Preston 8965	Lake Dumbleyung 7357	Lake Kubitch 5000
Pacific Black Duck	386	Vasse-Wonnerup Estuary 2340	Irwin Inlet 626	Leschenault Inlet 458
Grey Teal	425	Vasse-Wonnerup Estuary 1546	Peel-Harvey Estuary 1429	Black Lakes 915
Chestnut Teal	39	Gordon Inlet 149	Hammersley Inlet 110	Old Jerramungup Pool 56
Australasian Shoveler	49	Lake Mortijinup 112	Yaalup Lagoon 43	Reinscourt Farm Lakes 22
Pink-eared Duck	92	Lake Coyrecup 183	Willoughby Swamp B 112	Ringamere Lake 100
Hardhead	69	Namming Lake 162	Benger Swamp 146	Chittering Lake 77
Maned Duck	284	Reinscourt Farm Lakes 919	Emu-Ballajura Lakes 400	Orongorup North Swamp 227
Blue-billed Duck	50	Mongers Lake 50	Lake Nowergup 45	Thomsons Lake 41
Musk Duck	126	Lake Clifton 92	Lake Joondalup 36	Mullet Lake 36
Eurasian Coot	238	Lake Guraga 1200	Lake Forrestdale 1156	Chittering Lake 284
March 1989				
Black Swan	187	Lake Muir 3837	Lake Guraga 2900	Wilson Inlet 1035
Freckled Duck	12	Barrett-Lennard 43	Football Lake 6	Lake Coyrecup 5
Australian Shelduck	346	Lake Eganu 4050	Lake Muir 3443	Flagstaff Lake 1950
Pacific Black Duck	413	Lake Muir 18450	Lake Cooloongup 7000	Lake Bullingarra 3450
Grey Teal	358	Lake Dumbleyung 16850	Lake Muir 16002	Peel-Harvey Estuary 9170
Chestnust Teal	56	Stokes Inlet 872	Lake Jerdacuttup 266	Beaufort Inlet 251
Australasian Shoveler	93	Lake Forrestdale 960	Parriup Central 400	Wheatfield Lake 370
Pink-eared Duck	97	Lake Dumbleyung 8280	Bokaring Yate Swamp 1500	Lake Coyrecup 1000
Hardhead	51	Tordit-garrup Lgn 550	Lake Logue 160	Namming Lake 155
Maned Duck	212	Emu-Ballajura 526	Waneragup Lake 400	Lake McLarty 308
Blue-billed Duck	39	Lake Yangebup 388	Mongers Lake 260	Thomsons Lake 220
Musk Duck	131	Lake Preston 435	Mongers Lake 250	Lake Clifton 181
Eurasian Coot	222	Lake Muir 9628	Lake Dumbleyung 5780	Lake Forrestdale 4535

Appendix 2 (*continued*)

NOTE		
*Barrett-Lennard Lake	Gingin	L[(a)]
Benger Swamp	Bunbury	L
*Beaufort Inlet	Bremer	E
Black Lakes	Bunbury	R
*Bokaring Yate Swamp	Wagin	L
Chittering Lake	Gingin	L
Emu-Ballajura Lakes	Gingin	L
Flagstaff Lake	Wagin	L
*Football Lake	Gingin	L
Gordon Inlet	Bremer	E
Hammersley Inlet	Bremer	E
Irwin Inlet	Walpole	E
Jerdacuttup Lake	Esperance	L
*Lake Bullingara	Gingin	L
Lake Clifton	Bunbury	L
Lake Cooloongup	Gingin	L
Lake Coyrecup	Wagin	L
Lake Dumbleyung	Wagin	L
Lake Eganu	Moora	L
Lake Forrestdale	Gingin	L
Lake Guraga	Gingin	L
Lake Joondalup	Gingin	L
*Lake Kubitch	Esperance	L
Lake Logue	Geraldton	L
*Lake McLarty	Bunbury	L
*Lake Mortijinup	Esperance	L
Lake Muir	Frankland	L
*Lake Nowergup	Gingin	L
Lake Preston	Bunbury	L
Lake Wannamal	Gingin	L
Lake Yangebup	Gingin	L
Leschenault Inlet	Bunbury	E
Mongers Lake	Gingin	L
*Namming Lake	Gingin	L
*Old Jerramungup Pool (Gairdner R.)	Bremer	R
*Orongorup North Swamp	Frankland	L
Parriup Central Lake	Esperance	L
Peel-Harvey Estuary	Bunbury	E
*Reinscourt Farm Lakes	Bunbury	L
*Ringamere Lake	Magenta	L
Stokes Inlet	Esperance	E
Thomsons Lake	Gingin	L
Tordit-garrup Lagoon	Frankland	L
Vasse-Wonnerup Estuary	Bunbury	E
*Waneragup Lake	Bunbury	L
Wheatfield Lake	Esperance	L
*Willoughby Swamp B	Magenta	L
Wilson Inlet	Walpole	E

[(a)]Wetland types: E = estuary, L = lake, R = river