A Survey of THE BIRDS OF HERDSMAN LAKE 1980-81

by Peter Curry

Royal Australasian Ornithologists Union
21 Gladstone Street
Moonee Ponds, Victoria 3039
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A Survey of

THE BIRDS OF HERDSMAN LAKE

1980-81

ERRATA

p. 10	l. 18	Australian should read	Australasian
p. 20	l. 1	nycticorax	caledonicus
p. 25	l. 19	ruficollis	ruficapillus
p. 31	l. 6	Magp	Magpie

Cover: Little Bittern drawn by Peter Curry.

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Aerial Photography 7/6/80
by Dept. of Lands & Survey

HERDSMAN LAKE AND ENVIRONS

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INTRODUCTION

Objectives

This report results from a monitoring programme commissioned by the Department of Conservation and Environment from the Royal Australasian Ornithologists Union. The programme was based on a monthly survey of birdlife at Herdsman Lake and had the following broad objectives:

- To identify the birds which occurred in the wetland habitats of the Herdsman basin within the boundaries constituted by stands of ***Eucalyptus rudis*** or housing/industrial areas.
- To provide qualitative statements about waterbirds' usage of the various habitats identifiable within the Herdsman basin.
- To provide quantitative information on the waterbird populations which used areas of open water and waterside margins created during residential development in the south-western sector.
- Where other counts or estimates could reasonably be made, to provide quantitative information on waterbird populations present elsewhere in the Herdsman basin. This follows monthly field surveys and supplementary inspections carried out between May 1980 and April 1981.

Background Information

Published references to the birdlife of Herdsman Lake include Serventy (1948)[8], MRPA (1976)[6], Conservation Council of W.A. (1980)[4], and Bekle (in press)[2]. A useful review of other historical aspects of the lake's use is contained in Southern and Teakle (1937)[10].

CONCLUSIONS AND RECOMMENDATIONS

Existing Habitat Components

A total of 81 bird species was found at Herdsman Lake during the study period. Of these, 20 species are known to have bred there and at least 10 others may have done so. Herdsman Lake contains an unusual juxtaposition of habitats, all of which bear evidence of past or present modification by people who have made use of the area for a variety of reasons.

Existing drainage schemes and management practices, in particular the autumn burning of bulrush ***Typha orientalis*** thickets, have tended to encourage the spread of dense bulrushes. Bulrush stands regenerating after fire support a depauperate bird fauna compared with nearby areas which have escaped burning for a year or more and remain broken up by intervening patches of bulrush-free lakebed.

There are no species of birds, either breeding or otherwise using Herdsman, which are dependent upon large tracts of dense, annually burnt bulrushes for their continued survival.

Areas of paperbarks that remain are remnant stands of a once continuous zone of vegetation. They are subject to degradation and in need of careful management if they are to retain much value as refuges or nesting areas for waterbirds.

Other peripheral areas of the higher level are used opportunistically by a variety of waterfowl and marshbirds which sometimes feed there in large numbers.

The system of drains maintained by the Metropolitan Water Supply, Sewerage and Drainage Board is also used opportunistically by a wide variety of wetland species, though none is particularly linked with these drainage courses.

The diversity of wetland birds using the Herdsman lakebed could be improved by:

- protecting existing stands of paperbarks and bulrushes from fire;
- the planting of paperbarks and perhaps other appropriate swamp-adapted trees;
- construction of small slightly elevated islets with artificial nesting sites for wildfowl and other marsh birds, sited in inaccessible locations;
- provision of shallow gradients around islets to favour the specialized feeding requirements of scarcer migrant waders and ralline marsh birds.

Comparison of Herdsman Lake Bird Populations with those of Neighbouring Wetlands

By virtue of its exceptionally extensive areas of bulrush thickets and shallow meres, Herdsman is a major breeding station for wildfowl (particularly Black Swans), the south-western race of the Purple Swamphen, Clamorous Reed Warblers and Little Grassbirds. It is also one of the few south-western localities at which the Little Bittern continues to breed.

Contrary to previous claims, the locality is of no special importance to Black-winged Stilts, which breed in small numbers at several other sites in and around Perth.

Though the areas of open swamp within Herdsman are small, they support transient populations of Australian marshbirds, such as Great Egrets and Sacred Ibis.

While undergoing an annual summer drying, these limited areas also support a surprising diversity of migratory waders from the northern hemisphere. Herdsman ranks with Lakes Forrestdale, Thompson and Yangebup as one of the few wetlands in Australia known to be visited by parties of Long-toed Stints. The continued survival of this rare and little-known migrant from Siberia depends upon the successful conservation of open shallow margins around freshwater wetlands in the south-west. Due to its lack of permanent water in summer, Herdsman has been considered to be of less importance than its deeper neighbours (e.g. Lake Monger, Lake Claremont) as a resource area for non-breeding wildfowl. Recent creation of a lagoon of permanent water through dredge-and-fill operations has provided new opportunities for non-breeding wildfowl to obtain food and refuge at Herdsman during the dry months.

Despite Bekle (1980)[1] and Newman (1976)[7], up-to-date information on the bird populations of other wetlands on the Swan Coastal Plain is, in most cases, inadequate for useful comparisons to be drawn between Herdsman's waterbird populations and those of other metropolitan lakes. What can be said with certainty is that the diversity of wetland bird species presently occurring at Herdsman is not known to be surpassed by any other body of freshwater in the south-west. In the present

12 month study, 47% more species of waterbirds were located at Herdsman than within the entire Cockburn Lake System surveyed by Newman over a 13 month period.

Impact of Floreat Waters Estate Housing Development on Wetland Birds

There is no evidence to suggest that developments to April 1981 endanger the continued survival of any species found at Herdsman.

Dredging excavations have removed bulrush thickets which grew in the south-western sector. Destruction of this type of habitat is likely to reduce breeding populations of Purple Swamphens, Clamorous Reed Warblers and Little Grassbirds by at least 2-3 pairs each for every hectare of thickets lost.

Other less numerous species of crakes, rails and wildfowl which breed at Herdsman will also experience losses in proportion to the amount of bulrush habitat which is removed.

In place of these losses, the developments have created three types of habitat: permanent, open water; open margins; waterfront lawns. Already, these have been used extensively by birds, of which about ten species recorded at Floreat Waters in a year's study were either previously unknown at Herdsman or had not been seen there for many years. Thus the habitat modifications have had a diversifying influence on the waterbird fauna of Herdsman as a whole.

Of the three types of habitat given above the most valuable has been the open margins of peat and mud which border the Floreat Waters lagoon. The creation of permanent open water has produced a valuable diversification of the habitats available within Herdsman, though waterbirds have not used the deepest section of the lagoon to a great extent. On average, as many species of waterfowl used the new lagoon as they did the whole of Lake Monger during the year although total numbers of wildfowl on the lagoon averaged only 23% of those on Lake Monger, (Table 1).

The new lawns proved to be a valuable upward extension of the shallow waterside margins used by so many waterbirds.

Recommendations for the Conservation of Habitats Modified by Dredge and Fill

- Such operations should be carried out only within the planning framework set down by the M.R.P.A. Concept Plan (1976).
- Some sections of the margins which border newly-created open water should be landscaped specifically as habitats for migrant wading birds. Of this group of birds, the species which occur most commonly at Herdsman are those characteristic of freshwater habitats very scarce elsewhere. These birds are necessarily nomadic within W.A. In ratifying the Australia-Japan migratory birds treaty the Australian Government has recently pledged its support for the preservation of such international species which depend on Australian watersides as resource areas throughout the non-breeding period of their lives.

  Herdsman is potentially a most valuable feeding area for these birds. By virtue of its general shallowness and rapid drainage during early summer it is the earliest of the metropolitan lakes to provide the receding margins used by waders. Such conditions exist at Herdsman in spring and early summer, when they do not elsewhere on the Swan Coastal Plain.

  The best possible habitats for such birds would consist of open, peaty margins with gradients no greater than 1 in 100, bordering water of a continuing high quality.
  Domestic dogs have already begun to take a toll on the Black Swans and other wildfowl at Floreat Waters lagoon. Because recreational activities around the lake seem certain to increase markedly in the near future, some areas should have their access restricted if detrimental affects on Herdsman's bird life are to be avoided. This could be done by constructing inter-connecting open channels around inner, fire-protected thickets, meres and islets. If shallow-sloping margins were constructed on the inner sides of deep-water lagoons left by dredge-and-fill, this could compensate for the disturbance that unrestricted public access will bring to the outer watersides.
- Water quality should be monitored continuously, paying particular attention to the flux of nutrients and pollutants and to the nature of the water bodies which fill the deepest

excavations. Some areas, ideally islets adjacent to newly created open water, should be replanted with paperbarks and native sedges. Such young thickets would need to be protected from fire for several years.

- The construction of sandbars adjacent to a grassed waterfront attracts Silver Gulls to the detriment of other species and is not recommended.
- Being centrally located, Herdsman has enormous potential as an area for public recreation, environmental education and more penetrating studies of birdlife and wetland support systems. Priority should be given to the closest possible integration of ongoing development projects with the establishment of a permanent nature study centre at Herdsman. The impressive scheme announced on 31 July 1981 by the World Wildlife Fund Australia is fully justified, both in terms of the rich wetland fauna extant at Herdsman and the potential it has for realizing public enjoyment and learning in a rare setting.

SURVEY METHODS

Floreat Waters Lagoon and Surroundings

Since April 1979, the lagoon at Floreat Waters estate in the south-western sector has been created through the excavation of peat and sand by means of underwater dredging. The area was formerly part of the shallow, bulrush-dominated lakebed. Dredge-and-fill operations took place throughout the study period, as did the re-shaping of waterside margins within the area.

Monthly counts were made of birds present on and around the lagoon. Counts were made from the western shoreline during early to mid-afternoon, when viewing conditions were at their best for a full count of the entire area. Figures were compiled working from north to south by scanning and re-scanning every part of the area. Supplementary winter and autumn counts of Purple Swamphens were made around sunset, when flocks emerged from the bulrush thickets to feed on the open margins. Estimates of Tree Martins and Silver Gulls flying to roost were also made at dusk.

Survey of the Bulrush Zone by Transect Studies

At least 260 ha (over 80%) of the study area was dominated by stands of ***Typha orientalis***, the native bulrush (see Briggs & Johnson, 1968[3]; Smith, 1980)[9]. Therefore some prominence was given to a survey of this difficult habitat. In many areas of the lakebed, the stands of bulrushes were more or less broken up by rush-free areas subject to annual flooding. Such areas are referred to herein as *meres*.

To sample the birds of this major habitat, a one km line transect was marked out across an area in the central southern sector in July 1980. The transect was marked out as a straight west-to-east line across a low-lying part of the lakebed (6.3 m contour) and then onto higher levels to the eucalypt zone (approximately 8.0 m contour). The line was marked with numbered pegs at 50 m intervals. Surveys were carried out during the four months August to November, by which time several of the bulrush thickets through which the transect passed were so dense that a cut line was required to enable an observer to wade through. The transect was abandoned in December, when it was evident that observation time would be better spent away from the mature thickets. Line counts were made by noting all birds seen and heard during a mid-morning walk of 30 minutes to one hour's duration, from west to east. Searches for nests were made along a zone extending 5 m either side of the transect line. By October, systematic searches for nests were abandoned, because they could not be undertaken in the time allowed or without destroying parts of the impenetrable thickets which grew up during spring.

Territorial Mapping as a Technique for Estimating Populations of Clamorous Reed Warblers and Little Grassbirds.

A method based on that recommended by the International Bird Census Committee (1969)[5] was used, with one major difference brought about by the nature of the habitat. It was not possible to set out a grid system of ground areas which could be seen by an observer working in such dense vegetation. Thus, the location of birds seen or heard had to be estimated relative to their positions along a line of marker pegs. Contemporaneous contacts with two or more birds of the same species were recorded in the normal way, though for the Little Grassbird some doubts arose as to what

extent the simple song is delivered by both sexes.

Preliminary estimates of the number of territories per unit area (see page 29) were based on a boundary 25 m on either side of the line transect to represent the average distance from which song could be heard. This distance probably over-compensates for the low audibility of birds singing in dense thickets but under-estimates audibility of song travelling downwind across open water.

Other Areas

Observations and direct counts were made on an *ad hoc* basis on and around:

- open drains
- banks of drains
- land under pasture and cultivation
- stand of paperbarks ***Melaleuca rhaphiophylla***.

BIRD USAGE OF HERDSMAN'S COMPONENT HABITATS

Habitat Categories

The components listed here are readily identifiable on the basis of vegetation type and/or hydrological features.

1. Thickets of paperbarks ***Melaleuca rhaphiophylla.***
2. Pasture and cultivated areas.
3. Open drains.
4. Banks of drains.
5. Thickets of bulrushes ***Typha orientalis.***
6. Meres (***Typha***-free areas between thickets).
7. Aerial (airspace above vegetation).
8. Floreat Waters lagoon.
9. Floreat Waters shoreline.
10. Floreat Waters lawns.

Use of Individual Habitats

Thickets of ***Melaleuca rhaphiophylla*** — Bird Species: 9

Stands of mature trees in the north-western and north-eastern sectors harboured low numbers of six species of songbirds which

used the paperbarks as the lower limit of surrounding eucalyptus habitat. Few waterbirds were found using paperbarks: Sacred Ibis and Rufous Night Heron roosted in the tallest foliage; Little Pied Cormorants may have nested in them. Stands showed evidence of degradation through burning, weed infestation, grazing and felling.

Pasture and Cultivated Areas — Bird Species: 11

The early winter flooding of the market garden cultivations and grazing areas in north-west and northern sectors attracted surface feeding wildfowl, most notably gatherings of Black Swans. The swans used these areas for feeding and also for display and courtship. Patches of floodwater which remained in spring grew algae profusely and were abandoned by wading birds, mainly Sacred Ibis and Black-fronted Plovers, which fed there in winter. Richard's Pipits held territories and probably bred in all suitable open areas. A small population of introduced Chestnut-breasted Mannikins continued to appear around areas overgrown with weeds which flourish between the cultivated areas and the bulrush zone.

Open Drains — Bird Species: 13

Current management practices maintain the drains as steeply banked open watercourses. Waterbirds used the drains for daytime roosting, display and, to some extent, for feeding. When shallow enough to allow long-legged wading birds to stand in them, Greenshank and Great Egret hunted along them. Prior to the development of Floreat Waters lagoon these drains provided the only permanent open water in Herdsman.

Banks of Drains — Bird Species: 11

The verges were used as feeding areas by Australian Shelduck, Purple Swamphen, Buff-banded Rail, White-faced Heron, Straw-necked Ibis and Nankeen Kestrel. Other wildfowl species and the two smaller cormorants used the banks for daytime roosting.

Thickets of ***Typha orientalis*** — Bird Species: 20

In May, 1980, the proportion of bulrush-covered areas which showed evidence of autumn burning was estimated at 33% for the lakebed as a whole and 21% for the transect study area. In early

winter, areas of the bulrush zone which had been burnt during autumn were inhabited by few waterbirds. Sacred Ibis fed in areas which had been burnt out almost completely. Clamorous Reed Warblers held territories amid stands of blackened stalks. Silvereyes fed in similar situations. Little Grassbirds were totally absent from such sites, but were present and subsequently bred only in stands which had remained free from fire. Purple Swamphens showed a similar preference for dense, partly collapsed stands of dead bulrushes, in which they constructed winter roosting platforms and, later, nests. The presence of matted growths of ***Phyla nodiflora*** (= ***Lippia nodiflora***) was characteristic of many of their feeding sites. Buff-banded Rails were located only in the higher parts surrounding the flooded zones and typically where the ground layer was thickly vegetated.

During late winter and spring, populations of several waterbirds began to breed in the regenerating bulrushes on a rising water level: Black Swans, Musk Duck, Hardhead, Australian Shoveler, Blue-billed Duck, Grey Teal, Purple Swamphen, Eurasian Coot, Little Grassbird and Clamorous Reed Warbler. Small numbers of Little Bitterns were the only predatory marshbirds found breeding in the bulrush thickets. Transect surveys showed that bulrush thickets which regenerated after burning were typically very dense and largely devoid of waterbirds: only Clamorous Reed Warblers were located in them. Any populations of crakes present there were overlooked.

As floodwaters receded (from October), other plants flourished under the bulrushes. These included ***Centella asiaticus*** (= ***Hydrocotyl asiaticus***), ***Aster subatulatus, Nasturtium officinale, Rumex crispus*** and ***Cynodon dactylon***. Kikuyu grass ***Pennisetum clandestinum*** dominated the ground layer over the higher levels. Food webs thus expanded and at least three species of frogs became abundant. Immigrant Rufous Night Herons frequented the unburnt, less dense thickets until surface waters dried up, in midsummer. Further drying out of the thickets in autumn was marked by a general desertion by all birds, except for Purple Swamphens and Buff-banded Rails. Localized burning took place between February and May; it evidently had little direct effect on birds. Even so, regular burning of the bulrush beds

undoubtedly has a direct effect on the distribution of plants across the lakebed. This would exert a profound influence on the animal communities which depend on them for food, shelter, breeding sites and nesting materials.

Meres — Bird Species: 31

Areas of lakebed which are not covered by bulrushes form a patchwork of sheltered, secluded stretches of open water in winter and spring. It appears that the distribution and density of bulrush growth on the lower levels is not explained by vertical zonation and hydrology alone. Factors such as burning, variation in surface sediment and the activities of Black Swans and Purple Swamphens probably influence the way in which areas of bulrushes flourish and decline in successive years. High densities of introduced Argentine Ants ***Iridomyrmex humilis*** evidently replace native ants. Circumstantial evidence suggests that the ants have a considerable impact on the perennial cycle of ***Typha,*** in that they are involved in breaking down both dead and living bulrush plants. Argentine Ants at Herdsman are the subject of a long established programme of chemical control which is implemented on a regular basis by the Department of Agriculture.

The waterplants which predominate during winter and spring include ***Phyla nodiflora, Lemna*** sp. and submerged grasses, including couch ***Cynodon dactylon***. Between June and November, these associations and their rich invertebrate faunas formed the major feeding grounds for Herdsman's wildfowl. Blue-billed Ducks were alone in that they remained around the new deepwater lagoon at all times, which suggests that the shallower meres have been, at best, only marginal habitats for that species in previous years.

Some species (e.g. Black Swan, Hardhead) which used the meres extensively during spring mostly left when the water level decreased rapidly in November. During summer, a progressive exposure of shallow water and gently sloping margins was exploited by at least six species of predatory wading birds, four species of Australian waders and seven species of the sandpiper group of migrant waders from the Eurasian Arctic. Three of the Australian waders bred successfully on deflooded margins

(Red-kneed Dotterel, Black-fronted Plover and Black-winged Stilt). Patterns of vegetation changed, in that dense beds of sedges ***Scirpus*** spp. and ***Cyperus rotundus*** grew up to cover the meres, attracting Purple Swamphens and Little Grassbirds from the dry bulrushes.

Aerial — Bird Species: 20

Birds which used Herdsman's airspace for more than just movement between habitats include the hirundines (Welcome Swallow and Tree Martin), eight species of birds of prey, birds which soar socially (e.g. Australian Pelican, Straw-necked Ibis) and other aerial feeders (e.g. Rainbow Bee-eater).

The occasional presence of large concentrations of Tree Martins feeding over the lakebed is likely to be a response to weather conditions rather than to ecological events taking place in the lake.

Floreat Waters Lagoon — Bird Species: 19

At the start of the study period, almost all of the waterbirds which used the lagoon gathered on the shallower water towards the southern end. The deepwater sector was largely ignored by waterfowl. Black Swans which attempted to feed there quickly moved off, having found that there was no vegetation accessible beneath them. The surface feeding wildfowl which gathered on and around the shallower sector used the lagoon mainly for roosting and left at dusk for their overnight feeding grounds, in the meres within the bulrush zones.

Diving ducks and grebes were able to put the lagoon to more extensive use as the season advanced. Blue-billed Ducks were the only wildfowl to confine their breeding activities to the lagoon and its peripheral swamps. While Black Swans bred widely within the outlying bulrush areas, none did so on the lagoon; only two families remained on the lagoon throughout the summer months. Small numbers of Australasian and Hoary-headed Grebes were usually in evidence; at least the former bred there. The spring influx of Great Crested Grebes brought birds onto the lagoon, the deepwater parts of which might provide better habitat for this scarce species than would other, shallower, lakes. Two pairs eventually nested, rather later than those elsewhere in the

metropolitan area (e.g. Lake Monger). The delayed start may have been attributable to disturbance and to changes in the water level, brought about for the construction of banks on the west side of the lagoon. In any event, the Great Crested Grebes incubated their nests to full term on a rapidly declining water level, but failed to produce any young.

A flock of Eurasian Coot present during the spring and summer was evidently a gathering of non-breeders. Numbers were augmented by a temporary influx in November. Several pairs bred in the bulrush fringes of the lagoon during spring, summer and autumn.

One striking feature of the summer period was an influx of Grey Teal and Black Ducks. Increased growth of the benthic plants, such as ***Potamogeton pectinatus*** and ***Chara baueri*** was very evident at this time and wildfowl spent much time feeding by up-ending in shallow water.

The lagoon also supported an influx of, at times, all four species of freshwater cormorants. Occasionally, parties of Australian Pelicans used the lagoon, as a resting place rather than for feeding.

Floreat Waters Shorelines — Bird Species: 46

The high numbers of species using this habitat reflects two main types of usage:

- of semi-permanent areas of freshwater margins somewhat similar to those provided elsewhere in Herdsman, at least during the summer drying of the meres;
- of novel habitats, for example islets, artificially created peatbanks, mudbars and a sandspit.

Some examples of birds using the shoreline habitats are given below:

- cormorants used islets, peatbanks and mudbars for roosting;
- herons, egrets and ibises hunted in rushy parts;
- wildfowl roosted on exposed banks and islets;
- Clamorous Reed Warblers and four species of crakes and rails frequented the margins of bulrush clumps that remained wet throughout the year;

- Purple Swamphens gathered to feed on vegetation growing on deflooded mud;
- nomadic Australian waders found micro-environments appropriate to their needs, in one case (Black-fronted Plover) for breeding purposes;
- nine species of Palaearctic waders found and exploited the newly created freshwater margins which are so scarce (and otherwise short lived) in the south-west;
- an Asian Yellow Wagtail inhabited the Floreat Waters shoreline for its first detected occurrence in the south-west.

Despite the proven attractiveness of parts of the shoreline to a wide variety of waterbirds and shorebirds, much of it slopes too steeply to provide the shallow contours necessary as a basis for productive freshwater margins. The areas which proved most attractive to an impressive array of birds during the study period were the mudflats and remnant islets of bulrushes at the southern end of the lagoon. These margins were effectively destroyed when further dredge and fill operations were underway there in May, 1981.

Floreat Waters Lawns — Bird Species: 14

Three species were pre-eminent as users of the newly grassed open space west of the lagoon. Parties of Black Swans frequently gathered to graze there during the winter. Two families which remained in the vicinity grazed there throughout summer and autumn. Eurasian Coot used the lawns for similar purposes at all seasons. These two species and other waterfowl gained extra food supplies through their contact with the public on the Floreat Waters foreshore. Black-fronted Plovers used the lawns in much the same way that they elsewhere use new grass which grows on the upper margins of other freshwater lakes as they begin to fill during early winter. The permanent availability of short grassland adjacent to freshwater margins enabled this wader to become resident at Herdsman and to take up breeding territories in an area previously unavailable to it.

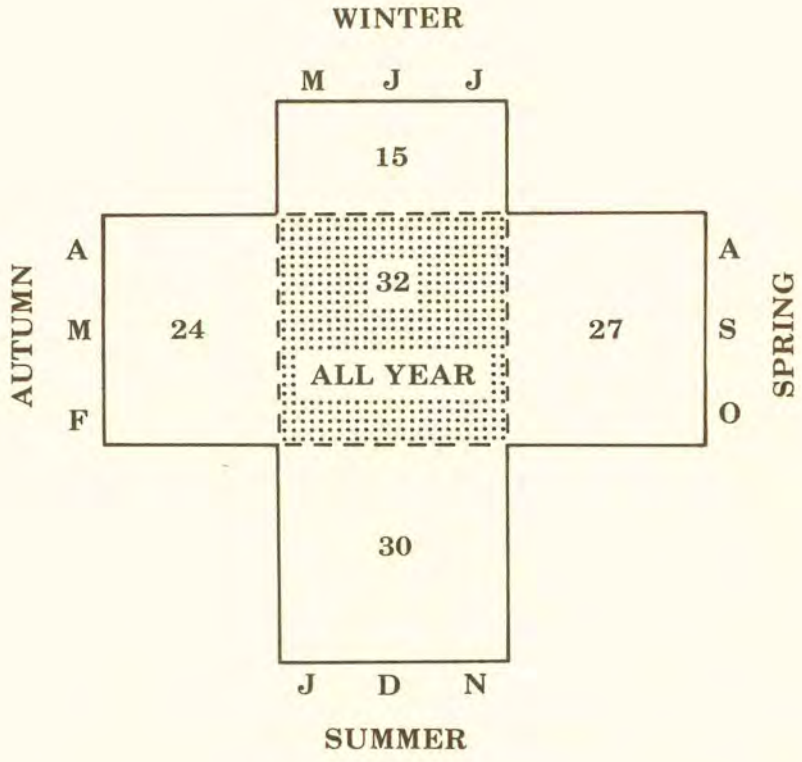
Several other birds used the lawns, as a resting place commanding wide views, at various times. Richard's Pipits reared their young on grubs extracted from the lawns.

TABLE 1: COMPARISON OF WILDFOWL (SWANS AND DUCKS) PRESENT ON FLOREAT WATERS LAGOON WITH THOSE AT LAKE MONGER, 1980-81.

Month	Floreat Waters		Lake Monger	
	No. of species	Total wildfowl	No. of species	Total wildfowl
May	6	75	9	392
June	7	268	6	205
July	7	216	5	130
August	5	90	6	158
September	6	43	9	411
October	8	87	6	583
November	9	231	7	892
December	3	230	7	726
January	9	213	7	726
February	7	67	8	742
March	8	116	9	1427
April	10	179	8	1333
Means*	7.5	151	7.25	666

* Difference between mean number of species at the two localities is not significant (t test).

FIGURE 1: A GRAPHIC REPRESENTATION SHOWING NUMBERS OF SPECIES USING HERDSMAN LAKE SEASONALLY AND THROUGHOUT 1980-81.



ANNOTATED CHECK-LIST OF 81 SPECIES LOCATED AT HERDSMAN LAKE MAY 1980-APRIL 1981

Species Names and Abbreviations Used

English names for species and their Latin equivalents are those given by the Royal Australasian Ornithologists Union (1977).

Abbreviations used are as follows:

SEASONS — the seasonal periods during which the species was located.

- W = winter (May-July)
- Sp = spring (August-October)
- Su = summer (November-January)
- A = autumn (February-April)

HABITATS — a list of habitat types in which the species was found at least once.

- TM = thickets of paperbarks ***Melaleuca rhaphiophylla.***
- PC = pasture and cultivated areas.
- TT = thickets of bulrush ***Typha orientalis*** and associated flora.
- M = meres.
- OD = open drains.
- BD = banks of drains.
- A = aerial, i.e. using airspace above the lake.
- FWL= Floreat Waters lagoon.
- FWS= Floreat Waters modified shorelines.
- FL = Floreat Waters lawns.

Initials of other observers to whom particular records are attributable in brackets:

Elizabeth C. Edwards (ECE)
Gregory J. Roberts (GJR)
Dick Hewitt (RH)

Species List

Great Crested Grebe — ***Podiceps cristatus.***
Seasons: Sp, Su, A.
Habitats: FWL.

First noted 16 August; 1 or 2 present irregularly, then influx in late October: 10 present, declining from mid-December until absent 25 April; at least 10 adults and 2 independent juveniles involved. Adults seen to catch small fish; display and territorial behaviour observed on both deep and shallow sections of lagoon; nest building (directly from mating platform) first observed 24 November; 2 pairs built and incubated but no hatched young seen.

Hoary-headed Grebe — ***Poliocephalus poliocephalus.***
Seasons: W, Sp, Su, A.
Habitats: FWL, M.

Up to 12 present on FWL monthly, except August and February; one independent juvenile present December; possibly bred locally; up to 5 present on M, July, October, but no evidence of nesting.

Australasian Grebe — ***Tachybaptus novaehollandiae.***
Seasons: W, Sp, Su, A.
Habitats: FWL, OD, TT.

Up to 7 present on FWL monthly, except August and September; adult with one young present December. Also on OD: singles June, December, February.

Australian Pelican — ***Pelecanus conspicillatus.***
Seasons: Sp, Su.
Habitats: FWS, FWL, A.

Up to 9 present irregularly, mainly using peat-banks and shallows for roosting.

Great Cormorant — ***Phalacrocorax carbo.***
Seasons: W, Sp, Su, A.
Habitats: FWL, FWS, A.

Up to 11 present; this species and ***P. melanoleucos*** were pioneers in using the deepwater section of the lagoon, fishing and roosting there on floating booms. Of two flying E, 17 August, one carried a stick, so may have nested nearby.

Pied Cormorant — ***Phalacrocorax varius.***
Seasons: A.
Habitats: FWL.
Single, 11 March.

Little Black Cormorant — ***P. sulcirostris.***
Seasons: Sp, Su, A.
Habitats: FWL, FWS: also on OD, BD, M & A.
Marked influx in summer, up to 21 roosting and fishing. Occasional on OD and M.

Little Pied Cormorant — ***P. melanoleucos.***
Seasons: W, Sp, Su, A.
Habitats: FWL, FWS: also BD, OD, TM and M.
Marked influx in summer, continuing into autumn, maximum 20 at FWL/FWS in April; birds fishing and roosting. Pair present around TM and OD, western sector of lake, winter and spring; 2 fledged juveniles there, October. Once only on M.

Pacific Heron — ***Ardea pacifica.***
Seasons: Sp, Su.
Habitats: FWS, M.
One to two October, November and December.

White-faced Heron — ***Ardea novaehollandiae.***
Seasons: W, Sp, Su, A.
Habitats: FWS, OD, BD, M, PC.
Up to 27 at FWS in February; up to 15 OD/BD in November. Used recently modified habitats extensively; seen to catch grasshoppers and frogs.

Great Egret — ***Egretta alba.***
Seasons: W, Sp, Su, A.
Habitats: M, FWS, also OD.
Temporarily common around flooded sedges growing in M during summer: up to 9 together; also around bulrush fringes of FWS, once in OD (March).

Little Egret — ***E. garzetta.***
Seasons: S.
Habitats: FWS.
Single, 26 December (GJR).

Rufous Night Heron — ***Nycticorax nycticorax.***
Seasons: W, Sp, Su.
Habitats: TT, M, TM, FWS.

Influx in spring, followed by sudden departure when lakebed began to dry up in late December/early January. Flushed from TT day and night; parties (maximum 15) flew in and out of area at dawn and dusk; dead trees favoured for daytime perches.

Little Bittern — ***Ixobrychus minutus.***
Seasons: W, Su.
Habitats: TT.

Single flying in from W, 31 May; then not located until November, when 3+ calling at dusk and dawn from two areas of mature, partly collapsed unburnt TT; fledged juvenile flushed nearby, 7 December.

Sacred Ibis — ***Threskiornis aethiopica.***
Seasons: W, Sp, Su, A.
Habitats: PC, TT, FWS, M, also TM.

At least 20 present, June. In winter particularly favoured burnt-out TT; few subsequently; tops of TM used for duck roost; none attained breeding plumage.

Straw-necked Ibis — ***Threskiornis spinicollis.***
Seasons: Sp, Su.
Habitats: BD, M, PC.

Up to 6, mainly foraging on grassed areas and in beds of sedges.

Black Swan — ***Cygnus atratus.***
Seasons: W, Sp, Su, A.
Habitats: TT & M (breeding); PC, OD, FWL, FL.

Maximum count: 486 on PC, 31 May; winter concentrations of mainly adult birds displaying and feeding on shallow pools over cultivations of sweet potatoes; many of these birds roosted overnight on FWL. About 50 occupied nests in August (from aerial photos), all sited in flooded, unburnt bulrushes around edges of meres (M); not in densely regenerating burnt thickets; nests constructed mainly of dead bulrushes. Most families departed from Herdsman when cygnets still young; road casualties noted Pearson Street; approximately 31 broods present at nearby Lake Jackadder and Monger not accounted

for by nesting at those localities: presumably pedestrian migrants from Herdsman. FWL: 2 families resident spring to autumn; FL: grazing noted every month. Summer populations below 25 prior to autumn influx (April).

Freckled Duck — ***Stictonetta naevosa.***
Seasons: A.
Habitats: FWS.
Single, roosting and preening on islet, 25 April.

Australian Shelduck — ***Tadorna tadornoides.***
Seasons: W, Sp, Su, A.
Habitats: PC, BD, OD, FWS, FWL, FL.
Up to 14, May; 2 pairs bred successfully; reared young at FWL.

Pacific Black Duck — ***Anas superciliosa.***
Seasons: W, Sp, Su, A.
Habitats: M, FWS, FWL, FL, OD, BD, PC.
In winter, flocks roosted during the day at FWL/FWS and moved out at dusk to central feeding areas (grassy meres). More general feeding at FWL from summer onwards. Broods seen August/September; breeding population estimated at 10 pairs.

(Mallard hybrid ducks) — ***A. platyrhynchos X.***
Four appeared at FWL/FWS, March.

Grey Teal — ***A. gibberifrons.***
Seasons: W, Sp, Su, A.
Habitats: FWS, FWL, M, OD, BD, PC.
Small numbers, with summer influx at FWL; up to 5 pairs, M, in spring; only 1 brood seen.

Australasian Shoveler — ***A. rhynchotis.***
Seasons: W, Sp, Su, A.
Habitats: M, OD, FWS, FWL.
Up to 20 in winter; few in spring; at least one brood, M, November.

Pink-eared Duck — ***Malacorhynchus membranaceus.***
Seasons: W, Sp, Su.
Habitats: M, FWS.
Up to 7 noted, including pair, M, September, but no evidence of breeding.

Hardhead — ***Aythya australis.***
Seasons: W, Sp, Su, A.
Habitats: M, TT, FWL, FWS, OD.
Most visible at FWL, though July-November population mainly dispersed through meres. Maximum count 24 (FWL/FWS November) and total spring population estimated at 50; at least 3 pairs reared young.

Blue-billed Duck — ***Oxyura australis.***
Seasons: W, Sp, Su, A.
Habitats: FWL, TT.
Influx in spring: up to 16 adults; several pairs bred successfully in TT bordering FWL; females brought small ducklings onto FWL, where broods merged and up to 22 ducklings seen together in December. All adult males had departed by 1 January.

Musk Duck — ***Biziura lobata.***
Seasons: W, Sp, Su, A.
Habitats: TT, M, OD, FWL.
Influx in July; subsequently 10+ males calling territorially throughout TT/M, where extremely difficult to observe but calling frequently until December. At least one brood seen but, unlike preceding species, families remained concealed in heavily vegetated habitats until young almost fully grown.

Black-shouldered Kite — ***Elanus notatus.***
Seasons: W, Sp, Su, A.
Habitats: A; also TM and scattered isolated vantage points.
One or two apparently resident in area; fledged juvenile in October. Prey items seen: grasshoppers and small rodent (probably ***Mus musculus***).

Whistling Kite — ***Haliastur sphenurus.***
Seasons: W, Sp, Su.
Habitats: A.
Singles May-November.

[Collared Sparrowhawk — ***Accipiter cirrocephalus.***
Brief sighting of ***Accipiter***, probably this species, October.]

Little Eagle — ***Hieraaetus morphnoides.***
Seasons: W, A.
Habitats: A.
Two, dark phase, June; one light phase, February.

Marsh Harrier — ***Circus aeruginosus.***
Seasons: W, Sp, Su, A.
Habitats: A, TT.
One, sometimes two (evidently paired), all months except January, February; aerial display and calling at sunrise followed by pair alighting together, October, but no further evidence of breeding attempt.

Peregrine Falcon — ***Falco peregrinus.***
Seasons: Sp.
Habitats: A.
Adult, probably male, 12 October.

Australian Hobby — ***F. longipennis.***
Seasons: Su, A.
Habitats: A.
Single adults and one immature (February); seen chasing flying insects and (once) a Laughing Turtle-Dove.

Brown Falcon — ***F. berigora.***
Seasons: W, A.
Habitats: A; tops of isolated trees.
Two, July; one April.

Australian Kestrel — ***F. cenchroides.***
Seasons: W, A.
Habitats: A, TM, BD, various elevated vantage points.
At least 10 hunting simultaneously, 31 May; then only occasional sightings; hunting over active dredge and fill operations, April.

Brown Quail — ***Coturnix australis.***
Seasons: Su.
Habitats: FWS, TT (?).
Single flushed 1 January; other single unidentified quails reported either this species or Stubble Quail (***C. pectoralis***).

Buff-banded Rail — ***Rallus philippensis.***
Seasons: W, Sp, Su, A.
Habitats: TT, BD, FWS, M.

Singles heard in TT wherever lightly flooded grasses formed matted understorey vegetation; at least 7 located around drains in N and central sections, October; one flushed from an excavation 5 cm into dry mud below sedges, M, 28 February.

[Baillon's Crake — ***Porzana pusilla.***

No definite records, but calls thought to be attributed to the species heard W, Sp; survey methods totally inappropriate for locating it.]

Australian Crake — ***P. fluminea.***
Seasons: Su.
Habitats: TT, FWS.

Single birds encountered on muddy watersides bordering TT (ECE, GJR).

Spotless Crake — ***P. tabuensis.***
Seasons: Sp, Su, A.
Habitats: TT, FWS.

Dusk song from area of dense, unburnt TT, elicited by playing recorded song of species, September; one or two frequented bulrush fringes of nature walk, FWS, January-March.

Dusky Moorhen — ***Gallinula tenebrosa.***
Seasons: W, Sp, Su, A.
Habitats: TT (edges), FWS.

Up to 5 present in vicinity of FWS to W central areas.

Purple Swamphen — ***Porphyrio porphyrio.***
Seasons: W, Sp, Su, A.
Habitats: TT, FWS, M, FL, BD.

Bred widely in TT/M in winter/spring; first incubated nest found 20 July; families generally remained concealed until young large. Gatherings on E margins, FWS, in May dispersed by June; then scarce there until January; numbers then increased to 263 (April), when many also present elsewhere.

Population estimates:
From 2 nests on belt transect (July-August): 500 pairs.
From direct observations (April): 500 birds.

Eurasian Coot — ***Fulica atra.***
Seasons: W, Sp, Su, A.
Habitats: TT, FWL, FWS, FL, M, OD.

Breeding season later and more protracted than preceding species: young seen October-April; bred around FWS in flooded bulrush clumps; also around M. Main part of flock present FWL spring-summer consisted of non-breeders; influx of adults, December. Parties grazed FL extensively; families fed on ***Potamogeton*** and other submerged plants growing in FWL.

Red-kneed Dotterel — ***Erythrogonys cinctus.***
Seasons: W, Su, A.
Habitats: M, TT, FWS.

Pair bred successfully November-December, on islet formed by peat tipping, SE of FWS; hatched 4 chicks and fledged 2. Same pair or another attempted breeding on nearby mere, January. An extension of known breeding range from inland WA onto Swan Coastal Plain. Maximum count 7 on FWS, January.

Red-capped Plover — ***Charadrius ruficollis.***
Seasons: W, Su, A.
Habitats: FWS, FL.

Singles, excepting 6 on 21 March.

Black-fronted Plover — ***C. melanops.***
Seasons: W, Sp, Su, A.
Habitats: FL, FWS, M; also PC.

Present every month on FWS/FL, with maximum 32 in June. Several pairs bred successfully, downy young noted October-January; one pair also bred successfully on algal-covered M, December-January. Fourteen on sweet potato cultivation, July, but not subsequently.

Black-winged Stilt — ***Himantopus himantopus.***
Seasons: W, Sp, Su, A.
Habitats: M, FWS, FL.

One pair fledged 4 young, December; at least one other unsuccessful breeding attempt. Summer influx, maximum 58 on FWS, January.

Banded Stilt — ***Cladorhynchus leucocephalus.***
Seasons: Su, A.
Habitats: FWS, M.

More confined to FWS than ***Himantopus***: only occasional birds on M. Summer influx, juveniles only, maximum 23 in January.

Red-necked Avocet — ***Recurvirostra novaehollandiae.***
Seasons: Sp.
Habitats: FWS.

One, 20 October (ECE).

Wood Sandpiper — ***Tringa glareola.***
Seasons: Sp, Su, A.
Habitats: FWS, M.

Up to 8 FWS, mostly on peat margins near TT, September-March. Birds often on M October-January, when water level sufficiently low to uncover appropriate marginal habitats.

Common Sandpiper — ***T. hypoleucos.***
Seasons: Sp, Su, A.
Habitats: FWS, M.

Single birds only, 4 dates.

Greenshank — ***T. nebularia.***
Seasons: Sp, Su, A.
Habitats: FWS, M, OD.

One or two, irregularly, October-March.

Great Knot — ***Calidris tenuirostris.***
Seasons: Su.
Habitats: FWS.

Four flew in and landed briefly on mudbank, 7 December. A species of intertidal shores, not normally associated with freshwater margins.

Sharp-tailed Sandpiper — ***C. acuminata.***
Seasons: Sp, Su.
Habitats: FWS, M.

One-six present, irregularly, October-December; peak of 9+ inhabiting open mud and peat banks at FWS and M, January. Birds departed when habitat dried out, mid-January.

Pectoral Sandpiper — ***C. melanotos.***
Seasons: Su.
Habitats: FWS.
One on 23 and 30 November (GJR).

Red-necked Stint — ***C. ruficollis.***
Seasons: Sp, A.
Habitats: M, FWS.
Ten, FWS on 12 October, joined by another when flock moved onto peat margin of M; otherwise singly.

Long-toed Stint — ***C. subminuta.***
Seasons: W, Su.
Habitats: M, FWS, FL.
One feeding FL/FWS on 22 June: probably first mid-winter observation in Australia. Influx late December-early January; 2 on 26 December (GJR), 24+ on 1 January, feeding on areas of wet mud uncovered around TT and islets, S end of FWS and M. Birds departed rapidly with further drying of mud margins: only one remaining 8 January; note contrasting seasonal occurrences and status compared with the more widespread species of migrant waders.

Curlew Sandpiper — ***C. ferruginea.***
Seasons: Su.
Habitats: M.
Two, January 1.

Oriental Pratincole — ***Glareola maldivarum.***
Seasons: A.
Habitats: FWS.
One, 17 and 21 March, 25 April.

Silver Gull — ***Larus novaehollandiae.***
Seasons: W, Sp, Su, A.
Habitats: FWS, FL, A.
Sandspit on FWS attracted overnight roosting in winter: at least 200 present, May. Small numbers there daytime, some foraging on FL, December.

Laughing Turtle-Dove — ***Streptopelia senegalensis.***
Seasons: W, Sp, Su, A.
Habitats: TM, also BD, FWS.
Up to 3 together, mostly grassy areas around TM.

White-tailed Black Cockatoo — ***Calyptorhynchus baudinii.***
Seasons: W.
Habitats: A.
Flock of about 50 crossed lakebed, July.

Galah — ***Cacatua roseicapilla.***
Seasons: Sp.
Habitats: PC.
Five September.

Sulphur-crested Cockatoo — ***C. galerita.***
Seasons: Sp, Su, A.
Habitats: A.
Up to 3 crossed lakebed on 3 dates.

Rainbow Bee-eater — ***Merops ornatus.***
Seasons: Sp, A.
Habitats: A.
Birds calling overhead, October, February.

White-backed Swallow — ***Cheramoeca leucosternum.***
Seasons: W, Sp.
Habitats: A, FL.
Singles, July and August.

Welcome Swallow — ***Hirundo neoxena.***
Seasons: W, Sp, Su, A.
Habitats: A, FL.
Small numbers (< 50) particularly over TT and M; FL used for roosting during rainstorm, July.

Tree Martin — ***Cecropsis nigricans.***
Seasons: W, Sp, Su, A.
Habitats: A, TT; also FL.
Large daytime gathering (> 1000) over lakebed, May. Flocks used FL for roosting during rainstorm July, and as a gathering point prior to roosting overnight in TT during summer.

Richard's Pipit — ***Anthus novaeseelandiae.***
Seasons: W, Sp, Su, A.
Habitats: PC, FL, BD.
Pairs present in all suitable localities; bred successfully in rough grassland on vacant lots at Floreat Waters, feeding young on grubs gleaned from FL.

Yellow Wagtail — ***Motacilla flava.***
Seasons: A.
Habitats: FWS.
Single, 28 February; reported in same place, 8 March (RH); the first sightings of this Eurasian species in the south-west.

White-winged Triller — ***Lalage leucomela.***
Seasons: Su.
Habitats: FWS.
Singles, December-January, in young shrubs.

Jacky Winter — ***Microeca leucophaea.***
Seasons: W.
Habitats: TM.
Single, 22 June, A species rarely seen west of the Darling Range.

Willy Wagtail — ***Rhipidura leucophrys.***
Seasons: W, Sp, A.
Habitats: TM, FWS.
Singles only.

Clamorous Reed Warbler — ***Acrocephalus stentoreus.***
Seasons: W, Sp, Su, A.
Habitats: TT, M, FWS.
Confined to wet bulrushes, occupying both burnt and unburnt stands except for occasional pair(s) in isolated patches of rushes ***Baumea articulata.*** Breeding noted September-December, feeding fledged young October-December. Song heard all months; highest density of singing birds located along transect line in August-September: 14 per 0.95 km. In autumn, absent from dry stands of bulrushes and sedges; but a few still present at waterside margins of FWS.

Spring population estimates:
From 1 nest on belt transect: 250 pairs.
From territorial mapping on transect: 750 pairs.

Little Grassbird — ***Megalurus gramineus.***
Seasons: W, Sp, Su, A.
Habitats: TT, M.
Habitat usage differed from preceding species in 2 main ways: (1) breeding birds absent from TT regenerating after burning;

(2) in autumn, abandoned dry TT but many moved into green sedges covering M. Breeding season earlier than ***Acrocephalus***, first nest with eggs found 5 July. All 8 nests found were sited in dead, part-collapsed thickets of previous year's bulrush growth and constructed mainly of dead bulrush leaves. Highest density of singing birds on line transect was in August: 19 per 0.95 km.

Spring population estimates:
From 3 nests found on belt transect: 750 pairs.
From territorial mapping along transect: 600 pairs.

Western Gerygone — ***Gerygone fusca.***
Seasons: W, Sp, Su.
Habitats: TM.
Singing in mature stands of paperbarks, E, W & S margins.

Inland Thornbill — ***Acanthiza apicalis.***
Seasons: W.
Habitats: TM.
Singing in mature stands of paperbarks, E & W margins.

Brown Honeyeater — ***Lichmera indistincta.***
Seasons: Sp, Su.
Habitats: TM.
Singing birds in mature stands of paperbarks, E & S margins.

White-fronted Chat — ***Ephthianura albifrons.***
Seasons: Sp, Su.
Habitats: FL, FWS, M.
Flocks (maximum 30) foraged areas of open ground, November-April.

Silvereye — ***Zosterops lateralis.***
Seasons: W, Sp, Su, A.
Habitats: TT, TM.
In winter, parties fed around charred bulrush stalks gleaning from under leaf bases; small numbers present TT, MT and flying over, all months.

Chestnut-breasted Mannikin — ***Lonchura castaneothorax.***
Seasons: Su, A.
Habitats: PC, TT.

Up to 4 around weed-grown plots in N central area, September-October, (flock of 20+ there, May 1981).

Australian Magp — ***Gymnorhina tibicen.***
Seasons: W, Sp, Su, A.
Habitats: A.

Birds from stands of ***E. rudis*** held territory over peripheral areas of the lakebed.

Australian Raven — ***Corvus coronoides.***
Seasons: W, Sp, Su, A.
Habitats: A.

Singles and small parties overhead on 8 dates.

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REFERENCES

1. Bekle, H. (1980).
   A seasonal biogeography of Lake Joondalup.
   Geowest 16:83-119.

2. Bekle, H.
   The wetlands lost: drainage of Perth lake systems.
   Western Geographer (in press).

3. Briggs, B.G. and Johnson, L.A.S. (1968).
   The status and relationships of the Australian species of ***Typha.***
   Contributions from the N.S.W. National Herbarium 4:57-69.

4. Conservation Council of W.A. (1980).
   Herdsman Lake Bird Sanctuary.
   Pamphlet of 8 pp. Conservation Council of W.A., Perth.

5. International Bird Census Committee (1969).
   Recommendations for an International standard for a mapping method of bird census work.
   Bird Study 16:249-255.

6. Metropolitan Regional Planning Authority (1976).
   Herdsman Lake Concept Plan, Perth, M.R.P.A.

7. Newman, P. (1976).
   The Cockburn Wetlands — an environmental study.
   Murdoch University.

8. Serventy, D.L. (1948).
   The Birds of the Swan River District, W.A., Emu 47:241-286.

9. Smith, G.G. (1980).
   Rushes, sedges and reeds.
   W.A. Naturalist 14:169-174.

10. Southern, B.L. and Teakle, L.J.H. (1937).
    A soil survey of Herdsman Lake.
    Department of Agriculture, W.A. 14:404-424.

APPENDIX 1
MONTHLY COUNTS OF BIRDS PRESENT AT FLOREAT WATERS LAGOON HERDSMAN, 1980-81
Highest counts for each species indicated in bold type.

Species	1980 31 May	22 Jun	5 Jul	17 Aug	14 Sep	12 Oct	16 Nov	8 Dec	1981 1 Jan	28 Feb	21 Mar	25 Apr
Great Crested Grebe	0	0	0	0	0	0	**10**	**10**	7	6	3	0
Hoary-headed Grebe	1	2	9	0	3	3	3	4	5	0	**12**	7
Australasian Grebe	3	3	2	0	0	0	1	2	**7**	4	4	4
Australian Pelican	0	0	0	0	0	0	1	**3**	0	0	0	0
Great Cormorant	1	0	0	2	2	4	1	2	9	**11**	2	5
Pied Cormorant	0	0	0	0	0	0	0	0	0	0	**1**	0
Little Black Cormorant	0	0	0	0	0	0	17	**21**	17	0	**6**	1
Little Pied Cormorant	1	0	0	0	0	0	6	17	17	14	6	**20**
Pacific Heron	0	0	0	0	0	**1**	**1**	1	0	0	0	0
White-faced Heron	10	4	0	0	0	1	4	4	0	**27**	1	5
Great Egret	0	0	0	0	0	0	1	1	**9**	0	0	0
Rufous Night Heron	0	0	0	0	0	0	**13**	2	1	0	0	0
Sacred Ibis	**11**	0	0	5	6	0	0	0	5	1	0	0
Straw-necked Ibis	0	0	0	0	0	0	0	1	**2**	0	0	0
Black Swan	35	15	4	5	4	17	9	12	12	22	14	**74**
Freckled Duck	0	0	0	0	0	0	0	0	0	0	0	**1**
Australian Shelduck	0	4	0	0	8	4	10	8	3	0	0	**14**
Pacific Black Duck	27	**204**	174	65	17	25	140	101	110	27	70	49
Mallard hybrids — domestic ducks	0	0	0	0	0	0	0	0	0	0	4	**5**
Grey Teal	0	2	16	2	0	11	26	**57**	54	5	11	22
Australasian Shoveler	7	**20**	15	8	1	8	2	4	2	2	11	4
Pink-eared Duck	1	0	0	0	0	0	1	0	**7**	0	0	0
Hardhead	1	12	1	15	5	2	**24**	7	5	6	1	8
Blue-billed Duck	0	0	1	0	8	16	11	**26**	17	3	5	5
Musk Duck	4	9	5	0	0	4	8	**13**	3	2	4	2
Black-shouldered Kite	0	**1**	0	**1**	0	0	0	0	0	0	0	0
Whistling Kite	0	0	0	0	**1**	0	0	0	0	0	0	0
Little Eagle	0	0	0	0	0	0	0	0	0	**1**	0	0

Peregrine Falcon	0	0	0	0	0	**1**	0	0	0	0	0	0
Australian Hobby	0	0	0	0	0	0	**1**	0	**1**	0	**1**	**1**
Australian Kestrel	0	**1**	0	0	0	0	0	0	0	0	0	1
Brown Quail	0	0	0	0	0	0	0	0	**1**	0	0	0
Buff-banded Rail	0	0	0	0	0	0	0	0	0	0	**1**	0
Spotless Crake	0	0	0	0	0	0	0	0	0	**1**	**1**	**1**
Dusky Moorhen	1	1	0	0	0	0	1	1	0	**4**	3	2
Purple Swamphen	124	2	0	2	3	12	1	4	36	200	200	**263**
Eurasian Coot	43	47	72	60	63	74	71	**189**	90	100	83	137
Red-kneed Dotterel	0	2	0	0	0	0	1	2	**7**	2	0	0
Red-capped Plover	1	0	0	0	0	0	0	0	1	0	**6**	0
Black-fronted Plover	23	**32**	9	6	2	11	10	6	10	15	10	10
Black-winged Stilt	4	8	2	0	3	8	18	23	**58**	13	8	15
Banded Stilt	0	0	0	0	0	0	0	0	**23**	0	2	0
Wood Sandpiper	0	0	0	0	**4**	3	3	2	**4**	1	1	0
Common Sandpiper	0	0	0	**1**	0	0	0	0	0	**1**	**1**	0
Greenshank	0	0	0	0	0	0	0	0	0	**1**	**1**	0
Sharp-tailed Sandpiper	0	0	0	0	0	0	1	5	**6**	0	0	0
Red-necked Stint	0	0	0	0	0	0	0	0	0	0	**1**	0
Long-toed Stint	0	1	0	0	0	0	0	0	**15**	0	0	0
Oriental Pratincole	0	0	0	0	0	0	0	0	0	0	**1**	**1**
Silver Gull	**500**	20	0	0	0	2	2	P	6	0	2	0
Laughing Turtle-dove	0	0	0	0	0	0	0	0	0	0	0	**1**
Sulphur-crested Cockatoo	0	0	0	0	0	**1**	0	0	0	0	0	0
Rainbow Bee-eater	0	0	0	0	0	0	0	0	0	P	0	0
White-backed Swallow	0	0	0	**1**	0	0	0	0	0	0	0	0
Welcome Swallow	0	0	0	P	0	0	0	0	P	P	P	P
Tree Martin	P	0	0	P	0	0	0	P	**50**	P	0	0
Richard's Pipit	0	1	0	0	3	3	1	3	**7**	2	6	0
Yellow Wagtail	0	0	0	0	0	0	0	0	0	**1**	0	0
White-winged Triller	0	0	0	0	0	0	0	0	**1**	0	0	0
Willy Wagtail	0	0	0	0	0	0	0	0	0	0	**1**	0
Clamorous Reed Warbler	P	P	P	P	P	P	P	P	P	P	P	P
Little Grassbird	P	P	P	P	P	P	P	P	P	P	P	P
White-fronted Chat	0	0	0	0	0	0	0	0	0	5	10	**30**
Silvereye	0	0	**1**	0	0	0	0	0	**1**	0	0	0

Total 65 species

P = species present but not counted.

APPENDIX 2
MONTHLY COUNTS OF WATERBIRDS PRESENT AT LAKE MONGER, 1980-81 (G.J. Roberts)

Species	1980 31 May	22 Jun	20 Jul	16 Aug	19 Sep	15 Oct	16 Nov	10 Dec	1981 19 Jan	14 Feb	17 Mar	24 Apr
Great Crested Grebe	0	0	0	7	13	13	18	22	**28**	11	10	2
Hoary-headed Grebe	**30**	13	6	4	0	7	2	0	9	25	18	27
Australasian Grebe	**8**	0	1	2	0	0	1	0	1	1	4	6
Australian Pelican	0	0	0	0	0	1	0	0	0	**3**	0	0
Great Cormorant	0	0	0	0	2	3	**5**	3	1	0	1	1
Little Black Cormorant	0	0	0	0	1	5	2	**8**	3	5	4	4
White-faced Heron	**1**	0	0	0	1	0	0	0	0	1	1	0
Great Egret	0	0	0	0	0	0	0	0	0	0	**1**	0
Sacred Ibis	0	0	0	0	0	0	0	0	0	0	**2**	0
Black Swan	220	48	64	73	235	300	380	260	315	350	420	**450**
Australian Shelduck	2	0	0	0	9	48	85	114	**240**	210	160	8
Pacific Black Duck	45	28	12	23	94	162	**375**	185	190	95	80	75
Mallard hybrids — domestic duck	P	P	P	P	P	P	P	P	P	P	P	P
Grey Teal	4	0	9	0	2	0	0	0	0	10	**40**	0
Australasian Shoveler	25	0	0	2	2	0	7	1	4	25	220	**240**
Pink-eared Duck	12	0	0	0	2	0	0	0	0	0	**450**	410
Hardhead	6	3	6	29	36	40	25	37	**80**	13	18	25
Blue-billed Duck	32	**102**	39	28	29	31	3	81	55	10	10	80
Musk Duck	46	23	0	3	2	2	16	48	**105**	70	28	45
Buff-banded Rail	0	0	0	0	0	0	0	0	0	0	**1**	0
Black-tailed Native Hen	0	0	0	0	0	0	0	0	**1**	1	0	0
Spotless Crake	0	0	0	0	0	0	0	0	0	0	0	**1**
Australian Crake	0	0	0	0	0	0	0	0	0	1	**2**	1
Dusky Moorhen	10	7	6	5	8	11	10	11	8	**12**	6	8
Purple Swamphen	4	**10**	3	2	3	2	1	2	3	6	5	4
Eurasian Coot	800	**890**	420	44	56	48	110	160	480	450	600	650
Black-fronted Plover	0	0	0	0	0	0	0	0	0	**3**	2	2
Common Sandpiper	0	0	0	0	0	0	0	0	0	0	0	**1**
Black-winged Stilt	0	0	0	0	0	0	0	0	0	0	1	**3**