

OBSERVATIONS OF WATERBIRDS AT THREE SITES ON THE TUGGERAH LAKES

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Three interconnected lakes, Munmorah, Budgewoi and Tuggerah, comprise what is commonly called the Tuggerah Lakes (Fig. 1). The Lakes cover an area of 116 square km on the N.S.W. central coast with their depth averaging about 2 m and the salinity of the water varying from brackish to marine. (Powis, 1975; and Barclay, pers. comm.).

Waterbirds are a common sight around the lakes and several species are distributed widely with some congregating in particular areas. Australian pelicans* are probably the most conspicuous of the widespread group because of their size and abundance. Three species of cormorants, the great, little black and little pied can be seen either feeding in the water or perching on sites above or nearby the water. Silver gulls are probably the most common waterbird of the area, so much so that their presence is often overlooked. Crested terns are common but less abundant than the silver gulls. Black swans are representative of much of the lakes' waters although they do prefer particular sites.

While the above birds are widely distributed, areas exist on the Lakes where they and other waterbirds are most easily seen. Three sites were chosen for more detailed study, which appear to attract large numbers of waterbirds.

Toukley sand flat

This site is a large sand flat (approx. 250 ha.) in the north-east corner of Lake Budgewoi, near the township of Toukley (Fig. 1). Water depth over the area varies but is generally less than 30 cm, with fluctuations due to seasonal and climatic factors and virtually no tidal effect.

Of the 31 species of waterbird seen during 1979-80, the waterfowl (the collective term for ducks, geese and swans) were most abundant (Table 1). Large mixed flocks of grey and chestnut teal (often in the thousands) used the sand flat largely as a resting (or loafing in waterfowl jargon) place. My observations indicated that these birds and also black duck feed little here during the day. The black ducks were rarer (Table 1) and confined to the less open areas of the sand flat. Black swans can number in the hundreds and are often found loafing on the sand flat. Some swans were also seen feeding in the deeper water at the edge of the sand flat.

Shallow water areas are sometimes good habitat for many species of waterbird especially wading birds.

Foremost amongst the wader group were the 'shorebirds' (of the avian Order Charadriiformes). Many of the shorebirds are Palearctic migrants who breed in the Northern Hemisphere and reside in Australia from September - October to March or April. Of the migratory shorebirds were seen at the Toukley sand flat sharp-tailed sandpiper, red-necked stint, curlew sandpiper and bar-tailed godwit were the most abundant (Table 1). The migrants seasonal pattern of movement was obvious since they were the most common in the spring-summer period. Although isolated individuals of species overwintered on the sand flat (Table 1).

Non-migrant shorebirds were also present at the sand flat and masked lapwings and red-capped plover were the most frequent. All the shorebird species that wade are sediment feeders, i.e. they seek their prey, usually benthic organisms, upon or within the sand/mud sediment. Looking at the range of shorebird species, a variety of body and bill sizes and shapes as well as behavioural peculiarities is evident. This results in each species foraging in a different manner and harvesting different prey.

The remaining shorebirds at the Toukley sand flat were the gulls and terns. Silver gulls and little terns were the most abundant of these (Table 1) and they were common roosting on islands or flying over the water in search of food.

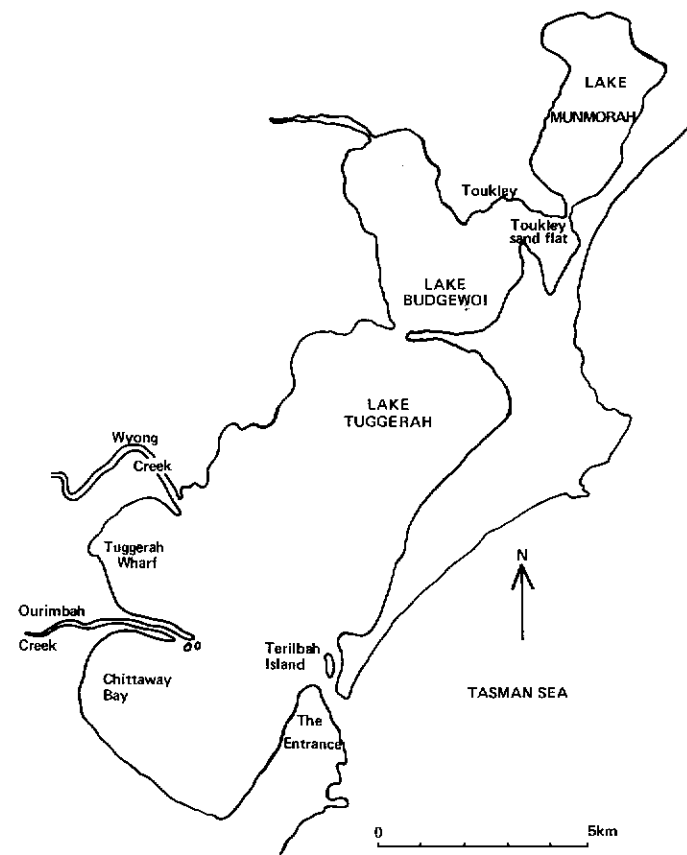


Figure 1. The Tuggerah Lakes and study sites.

Wading birds of the heron and egret group (Order Ardeiformes) were commonly present but their occurrence was irregular.

The summer 1980 survey revealed fewer waterbirds than during any other season (Table 1). Even the migrant shorebirds were mostly absent. An increase in water depth that had occurred since the previous survey was the most likely reason. While I did not monitor water depths, the increase was of sufficient magnitude to make it more difficult for resident birds to stand or feed upon the sediment. This illustrates the importance of water depth on the waterbird community.

Table 1 Species list, seasonal occurrence and estimated abundance for birds at Toukley sand flat.

Species	1979			1980	
	Summer	Autumn	Winter	Spring	Summer
Grey Teal	3000*	700	1100	1100	200
Chestnut Teal					35
Black Duck	10	125	100	32	11
Black Swan	200	45	86	212	6
Australian Pelican	65	5	9	13	
Great Cormorant	1	10		12	
Little black Cormorant	10	5			
Little pied Cormorant	1	5	1	1	
Pied Cormorant				3	
Sacred Ibis		1			
White-faced Heron	3	2	27	6	
Great Egret		1	3		4
Little Egret			2	1	12
Royal Spoonbill			3		4
Red-capped Plover	21	10	18	11	
Black-fronted Plover			1		
Masked Lapwing	20	15	18	9	30
Lesser golden Plover +	40	25		2	17
Grey Plover +	2				2
Whimbrel +	1				
Sharp-tailed Sandpiper +	75			300	43
Red-necked Stint +	53		3	500	20
Curlew Sandpiper +	106		1	200	2
Bar-tailed Godwit +	31	5	3	9	16
Red Knot +				1	
Greenshank +	1				3
Silver Gull	50	55	50	15	
Caspian Tern	1	2	7	4	20
Little Tern	250	100		120	30
Crested Tern	4	80	16		
Little Grebe			3		
Totals = 31 species	23	19	20	21	17
Total abundance	3947	1191	1445	2552	455

*Because of the large numbers of these birds they could not be counted separately.

+Migratory species.

Terilbah Island

Terilbah Island lies adjacent to North Entrance in the channel connecting Lake Tuggerah to the ocean (Fig. 1). Surrounding the island is a sand-mud flat and the main expanse (approx. 100 ha. in size) extends to the west. The island is close to the town of The Entrance, which is a popular recreational centre.

Thirty species of waterbird were seen around Terilbah Island during the surveys (Table 2). Of these, the pelicans and cormorants were most numerous. Pelicans appear to congregate in the area because of the food (in the form of discarded fish) supplied by a amateur and professional fishermen. Cormorants were nearly always abundant (Table 2) on roosting sites on or around the island or feeding in the surrounding water. Pied cormorants, which are uncommon in the district, were occasionally seen here (Table 2).

Many species of shorebird were seen around the island (Table 2). Compared to the Toukley sand flat, the Terilbah Island shorebirds were fewer in total number but more species were present. Here too the most common migrant shorebirds were the red-necked stint, sharp-tailed sandpiper and bar-tailed godwit. Lesser golden plovers were also common in the spring of 1977 but the other migrants were present only in small flocks or as isolated individuals.

Of the heron and egret group, only the white-faced heron was numerous. Intermittently, an influx of other members of this group (e.g. sacred ibis and royal spoonbill) occurred (Table 2).

The seasonal appearance of birds at Terilbah Island was similar to that at the Toukley sand flat. Again, the fewest birds and number of species occurred during the summer survey of 1980. This correlated with a greater depth of water covering the sediment.

Table 2 Species list, seasonal occurrence and estimated abundance for birds at Terilbah Island.

Species	1979			1980	
	Summer	Autumn	Winter	Spring	Summer
Grey Teal	50	10		29	20
Chestnut Teal	25	15	2		
Black Duck	2				
Black Swan		100		41	65
Australian Pelican	85	40	15	92	20
Great Cormorant	9			11	3
Pied Cormorant	4			6	
Little black Cormorant	4	30		30	3
Little pied Cormorant	35	40	3	16	23
Sacred Ibis	4	20	8		
White-faced Heron	28	4	25	23	7
Great Egret		1	3	6	1
Royal Spoonbill			15		
Whimbrel +	2			1	
Latham's Snipe +	2				1
Greenshank +	1				
Sharp-tailed Sandpiper +	20				
Curlew Sandpiper +	1			2	
Bar-tailed Godwit +	1	10		35	1
Masked Lapwing				3	
Lesser golden Plover +				30	
Red-necked Stint +				100	
Terek Sandpiper +				2	
Grey-tailed Tattler +				5	
Eastern Curlew +				3	
Pied Oystercatcher		1			
Caspian Tern	3			5	
Little Tern	3				
Crested Tern	3				
Silver Gull	52	73	29	43	40
Totals = 30 species	20	12	8	20	11
Total abundance	334	344	102	483	184

+Migratory species

Tuggerah Wharf

On the Tuggerah Lakes at present the largest expanse of relatively undisturbed, non-rocky foreshore exists between Ourimbah and Wyong Creeks (Fig. 1). Tuggerah Wharf lies toward the middle of this shoreline. Chittaway Bay, to the south of Ourimbah Creek occasionally supported large numbers of black swan, grey and chestnut teal, pied stint, egret and white-faced heron. However, the lake front of this bay is residential with the potential for further development.

By comparison to Chittaway Bay, the foreshore between Ourimbah and Wyong Creeks (Tuggerah Wharf) is pristine. This, along with its size (about 200 ha.), shallow water (< 1m) and extensive sea grass beds, create conditions attractive to many waterbirds (22 species, Table 3). Waterfowl benefit the most from the habitat conditions. Black swan, the density and distribution of which appears related to the distribution of sea grass beds, were often present in large numbers. Mixed flocks of teal were less abundant with black duck and musk duck rare (Table 3).

Pelicans and cormorants were comparatively infrequent on the waters but were very common on the wharf which served as a roosting site. Terns, including the Caspian tern, and silver gulls also roosted on the wharf.

Shorebirds were uncommon at Tuggerah Wharf, especially migrant species. This is most likely due to the sediment conditions which are muddier and contain different benthic groups than at the other surveyed sites (Powis, 1975). A large expanse of dry sediment existed north of Tuggerah Wharf during much of the year providing conditions favoured by red-capped plover and masked lapwing.

Egrets and herons were common, especially to the north of Tuggerah Wharf; but numbers were never large (Table 3). In January 1981, I observed a pair of black-necked stork resting and feeding in the shallow water near the wharf. These birds are rare on the central coast and generally uncommon in N.S.W. (Salmon, 1965). It is likely that their presence was transitory.

Little seasonal trend appears in the data (Table 3). A summer reduction in black swan numbers was noted but the reasons are unknown.

*Common names according to the 'Recommended English names for Australian Birds' Emu 77 Supplement 1978.

Table 3 Species list, seasonal occurrence and estimated abundance for birds at Tuggerah Wharf

Species	1979			1980	
	Summer	Autumn	Winter	Spring	Summer
Grey Teal	50	30	3	450	500
Chestnut Teal	12	30	4		
Black Duck			3		
Black Swan	74	50	440	600	85
Musk Duck					2
Australian Pelican	3		2	21	2
Great Cormorant	7		15		100
Little black Cormorant	12				
Little pied Cormorant	16		10		
White-faced Heron	4		9	7	3
Pacific Heron		1			
Great Egret	1	1	1	6	12
Little Egret		1	1	1	13
Red-capped Plover		10	15	6	12
Black-fronted Plover			10		1
Masked Lapwing	2	1	70	10	4
Red-necked Stint +		1	15		11
Pied Stint		50		20	18
Silver Gull	10		2	20	
Caspian Tern	1			4	
Crested Tern	1				
Sharp-tailed Sandpiper					5
Totals = 22 species	13	10	15	12	15
Total abundance	143	175	600	1125	669

+Migratory species

Discussion

The differences existing between the waterbird communities at each of the three sites were most likely due to a variety of factors, most obvious of which can be identified. The large and diverse community at the Toukley sand flat indicated the area supplied food and/or resting requirements for those species. The size, relative isolation and sediment status of this area are the most manifest factors in attracting and retaining these birds. Terilbah Island has a slightly different avifauna. There is a high degree of human interference here and this results in a reduced abundance of shy species such as duck and teal. Furthermore, the water is usually more saline than at Toukley sand flat (Harper, 1972) and the muddier sediment retains a different benthos (Powis, 1972). Tuggerah Wharf also has a sediment different from the other sites; it is classified as 'mud' (Powis, 1975). Large beds of sea grass (predominantly *Zostera sp.* and *Ruppia sp.*) are found in the shallow water. While the precise relationship between sea grass beds and waterbirds is unknown, it almost certainly lies in the provision of food, especially for black swan.

The most obvious seasonal change in the avifauna of each site was the expected migration by some of the shorebirds. An increase during the winter of fish and crustacean eating birds, as suggested by Miller (1972), was not apparent. However, attempts to interpret the seasonal data were limited by the length of the study and the paucity of information about the movements and needs of most Australian waterbirds, especially in coastal districts.

The results of the survey show that the Tuggerah Lakes are a haven for a large and diverse community of waterbirds. If the total expanse of the Lakes had been included, the census would have contained more individuals. Other studies (e.g. Loyn, 1978) have shown that similar habitats can carry even greater numbers of waterbirds. It is claimed by many authorities (e.g. Frith, 1977) that coastal wetlands serve as refuge areas for waterbirds escaping inland droughts or dry periods. This is not the only function of these coastal areas since they carry resident populations, and some are also utilized by migrant shorebirds. However, to date there has been little reported examination of the role saline areas play in supplying waterbird habitat in Australia. Despite their undoubted importance to waterbirds such habitats are under continual pressure from industrial, recreational and residential developments (Miller, 1972).

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