

by a scientific meeting which we hope will be as interesting as the last one, so we look forward to a good turn-out of members of all categories, and bring your friends! See notice on p. 171.

BANDING OF PIED CORMORANT (*Phalacrocorax varius*)
AT PORT GAWLER, SOUTH AUSTRALIA.

R. F. Brown and M. H. Waterman.

Port Gawler is an abandoned wheat port situated near the mouth of the Gawler River, some 20 miles North of Adelaide. There are no habitations and it is now visited mostly by fishermen at weekends. The district, which is characterised by tidal samphire flats and mangroves (*Avicennia marina*) extending for some distance North and South of the old port, may be reached by traversing a raised, single track road built towards the end of last century. Close at hand is the well-known "birding" area of Buckland Park.

Pied Cormorants have been known to breed in the dense, coastal-fringing mangrove-woodland for more than 40 years. The exact location of the breeding colony varies from time to time but it is always relatively inaccessible to fishermen and others who may wish to destroy the birds.

The usual breeding place is about half a mile from the port. To reach it one must wade through the tidal mud flats and the numerous tidal creeks which form the delta of the river; and it cannot be reached from the landward side at high tide. Only 24 nestlings were banded in 1961, but in 1962 the colony was visited by banders on seven occasions when a total of 480 were banded.

The first visit took place on April 15, 1962, and subsequent trips were made on April 20, 28, May 5, 13 and 19, and June 2. Members of the Bird Banding Scheme who took part were Messrs. F. Chapman, R. Gibbs, R. C. Shearer, R. F. Brown and M. Waterman. They were assisted by friends and members of the South Australian Ornithological Association.

The nesting site covered about one acre along the bank of a narrow tidal creek. Nests were situated in mangrove trees, the heights of which varied from 15 to 30 feet. Owing to the density of the mangroves an exact count of the nests was not possible, although it is thought that there were at least 300. Among the birds banded on these excursions were

four adults caught by hand or with fowling hooks.

Up to April 3, 1963, there were 37 recoveries. One report referred to a bird found as a "Mountain Duck"! Many of the deaths may have been due to human agency (e.g. 31257, 26825 and 26627). Other birds reported as "dead" may have been shot, or washed ashore after being drowned in a fishing net. Further, although South Australia is rather sparsely populated, the colony is not very far from a fairly closely settled part of the coast. For all these reasons, it is not unlikely that a good deal of the mortality was in fact concentrated in this area initially.

Eleven of the 18 recoveries (with known date) in the first 6 months after banding fell in the period July 20 to August 21. Nine of these birds were recovered about 30 miles South of the breeding colony; and two of these (26877 and 25305) were probably sick when first seen. This suggests that there was a period of particular stress for the young birds, perhaps owing to weather (i.e. difficulty in obtaining food) or disease. Alternatively, it could mean that the bulk of the young birds may have been concentrated in the human population zone at this time.

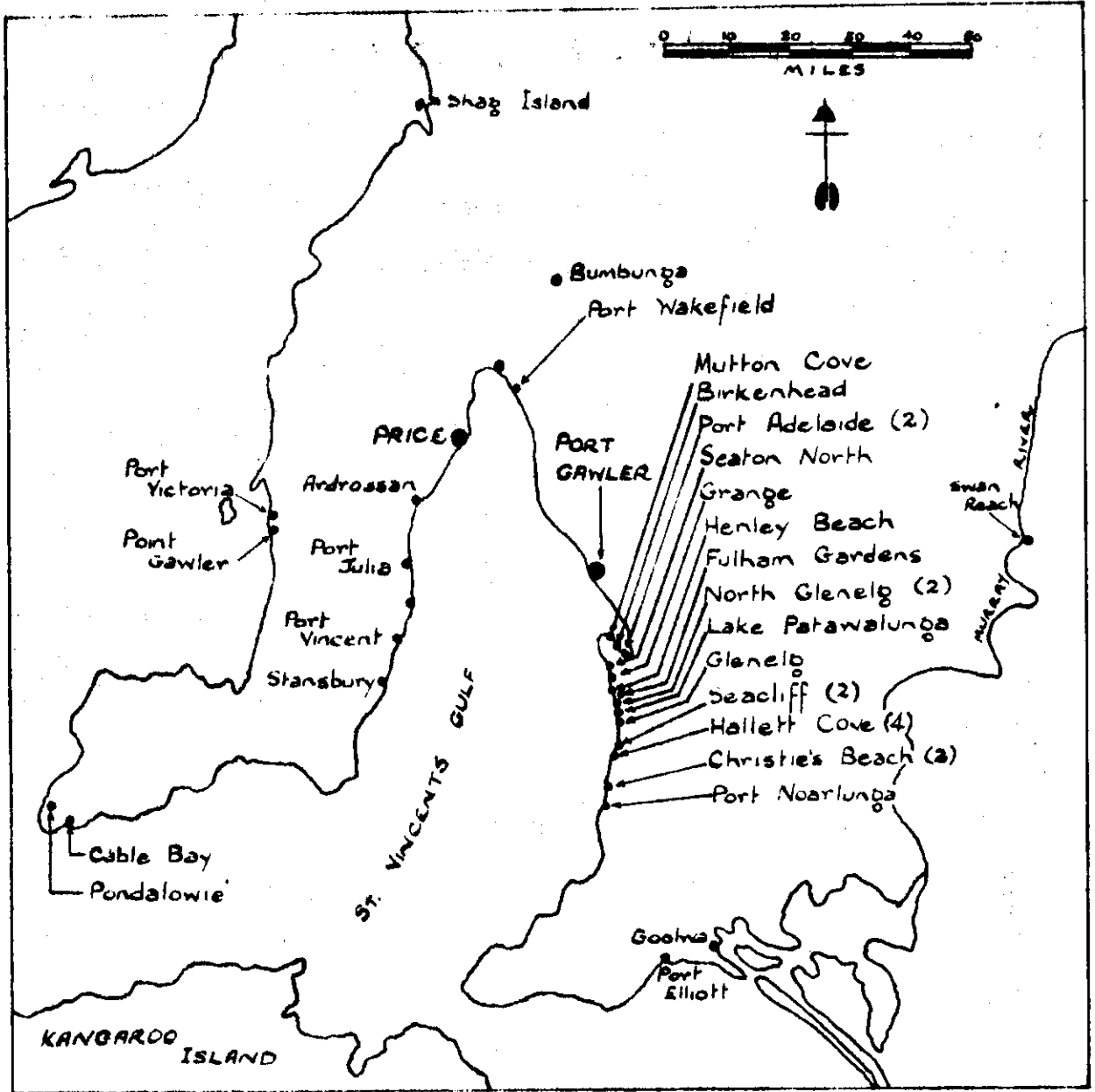
The furthest recovery, a bird banded on April 28, 1962, was found at Dimboola Reservoir, Victoria, 235 miles from the colony. Another from the same brood was found dead at Port Elliott, 61 miles from the banding site. For further details, see Table 1.

Port Gawler was twice visited this year (1963), but on both occasions the nesting place of the previous two years was deserted. Birds (about 300 were counted) congregated on the bank of another tidal creek about 100 yards away and built about 100 nests. No eggs were found in those nests inspected and the birds dispersed without completing the breeding cycle at this spot.

However, some 5 miles south is a roosting place sited in dead "drowned" mangroves in an I.C.I. salt pan. As many as 1,000 cormorants have been counted at this place, and on 27.4.63 there were 35 nests, on one of which a bird was sitting.

This smaller nesting colony came into being approximately 2 months later than is usual, and on 17.8.63 some well-grown young birds were still being fed in the nests. Other nests appeared to be occupied by sitting adults. No birds were banded at this site.

Map showing distribution of recoveries - Kingston (170m.S.S.E) and Dimboola, Vic. (235m.E.S.E) not shown.



Food of Pied Cormorants and Other Notes.

Large numbers of Jumping Mullet (Mugil cephalus), up to 9 inches in length, were seen to visit the nesting colony with the incoming tide. The fishes fed mostly on carrion - dead fishes transported to the spot by the cormorants and dead young cormorants which had fallen from the nests. On the other hand, Jumping Mullet were rarely noted in the food remains of the birds.

A random sampling of fish dropped or ejected by the cormorants on April 16, 1962, in the vicinity of seventeen nests, was as follows: 3 Spotted Whiting (Sillaginodes punctatus), sizes 4, 4, and 6 inches; 2 Leather Jackets (Cantherines sp.) both 5 inches; 3 Sand Flatheads (Platycephalus bassensis), sizes 10, 10, and 6 inches; 1 Trumpeter (Helotus sexlineatus), 5 inches; 2 Weedy Whiting (Neo-odax waterhousei), both 6 inches; 1 Red Mullet (Upeneus porosus), 9 inches; 1 Toad Fish (Spheroides pleurogramma), 4 inches.

On the same day, a member of the Banding Scheme observed an adult cormorant regurgitate what must have been its complete catch - 8 Trumpeters, all about 5 inches long; three were partly digested.

Other species of fishes noted at the colony were Estuary Catfish (Cnidogobius macrocephalus), Pipefish (Syngnathus sp.), Sand Mullet (Myxus elongatus), Salmon Trout (Arripis trutta), Tommy Ruff (A. georgiana), Trevally (Caranx georgianus), Coral Fish (Chelmonops truncatus) and an unknown species of weedfish (Petraites).

The colony was visited at times by the following birds - Whistling Kites (Haliastur sphenurus), Silver Gulls (Larus novae hollandiae) and Ravens (Corvus coronoides) - in search of dead fish and casualties among the young cormorants. An immature White-breasted Sea-Eagle (Haliaeetus leucogaster) was also observed on eight occasions, apparently attracted to the place for the same reasons as the other scavengers mentioned above.

OTHER BREEDING COLONIES OF CORMORANTS.

1. Price, Yorke Peninsula: This colony is in a mangrove swamp, about $\frac{1}{2}$ mile East of the township of Price. The nesting site borders both sides of an inlet of the sea known as Shag Creek. It is the largest of the three colonies so far visited by us for banding purposes, and may be reached from the landward side only at low tide.

Altogether, seven trips were made to this place in 1963

and 1339 birds were banded.

Blood samples of the birds were taken by three members of the staff of the Adelaide University in connection with studies on Murray Valley encephalitis, but more data is needed before any positive results can be obtained.

Fishes from this colony were collected and forwarded to Mr. T. D. Scott, Curator of Fishes, S. A. Museum. He identified the following: 13 Wavy Grubfish (Parapercis haackei), largest 4 inches long; 5 Striped Perch (Helotes sexlineatus), largest 8 inches; 2 Catfish (Cnidoqlanis macrocephalus), largest 9 inches; 2 Weedy Whiting (Neo-odax sp.) largest 9½ inches; 1 Cobbler (Gymnapistes marmoratus), 5 inches; 1 Leather Jacket (Acanthaluteres brownii), 8 inches; 1 Weed Fish or Blenny (Cristiceps australis), 7 inches; 1 Red Mullet (Upeneichthys porosus), 10 inches; 1 Flathead (Platycephalus sp.) Cuttlefish (Mesembrasepia novae hollandiae).

A White-breasted Sea-Eagle was sighted on one occasion - it circled above the colony for about 15 minutes before disappearing. Other species identified in this area on various occasions included Whistling Kites, Silver Gulls, White-fronted Herons, and large flocks of Starlings (Sturnus vulgaris).

2. Port Broughton, Spencer Gulf: Fisherman's Bay, approximately 3½ miles North of Port Broughton was visited on four occasions in 1963. Although we were too late for the main breeding activity, 280 young birds were banded.

This colony (marked on the map as Shag Island) is situated on an island ½ mile from the shore; it can be reached easily at low tide. We found another species of cormorant, the Little Pied (Phalacrocorax melanoleucos) breeding at the same spot. These birds behaved differently to their larger relatives. On the approach of an intruder, the young birds quickly left the nests and were away before they could be reached. However, on our return half an hour later some at least were back in their nests as if nothing had occurred.

We managed to band 39 birds of this species on the first trip.

Acknowledgment.

We are indebted to Mr. H. T. Condon and Dr. A. M. Gwynn for assistance in preparing this account.

TABLE 1

List of recoveries of Pied Cormorant (P. varius) banded at Port Gawler 1962. Localities shown on accompanying map. All birds banded as young in colony.

<u>Band No.</u> 130-	<u>Bander</u>	<u>Date Banded</u>	<u>Site of Recovery</u>	<u>Date of Recovery</u>	<u>Distance From B.P.</u>
18968	FRHC	17.6.61	Port Adelaide	5.2.63	11m.S.
18974	FRHC	"	Cable Bay	7.2.63	95m.W.S.W.
26825	MHW	15.4.62	Goolwa	20.7.62	65m.S.S.E.
31280	MHW	"	Port Noarlunga	25.7.62	33m.S.
27008	FRHC	"	Hallett Cove	16.8.62	29m.S.
27033	FRHC	"	Christies Beach	21.8.62	31m.S.
31257	MHW	"	Stansbury	12.9.62	36m.W.S.W.
27032	FRHC	"	Seacliff	13.10.62	28m.S.
26627	RCS	"	Pondalowie Bay	2.11.62	100m.W.S.W.
26630	RCS	"	Seaton North	4.11.62	13m.S.S.E.
26838	MHW	"	Between Pt. Julia and Pt. Vincent	2.1.63	34m. W.
26807	MHW	"	Pt. Vincent	17.1.63	37m.W.
26803	MHW	"	Lake Patawalunga, Glenelg	30.1.63	24m.S.
26867	MHW	20.4.62	Henley Beach	30.6.62	23m.S.W.
26883	MHW	"	Mutton Cove	6.7.62	10m.S.
26877	MHW	"	Glenelg	24.7.62	26m.S.
"	MHW	"	Glenelg North	27.7.62	25m.S.
26876	MHW	"	Fulham Gardens	21.1.63	20m.S.
26863	MHW	"	Point Gawler Yorke Pen.	26.1.63	58m.W.N.W.
25305	MHW	28.4.62	Seacliff	5.8.62	29m.S.
25390	MHW	"	Christies Beach	5.8.62	31m.S.

<u>Band No.</u> 130-	<u>Bander</u>	<u>Date Banded</u>	<u>Site of Recovery</u>	<u>Date of Recovery</u>	<u>Distance From B.P.</u>
25311	MHW	28.4.62	Port Julia	7.8.62	31m.W.
25388	MHW	"	Hallett Cove	11.8.62	29m.S.
25375	MHW	"	Birkenhead	8.10.62	10m.S.
+25337	MHW	"	Port Elliott	27.12.62	61m.S.S.E.
25313	MHW	"	Hallett Cove	4.1.63	29m.S.
25365	MHW	"	Ardrossan	22.1.63	36m.W.N.W.
+25338	MHW	"	Dimboola Reservoir Victoria	1.3.63	235m.E.S.E.
25356	MHW	"	Port Adelaide	5.2.63	11m.S.
26985	MHW	13.5.62	Bumbunga S.A.	16.11.62	55m.N.N.W.
26994	MHW	"	Kingston Jetty	11.2.63	170m.S.S.E.
26734	MHW	19.5.62	Glenelg North	4.8.62	25m.S.
26739	MHW	"	Grange	5.8.62	20m.S.
26701	MHW	"	Port Victoria	26.12.62	57m.W.N.W.
26750	MHW	"	Nr.Pt.Wakefield	Unknown (before 13.9.62)	38m.N.N.W.
26765	MHW	2.6.62	Swan Reach S.A.	16.9.62	66m.E.
26773	MHW	"	Hallett Cove	3.3.63	29m.S.

+ Banded as 2 in brood.

F.R.H.C. = Frank Chapman
R.C.S. = Robert Shearer
M.H.W. = Max Waterman

APPENDIX.

Since this paper was prepared for publication we have received a copy of "Dispersal and Mortality in the Pied Cormorant in Western Australia" by Julian Ford (W.A.Naturalist, 1963, vol.8, No.8: 177-181 (May 31)). The trends recorded in the two reports are in general somewhat similar, but it is still too early to formulate any conclusions on the results so far available. - Ed.