SEABIRD ISLANDS No. 181

Mud Islands, Port Phillip Bay, Victoria

Location: 38°16'30"S., 144°46'00"E.; 10 kilometres east of Queenscliff, Port Phillip Bay, Vic.

Status: State Nature Reserve (proclaimed June 1961) above high water mark but including the central lagoon (proclaimed June 1985) and surrounded by the Harold Holt Marine Reserve (below high water mark). Managed by the Geelong Region, Department of Conservation, Forests and Lands in consultation with the National Parks and Wildlife Division of that Department. Listed by the International Union for the Conservation of Nature as a Wetland of International Importance and included on the Register of the National Estate.

Other Names: Swan Isles, Cygnet Island, Flat Islands. None of these is in present usage.

Description: Land area 60 ha, lagoon 26 ha; greatest dimensions 1.2 × 0.9 km; maximum height 4 m above sea level. Mud Islands are a series of low, concentric sand dunes formed on an extensive sand shoal and anchored by outcroppings of shelly beach rock[3]. These surround a shallow tidal lagoon connected to the sea by narrow channels which separate the three present islands (Fig. 1). The surrounding waters are shallow and at low tide extensive sandspits extend from the south and north-west shores. The conformation and shapes of the islands, sandspits and channels are constantly changing[3,12]. Four islands have been recognized in the past and given the unofficial names of Boatswain, Middle, Eastern and Western Islands. At present Eastern and Middle Islands are joined and Western Island has been greatly reduced by erosion. For the purposes of this paper the individual islands will be named Boatswain, Eastern and Northern Islands (Fig. 1).

In association with the changing physiography, the vegetation of Mud Islands is complex and dynamic. A comparison of species complements recorded by Campbell in 1906[14], Willis[32] and Yugovic[33] reveals numerous changes: Three

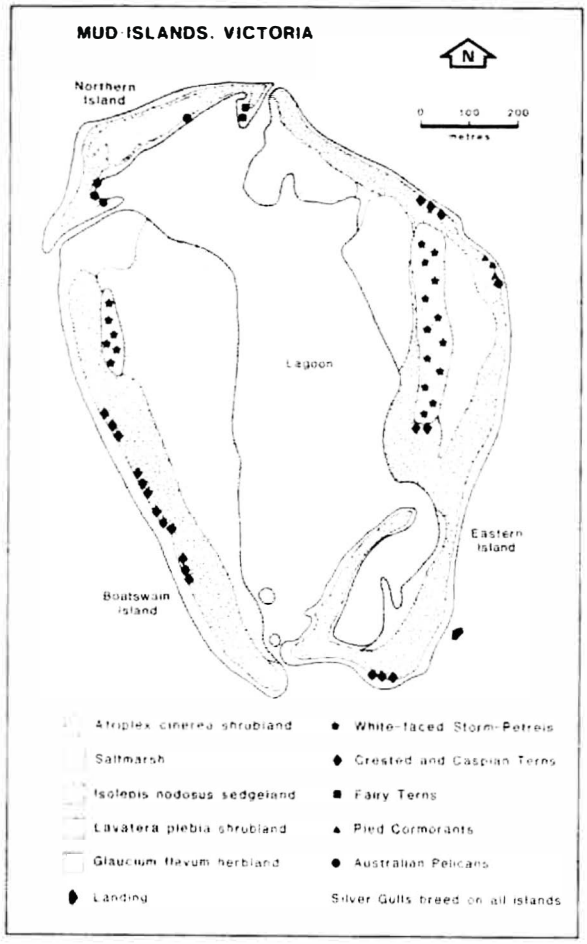
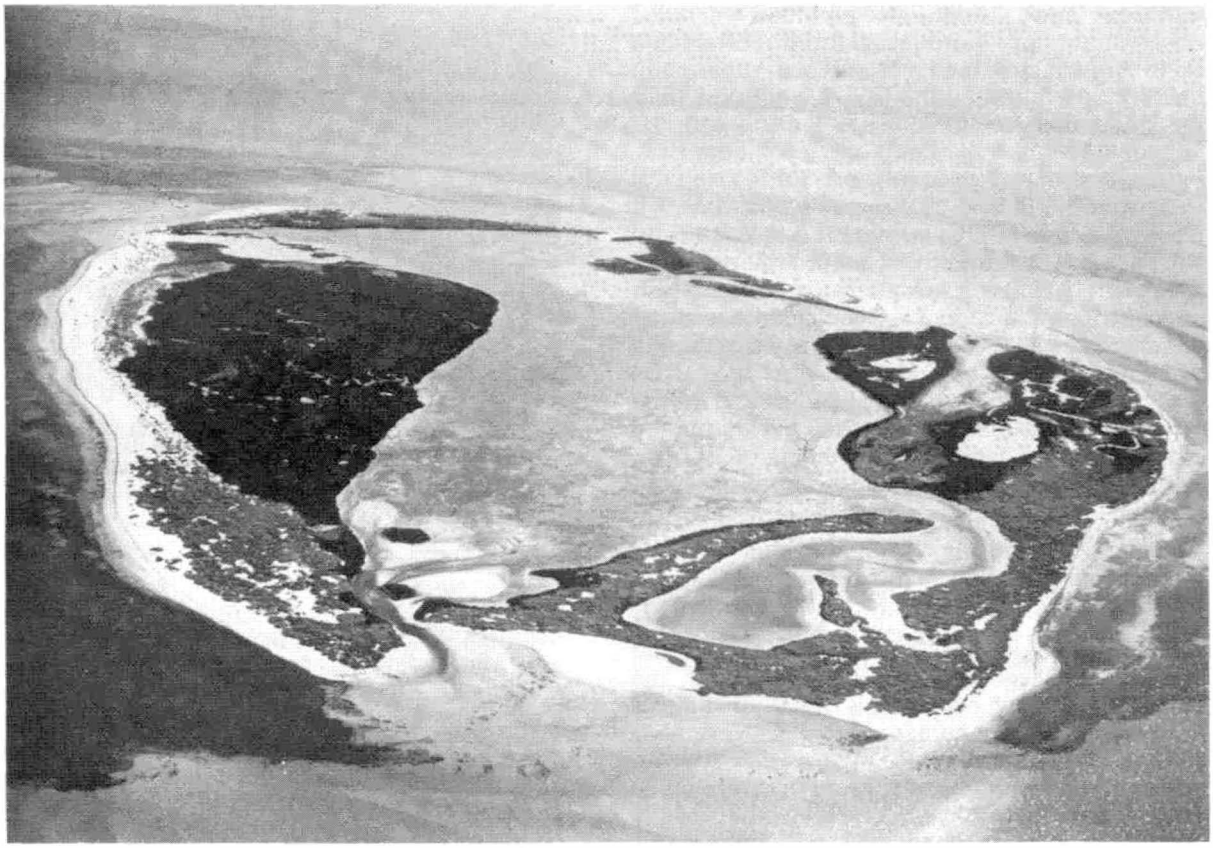


Figure 1. *Map of Mud Islands showing present conformation, major vegetation communities and seabird breeding areas.*

native shrub species listed by Campbell were apparently extinct by 1945[32] (*Calocephalus brownii*, *Helichrysum paralium* and *Olearia axillaris*); the native shrubs *Lavatera plebeia* and *Solanum laciniatum*, which were absent in 1945[32] and in 1972 (G. W. Carr unpublished data), are now dominant over, or rapidly colonizing, large areas; a tall shrubland of *Leucopogon parviflorus*



• *Mud Islands, summer 1975-76 (looking north).*

Photo: K. R. Kerry

at the northern end of the islands has been entirely lost due to erosion; and the number of alien species has risen from 10 in 1945 to 59 in 1984[33].

Eight terrestrial vegetation communities were defined by Yugovic[35]. The most significant of these for seabirds are those comprising the sandridge flora: *Atriplex cinerea* shrubland, *Lavatera plebeia* shrubland, *Isolepis nodosa* sedgeland, *Glaucium flavum* herbland and *Cakile maritima* herbland (Fig. 1). The extent of *Cakile maritima* varies greatly according to storm tide levels. The remaining three communities are saltmarsh communities little used by seabirds (*Sarcocornia quinqueflora* herbland, *Sclerostegia arbuscula* shrubland and *Stipa stipoides* grassland).

Landing: Deepest and closest approach is along the south-eastern shore.

Ornithological History: Although first sighted by Europeans in February 1802, and probably subsequently frequently visited by parties from the nearby Sullivans Cove settlement[22], ornithologists did not take an active interest in Mud Islands until near the turn of the century. Campbell[4] recorded eggs of the White-faced Storm-Petrel collected on Mud Islands in 1882 and Belcher visited in 1901[2]. Townsend[27] was primarily responsible for stimulating interest in the ornithology of Mud Islands, visiting them in December 1902 and January 1903 when he prepared the first bird list and documented the destruction of White-faced Storm-Petrel colonies by guano miners. Guano, which probably resulted largely from Australian Pelican colonies[9], was mined intermittently on Boatswain and Northern Islands between 1860 and about 1903. Subsequently, Mattingley[14], Campbell and Mattingley[6], Campbell[5] and

Gillham and Thomson[9] provided detailed observations on White-faced Storm-Petrels and their breeding habitat. Numerous subsequent observers have visited the Islands and some have published their observations (e.g. 7, 13, 20, 25, 26).

Between 1914 and 1919 members of the Bird Observers Club (BOC) visited the Islands to band White-faced Storm-Petrels[8] as did Campbell in 1931[5]. In 1955 the Altona Survey Group began annual trips to band storm-petrels and document the avifauna. In 1962 the newly-formed Victorian Ornithological Research Group (VORG) assumed responsibility for the banding and for the next 18 years banding was carried out during the last weekend of January by members of VORG, BOC and the Geelong Field Naturalists Club. Data resulting from this work have been analysed by Menkhorst *et al.*[19] and a species list for the Islands was prepared[28]. All progress reports of this study were listed by Menkhorst[16].

Since the mid 1970s staff of the Fisheries and Wildlife Service have frequently visited the Islands to monitor populations of breeding Silver Gulls and to control human visitors. In November 1978 M. P. Harris and R. S. Brown conducted censuses of breeding seabirds[10,11]. Since 1980 regular visits have been made by members of the Victorian Wader Study Group to census shorebirds and other observers have visited in winter to census Orange-bellied Parrots. Since 1979 D. G. Nicholls has organized annual visits to band Silver Gulls.

Breeding Seabirds and Status

Eudyptula minor Little Penguin — One or two pairs observed breeding each year between 1964 and 1969[20] and in 1987.

Pelagodroma marina White-faced Storm-Petrel — Breeding has been recorded since 1882[4]. Burrows are cleaned out in September or October, eggs are laid in November and most young fledge in February. The colonies were apparently once more extensive: Mattingley[14] estimated that they covered 10-11 acres (4-4.5 ha) but the present colonies cover less than 2 ha and contain about 5 600 nesting burrows (95% confidence limits 4 400-6 900)[17]. Estimates since 1966 suggest little change in breeding population[19] (Note that the estimate of 50 000 burrows given by Campbell and Mattingley[6] was later amended to 5 000 by Campbell[5]). Formerly bred over several areas on Boatswain, Eastern and Western Islands, but now confined to a long narrow dune on Eastern Island (the 'Airstrip') and the north end of Boatswain Island. Breeding on Western Island and Eastern Island (apart from the 'Airstrip') apparently ceased in the late 1960s. The Boatswain Island colony was flooded by high seas in 1964[30] and subsequently only 200-300 pairs bred there until the early 1980s when this colony increased to some 1 000 pairs in 1984. There is some evidence of a corresponding decrease in numbers breeding at the 'Airstrip' colony, possibly due to the invasion of this area by breeding Silver Gulls. Vegetation on the colony sites is usually sparse and low, for example herbland dominated by *Glaucium flavum* and *Conyza bonariensis*, and was probably maintained in this condition by grazing Rabbits[9,35]. Rabbits were almost entirely exterminated in the early 1980s and the 'Airstrip' colony has subsequently been invaded by the shrubs *Lavatera plebeia*, *Atriplex cinerea* and *Solanum laciniatum*. The resulting shrubland has provided excellent breeding habitat for Silver Gulls which now dominate all but the most dense stands.

• *The main White-faced Storm-Petrel colony (the 'Airstrip') in the late 1960s.*

Photo: T. W. Pescott

Pelecanus conspicillatus Australian Pelican — First recorded breeding in 1983 although bone remains and guano indicate an extensive breeding

• *The 'Airstrip' in July 1986 showing the development of* Lavatera plebia *shrubland.*
Photo: P. W. Menkhorst

colony in the past[9]. Small numbers have bred successfully on Northern and Eastern Islands in 1983, 1985 and 1986[17,18] and 1987. Eggs were laid from late July to September and young fledged in November and December.

Phalacrocorax varius Pied Cormorant — First definitely recorded breeding in 1986 when 34 nests were found in *Atriplex cinerea* shrubland growing on the easternmost point of Eastern Island. Seventeen of the nests contained eggs on 27 July. In September 1987, 106 nests were present and at least 70 young were fledged in that year. Belcher[2] provided evidence of an extensive colony of Pied Cormorants at Mud Islands in the 1890s and J. H. Reed observed cormorant nests there about 1931 (in litt. to W. R. Wheeler).

Haematopus longirostris Pied Oystercatcher — Up to 10 pairs nest annually, e.g. Tarr[25] found 20 juveniles in November 1951.

Haematopus fuliginosus Sooty Oystercatcher — There have been several reports of a Sooty Oystercatcher mated with a Pied Oystercatcher at Mud Islands[26-29] (PWM pers. obs. 1984, I. D. Temby, NPWS pers. comm. 1986) and in 1974 a Sooty Oystercatcher chick was banded[1] (D. Moroney, VORG pers. comm.). No other breeding has been recorded.

Larus novaehollandiae Silver Gull — First recorded breeding in 1959 when five pairs bred[20]. The colony grew slowly to about 1 000 pairs in 1970[20]. In the late 1970s the population exploded and had reached 40-50 000 pairs by 1986. Nests are found over the entire area above high tide level except for the *Glaucium flavum* herbland at the north end of Boatswain Island. Nest densities are highest in *Isolepis nodosa* sedgeland on Northern Island and throughout the *Atriplex cinerea* shrubland on Boatswain and Eastern Islands. Colour marking has shown that birds breeding at Mud Islands feed throughout the suburbs of Melbourne, especially on rubbish tips in the south-eastern suburbs and Mornington Peninsula (I. D. Temby, NPWS, pers. comm.).

Hydroprogne caspia Caspian Tern — Usually 20 to 25 pairs nest in loose colonies. Eggs are laid between late September and early November. Nesting areas vary but in recent years have all been on bare sand or in *Cakile maritima* herbland along the western shore of Boatswain Island. Formerly often nested at the north end of the 'Airstrip' on Eastern Island.

Sterna nereis Fairy Tern — Previously bred annually on shingle banks at various sites around the Islands. Up to 100 nests were reported during the 1960s and early 1970s. In recent years breeding has been infrequent and has involved only about 10 pairs, usually on a shingle bank near the channel between Northern and Eastern Islands.

Sterna bergii Crested Tern — Has bred annually since 1966 but apparently not recorded prior to then[31]. Numbers have increased in the late 1970s-early 1980s and 800-1 000 pairs now breed[10] (pers. obs.). Breeds in *Cakile maritima* herbland at various points along the western shore of Boatswain Island or the southern shore of Eastern Island and has bred at the south end of the 'Airstrip'. Eggs are laid in late October and November and most young have left the nest by late December.

Factors Affecting Status

The numerous changes in physiography of Mud Islands have strongly influenced the locations and

size of seabird colonies there. Widening and deepening of the entrance to Port Phillip Bay, and the dredging of the shipping channels, changed the patterns of currents and resulted in physiographic changes to the sand shoals and, consequently, to Mud Islands. The most dramatic changes have been the erosion of most of Western Island (whose remnants form Northern Island) and the loss of North Cape with its tall *Leucopogon parviflorus* shrubland.

The long-term effects of guano mining are largely unknown as there are no detailed records of seabird colonies before mining began. However, the introduction and proliferation of European Rabbits *Oryctolagus cuniculus* resulted in significant long-term changes to the vegetation and probably contributed to erosion of storm-petrel colonies. Since the early 1980s, when the rabbit population was almost exterminated, a dense regrowth of shrubs and weeds has created further favourable breeding habitat for Silver Gulls. The enormous increase in the breeding population of Silver Gulls appears to have placed increased pressure on breeding terns through direct predation of eggs and pulli, as well as harassment. However, evidence of significant predation or harassment of White-faced Storm-Petrels is lacking. In the late 1920s breeding colonies of Pied Cormorants were apparently destroyed by fishermen (J. H. Reed in litt. to W. R. Wheeler).

With increasing frequency, visitors to Mud Islands cause disruption to breeding pelicans, cormorants, terns, oystercatchers and Red-capped Plovers. People walking on the beaches and sandspits inadvertently flush incubating birds, leaving the eggs and young exposed to predation by Silver Gulls. Few, if any, visitors walk over the present storm-petrel colonies as these are in rather uninviting situations.

Other Seabirds Recorded

Phalacrocorax carbo	Great Cormorant
Phalacrocorax sulcirostris	Little Black Cormorant
Phalacrocorax melanoleucos	Little Pied Cormorant
Larus pacificus	Pacific Gull
Larus dominicanus	Kelp Gull
Sterna hirundo	Common Tern
Sterna albifrons	Little Tern

• Cakile maritima *herbland, Boatswain Island, February 1984.*

Photo: P. W. Menkhorst

Banding

Eudyptula minor — two adults banded in 1968.

Pelagodroma marina — some of the earliest bird banding in Australia was conducted on this species at Mud Islands[8,15,23,24]. Forty-four White-faced Storm-Petrels were banded in 1914 and a further 192 adults were banded between 1915 and 1919. No further banding took place at Mud Islands until January 1955 when a long-term banding study of the White-faced Storm-Petrel commenced. During this project, which ceased in 1980, 12 652 storm-petrels were banded and about 2% recovered[19]. An unconfirmed recovery, almost certainly from Mud Islands, was from 65 km north-west of Geraldton, Western Australia. Another bird was recovered in November of its second year on a ship off Cape Otway, 130 km south-west of Mud Islands[19].

Pelecanus conspicillatus — ten pulli banded in 1983, two in 1985.

Phalacrocorax varius — 68 pulli banded in October 1987.

Haematopus fuliginosus — one pullus banded 1974.

Larus novaehollandiae — small numbers banded annually between 1960 and 1965 and in 1974. Between 1979 and 1987 11 300 pulli were banded by D. G. Nicholls and 2% have been recovered. Recoveries from Victoria, NSW, Tas., and Qld (up to 1 450 km from banding site).

Hydroprogne caspia — One adult and one pullus in 1963.

Sterna bergii — 11 adults, and seven pulli banded in 1981, 484 pulli in December 1986 and 400 pulli in December 1987.

Sterna nereis — Ten adults, 32 pulli and two juveniles banded between 1961 and 1965.

Bibliography

1. Anonymous (1974). Mud Island campout, 27-29 January 1973 and 26-28 January 1974. *VORG Notes* 10(1): 7-10.
2. Belcher, C. F. (1914). The Birds of the District of Geelong, Australia. Griffiths: Geelong.
3. Bird, E. C. F. (1973). Physiographic changes at Mud Islands, Port Phillip Bay. *Victorian Nat.* 90: 157-165.
4. Campbell, A. J. (1900). Nests and Eggs of Australian Birds. Author: Sheffield.
5. Campbell, A. G. (1933). The White-faced Storm-Petrel. *Emu* 33: 86-92.
6. Campbell, A. G. and A. H. E. Mattingley, (1907). A rookery of storm petrels. *Emu* 6: 186-192.
7. Carter, M. J. (1970). Birds at Mud Island, 24, 25 and 26 January 1970. *VORG Notes* 8(5a): 5-10.
8. Chandler, L. G. (1959). The first banding of birds in Australia. *Aust. Bird Watcher* 1: 11-14.
9. Gillham, M. E. and J. A. Thomson. (1961). Old and new storm petrel colonies in Port Phillip Bay, Victoria. *Proc. R. Soc. Vict.* 74: 37-46.
10. Harris, M. P. (1979). The seabirds of Victorian islands. Unpublished report to the Ministry for Conservation, Victoria. ITE Project Report No. 588.
11. Harris, M. P. and F. I. Norman. (1981). Distribution and status of coastal colonies of seabirds in Victoria. *Mem. Natn. Mus. Vict.* 42: 89-106.
12. Keble, R. A. (1947). History and geology of Mud Islands. *Mem. Natn. Mus. Vict.* 15: 131-138.
13. Klapste, J. (1975). Some notes from Mud Islands. *Aust. Bird Watcher* 6: 79-82.
14. Mattingley, A. H. (1907). A trip to Mud Islands, Port Phillip. *Victorian Nat.* 24: 4-12.
15. Mattingley, A. H. E. (1942). History of the banding of birds in Australia. *Bird Observers Club Monthly Notes*, May 1942.
16. Menkhorst, P. W. (1982). A bibliography of research by the Victorian Ornithological Research Group, 1962-1981. *Corella* 6: 105-113.
17. Menkhorst, P. W. (1985). Further breeding of Australian Pelicans at Mud Islands, Victoria. *VORG Notes* 21: 47.
18. Menkhorst, P. W., G. W. Davey and D. G. Nicholls, (1983). Australian Pelicans breeding at Mud Islands, Victoria. *VORG Notes* 19: 43-44.
19. Menkhorst, P. W., T. W. Pescott and G. F. Gaynor, (1984). Results of banding White-faced Storm-Petrels *Pelagodroma marina* at Mud Islands, Victoria. *Corella* 8: 53-60.
20. Pescott, T. (1970). Mud Island — some background notes. *VORG Notes* 8(5): 11-14.
21. Pescott, T. (1977). Mud Island campout 1977. *Geelong Nat.* 14(2): 46-48.
22. Shillingaw, J. J. (1872). Historical records of Port Phillip: the first annals of the colony of Victoria. Facsimile edition (1972) ed. by C. E. Sayers. Heinemann: Melbourne.
23. Stone, A. C. (1918). Report on the ringing of wild birds. *Emu* 18: 230.
24. Stone, A. C. (1919). Report on the ringing of wild birds. *Emu* 19: 236.
25. Tarr, H. E. (1952). Notes from Mud Island, Vic. *Emu* 52: 220.
26. Tarr, H. E. (1954). Mud Island revisited. *Bird Observer* February 1954.
27. Townsend, S. P. (1903). A trip to Mud Island, Port Phillip Bay, with notes on the White-faced Storm-Petrel *Pelagodroma marina*. *Victorian Nat.* 19: 166-170.
28. Wheeler, R. (no date). Birds of Mud Islands, Victoria. Unpublished bird list. Bird Observers Club, Melbourne.
29. Wheeler, R. (1958). Report of the Altona Survey Group, July 1958 — Mud Island revisited. *Bird Observer* No. 321.
30. Wheeler, R. (1964). Mud Island report: 25-27 January 1964. Unpublished report to Fisheries and Wildlife Division, Victoria.
31. Wheeler, R. (1966). Mud Island — January 29-31, 1966. *VORG Notes* 3(12): 5.
32. Willis, J. H. (1947). Flora of the Mud Islands, Port Phillip Bay. *Mem. Natn. Mus. Vict.* 15: 138-143.
33. Yugovic, J. V. (in prep.). Vegetation of Mud Islands, Port Phillip Bay, Victoria.

Acknowledgements

We are grateful to Jeff Yugovic and Geoff Carr for providing unpublished data on vegetation and to Kim Lowe (Australian Bird and Bat Banding Schemes), Ian Temby and David Nicholls for information on banding conducted at Mud Islands. Dr Ian Norman, Trevor Pescott, Ian Temby and Jeff Yugovic provided helpful comments on an earlier draft.

Date compiled: November 1987.

P. W. Menkhorst, National Parks and Wildlife Division, Department of Conservation, Forests and Lands, P.O. Box 137, Heidelberg, Victoria, 3084.
K. R. Kerry, Antarctic Division, Department of Science, Channel Highway, Kingston, Tasmania, 7150.
E. F. Hall, Amaroo, RSD 4542, Euroa, Victoria, 3666.