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**The Natural History of
Two Peoples Bay Nature Reserve,
Western Australia**

Edited by A.J.M. Hopkins, G.T. Smith and A. Danks

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CONTRIBUTORS

Mr G.A. Bartle, CSIRO Division of Water Resources, Private Bag, Wembley, Western Australia, 6014.

Dr A.A. Burbidge, Department of Conservation and Land Management, Western Australian Wildlife Research Centre, PO Box 51, Wanneroo, Western Australia, 6065.

Mr G.R. Chatfield, 30 Shophouse Road, Twerton, Bath, United Kingdom BA2 1ED.

Mr N.J. Coy, 'Coywrite' PO Box 2284 Esperance, Western Australia 6450.

Mr A. Danks, Department of Conservation and Land Management, South Coast Regional Office, 44 Serpentine Road, Albany, Western Australia, 6330.

Mr G.L. Folley, Barnes Road, Denmark, Western Australia, 6333.

Dr S.A. Halse, Department of Conservation and Land Management, Western Australian Wildlife Research Centre, PO Box 51, Wanneroo, Western Australia, 6065.

Dr R. Hart, Hart, Simpson and Associates Pty Ltd, Environmental Consultants, 21 Rankin Road, Shenton Park, Western Australia, 6008.

Ms J.M. Harvey, Department of Conservation and Land Management, Western Australian Wildlife Research Centre, PO Box 51, Wanneroo, Western Australia, 6065.

Dr P.A. Hesp, Geomarine Pty Ltd, PO Box 67, Chippendale, New South Wales, 2008.

Mr R.N. Hilton, 62 Viewway, Nedlands, Western Australia, 6009.

Mr A.J.M. Hopkins, Department of Conservation and Land Management, Western Australian Wildlife Research Centre, PO Box 51, Wanneroo, Western Australia, 6065.

Dr S.D. Hopper, Director of Kings Park and Botanic Garden Perth, Western Australia 6000.

Mr W.M. McArthur, 60 Davey Road, Alfred Cove, Western Australia, 6154.

Mr L.A. Moore, CSIRO Tropical Forest Research Centre, Atherton, Queensland, 4883.

Dr Phillip E. Playford, retired Executive Director, Geological Survey of Western Australia. Department of Mines, 'Mineral House', 100 Plain Street, Perth, Western Australia, 6000.

Dr G.T. Smith (dec.) formerly of CSIRO Division of Wildlife and Ecology, LMB4, PO Midland, Western Australia, 6056.

Mr R.E.S. Sokolowski, Department of Conservation and Land Management, Western Australian Wildlife Research Centre, PO Box 51, Wanneroo, Western Australia, 6065.

Dr A.W. Storey, Department of Conservation and Land Management, Western Australian Wildlife Research Centre, PO Box 51, Wanneroo, Western Australia, 6065.

Dr A. Stoneburner, Department of Botany, The University of Georgia. Athens, Georgia, USA, 30602.

Mrs K. Syme, Nornalup Road, Denmark, Western Australia 6333.

Mr A A.E. Williams, Department of Conservation and Land Management, Western Australian Wildlife Research Centre, PO Box 51, Wanneroo, Western Australia, 6065.

Professor R. Wyatt, Department of Botany, The University of Georgia, Athens, Georgia, USA, 30602.

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By A.J.M. Hopkins, G.T. Smith and A. Danks

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4	Geology	PE Playford					
5	Landforms & Soils	MW McArthur & GA Bartle					
6	Beaches & Dunes	P A Hesp					
7	Climate	AJMH, WMMcA & GAB					
8	Larger Fungi	KA Syme & R Hilton					
9	Bryophytes	R Wyatt, A Stoneburner & SD Hopper					
10	Vascular Flora	AJMH, JM Harvey, LAMoore & GTS					
11	Vegetation	AJMH, AAE Williams & JM Harvey					
12	Banksias & Eucalypts	SD Hopper & GL Folley					
13	Aquatic Ecosystems	NJ Coy, SD Halse					
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@NO. = 3.2

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@BODY1 = The Wilson family's fishing sheds located on Lease 7132 at the mouth of Gardner Creek. The boat shed is the building nearest to the photographer (H.B. Shugg, photo).

@NO. = 3.6

@BODY1 = Observation platform overlooking Two Peoples Bay and constructed as part of the self-guiding nature trail (G.L. Folley, photo).

@NO. = 3.7

@BODY1 = Synoptic charts for 2,3,4 August 1984, illustrating the development of the southerly storm which severely eroded Two Peoples Bay (original data from the Bureau of Meteorology).

@NO. = 3.8

@BODY1 = View of weed bank deposited by the 1984 storm; looking south-east to the access road. Note lagoon backed up behind the weed rack (G.L. Folley, photo).

@NO. = 3.9

@BODY1 = Sketch of beach profile showing extent of storm erosion (adapted from site sketch by G.L. Folley in August 1984).

@NO. = 3.10

@BODY1 = This photo illustrates the extensive foredune erosion caused by the 1984 storm. The observer is 1.7 m tall (G.L. Folley, photo).

@NO. = 3.11

@BODY1 = This unobtrusive road bridge over Gardner Creek is often the visitors' introduction to the natural ambience of the Reserve (N.J. Coy, photo).

@NO. = 3.12

@BODY1 = A beached Minke Whale being rescued single-handedly by Reserve Assistant Dave Wilson - a reminder of the days when the Bay was an important whalers' venue (J. Edwards jnr. photo).

@NO.SPACE = 4.1

@BODY1 = Map of the Geology of the Two Peoples Bay area.

@NO.SPACE = 5.1

@BODY1 = Map of the Landforms and Soils structure in the Two Peoples Bay area.

@NO. = 5.2

@BODY1 = Limestone platform at Sinker Reef along the southern shoreline of the Reserve (W.M. McArthur, photo).

@NO. = 5.3

@BODY1 = An exposed granite section on Mt Gardner, looking north-west across the Bay to the distant Stirling Range. The conical Reservoir Hill is centre background (G.T. Smith, photo).

@NO. = 5.4

@BODY1 = Podsol profile showing the well-defined B Horizon at c. 1 m, near the north shore of Moates Lake (W.M. McArthur, photo).

@NO. = 5.5

@BODY1 = The parabolic unstable dunes (Mu) as seen from the north across Moates Lake (M. & I. Morcombe, photo).

@NO. = 5.6

@BODY1 = The granitic Coffin Island, as seen from Webster Hill, looking south-east down Coffin Gully (G.T. Smith, photo).

@NO.SPACE = 6.1

@BODY1 = Map of the beach and dune systems of the Two Peoples Bay-Nanarup area.

@NO. = 6.2

@BODY1 = South coast dunes and beach west of Rocky Point. Note the wide surfzone and steep foredunes subject to frequent storm erosion (S.D. Hopper, photo).

@NO. = 6.3

@BODY1 = A low profile section of the large dunes south of Moates Lake. Water lies in some of the swales and other portions remain vegetated (G.T. Smith, photo).
@NO. = 6.4
@BODY1 = Little Beach - one of the three 'pocket beaches' in the Two Peoples Bay area, with a narrow surfzone and moderately steep gradient (G.T. Smith, photo).
@NO.SPACE = 7.1
@BODY1 = Ombrothermic diagram showing average temperature variations at Two Peoples Bay and rainfall comparisons with the meteorological office at Albany Airport.
@NO. = 7.2
@BODY1 = Surface wind roses adapted from records maintained for Eclipse Island, between 1926 and 1972, after which meteorological recordings ceased at that locality.
@NO.SPACE = 10.1
@BODY1 = Cumulative totals of plant species in flower on the Two Peoples Bay Nature Reserve (data from Table 10.1) compared with rainfall and temperature data for the area (from Chapter 7 of this publication).
@NO. = 10.2
@BODY1 = *Stylidium plantagineum* (D. Coates, photo).
@NO. = 10.3
@BODY1 = The florescence of *Melaleuca* sp. 1 (*baxteri*) (S.D. Hopper, photo).
@NO.SPACE = 11.1
@BODY1 = Vegetation map of Two Peoples Bay Nature Reserve.
@NO. = 11.2
@BODY1 = Changes in vegetation looking north-west from Tor Hill;
@NO.INDENT = (a)
@BODY1 = 1960: Note that the vegetation through to Gardner Lake is generally low; this is probably the result of recent burning (E. Slater, photo).
@NO.INDENT = (b)
@BODY1 = 1982: Note the extent of regeneration of thicket from the granite to the lake and the clearing of farmland north of Gardner Lake.
@NO. = 11.3
@BODY1 = Changes in vegetation in Tick Flat, looking south-east to the summit of Mt Gardner;
@NO.INDENT = (a)
@BODY1 = 1960: Heath with sparse emergent *Allocasuarina* and *Eucalyptus* (E. Slater, photo).
@NO.INDENT = (b)

@BODY1 = 1982: Heath and thicket vegetation. The emergent trees and shrubs have increased in height and canopy cover since 1960 (L.A. Moore and G. Chapman, photo).
@NO.INDENT = (c)
@BODY1 = 1990: Note that changes since 1982 are relatively minor (N.J. Coy, photo).
@NO. = 11.4
@BODY1 = Changes in heath and mallee at bottom of Tick Flat, looking west across the isthmus to the mobile sand dune south of Moates Lake.
@NO.INDENT = (a)
@BODY1 = 1960: The heath vegetation south of the lakes is uniform with few *Dryandra sessilis* (E. Slater, photo).
@NO.INDENT = (b)
@BODY1 = 1982: Note the regeneration of mallee vegetation in the swale in the foreground and the emergence of *Dryandra sessilis* along the calcareous dunes to the coast (L.A. Moore and G. Chapman, photo).
@NO.INDENT = (c)
@BODY1 = 1990: Photo shows further growth of *Dryandra sessilis* in the midground and the mallee eucalypts in the swale in the foreground (N.J. Coy, photo).
@NO. = 11.5
@BODY1 = From the summit of Tor Hill looking north-east towards Mt Manypeaks.
@NO.INDENT = (a)
@BODY1 = 1960: The vegetation fringing the granite is probably in the order of 15 years old (E. Slater, photo).
@NO.INDENT = (b)
@BODY1 = 1990: The vegetation fringing the granite is now taller and more woody. Records indicate that this area has not been burnt since some time prior to 1946 (N.J. Coy, photo).
@NO. = 11.6
@BODY1 = *Agonis juniperina* Forest (T1) in wet sedgelands at the eastern end of Moates Lake (A. Danks, photo).
@NO. = 11.7
@BODY1 = Jarrah/*Allocasuarina* Low Forest (T6) north of Moates Lake (S.D. Hopper, photo).
@NO. = 11.8
@BODY1 = *Eucalyptus staerii* Low Woodland (T14) over heath in the area of the Moates traverse between Moates lake and Two Peoples Bay Road (S.D. Hopper, photo).
@NO. = 11.9
@BODY1 = Gully Thicket (S2) along the walk trail, due south of Mt Gardner (S.D. Hopper, photo).
@NO. = 11.10

@BODY1 = Coastal Dune Scrub (S4) south of Moates Lake (G.T. Smith, photo).

@NO. = 11.11

@BODY1 = Isthmus Mixed Dense Low Heath (S7) adjacent to Sinker Reef Road, looking south-east towards Mt Gardner (A.J.M. Hopkins, photo).

@NO. = 11.12

@BODY1 = Headland Mixed Dense Low Heath (S8) on deep sands near Wave Sign Gully, west of Mt Gardner (S.D. Hopper, photo).

@NO. = 11.13

@BODY1 = Granite Rock Complex (S12) near Webster Hill (G.T. Smith, photo).

@NO. = 11.14

@BODY1 = *Baumea/Juncus* Tall Sedge Swamp (V3) in a swale between Gardner Lake and The Sand Dunes (S.D. Hopper, photo).

@NO.SPACE = 12.1

@BODY1 = Map of Two Peoples Bay Nature Reserve divided into 500 m grids using Australian Map Grid co-ordinates.

@NO. = 12.2

@BODY1 = *Banksia ilicifolia*, which grows in a limited area to the north and west of Moates Lake (S.D. Hopper, photo).

@NO. = 12.3

@BODY1 = *Eucalyptus conferruminata* is one of the mallees growing on coastal granite slopes on the Mt Gardner headland (S.D. Hopper, photo).

@NO. = 14.1

@BODY1 = Drainage systems of the Two Peoples Bay area and locations of fish and aquatic invertebrate sampling points.

@NO. = 14.2

@BODY1 = Depth and water quality data from Angove, Moates and Gardner Lakes. Recordings for Moates Lake spasmodic after 1986.

@NO. = 14.3

@BODY1 = Lower reaches of the Goodga River, looking south-west over the mobile sand dunes to Mt Gardner (S.D. Hopper, photo).

@NO. = 14.4

@BODY1 = Portion of a lagoon, known locally as the 'Limpopo' section of 'Juniperina Creek', south-east of Moates Lake (S.D. Hopper, photo).

@NO. = 14.5

@BODY1 = A section of the eastern shoreline of Gardner Lake. In places the emergent sedges extend 100 m from the shoreline (S.A. Halse, photo).

@NO. = 14.6

@BODY1 = Gardner Creek, looking upstream from a low level bridge installed by the Wilson family in the early 1970s (S.D. Hopper, photo).
@NO. = 14.7

@BODY1 = Angove Lake, in summer, looking east from Reservoir Hill. Note the wide expanse of *Baumea articulata*, the dominant sedge of this wetland (S.A. Halse, photo).
@NO. = 14.8

@BODY1 = This view down West Gully is an example of the steeply sloping gullies draining Mt Gardner headland (G. Chapman, photo).
@NO. = 14.9

@BODY1 = A pair of *Platalea flavipes* yellow-billed spoonbill (M. & I. Morcombe, photo).
@NO. = 14.10

@BODY1 = *Circus aeruginosus* Marsh Harrier (M. & I. Morcombe, photo).
@NO.SPACE = 15.1

@BODY1 = *Lophoictinia isura* Square-tailed Kite (M. & I. Morcombe, photo).
@NO. = 15.2

@BODY1 = A pair of *Haliaeetus leucogaster* White-bellied Sea-Eagle (M. & I. Morcombe, photo).
@NO. = 15.3

@BODY1 = *Falco peregrinus* Peregrine Falcon (M. & I. Morcombe, photo).
@NO. = 15.4

@BODY1 = A family of *Fulica atra* Eurasian Coot (photo unknown).
@NO. = 15.5

@BODY1 = *Vanellus tricolor* Banded Lapwing (E. Lingren, photo).
@NO. = 15.6

@BODY1 = *Calyptorhynchus latirostris* Carnaby's Cockatoo (M. & I. Morcombe, photo).
@NO.SPACE = 16.1

@BODY1 = Past and present locations of the Noisy Scrub-bird (*Atrichornis clamosus*), the Western Whipbird (*Psophodes nigrogularis*) and the Western Bristlebird (*Dasyornis longirostris*).
16.2

@BODY1 = Noisy Scrub-bird male territorial boundaries in Tick Flat and Robinson Valley. Inserts show annual changes, from 1971 to 1974, of the use of two territories by resident birds. Based on Smith (1987a).
16.3

@BODY1 = Locations of Noisy Scrub-bird male territories in the lakes area of Two Peoples Bay Nature Reserve (refer to Table 16.1).

@NO. = 16.4

@BODY1 = Locations of Noisy Scrub-bird male territories on Mt Gardner headland in the Two Peoples Bay Nature Reserve (refer to Table 16.1).

@NO. = 16.5

@BODY1 = A Noisy Scrub-bird nest is well-disguised in this dense vegetation over a small gully stream (G. Chapman, photo).

@NO. = 16.6

@BODY1 = Western Whipbird territories in Tick Flat. Based on Smith (1987a).

@NO. = 16.7

@BODY1 = Western Whipbird nest and two eggs (L.A. Moore, photo).

@NO. = 16.8

@BODY1 = Locations of Western Whipbird territories in the Two Peoples Bay Nature Reserve in 1976 and 1982.

@NO. = 16.9

@BODY1 = Western Bristlebird territories in Tick Flat. Based on Smith (1987a).

@NO. = 16.10

@BODY1 = Locations of Western Bristlebird pairs in 1976 and 1982. The western boundaries of distribution (1970-1982) are also shown.

@NO.SPACE = 17.1

@BODY1 = Map of granite outcrops on Mt Gardner headland; showing streams, 100 m interval contours and granite outcrops in black. Transects A-A and B-B relate to Figure 17.2. Based on Smith (1985a).

@NO. = 17.2(a)

@BODY1 = Vegetation profile of Robinson Valley (from the east) along transect A-A, Figure 17.1: 1 = Heath; 2 = Thicket; 3 = Forest. Based on Smith (1985a).

@NO.INDENT2 = (b)

@BODY1 = Vegetation profile of Tick Flat (from the west) along transect B-B, Figure 17.1: 1 = Heath; 2 =Thicket; 3 = Forest. Based on Smith (1985a).

@NO. = 17.3

@BODY1 = Habitat selections of bird species in the vicinity of transect B-B (Fig. 17.1) in Tick Flat. Based on Smith (1987a).

@NO. = 17.4

@BODY1 = An example of Noisy Scrub-bird habitat in the forested and wet gully areas of Mt Gardner headland (G. Chapman, photo).
@NO. = 17.5
@BODY1 = An example of Western Whip-bird habitat in thicket (G. Chapman, photo).
@NO. = 17.6
@BODY1 = Closed Dense Heath; the preferred habitat for Western Bristlebirds on Mt Gardner headland (G. Chapman, photo).
@NO.SPAC = 19.1
@BODY1 = Map of fire history between 1940 and 1946 of the area now contained in the Two Peoples Bay Nature Reserve.
@NO. = 19.2
@BODY1 = Map of fire history between 1960 and 1966 of the area now contained in the Two Peoples Bay Nature Reserve.
@NO. = 19.3
@BODY1 = Map of wildfires in the Two Peoples Bay Nature Reserve (1967-1990).
@NO. = 19.4
@BODY1 = Map of management fires in the Two Peoples Bay Nature Reserve (1967-1990).
@NO. = 19.5
@BODY1 = Controlled burning activity on the Reserve (G. Folley, photo).

05/04/00 11:00

PREFACE

Two Peoples Bay Nature Reserve is one of the more important nature conservation areas along the south coast of Western Australia. This importance is based on two factors.

Firstly, it contains remnant populations of rare fauna and flora of which the best known is the Noisy Scrub-bird.

Secondly, it is a place where considerable research effort has been concentrated over almost 30 years; therefore it has the potential to serve as a model for development of management practices for the region.

This publication had its genesis in 1981 when it was proposed to prepare a management plan for the Reserve. There was a clear need to prepare a comprehensive background document to provide a basis for planning and, at the same time, it was recognized that such a document would encourage further research. The collation of information would also facilitate production of educational and interpretive material and thereby engender a greater interest in, and understanding of, the nature conservation issues of the Reserve and the State in general.

Some of the findings reported here result from studies that we began in the 1970s. Because these studies were limited in their scope and because of the need to prepare a comprehensive document, we actively solicited contributions from other people who had relevant knowledge. We wish to acknowledge the very willing support and encouragement that we received from these people and ultimately, their patience while the document was being edited.

Much has changed since the initial decision to begin writing a Bulletin on Two Peoples Bay Nature Reserve. A new Department was established in 1985 to manage nature conservation lands and waters, and vesting was formally transferred to the National Parks and Nature Conservation Authority in 1987. More importantly for the Reserve, new discoveries were made about the biota as new people became involved with the place. For example, the present Reserves Management Officer Alan Danks has continued to record new species of birds, since commencing duty in 1985. Management issues have also changed, as public pressure has continued to increase and the full impact of *Phytophthora cinnamomi* became apparent. The challenge for us as editors was to respond positively to these changes without unduly holding up publication.

This Special Publication is comprehensive but not absolutely complete. It contains a wealth of information about Two Peoples Bay Nature Reserve that will aid future management and research. It will need to be updated in due course, so we urge readers to make constructive input so that revision is possible.

Finally, we thank the many people who have contributed to the diverse studies reported here and to the preparation of this Bulletin. The studies were supported by the Western Australian Department of Fisheries and Wildlife, now incorporated into the Department of Conservation and Land Management, by CSIRO, and by a number of individuals. This support is gratefully acknowledged. We also thank Jan Rayner, Raelene Hick and Jill Pryde for word processing and typesetting. Computing support was provided by Mike Choo and Paul Gioia. Cartography was by the Mapping Branch, Department of Conservation and Land Management and the Australian Survey Office, with technical assistance from Greg Beeston, Department of Agriculture. Peter Chalmer and Roland Taylor of Environmental Drafting Services drafted most of the figures and a number of the maps.

A. Danks
A.J.M. Hopkins
G.T. Smith (Posthumously)
Editors
November 2000

PREFACE

Two Peoples Bay Nature Reserve is one of the more important nature conservation areas along the south coast of Western Australia. This importance is based on two factors. Firstly, it contains remnant populations of rare fauna and flora, of which the best known are the Noisy Scrub-bird and the Potoroo. Secondly, it is a place where considerable research effort has been concentrated over almost 30 years; therefore it has the potential to serve as a model for development of management practices for the region.

This publication had its genesis in 1981 when it was proposed to prepare a management plan for the Reserve. There was a clear need to prepare a comprehensive background document to provide a basis for planning and, at the same time, it was recognized that such a document would encourage further research. The collation of information would also facilitate production of educational and interpretive material and thereby engender a greater interest in, and understanding of, the nature conservation issues of the Reserve and the State in general.

Some of the findings reported here result from studies that we began in the 1970s. Because these studies were limited in their scope and because of the need to prepare a comprehensive document, we actively solicited contributions from other people who had relevant knowledge. We wish to acknowledge the very willing support and encouragement that we received from these people and ultimately, their patience while the document was being edited.

Much has changed since the initial decision to this Special Publication on Two Peoples Bay Nature Reserve. A new Department was established in 1985 to manage nature conservation lands and waters, and vesting was formally transferred to the National Parks and Nature Conservation Authority in 1987 (now the Conservation Commission). More importantly for the Reserve, new discoveries were made about the biota as new people became involved with the place. For example, Gilbert's Potoroo (*Potoroos gilbertii*), was rediscovered on the reserve in December 1994, more that 100 years after it was last seen in Australia. And the Reserves Management Officer up until 1998, Alan Danks, continued to record new species of birds, since commencing duty in 1985. Management issues have also changed, as public pressure has continued to increase and the full impact of *Phytophthora cinnamomi* became apparent.

This Special Publication is comprehensive but not absolutely complete. It contains a wealth of information about Two Peoples Bay Nature Reserve that will aid future management and research. It will need to be updated in due course, so we urge readers to make constructive input so that revision is possible.

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the Australian Survey Office. Peter Chalmer and Roland Taylor of Environmental Drafting Services drafted most of the figures and a number of the maps.

A.J.M. Hopkins
G.T. Smith (Posthumously)
A. Danks
Editors
November 2001

Dedication to Graeme Smith for his *c*25 years of work at Two Peoples Bay Nature Reserve on a wide range of elements of the biota – see Demis Saunders for a form of words