Two Peoples Bay Nature Reserve

Draft Management Plan

1993

Department of Conservation and Land Management

National Parks and Nature Conservation Authority

TWO PEOPLES BAY NATURE RESERVE

Draft Management Plan

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for the
National Parks and Nature Conservation Authority

WHAT DO YOU THINK ?

We want to know what you think of the proposals in this draft management plan. Have you thought about writing a submission ?

WHY WRITE A SUBMISSION ?

It is an opportunity to provide information, express an opinion, suggest alternatives and have a say on how we are proposing to manage Two Peoples Bay Nature Reserve over the next 10 years.

If you prefer not to write your own submission you could make a joint submission with others.

WHAT MAKES AN EFFECTIVE SUBMISSION ?

To ensure your submission is as effective as possible:

- make it concise and clear.
- list your points according to the subject sections (and page numbers) in the plan.
- describe briefly each subject or issue you wish to discuss.
- say whether you agree or disagree with any or all of the objectives or recommendations within each subject or just those of specific interest to you; clearly state your reasons (particularly if you disagree) and give sources of information where possible.
- suggest alternatives to deal with any issue with which you may disagree.

It is important to indicate those strategies and recommendations you agree with as well as those with which you disagree.

Each submission is important in its own right but those that give reasons for concerns, give support where appropriate and offer information and constructive suggestions are most useful.

WHAT HAPPENS TO YOUR SUBMISSION ?

All submissions will be summarised according to the topics discussed. The draft management plan will then be reviewed in the light of submissions, according to established criteria (see over). An Analysis of the Submissions will be published, including an indication of whether the plan was or was not amended in response to the comments and justification for the decisions. All submissions are confidential. If you do not want your name appearing in the list of submittors in the Analysis of Submissions please note this on your submission.

WHAT CRITERIA WILL BE USED IN ASSESSING YOUR SUBMISSION ?

1. The draft management plan *will* be amended if a submission:
   (a) provides additional resource information of direct relevance to management;
   (b) provides additional information on affected user groups of direct relevance to management;
   (c) indicates a change in (or clarifies) Government legislation, management commitment or management policy;
   (d) proposes strategies that would better achieve management goals and objectives; or
   (e) indicates omissions, inaccuracies or a lack of clarity.

2. The draft management plan *will not* be amended if a submission:
   (a) clearly supports the draft proposals;
   (b) offers a neutral statement or no change is sought;
   (c) addresses issues beyond the scope of the plan;
   (d) makes points which are already in the plan or were considered during plan preparation;
   (e) indicates strongly opposing views with the existing recommendations providing a preferred management option; or
   (f) contributes options which are not feasible (generally due to conflict with existing legislation, or Government or departmental policy).

DEADLINE

Submissions are welcome for two months following the date of release of the plan. Please ring (09) 364 0777 for enquiries.

WHERE DO YOU SEND YOUR SUBMISSION ?

Written submissions should be sent to:

Executive Director
Department of Conservation and Land Management
P.O. Box 104
COMO W.A. 6152

Attention:
Plan Coordinator (Kate Orr)
Two Peoples Bay Nature Reserve Management Plan

PREFACE

Conservation reserves in Western Australia, such as national parks, nature reserves and other similar reserves, are vested in the National Parks and Nature Conservation Authority (NPNCA), and managed on its behalf by the Department of Conservation and Land Management (CALM).

The NPNCA is responsible for preparing management plans for all land and water which is vested in it. These plans are prepared by CALM and released as drafts for public comment. After considering public comment, the NPNCA submits the revised plan to the Minister for the Environment for approval.

Plans are prepared for regions and specific areas, such as Two Peoples Bay Nature Reserve, on a priority basis. The South Coast Regional Management Plan (CALM, 1992) comprises management strategies for the Region in which Two Peoples Bay Nature Reserve is situated. Where applicable these strategies are integrated into this plan.

In addition two documents in preparation are associated with and complement this plan. The Noisy Scrub-bird Recovery Plan (Danks *et al.*, in prep) comprises management strategies to conserve this species, including continuing its translocation from Two Peoples Bay Nature Reserve (the primary location) to other suitable reserves. Relevant strategies are integrated into this plan.

The Natural History of Two Peoples Bay Nature Reserve (Hopkins and Smith, in prep.) comprises detailed resource information on the history, physical and biological environment and results of recent research. This document is not available to the public at present. Relevant information has been incorporated into this management plan.

ACKNOWLEDGEMENTS

The work of Richard McKellar as author, and Jim Williamson as coordinator, of the early versions of this document is acknowledged. The ideas and commitment of Graeme Folley, former Reserve Officer at Two Peoples Bay Nature Reserve, were invaluable.

Graeme Smith (CSIRO), Mike Freeman (WA Geological Surveys) and CALM officers Andrew Burbidge, Matt Cavana, Alan Clarke, Judith Harvey, Angas Hopkins, Lotte Lent, Terry Maher, Sue Moore, Terry Passmore, Grant Revell, Wayne Schmidt, John Watson and Dave Wilson have also made significant contributions to this plan.

Authors who have indirectly contributed to this plan through their work in the Natural History of Two Peoples Bay Nature Reserve (Hopkins and Smith, in prep.) are also acknowledged.

The efforts of Debbie Bowra in typing this plan, Land Information Branch in preparing the maps and Richard Grant in editing this plan are appreciated. Alan Danks provided the photograph for the front cover.

CONTENTS

KEY ISSUES

All issues relevant to management of the Two Peoples Bay Nature Reserve are considered in this draft management plan, however the following are considered to be key issues.

Purpose

The purpose of National Park is considered more appropriate than Nature Reserve, given its internationally recognised conservation values and opportunities for visitors. (See section 5, p11)

Zoning

Zones for special conservation, natural environment and recreation, based on the Reserves values and management requirements, are proposed. These include the need to cater for the distribution of threatened species, particularly Noisy Scrub-birds, Western Bristlebirds and Western Whipbirds, the location of areas free of dieback disease, requirements for access and fire management, present and future visitor use and ensuring boundaries are practical to manage. (See section 9, p16)

Fauna and Flora

These sections of the plan emphasise the high conservation value of the Reserve, particularly for threatened species. The Reserve has been subject to considerable research and monitoring and continued work is essential. The major habitat management requirement of the Noisy Scrub-bird is old undisturbed vegetation. This also favours the Western Bristlebirds and Western Whipbirds. Noisy Scrub-bird translocation will continue. Control of kangaroo grazing on recently burnt areas of the fuel reduced buffer (that separates the Reserves two main Noisy Scrub-bird sub-populations), is a management concern. (See sections 10, p21 and 11, p35)

Fire

Two fire management regimes are proposed; fuel reduced regime, including a fuel reduced buffer; habitat management (fire exclusion) regime within which no prescribed burning will be conducted unless research and monitoring indicates habitat is becoming unfavourable, and if so, it may be initiated. (See section 12, p42)

Disease

Most of the Reserve is infected with dieback disease which, although not confirmed until 1980, has been present for at least 40 years. Major changes to the vegetation have occurred. An understanding of the impact of the disease, particularly on threatened species, is essential. (See section 13, p49)

Information, interpretation and education

Information, interpretation and education is considered a key component of visitor use and many opportunities exist for its promotion. These will be facilitated by providing a visitor centre. Nature based tourism aimed at high quality educational experiences will be encouraged. (See section 21, p69)

Day use - facilities and access

Access and recreation areas are shown on figure 9. Proposals for the main day use area, the picnic area, are shown on the facilities concept plan, figure 10. These include new carparks and paths and continued boat launching. Other recreation areas will also be improved. New paths will be provided and others improved. When facilities are full the Reserve will be temporarily closed to further visitors.(See section 23, p75)

INDEX TO RECOMMENDATIONS

References are shown as the section number followed (in brackets) by the number of the recommendation(s).

INTRODUCTION

1. OVERVIEW

The Two Peoples Bay area, 35 km east of Albany on Western Australia's south coast, became the focus of international attention in 1961 after the rediscovery of the Noisy Scrub-bird which was thought at that time to be extinct (see Figure 1).

The Bay, named because of a chance meeting between French and American mariners in 1803, has a history of use by Aboriginal people and by maritime explorers, travellers, sealers and whalers, more recently, as a recreation destination. It was on the verge of becoming a town site when the Noisy Scrub-bird was rediscovered.

The Two Peoples Bay area was reserved as a Class A Nature Reserve for the Conservation of Fauna in 1967 to protect the Noisy Scrub-bird and its habitat. It is vested in the National Parks and Nature Conservation Authority (NPNCA) and managed by the Department of Conservation and Land Management (CALM).

The Two Peoples Bay - Mt Manypeaks area is considered to be the most significant area for endangered birds in mainland Australia (Garnett 1992a and 1992b). The conservation status of the Noisy Scrub-bird is considered endangered by Garnett (1992a, 1992b) and it is declared as "threatened" under the WA Wildlife Conservation Act. The population on the Reserve has grown from less than 100 at the time of its rediscovery to about 450 birds (1991) that occur in two main areas, on Mount Gardner and around Lake Gardner. Its favoured habitat is long unburnt vegetation[1] that provides dense cover for protection and an ample invertebrate food supply. Fire exclusion is the major habitat management requirement.

The Noisy Scrub-bird is one of a group of rare birds found in south coast heath and scrubland. This group includes the Western Bristlebird, Western Whipbird and the Ground Parrot, though the latter no longer occurs in the Reserve. Reserve management focusses on protecting these species and, as such, it is the most important factor in ensuring their future. Other threatened, specially protected and priority species also occur on the Reserve.

Most of the Reserve is infected with dieback disease which, although not confirmed until 1980, has been present for at least 40 years. Major changes to the vegetation have occurred. An understanding of the impact of the disease, particularly on threatened species, is essential.

The Reserve is a valuable research area that is easily accessable and has facilities available. Many research programs have been completed and others are underway, providing an increasingly improved basis for management.

The protected beach and waters of Two Peoples Bay, its sheltered, attractive picnic area and scenic landscape, combined with conservation interests, attract many visitors (about 34 000 in 1991-1992). This provides an ideal opportunity to provide for nature-based recreation and tourism and promote the educational aspects of the Reserve.

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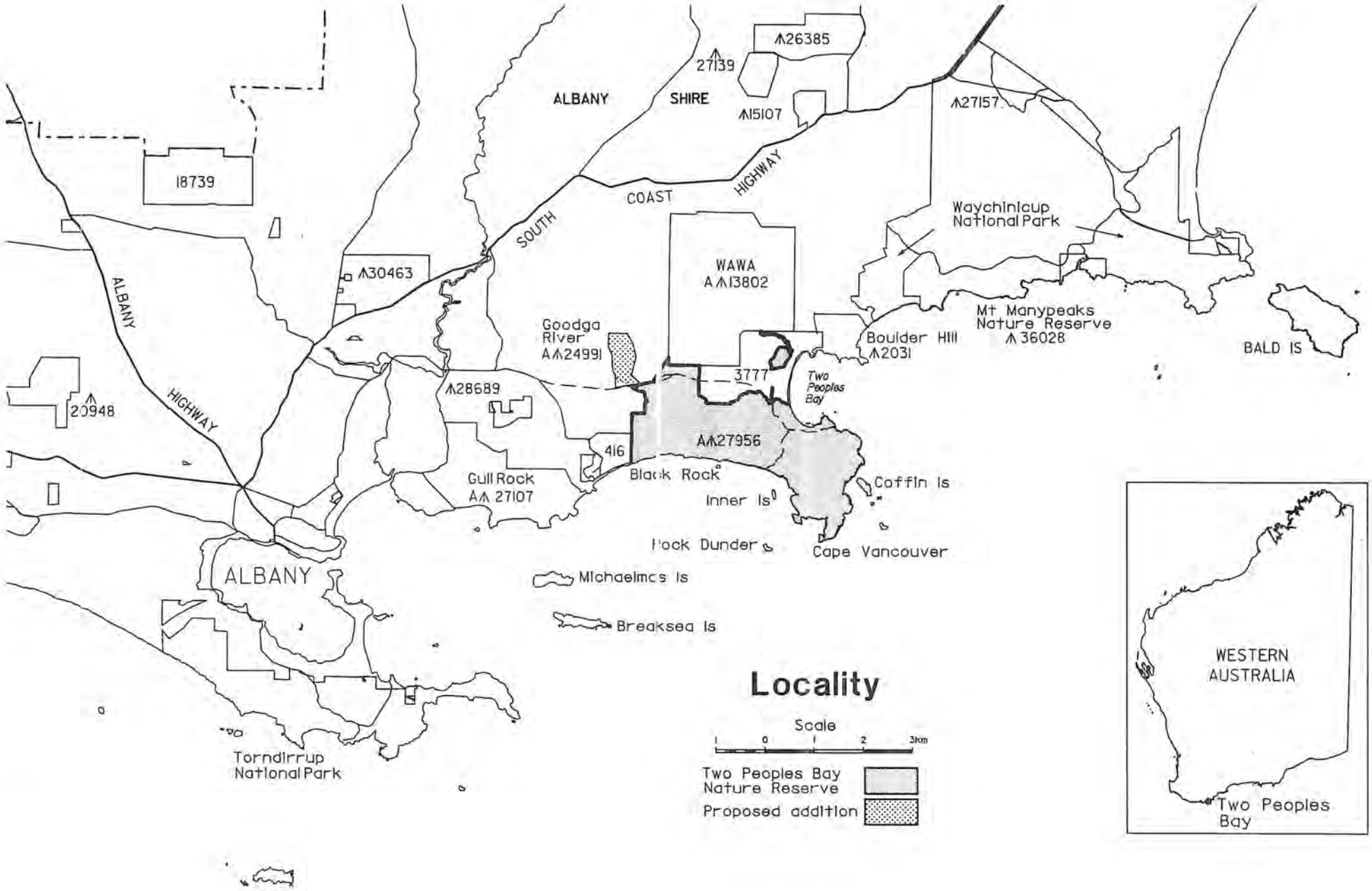
[1] Current research (1992) indicates vegetation should be at least 10 and preferably 20 to 40 years old, however further research is required.


ALBANY
SHIRE
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SOUTH
COAST
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National Park
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WAWA
AA13802
ALBANY
HIGHWAY
Goodga
River
AA24991
Mt Manypeaks
Nature Reserve
A 36028
Boulder Hill
A2031
BALD IS
3777
Two
Peoples
Bay
20948
A28689
AA27956
416
Gull Rock
AA 27107
Black Rock
Coffin Is
Inner Is
Rock Dunder
Cape Vancouver
ALBANY
Michaelmas Is
Breaksea Is
Torndirrup
National Park
Locality
Scale
0
1
2
3km
Two Peoples Bay
Nature Reserve
Proposed addition
WESTERN
AUSTRALIA
Two Peoples
Bay

VALUES

The Reserve's values include:

- the most significant area for the endangered Noisy Scrub-bird, comprising the largest and genetically most important populations and a source of birds for translocation to other areas.
- one of two areas where the endangered Western Bristlebird occurs, these being the Two Peoples Bay to Waychinicup area and Fitzgerald River National Park (located in the central south coast).
- one of a small number of locations, all of which occur in WA, where the endangered Western Whipbird occurs.
- an important area for other threatened and specially protected fauna such as the Red-eared Firetail and Western Ringtail Possum.
- the presence of threatened and other priority flora and vegetation communities.
- a significant contribution to the overall conservation value of the South Coast Region.
- opportunities for scientific study.
- Aboriginal and European history and cultural significance.
  natural resources with interpretive and educational opportunities.
- spectacular scenery.
- recreation and tourism opportunities such as bushwalking, picnicking, boating and observing nature.

MANAGEMENT CONCERNS

Management concerns for Two Peoples Bay Reserve include:

- protecting the Noisy Scrub-bird and its habitat, including
  - minimising the risk of unprescribed fire as this species relies on vegetation of an old age for habitat.
  - maintaining an effective buffer system of low fuel vegetation between the Mt Gardner and the Lakes area Noisy Scrub-bird populations to minimise the risk of a single fire burning both areas.
  - continuing research and monitoring of population dynamics and trends.
- protecting the Western Bristlebird and Western Whipbird and their habitat, including control of kangaroo grazing in the buffer area to minimise alterations to Bristlebird habitat.
- protecting threatened and other priority flora and vegetation communities.
- minimising the risk of spreading and intensifying plant disease and gaining an understanding of the impact of the disease, particularly on threatened species.
- minimising the risk of introducing bird disease.
- minimising the impacts of weeds and pests, including domestic animals, on conservation values.
- protecting rock formations, landforms and soils.
- maintaining and enhancing landscape and associated community values and minimising visual impacts associated with Reserve management.
- maintaining water quality and managing lake levels, particularly in association with impacts on Noisy Scrub-bird habitat.
- satisfying the needs and wishes of visitors, including providing suitable access and facilities, in such a way that the natural values are not impaired.
- explaining and interpreting the natural and cultural values for visitors.

- protecting Aboriginal and European history and cultural values.
- ensuring that the surrounding waters and lands are managed in sympathy with the Reserve.
- minimising the impact of commercial activities, including commercial fishing in nearby waters.
- providing adequate resources for management.

This management plan has been prepared to resolve present conflicts, to plan for future needs and to ensure the values of the Reserve are protected and maintained. It is associated with, and complementary to, the South Coast Regional Management Plan (CALM, 1992), Noisy Scrub-bird Recovery Plan (Danks *et al.*, in prep) and the Natural History of Two Peoples Bay Nature Reserve (Hopkins and Smith, in prep.).

2. NOISY SCRUB-BIRD RECOVERY PLAN

A Noisy Scrub-bird Recovery Team was established in 1992 to prepare and oversee the implementation of a Recovery Plan for the Noisy Scrub-bird. The team comprises officers from CALM, the Shire of Albany, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australian National Parks and Wildlife Service (ANPWS) and volunteers who help with translocations.

Since 1986, management of the Noisy Scrub-bird has occurred under a formal management program - CALM's Wildlife Management Program No. 2: the Noisy Scrub-bird (Burbidge *et al*, 1986). This has been reviewed and a Recovery Plan prepared for the species based on ANPWS and CALM guidelines.

The draft Noisy Scrub-bird Recovery Plan (Danks *et al.*, in prep.) describes the history of the species and summarises what is known of its biology, behaviour, habitats and life history and the conservation measures taken to conserve the Noisy Scrub-bird. An examination of the species' population size, trends and the degree of threat confirmed its status as Endangered under IUCN's recent guidelines for Threatened species.

The Recovery Plan sets out a strategy for managing the species towards full recovery. The long-term objective of Noisy Scrub-bird management is to increase the number of populations and individuals until the species can be withdrawn from threatened species lists and intensive management is no longer required.

The population size necessary to fulfil this objective is much larger than could be reached realistically within the next 10 years. For this period at least the Noisy Scrub-bird is likely to remain listed as endangered.

The Recovery Plan recognises the importance of Two Peoples Bay Reserve and the Noisy Scrub-bird populations it contains. The program outlined in the Recovery Plan requires a management plan (this plan) to be prepared and implemented, guidelines for managing other

lands on which Noisy Scrub-birds occur to be prepared, the translocation program to continue and populations to be regularly monitored. Improved information and education about the Noisy Scrub-bird, particularly at the Two Peoples Bay Reserve, is considered an important component of the Recovery Plan.

3. REGIONAL CONTEXT

The Two Peoples Bay Reserve is located in CALM's South Coast Region, one of nine CALM management regions throughout the State. A regional management plan prepared for this region (CALM 1992), provides regional management strategies for lands and waters vested under the CALM Act and wildlife responsibilities under the Wildlife Conservation Act.

The regional management plan includes information about CALM and the controlling bodies, vesting, tenure and purpose, landuse planning and management, administration, management issues and research. Relevant strategies (recommendations) from the regional management plan are included in the Two Peoples Bay area management plan (this plan), and recommendations more specific to the Reserve have been included as required.

Conservation

Two Peoples Bay Reserve is one of a number of important conservation reserves in the South Coast Region. Other major conservation reserves include Stirling Range, Fitzgerald River and Cape Arid national parks. Coastal reserves in the vicinity include Gull Rock and Waychinicup National Parks and Mt Manypeaks Nature Reserve. Other major natural areas which although not dedicated to conservation function as conservation reserves include Water Supply Reserve 13992 and Boulder Hill Reserve.

The Two Peoples Bay Reserve is significant because of the presence of the relatively large number of threatened species and the long period of intensive management and research on the Reserve.

Of the CALM managed reserves only Fitzgerald River National Park (about 330 000 ha) contains similar numbers of species of threatened fauna (Moore *et al.*, 1991). Waychinicup National Park, Gull Rock National Park and Mt Manypeaks Nature Reserve also contain several threatened species, including the Noisy Scrub-bird.

The Reserve contains a diversity of landforms and vegetation types not well represented in other CALM managed reserves in the area. It lies at the junction of the East Kalgan and Bremer vegetation systems and contains elements of both.

The Reserve also contains a wetland system composed of three lakes, each of a different type, as well as components of their catchment. The long post-fire age of most of the Reserve's vegetation, especially the heath, scrub and low forest of the Mt Gardner headland, is unique in coastal areas in the region.

The research conducted in the Reserve over the last 30 years on threatened birds, flora, vegetation, dieback and in other areas, provides background and baseline data for continuing studies which can improve conservation management of flora and fauna here and elsewhere in the Region. Continuing the Noisy Scrub-bird translocation program and intensive management will be of international and national significance as greater efforts are made to prevent further loss of species.

Visitor Opportunities

A range of visitor opportunities both on CALM and non-CALM managed lands are available relatively close to the Reserve and at Albany, the major population centre in the area. These are listed in Table 1.

Gull Rock National Park, which occurs between Two Peoples Bay and Albany, has many attractions, including close proximity to Albany and protected beaches, and is potentially more suitable for recreational activities than Two Peoples Bay Reserve. Its development as an alternative to Two Peoples Bay Reserve for visitor recreation is very important.

Access and facilities at Gull Rock are presently limited; although a range of recreation opportunities could be provided. While Gull Rock has the purpose of national park it is not vested in the NPNCA (and not managed by CALM) at present; however, it is proposed to be in the future in accordance with the South Coast Regional Management Plan (1992).

TABLE 1. MAJOR VISITOR OPPORTUNITIES IN THE VICINITY OF ALBANY

Areas listed from east to west	beach access	picnic BBQs	beach launch-ing	boat ramp	walk paths	camp sites	caravan park nearby	toilets	distance from Albany
Cheyne Beach	*	*	*				*	*	65Km
Normans Beach	*					*		*	48Km
Bettys Beach	*		*						48Km
East Bay Road	*		*			*		*	48Km
Two Peoples Bay N R	*	*	*		*			*	**35Km**
Nanarup	*	*						*	26Km
Gull Rock NP	*								31Km
Ledge Beach	*								30Km
Lower King River		*		*					11Km
Upper King River		*					*	*	11Km
Frenchman Bay	*	*	*				*	*	23Km
Murray Road	*			*					24Km
Torndirrup Nat. Park	*				*				19Km

PRINCIPAL MANAGEMENT DIRECTIONS

4. NPNCA AND CALM POLICIES

This draft plan is based on current NPNCA and CALM policies. These policies derive from legislation, principally the Conservation and Land Management Act 1984 (the CALM Act), the Wildlife Conservation Act 1950, and associated regulations. Policies are published and distributed throughout CALM as policy statements. They are available on request.

5. PURPOSE, VESTING AND TENURE

The objective is to ensure that the gazetted purpose, vesting and tenure reflect the Reserve's values.

The Reserve comprises:

- one main section of about 4510 ha containing a variety of features, including Gardner Lake, Moates Lake, Mt Gardner, mobile dunes, sandy beaches and steep rocky cliffs;
- a smaller section of about 89 ha comprising the northern portion of Angove Lake and its margin and part of Angove River, located about 2 km north of the main section of the Reserve; and
- four islands - Coffin Island, Rock Dunder, Black Rock and Inner Island - ranging in size from three to 28 ha.

The area was declared an 'A' Class Nature Reserve (A27956) in 1967. It is vested in the NPNCA for the Conservation of Fauna and is managed by CALM. The Reserve has an area of 4744.7 ha, extends to low water mark, and its values are recognised by its listing on the National Estate.

The purpose of national park is considered more appropriate for the area than nature reserve. The role of nature reserves and national parks and the criteria for designating them is outlined in the South Coast Regional Management Plan (CALM, 1992) as follows.

The role of nature reserves is wildlife and landscape conservation, scientific study and preservation of features of archaeological, historic or scientific interest.

The role of national parks is wildlife and landscape conservation, scientific study, preservation of features of archaeological, historic or scientific interest, together with recreational enjoyment by the public.

The criteria for designating nature reserves are:

- Areas to be managed for wildlife conservation and scientific study.
- Have important conservation value, either as part of a reserve system, as a remnant or because of particular speices.
- No historical commitments to inappropriate uses or activities.

The criteria for designating national parks are:

- Areas to be managed for conservation, scientific study and public enjoyment.
- The areas to have important conservation, cultural and scenic values.
- Nationally or internationally significant, in terms of landscape and/or biota.
- Size must be sufficiently great to accomodate recreation or historical uses without significantly detracting from conservation values.

Both national parks and nature reserves have high conservation values, the primary difference between them is that visitor use is facilitated in national parks with the nature and level of use varying according to the specific values and management of individual parks.

The Two Peoples Bay Reserve meets the criteria for national parks - it is internationally recognised for its very high conservation values, particularly due to the presence of the Noisy Scrub-bird, is an important area for scientific study and provides opportunities for public enjoyment and appreciation of its conservation values.

'National park' is probably the best known and understood form of conservation land and the area deserves to be held in such high esteem.

RECOMMENDATION

1. Change the purpose to National Park.

6. GOALS

The management goals reflect the Reserves special conservation values and public use.

A goal is defined as a long-term desirable aim. Goals have been set for each major part of this draft management plan. Objectives designed to achieve these goals have been set in the relevant sections. The goals for the Reserve are:

Conservation

Conserve the Noisy Scrub-bird.
Conserve other threatened, specially protected and priority fauna and flora.
Conserve other biological values and physical, cultural and landscape values.

Research and Monitoring

Seek a better understanding of the Reserve, particularly the Noisy Scrub-bird and other threatened, specially protected and priority fauna and flora, and the impact visitors and management actions have on them.

Community Relations

Promote informed appreciation and public support for the protection of the natural and cultural values and facilitate liaison with the community.

Recreation
Facilitate public enjoyment of the natural and cultural values in a manner compatible with conservation and other goals.

Commercial and Other Uses
Ensure that commercial and other uses are managed in a manner that minimises their impact on other values.

7. ADDITIONS TO THE RESERVE

The objective is to seek to incorporate appropriate additional areas of land into the Reserve.

The Reserve adjoins ocean, private property, Goodga River Reserve 24991 and other reserves (Figure 1). Adding some areas of adjoining land would enhance the Reserve's values. Proposed additions to the Reserve will be sought through the vesting of public lands in the NPNCA or, in the case of private property, through normal real estate transactions or other appropriate means. Where a proposed addition is not possible Reserve neighbours will be consulted about adopting and implementing mutually beneficial management arrangements.

Proposed additions of adjacent reserves
The Goodga River reserve (24491) is an 'A' class unvested reserve of about 300 ha for the purpose of National Park and Water. The area is recommended for vesting in the NPNCA (CALM South Regional management plan, 1992). The Reserve's values include potential Noisy Scrub-bird habitat, Western Bristlebird habitat, a species of fish considered rare by Allen, 1982 *(Galaxia truttacceous)* and declared rare flora (*Stylidium plantagineum* and *Andersonia* sp TPB Greg Keighery 8229).

Proposed additions (or management arrangements with owners) of adjacent private property
The Angove Lake and River section of the Reserve combined with private property (part location 3777) form a part of an important corridor of Noisy Scrub-bird habitat between the main section of the Reserve and Mt Manypeaks, where birds have been successfully translocated (see also Section 10). The addition of this area of private property to the Reserve would secure after some rehabilitation additional Noisy Scrub-bird habitat, provide a corridor for the species to move and allow the existing smaller section of the Reserve, which is currently surrounded by private property, to be better managed.

A small area of private property (part location 3777) between the north-west edge of Gardner Lake and Two Peoples Bay Road has been identified as a suitable site for the Reserve's management and research facilities (see Section 30).

Addition of a strip of uncleared private property (part location 3777), which abuts the eastern edge of Moates Lake, would include habitat and a corridor of the Noisy Scrub-bird to move, rationalise boundaries and improve fire management.

Addition of an area of natural vegetation on private property (part Location 416) adjoining the Reserve's western boundary would provide a corridor for the Noisy Scrub-bird to move between Two Peoples Bay Reserve and Gull Rock Reserve.

Near the Gardner Creek crossing the Two Peoples Bay Road is not aligned to the gazetted road reserve. This anomaly should be resolved. The land on the Reserve side of the road should be part of the Reserve for ease of management.

The boundary of the Angove River and Lake section of the Reserve cannot be fenced. It should be resurveyed and the boundary realigned with due regard to conservation values, particularly Noisy Scrub-bird habitat, in addition to ensuring a practical boundary for management purposes.

Other areas

Other areas may be suitable to add to the Reserve and their conservation values will be assessed should they become available.

RECOMMENDATIONS

1. **Seek addition of, or management arrangements for, appropriate private property near the Reserve. Include:**
   - **part of Location 3777 between the north-west edge of Gardner Lake and Two Peoples Bay Road;**
   - **the strip of uncleared land along the edge of Location 3777 where it abuts the eastern edge of Moates Lake;**
   - **the corridor of vegetation between Two Peoples Bay Reserve and Boulder Hill, particularly land associated with Lake Angove; and**
   - **part of Location 416 between Two Peoples Bay Reserve and Gull Rock Reserve.**

2. **Vest the Goodga River Reserve in the NPNCA.**

3. **Seek to add Road Reserve 15654 to Goodga River Reserve and ungazetted Road Reserve west of Moates Lake to the Two Peoples Bay Reserve.**

4. **Realign the boundaries and fence the Angove River and Lake section of the Reserve in liaison with the adjacent property owner/manager.**

5. **Assess other areas for their suitability as additions to the Reserve when they become available.**

8. INTERACTION WITH NEARBY LANDS AND WATERS

The objective is to promote cooperation and minimise conflicts in matters associated with the use of nearby lands and waters.

The use of nearby lands and waters may negatively impact on the Reserve's values making liaison with the relevant managers of these areas essential. These include:

- Western Australian Water Authority (WAWA) concerning Water Catchment Reserve 13802, Goodga River Gauging station and general catchment management issues (see also Section 15, Hydrology).
- Shire of Albany concerning adjoining land and road reserves and other responsibilities for areas within its management boundaries.
- Landowners concerning activities on their land.
- Department of Fisheries and commercial fishers concerning fishing (see also Section 26, Commercial Fishing in Nearby Waters).
- Department of Marine and Harbours concerning boating activity and safety in navigable waters (see also Section 24, Visitor Safety).

Other authorities may also influence future land and water use, particularly the Environmental Protection Authority and the Department of Planning and Urban Development. Of major concern are the potential negative impacts that could be associated with future use of nearby private property, for example, visual landscape impacts of tourist development and further land clearing, fire management impacts of commercial tree plantation. All proposals require to be carefully assessed to determine their potential impact on the Reserve's environment.

Areas of the Water Catchment Reserve, Shire Reserve and private property are habitat, potential habitat or corridors in which the Noisy Scrub-bird can move. Liaison with adjoining landowners and managers is essential to protect and enhance these values.

RECOMMENDATIONS

1. **Implement the following strategies adapted from the Regional Management Plan for the South Coast Region, 1992 (Sections 10.1 Landscape and 11.3 Marine and Estuarine Conservation):**
   - **(i) Provide advice to private landholders and other agencies on minimising the visual impact of operations, especially on lands adjacent to or within the viewshed of lands managed by CALM**
   - **(ii) Evaluate nearby marine areas as possible reserves**
   - **(iii) Prepare emergency plans to protect marine fauna (for example, stranded whales, seals) in the event of an oil spill.**
   - **(iv) Continue to carry out censuses of marine mammals on the south coast.**
   - **(v) As far as possible, seek to prevent actions within the catchment areas that will have an adverse effect on nature conservation values (see Section 15, Hydrology).**

2. **Establish and maintain working arrangements with other authorities that manage nearby lands and waters.**

3. **Liaise with the EPA, DPUD and other relevant authorities with regard to future developments that may impact on the Reserve's values.**

4. **Continue close liaison with Reserve neighbours over management practices, and encourage management of their lands in sympathy with Reserve management.**

9. ZONING

The objective is to introduce a zoning scheme that protects the Reserve's conservation values, particularly the Noisy Scrub-bird and other rare species, and provides for appropriate use.

The concept of zoning to manage conservation areas in general and people in particular is based on the principle that uses or activities that share similar or compatible environmental and cultural requirements can be allocated to designated areas or 'zones'. Allocating specific uses and activities to areas can be either spatial, temporal or both. Typically such allocation is determined on the basis of environmental and cultural values, land use capabilities, visitor needs and management considerations. A clearly communicated zoning scheme also helps to clarify management intentions to the public.

The zoning scheme for the Reserve was determined by:

- examining the existing and potential distribution of the Noisy Scrub-bird, Western Bristlebird, Western Whipbird and other threatened, specially protected and priority species
- identifying areas free of dieback disease
- determining practical management boundaries
- examining existing and projected visitor use, including opportunities, access and facilities
- identifying requirements for management access and facilities
- assessing fire management requirements
- assessing landscape management priorities.

The zones are:

Special Conservation

This zone comprises specific areas that contain rare and endangered and other priority species, communities and features or the best examples of them. The main consideration at the Reserve is the existing and potential distribution of the Noisy Scrub-bird. Management involves strict resource conservation. Public use of these areas is allowed only for appropriate purposes on a regulated basis.

Natural Environment

This zone comprises areas that can sustain, with a minimum of impairment, a selected range of low density activities with a minimum of related facilities. Management involves conserving the natural environment. Public access is non-motorised.

Recreation

This zone comprises limited areas that can accommodate a selected range of nature-based recreation activities without unduly damaging natural ecosystems or disrupting ecosystem processes. Management involves minimising the impact of visitor activities through the sensitive placement and provision of access and facilities. Public access includes motorised access.

Services

This zone comprises limited areas required for management facilities such as staff residences, workshops and research facilities. Major management facilities are generally accommodated in recreation zones. However, this zone may be applied to areas only used for these services and although not applied in this system, may be applicable if areas are added to the Reserve.

Some areas of the Reserve have been gazetted "prohibited" and "limited access" in accordance with the CALM Act. These will be cancelled after the zoning scheme for the Reserve is adopted.

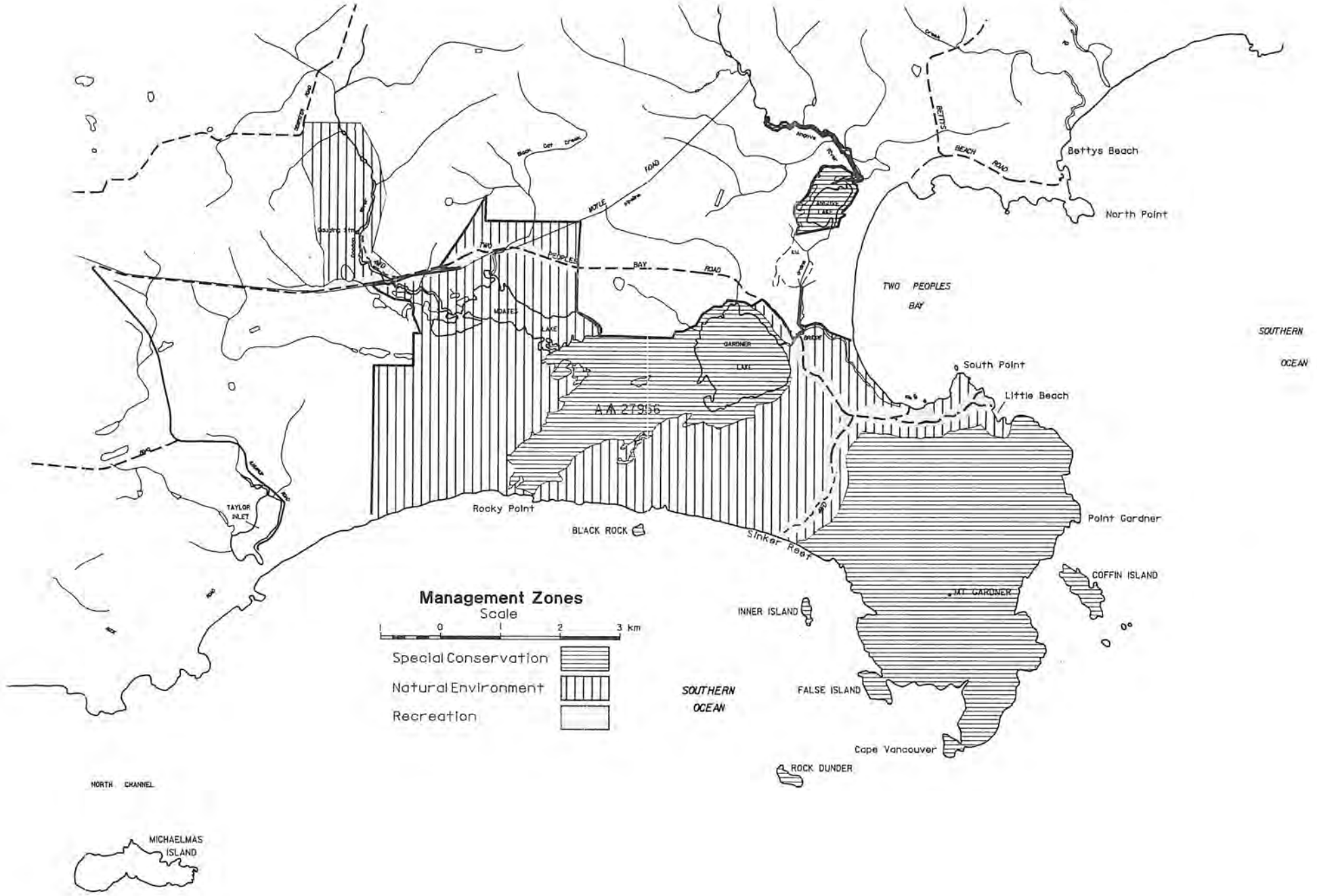
RECOMMENDATIONS

1. **Adopt and implement the zoning system shown in figure 2 as the basis for integrated management of the Reserve.**

2. **Advise the public of the zoning system, including where access is and is not allowed, and the basis for the zones.**

3. **Cancel the existing limited and prohibited access areas and gazette the zoning scheme.**

4. **Zone any additions to the Reserve based on the criteria used to assess the Reserve's zoning scheme.**


Bettys Beach
North Point
TWO PEOPLES BAY
SOUTHERN OCEAN
South Point
Little Beach
Point Gardner
COFFIN ISLAND
MT GARDNER
INNER ISLAND
FALSE ISLAND
Cape Vancouver
ROCK DUNDER
SOUTHERN OCEAN
Rocky Point
BLACK ROCK
Sinker Reef
TAYLOR INLET
NORTH CHANNEL
MICHAELMAS ISLAND
AA 27956
Management Zones
Scale
0
2
3 km
Special Conservation
Natural Environment
Recreation

CONSERVATION

Conservation Goals

Conserve the Noisy Scrub-bird.
Conserve other threatened and specially protected fauna and flora.
Conserve other biological values and physical, cultural and landscape values.

10. FAUNA

The objectives are to:

- **Conserve the Noisy Scrub-bird.**
- **Conserve other threatened and specially protected fauna.**
- **Conserve restricted assemblages of fauna.**
- **Conserve the sample of south coast fauna.**

The Two Peoples Bay - Mt Manypeaks area is considered to be the most significant area for endangered birds in mainland Australia (Garnett 1992a, 1992b). The presence of the Noisy Scrub-bird at Two Peoples Bay, given its status in the history of threatened species conservation in Australia, is a sufficient reason to make the Reserve a notable place for bird conservation. The presence of possibly the major populations of the Western Bristlebird and the heath sub-species of the Western Whipbird further increase the reserve's status for bird conservation. These three species are ranked equal ninth based on degree of threat, genetic uniqueness and conservation status in Australia (Garnett 1992b).

Other birds, and several species of mammals, and reptiles are also of special conservation interest (see Table 2). These have received less attention than the threatened birds since they are also represented in other areas where studies have focussed on them.

A good knowledge of the species of fauna present exists although there are still many gaps and many groups that are inadequately known. Attention has focussed on the vertebrate fauna with 255 species having been recorded in the Reserve. Invertebrate fauna play a vital role in virtually every biological process and yet are poorly studied.

BIRDS

A total of 188 bird species have been recorded within the reserve or on adjacent land and marine habitats. About 70 species can be considered resident land birds. Most of them breed within the Reserve, others are regular visitors and many are vagrants or unusual visitors.

Surveys of the reserve's wetlands between 1973 and 1990 recorded 42 waterbird species (Coy *et al.*, in prep.). While comparatively rich in species, the wetland system does not usually support large numbers of individuals of any one species. Nevertheless, wetlands within the Reserve are considered to be important for waterbird conservation.

The reserve's offshore islands provide breeding sites for seven species of seabird. Coffin Island in particular, is used by many thousands of Great-winged Petrels during the winter months. Little Penguins, Pacific Gulls and Flesh-footed Shearwaters breed there. Burrow-nesting species in particular are vulnerable to human disturbance. Food provided by the waters around Two Peoples Bay is very important for the breeding success of these species. These waters are also regularly used by migratory seabirds such as albatrosses, gannets and skuas.

TABLE 2. VERTEBRATE FAUNA OF SPECIAL CONSERVATION INTEREST

COMMON NAME	SCIENTIFIC NAME	CATEGORY
Birds		
Noisy Scrub-bird	*Atrichornis clamosus*	A, Gi
Western Bristlebird	*Dasyornis longirostris*	A, Gi
Western Whipbird	*Psophodes nigrogularis nigrogularis*	A, Gi
Peregrine Falcon	*Falco peregrinus*	B
Red-eared Firetail	*Stagonopleura oculata*	B
Little Bittern	*Ixobrychus minutus*	C
Square-tailed Kite	*Lophoictinia isura*	C
Hooded Plover	*Charadrius rubricollis*	C, Giii
Carnaby's Black Cockatoo	*Calyptorhynchus funereus latirostris*	B, Gii
Great-winged Petrel	*Pterodroma macroptera*	D
Little Penguin	*Eudyptula minor*	D
Flesh-footed Shearwater	*Puffinus carneipes*	D
Australasian Bittern	*Botaurus poiciloptilus*	A, Giv
Mammals		
Western Ringtail Possum	*Pseudocheirus peregrinus occidentalis*	A
New Zealand Fur-seal	*Arctocephalus forsteri*	B
Australian Sea-lion	*Neophoca cinerea*	B
Quokka	*Setonix brachyurus*	F
Southern Brown Bandicoot	*Isoodon obesulus*	A
Reptiles		
Little Brown Snake	*Notechis minor*	E
Carpet Python	*Morelia spilota imbricata*	B
Beautiful Skink	*Egernia pulchra*	F
Mournful Skink	*Egernia luctuosa*	F

CATEGORIES

A Declared threatened (WA Wildlife Conservation Act).
B Declared in need of special protection (WA Wildlife Conservation Act).
C CALM's Reserve List for consideration as declared threatened
D Seabirds with nesting sites restricted to islands
E Geographically restricted
F Nearing eastern limit of geographic range
G RAOU/ANPWS list of threatened birds (Garnett, 1992a and b)

Gi Endangered
Gii Vulnerable
Giii Rare
Giv Insufficiently known

Noisy Scrub-bird

The Noisy Scrub-bird belongs to the ancient Australo-Papuan passerine family, Atrichornithidae, whose nearest relatives are the lyrebirds. The family incorporates only one other species: the Rufous Scrub-bird (*Atrichornis rufescens*) which lives in the rainforests of northern New South Wales and southern Queensland. The entire family is considered to be at risk. Both are threatened species (Garnett, 1992a) although the Rufous Scrub-bird is considered to be in a more secure position.

The rediscovery of the Noisy Scrub-bird at Two Peoples Bay in 1961 was an historic event since the bird had not been officially recorded for 72 years and was considered by most ornithologists to be extinct. Establishing the Two Peoples Bay Nature Reserve in 1967 to protect the bird and its habitat was the first step in managing the Noisy Scrub-bird. Since then successful exclusion of fire has allowed their habitat to mature with a consequent steady increase in the population.

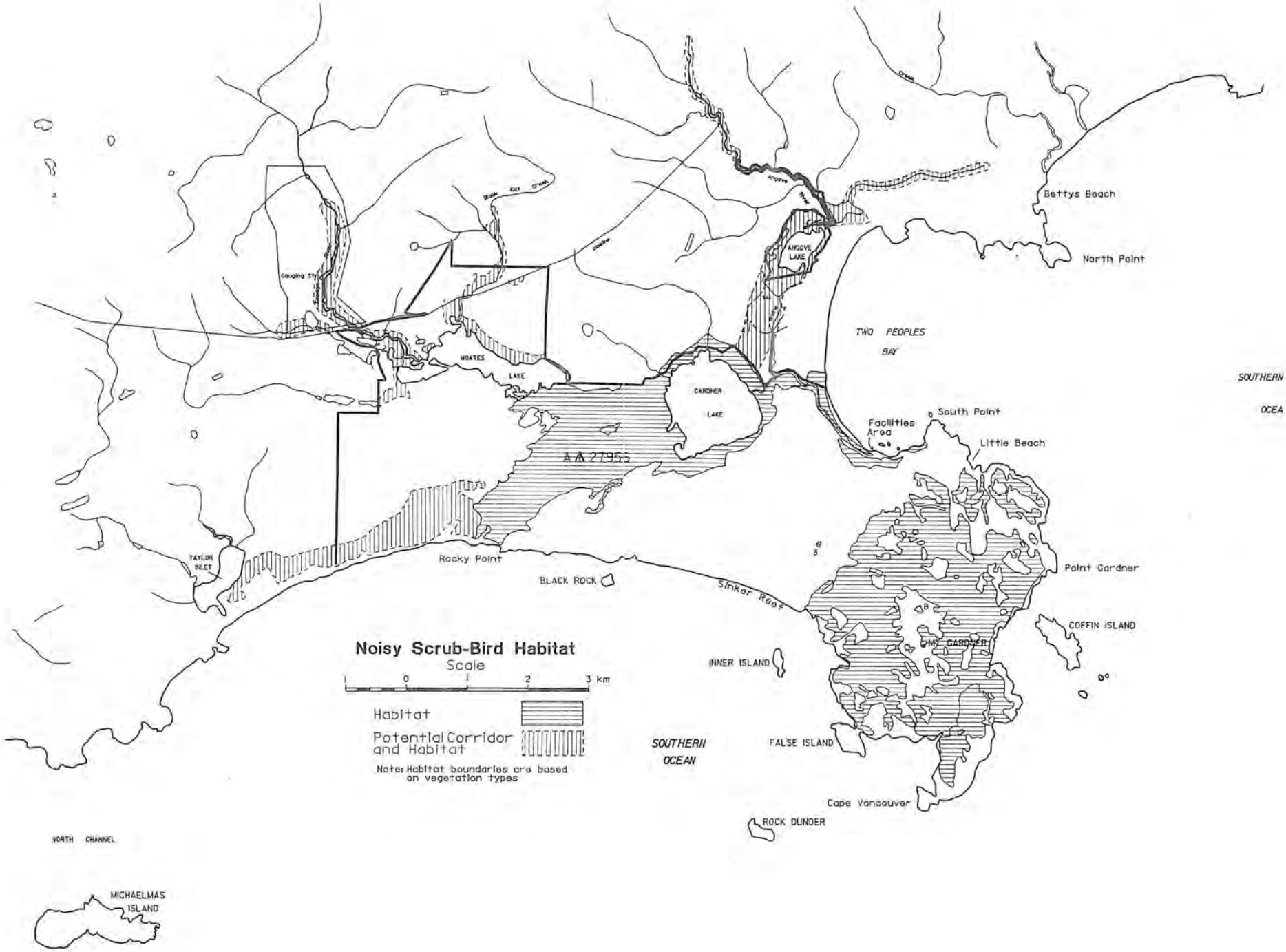
Population growth has resulted in other areas within and outside the Reserve being colonised by natural dispersal. The growth of the population allowed a translocation program, aimed at establishing other populations outside the reserve, to begin in 1983. The combination of protection, habitat management (fire exclusion) and translocation has seen the population increase from less than 100 at the time of rediscovery to around 750 (about 450 occur in the Reserve) in 1991.

With a more widespread population and a continuing program of translocation, conservation of the species now involves more than the management of the Reserve. Conservation of the Noisy Scrub-bird was initially guided by a wildlife management program prepared in 1986 (Burbidge *et al,* 1986). In 1992 a Noisy Scrub-bird Recovery Team was appointed and a Draft Recovery Plan for the species is being prepared (Danks *et al.*, in prep) that deals with managing the species wherever it occurs for the next 10 years. Where applicable that document is integrated with this plan which concentrates on managing the species within Two Peoples Bay Reserve.

The Reserve has the largest subpopulation of Noisy Scrub-birds and is the most intensively managed area in which it currently occurs. The sub-population in the Mt Gardner area, as well as being the original population rediscovered in 1961, has been the source of most of the birds used in the translocation program and this will continue to be the case in the forseeable future. Additionally it presumably contains the greatest genetic diversity of any Noisy Scrub-bird population and its continued protection and management is of great importance in conserving the species.

Habitat

The Noisy Scrub-bird is a small, semi-flightless inhabitant of dense scrub, low forest and heath. At Two Peoples Bay such habitat may occur in deep gullies, in shallower drainage lines, around springs and at the base of rock faces, along streams, in the wooded margins of lakes, interdune swales and overgrown swamps (see Figure 3). The common factor in all currently occupied habitat is the presence of a dense lower stratum of vegetation associated with a wet or moisture gaining site with a post-fire age of at least 10 years.


Bettys Beach
North Point
ANGOVE LAKE
TWO PEOPLES BAY
SOUTHERN OCEA
MOATES LAKE
GARDNER LAKE
Facilities Area
South Point
Little Beach
A.A 27953
TAYLOR INLET
Rocky Point
BLACK ROCK
Sinker Reef
Point Gardner
COFFIN ISLAND
GARDNER
INNER ISLAND
Noisy Scrub-Bird Habitat
Scale
0 1 2 3 km
Habitat
Potential Corridor and Habitat
Note: Habitat boundaries are based on vegetation types
SOUTHERN OCEAN
FALSE ISLAND
Cape Vancouver
ROCK DUNDER
NORTH CHANNEL
MICHAELMAS ISLAND

The Noisy Scrub-bird mostly feeds on insects and forages primarily in the leaf litter layer but also in decaying wood and debris and on the leaf and stem surfaces of shrubs in the lowest layers of vegetation. The birds require a well developed leaf litter fauna for food and dense vegetation for cover and protection. These are usually correlated with long post-fire age.

Little is known about the effect of successional changes in scrub-bird habitat. After fire it may take from four to 10 years before males start defending territories depending on the vegetation type. Noisy Scrub-birds are most numerous in vegetation that has not been burnt for between 20 and 50 years. In many areas males are defending sites in vegetation with a post-fire age of more than 50 years.

Breeding Biology

The scrub-bird has an unusual breeding biology for a passerine. The males, which are much larger than the females and bear prominent throat markings, are promiscuous and do not assist with nesting and chick rearing. They defend their territories with the loud song which has given the species its name. Only one egg, which weighs about 15% of the female's body weight, is laid generally late in June and incubated during the coldest part of the year.

Scrub-birds build their nests from a variety of materials with preference for pliable, broad-leaved sedges such as *Anarthria scabra, Gahnia trifida,* and *Lepidosperma* spp. The nests are often sited in clumps of the same species. Canopy closure has occurred in some gullies on Mt Gardner reducing, and in some cases eliminating, these sedges from former nesting areas. Continued monitoring of this situation is necessary to determine if this is having any adverse effect on the breeding potential of the scrub-bird in the Mt Gardner area.

Predation

Little is known about predation of Noisy Scrub-birds, but it is known that there was a steady increase in numbers in the Mt Gardner area in the presence of foxes and cats, before the fox control program was introduced. The density of the ground and lower shrub layer in habitat preferred by the scrub-bird may be an important factor in reducing predation by these introduced mammals as well as other potential predators such as Sparrowhawks.

Noisy Scrub-birds nest close to the ground where the female, egg and chick might be vulnerable to mammalian predators. One case of egg predation by the Mardo (*Antechinus flavipes*) is known. Nest predation by reptiles would be minimised by the timing of the breeding season.

Population

Censusses of the number of singing male Scrub-birds within the Reserve have been carried out almost annually since 1970. This provides an index to the Scrub-bird population and is very important in providing information on population trends and demography.

On Mt Gardner the number of singing males counted each year during this time has increased steadily from 40 to 163 in 1991 indicating habitat is still available although a limit may be expected at some time in the future. More males are now found in scrub and thicket formations and an increasing density of territories is occurring within the Mt Gardner area.

Within the reserve two sub-populations can now be distinguished: the original one on Mt Gardner and the other along Gardner Creek, the swamps near the mouth of the creek, around Gardner Lake and the dune swamps between the lake and the mobile dunes to the west. The existence of two sub-populations separated by the low fuel buffer (see Section 12, Fire) greatly enhances the conservation of the species within the Reserve. The Lakes area population is an important element in the overall population of the Scrub-bird and its maintainence is an essential component in the management strategy.

The number of occupied territories in the Lakes area increased rapidly to a maximum of 64 in 1987. Beginning in 1988, and perhaps linked to heavy rainfall and high lake water levels in that year, there has been a decline in numbers in this area. It is thought that flooding of the lake margin habitat may have removed feeding zones resulting in starvation and/or emigration. This situation is currently being monitored. Artificial opening of the bar at the creek mouth may be a way of alleviating this problem.

Translocation

Since 1983 the Reserve has provided a total of 110 Noisy Scrub-birds for the translocation program. Most of these have come from the Mt Gardner area. At current levels the removal of these birds from the breeding population appears to be having no effect (Danks and Smith, in prep.). The Noisy Scrub-bird Recovery Plan is based on continuing the translocation program over the next 10 years in an effort to establish more populations, particularly to the west of Albany.

The Reserve is most likely to be the primary and possibly the only source of birds for the translocation program in this period. Continued protection and management of the Noisy Scrub-bird populations within the Reserve will be critical for the success of this program. The effects of further removal of birds must continue to be monitored.

Corridors

Management of Scrub-bird habitat near the Reserve is also important, particularly corridors of vegetation connecting the Reserve to other areas. Corridors allow continuing dispersal into suitable habitat nearby. They may also be important for recolonising areas affected by fire and for genetic contact between the sub-populations in the Oyster Harbour-Cheyne Beach area. Corridors are, therefore, thought to be of major benefit for the long-term security of the species. Potential corridors identified include one leading from the reserve to the Boulder Hill area, to the Angove Catchment Reserve and to Gull Rock National Park in the west (Danks, 1991). These corridors require management and should either be protected within the conservation reserve system or through management arrangements with the managing agency/owner if possible (see Section 7, Additions to the Reserve).

Western Bristlebird

The Western Bristlebird is found in only two places: the Two Peoples Bay-Mt Manypeaks area and the Fitzgerald River National Park (McNee, 1986). The total number of birds is not known, but it is unlikely to exceed 1000. At Two Peoples Bay on the Mt Gardner headland and the isthmus areas south and south east of Gardner Lake, 86 territories were identified in 1976, and 100 were identified in 1983. A partial count in 1991 indicated at least 230 pairs in this area.

The Western Bristlebird's preferred habitat is closed heath, with open heath only used if there are sufficient patches of denser vegetation. The use of structurally more complex plant associations or swamp vegetation only occurs on the edges of their distribution or after fire when they are used as a refuge. Figure 4 shows existing habitat.

The Western Bristlebird appears to have been favoured by fire management for the Noisy Scrub-bird. Monitoring of bird numbers and habitat distribution should occur.

Prescribed burning of some heath occurs to maintain the essential low fuel buffer between the Mount Gardner and Gardner Lake Noisy Scrub-bird populations. The recently burnt areas are subject to intense and selective grazing, predominantly from kangaroos, owing to the small size of the areas burnt and the numbers of kangaroos. This causes changes to the heath that are unfavourable to the Western Bristlebird, particularly the loss of *Dasypogon bromellifolia* and *Cyathachaeta clandestina*. To maintain Western Bristlebird habitat, kangaroo grazing has to be controlled on recently burnt areas (see Kangaroo Grazing, p 30).

Western Whipbird

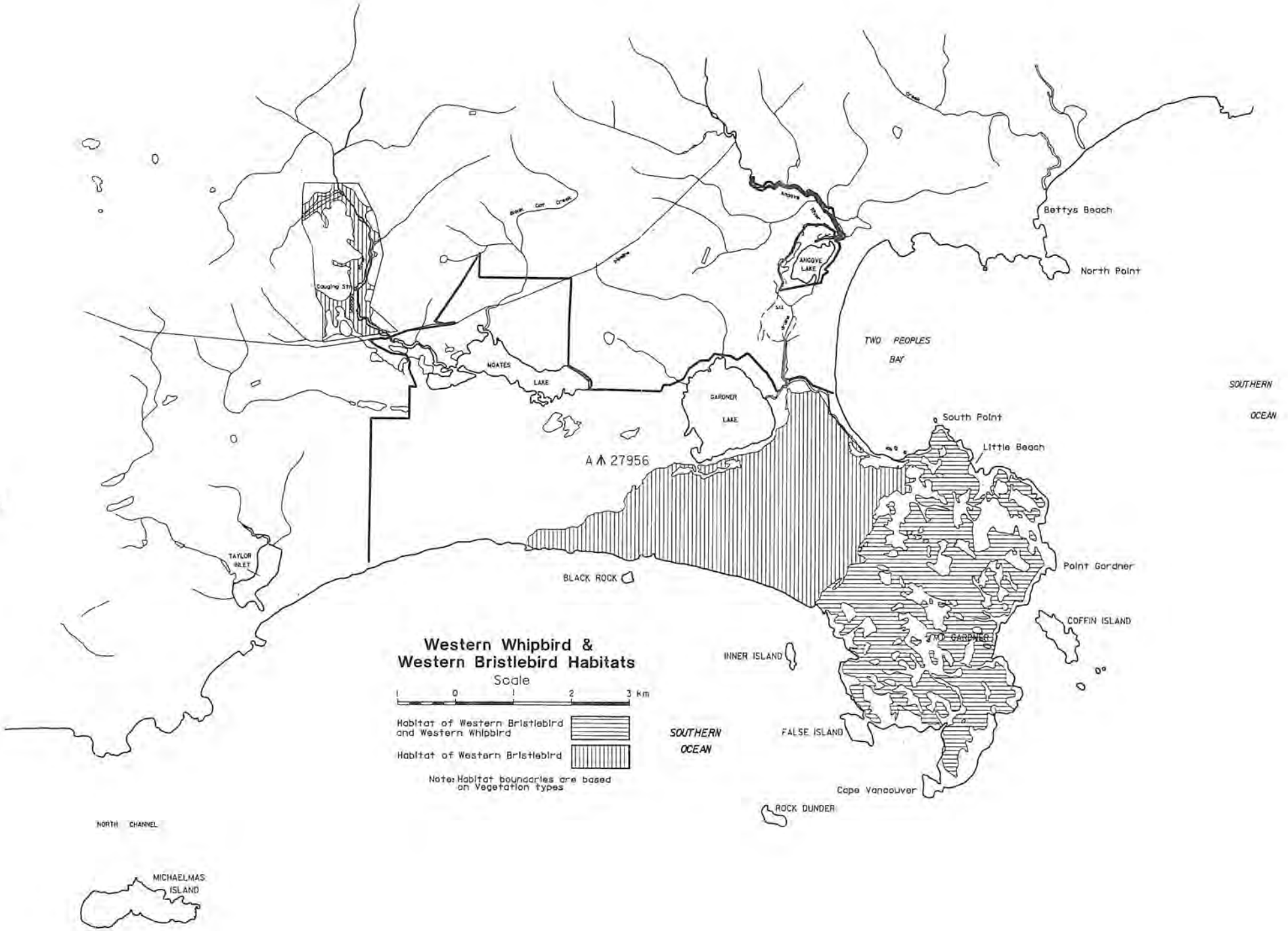
The Western Whipbird occurs in a number of locations across the drier parts of southern Australia from Victoria to south-west Western Australia. Schodde (1991) considers that the species consists of four sub-species. Only the western heath sub-species *Psophodes nigrogularis nigrogularis*, is classified as endangered (Garnett 1992 a and b). This sub-species once occurred along the Western Australian coast from Albany to Perth but now only occurs in the Two Peoples Bay - Mt Manypeaks area.

Western Whipbird habitat includes mallee, mallee/heath, scrub/heath, and coastal dune thicket, all two-layer formations with an open to closed upper layer and a closed lower layer. There appears to be no floristic factor and the species seems flexible in its requirements which can be met from the semi-arid inland to the humid coast (Smith, 1985b).

The primary habitat of the Western Whipbird at Two Peoples Bay is thicket and it only nests in heath which is less than 50 m from thicket. Figure 4 shows their habitat. Western Whipbirds only use areas that have remained unburnt for at least 10 to 12 years, and they favour much older vegetation. This species should be monitored.

Australasian Bittern

Results from surveys in the south-west of Western Australia during the 1990 breeding season indicated that the population of Australasian Bitterns was less than 100 pairs. During the survey Australasian Bitterns were heard calling from 15 locations within the Reserve's wetlands. Australasian Bitterns are commonly heard in the Lake Gardner and Moates area of the Reserve and these wetlands may be an important refuge. Fox control and continuing to exclude fire from this area should benefit this species.


Bettys Beach
North Point
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SOUTHERN OCEAN
MOATES LAKE
GARDNER LAKE
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A 27956
TAYLOR INLET
BLACK ROCK
Point Gardner
COFFIN ISLAND
INNER ISLAND
MID GARDNER
FALSE ISLAND
Cape Vancouver
ROCK DUNDER
NORTH CHANNEL
MICHAELMAS ISLAND
Western Whipbird &
Western Bristlebird Habitats
Scale
1 0 1 2 3 km
Habitat of Western Bristlebird and Western Whipbird
Habitat of Western Bristlebird
Note: Habitat boundaries are based on Vegetation types

Carnaby's Black Cockatoo

The main threat to the large white-tailed black cockatoos has been clearing for agriculture in the wheatbelt. This has removed and fragmented their habitat, prevented nest trees regenerating and destroyed food sources. Small family groups frequent the reserve during the breeding season. Flocks of 50 to 100 are regularly seen outside the breeding season mostly feeding on *Hakea* and *Dryandra* spp. Unfortunately these Proteaceous species are susceptible to the dieback disease and the progress of this disease will further reduce the cockatoo's food sources.

Square-tailed Kite

This raptor is a specialised predator of the canopy taking passerine birds, their eggs and nestlings. Australia-wide their population density appears to have declined especially in south-eastern Australia. Although regularly seen at times there is probably only one resident pair on the reserve. Maintaining structural diversity in the vegetation may be important to managing this species.

Peregrine Falcon

This spectacular falcon is considered threatened by pesticides and falconry (hunting with falcons) over much of its global range. In Australia the population appears to be stable although the species is sparsely distributed. The Reserve provides habitat for one or two pairs. The management requirement for the Peregrine Falcon is to maintain habitat and prevent disturbance of its nests.

Red-eared Firetail

Red-eared Firetails occur throughout most of the Reserve's habitat types. This species is endemic to south-west Western Australia although it is more common than previously thought. The Red-eared Firetail requires dense habitat.

Hooded Plover

The Hooded Plover is vulnerable to disturbance by introduced predators and people, particularly in the breeding season as the plovers nest on beaches during the summer months. Adults with young are regularly seen on Two Peoples Bay beach and at the eastern end of Nannarup beach. The birds sometimes nest on the rocky coast near Little Beach. Fox control in the Reserve and adjacent areas and reduced vehicle traffic on beaches should benefit this species.

MAMMALS

A total of 27 mammals have been recorded on the Reserve. Eleven of these are marsupials, 10 are eutherians and six are introduced species. The mammal fauna is typical of the wetter areas of the south coast with many species at or near the eastern limit of their range.

Among the marsupials the presence on Mt Gardner of a population of Quokka, *Setonix brachyurus*, which are relatively scarce on the mainland, is of note. The Honey Possum, *Tarsipes rostratus*, is also present in heaths and scrub despite the depredations of the dieback fungus which would have removed many of this species' food plants. The Brush Wallaby *Macropus irma*, which is present only in the Eucalypt woodlands and forest in the north western part of the reserve, may have declined in recent years. Sub-fossil remains of the Dibbler,

Parantechinus apicalis, have been found on the Reserve. The species does not appear to be currently present.

Large numbers of the Western Grey Kangaroo (*Macropus fuliginosus*) inhabit the reserve, particularly the heathlands of the isthmus. In this low vegetation they are highly visible which, combined with their lack of fear of humans and vehicles, make them an attraction for many visitors to the reserve.

Overgrazing by kangaroos on recently burnt areas within the fuel reduced buffer is modifying vegetation and this is detrimentally affecting this area as habitat for the Western Bristlebird (see earlier discussion on the Western Bristlebird). In addition, it is undesirable for fire management as the vegetation is difficult to prescribe burn but will carry wildfire and thus increases the risk of burning Noisy Scrub-bird habitat. Control of kangaroo grazing in this area is essential. Managing this problem comprises two components:

- altering fire management whereby the size of the area that will be burnt on the fuel-reduced buffer is increased (see Section 12, Fire).
- controlling kangaroos. This involves further study to determine kangaroo numbers and their movements. Options to prevent grazing will continue to be investigated. The option of physically preventing grazing by fencing has been attempted and is not feasible. Culling kangaroos may be neccessary. Control of indigenous species on a conservation reserve is a sensitive issue and CALM and other bodies are required to follow stringent procedures.

Marine mammals recorded off Two Peoples Bay include the Common Dolphin, Striped Dolphin, Bottle-nosed Dolphin (often recorded in schools of 20 or more), Southern Right Whales (regular visitors with females and calves sometimes present during the calving season), Humpback Whales, Sperm Whales, Killer Whales and Minke Whales.

Western Ringtail Possum

The western ringtail possum's range and population size has been significantly reduced in recent years. Reduction in habitat as a result of agricultural clearing and predation by foxes are considered responsible. The species is nearing the eastern limits of its range at Two Peoples Bay. It occurs in peppermint woodland and thickets and scrub in the Reserve. Dreys are commonly seen in the gullies and soakage lines on Mt Gardner. Wildfire may have a localised effect on populations in this habitat. Ringtails will, however, repopulate regenerating woodland and scrub provided there are adjacent undisturbed colonies. Control of foxes is considered to be an essential management requirement.

Southern Brown Bandicoot or Quenda

The western sub-species of the Southern Brown Bandicoot *Isoodon obesulus fusciventer* has disappeared from much of its former range in south-western Australia. The species falls into the critical weight range for mammals, .045g to 5kg adult weight, (Burbidge and McKenzie, 1989); many species within this range have disappeared or are under threat partly because of predation by foxes. Bandicoots are common on the reserve and their numbers seem to have increased in recent years possibly as a result of the fox control program instigated in 1988. They are often seen crossing roads and around the picnic area and research station where they are particularly approachable.

New Zealand Fur-seal

This seal lives on rocky coasts and offshore islands of South Australia, Western Australia and New Zealand, on the Chatham Islands, and on sub-Antarctic islands. The population was estimated in 1990 to be about 4600 in Western Australia (Shaughnessy, P. D., 1990). A survey of the Reserve's islands in May 1989 recorded about 120 males, females and yearlings, resting on Coffin Island and a few animals on Rock Dunder. Management involves protection from interference and ongoing monitoring.

Australian Sea-lion

This species is endemic to Australia, occurring on offshore islands from the Abrolhos Islands in Western Australia to Kangaroo Island, South Australia. The population is believed to be stable, with numbers estimated in 1990 to be 3100 in Western Australia and about 10 000 in Australia (Gales, N. L., 1990). Small numbers of adult sealions have been recorded on Coffin Island. Management involves protection from interference and ongoing monitoring.

REPTILES

The herpetofauna consists of 34 species. These include seven snakes, 13 skinks, one gecko, two legless lizards, one monitor, one tortoise and nine frogs. The abundance of snakes, skinks and frogs, and paucity of representatives of families typical of drier areas reflects the wet climate of the reserve.

Carpet Python

The Carpet Python *Morelia spilota* has disappeared from much of its former habitat in Western Australia. On the reserve it is moderately common being found in many gullies in the Mt Gardner area as well as the heathlands and the swamps surrounding Gardner Creek and the picnic area. This harmless python is unfortunately often the victim of careless drivers on roads within the reserve as are other reptiles such as *Tiliqua rugosa, Notechis coronatus, N. curta* and *N. scutatus*. Management involves protecting habitat, fox and cat control and visitor education.

FISH

Five species of native freshwater fish have been collected in the Angove and Goodga drainage systems and others may be present. The Trout Minnow (*Galaxius truttaceous*) is known from only a few locations in the Albany area and has been categorised by Allen (1982) as the rarest species of native minnow in Western Australia. Balston's Pygmy Perch (*Nannatherina balstoni)* has a restricted occurence on the south coast (Christensen, 1982). The freshwater systems of Two Peoples Bay Reserve appear to be at the western or eastern limits of a number of endemic fish species.

Rainbow Trout (*Onchorhynchus mykiss*) were introduced, and the Redfin Perch *Perca fluvialis* may have been introduced, into the Reserve and may still be present. Other introduced species may also occur within the reserve.

The lower reaches of the Angove and Goodga River systems appear to be nursery areas for euryhaline species such as Black Bream *Mylis butcheri,* Yellow-eye Mullet *Alderichetta fosteri* and the Hardyhead *Atherinosoma wallacei.*

The diversity of marine species present in this area has not been systematically documented, but it would appear that the extensive sea grass beds, especially in the sheltered, shallow waters of the southern end of the Bay, would be important nurseries and feeding areas for many marine species.

The fish of Two Peoples Bay itself and the adjacent seas provide catches for recreational fishermen operating from the beaches and rocky shores of the reserve or from boats. Commercial fishermen also operate in these waters and commercial species include Salmon, Tuna, Herring, sharks as well as "bait fish", with mulies the primary fish sought after by commercial fishermen currently operating out of Two Peoples Bay (1993).

INVERTEBRATE FAUNA

The invertebrate fauna of Two Peoples Bay has received little attention compared with the higher vertebrates, although the floristic richness of the area would suggest large numbers of terrestrial invertebrates. Invertebrates provide food for many species including those listed as threatened, such as the Noisy Scrub-bird (insects), Western Whipbird (mostly insects) and Western Bristlebird (insects and also seeds), and deserve to be studied for the light they may shed on managing these species. They are also important components of the fauna in their own right and effective long-term management of the reserve requires a sound knowledge of invertebrates and the ecological processes they are involved in.

Two hundred and 47 aquatic invertebrate taxa were collected in two studies. Rivers and streams contained 110 taxa that were dominated by insects especially chironomids. The lakes provided 170 taxa largely of microinvertebrates. All the known major components of the aquatic invertebrate fauna of South-Western Australian flowing waters are represented in the rivers and streams of Two Peoples Bay (Storey *et al.*, in prep.).

The microinvertebrate fauna of the freshwater bodies at Two Peoples Bay contain many undescribed species and show an unusual richness compared to other south-west areas. Many new records for Western Australia and, in some cases, Australia have been recorded (Storey *et al.*, in prep.). The slow-flowing lowland rivers and streams support large numbers of decapod Crustacea such as Marron *(Cherax tenuimanus)* which were probably introduced into Moates Lake in about 1940, and Koonac *(C. plebejus).*

The marine invertebrate fauna of Two Peoples Bay has not been documented. However, the sandy beaches, rock platforms, reefs, boulder beaches, rock pools and exposed sea grass of the intertidal zone within the Reserve provide a diversity of habitats for many marine species. These intertidal areas are receiving increasing recreational pressure including the collecting of shellfish such as limpets and abalone for human consumption and bait.

Species of the intertidal and inshore areas that are opportunistically collected include the large herbivorous Lighthouse Shell (*Campanile symbolicum* - a relict member of a once more widespread group now found only in south-western Australia), sea hares (*Aplysia parvula*), chitons, bivalves and cephalapods, crustaceans, such as shrimps (including the Snapping Prawn), crabs and barnacles, echinoderms, such as sea stars, brittle stars and sea urchins, worms and sponges.

RECOMMENDATIONS

1. **Implement the following strategies adapted from the Regional Management Plan for the South Coast Region, 1992 (Sections 11.1 Flora and Fauna and 11.2 Vegetation and Reserve Corridors)**
   - **(i) Continue surveys to record the distribution, abundance and other details of flora and fauna including species declared rare or specially protected.**
   - **(ii) Seek to control pest flora and pest fauna.**
   - **(iii) Where appropriate, manage habitat to favour declared rare or specially protected fauna.**
   - **(iv) Protect and monitor populations of threatened and specially protected species.**
   - **(v) Implement the Department's Recovery Plans for the Noisy Scrub-bird and other species for which they are prepared.**
   - **(vi) Seek to establish and protect vegetation corridors near the Reserve in consultation with neighbours.**

Research and Monitoring

2. **Continue to regularly monitor Noisy Scrub-bird, Western Bristlebird and Western Whipbird populations (adapted from the Noisy Scrub-bird recovery plan).**

3. **Monitor numbers of other species of special conservation interest to determine appropriate management practices.**

4. **Continue to investigate the impact of removing Noisy Scrub-birds for translocation, including their rate of replacement (adapted from the Noisy Scrub-bird recovery plan).**

5. **Investigate the genetic variability of the original Mount Gardner Noisy Scrub-bird subpopulation and the subpopulations derived from this group (adapted from the Noisy Scrub-bird recovery plan).**

6. **Investigate the relationship between the number of singing male Noisy Scrub-birds and population size.**

7. **Investigate decreases in Noisy Scrub-bird populations that cannot be explained by known actions or phenomena (adapted from the Noisy Scrub-bird recovery plan).**

8. **Investigate the effects of habitat changes on Noisy Scrub-bird, Western Bristlebird and Western Whipbird populations and methods by which their habitat can be improved if changes are found to be detrimental to them, including physical manipulation of habitat.**

9. **Continue research on the biology, ecology and behaviour of the Noisy Scrub-bird (adapted from the Noisy Scrub-bird recovery plan).**

10. **Investigate the numbers and movements of kangaroos in the vicinity of the fuel reduced buffer (Figure 7) and methods to control kangaroo grazing. Where necessary implement control programs. Ensure the appropriate procedures are stringently followed.**

11. **Investigate the invertebrate fauna, including an inventory.**

12. **Investigate the Noisy Scrub-bird diet.**

13. **Investigate the wetland fauna, including the impact of introduced species.**

General

14. **Protect, as the highest priority, Noisy Scrub-birds, Western Whipbird and Western Bristlebird and their habitat, including the maintainence of long unburnt habitat [2](adapted from the Noisy Scrub-bird recovery plan).**

15. **Seek to ensure the persistence of at least one viable subpopulation of Noisy Scrub-birds within the Reserve to recolonise the Reserve after disturbance.**

16. **Seek to ensure the persistence of productive Noisy Scrub-bird habitat in both major sub-population areas. Re-establish or provide for regeneration of Noisy Scrub-bird habitat if areas are lost through disturbance or change.**

17. **Develop and implement procedures to minimise or prevent the loss of genetic variability within the Noisy Scrub-bird population (adapted from the Noisy Scrub-bird recovery plan).**

18. **Provide Noisy Scrub-birds for translocation while at the same time ensuring that the viability of subpopulations on the Reserve are not adversely affected, and suspend the translocation program if necessary (adapted from the Noisy Scrub-bird recovery plan).**

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[2]Current research (1992) indicates vegetation should be at least 10 and preferably 20 to 40 years old, however further research is required

19. Ensure the viability of identified corridors within the Reserve for Noisy Scrub-birds to move into adjacent lands (adapted from the Noisy Scrub-bird recovery plan).

20. Seek to ensure the viability of Noisy Scrub-bird corridors of movement and existing and potential habitat near the Reserve, including corridors to Boulder Hill/Mt Manypeaks and Gull Rock, see Section 7, Additions to the Reserve, and 8, Interaction with Nearby Lands and Waters (adapted from the Noisy Scrub-bird recovery plan).

21. Ensure the persistence of viable populations of other rare fauna on the Reserve.

22. Protect the habitat of other fauna of special conservation interest.

11. VEGETATION AND FLORA

The objectives are to:

- **Conserve the Reserve's threatened flora.**
- **Conserve vegetation of special conservation interest.**
- **Conserve the sample of south coast flora.**
- **Provide habitat for species that rely on a regional network of conservation lands.**

Vegetation

The variety of landforms and soils found on the Reserve supports a diversity of vegetation associations. Beard (1979) placed the boundary between the Darling and Eyre Botanical Districts within the Reserve. The forested area north of Moates Lake is in the East Kalgan Vegetation System (a part of the Darling District) and the remainder of the Reserve is in the Bremer Vegetation System (part of the drier Eyre District).

The vegetation associations present include tree-dominated communities classified as low forest that are prominent to the north of Moates Lake, but also occur on the margins of the lakes and along the major streams of the wetland system, around the picnic area and Reserve headquarters and in small pockets in deep gullies on Mt Gardner. Woodlands are found to the north of Moates Lake as well as on the dunes between Moates and Gardner Lakes and the north-eastern slopes of the Mt Gardner headland. Low heath and shrublands dominate the isthmus area on limestone and calcareous sands and extend to the deeper sands at higher levels around the headland. Dense scrub and thicket dominate much of the headland occurring in gullies and on the slopes.

Hopkins *et al.* (in prep.) identified 33 plant communities within the Reserve. The major associations are summarised below and mapped on Figure 5.

Forest is a tree dominated association over 15m tall which occurs in only a few patches on the Reserve. The dominant plant in these formations is *Agonis juniperina* with an understorey of sedges such as *Lepidosperma gladiatum,* which may reach two to three metres, *Phebalium anceps,* and *Myoporum caprarioides.*

Low forest formations may be up to 15 m high and include plant communities dominated by *Eucalyptus megacarpa, E. marginata, E. calophylla, E. cornuta, Agonis flexuosa, A. juniperina, Allocasuarina fraseriana* and various mixes of these species. Important understory plants may include *Banksia littoralis, Phebalium anceps, Bossiaea linophylla, Hibbertia furfuracea, Hypocalymma cordifolium* and *Acacia leioderma.* Depending on soil type, location and the specific composition a number of particular communities can be distinguished. Some low forest formations are important as Noisy Scrub-bird habitat (see Section 10, Fauna).

Low woodland formations include the sparse stands of *Eucalyptus staeri* in the broad valleys to the north of Moates Lake as well as swale vegetation between the Lakes where *Banksia littoralis* dominates.

Thicket and Scrub are dense shrub formations between two and five metres tall often consisting of a mosaic of species and densities intergading in many locations with heath and forest. On Mt Gardner thicket and scrub associations consist of *Hakea elliptica, H. trifurcata, Dryandra formosa, Oxylobium cuneatum, A. marginata* and *Chorilaena quercifolia.* Stunted eucalypts may also be present.

On coastal dunes plants such as *Banksia praemorsa, Spyridium globulosum, Acacia cyclops* and *Adenanthos sericeus* may be important in this formation. In the swamps surrounding the picnic area and to the north-west of the Reserve office *Phebalium anceps* and *Lepidosperma gladiatum* predominate with some emergent *Banksia littoralis.*

Swamp margin thickets contain *Homalospermum firmum, Astartea fascicularis* and *Kunzea ericifolia.* Taller plants such as *Agonis juniperina* and *Oxylobium lanceolatum* also occur as emergents. The peaty soils often contain *Cephalotus follicularis.*

Scrub and thicket formations are particularly important habitat for the Noisy Scrub-bird (see section 10, Fauna). Since the 1970s singing males on Mt Gardner have increasingly occupied these formations. Low heath consists of dense shrubland less than one metre tall. On the isthmus and the sandy soils of the headland such communities may include *Acacia cochlearis, Melaleuca thymoides, Adenanthos cuneatus, Leucopogon revolutus,* and many other epacrids. In many places the sedges *Anarthria scabra* and *Cyathochaeta clandestina* predominate.

On the islands off the coast where there is sufficient soil accumulation, a species poor heath develops. A tall heath of *Rhagodia baccata* dominates the vegetation of Coffin Island. Shallow pockets of soil on exposed sheets of granite and larger boulders on the headland support a complex vegetation of mosses, lichens, *Borya nitida, Andersonia simplex* and taller shrubs of *Verticordia plumosa, Anthocercis viscosa* and *Agonis marginata.* Small patches of mallee occur throughout the headland and in clumps on the isthmus. Mallee species include *Eucalyptus angulosa, E. conferruminata* and *E. goniantha.*

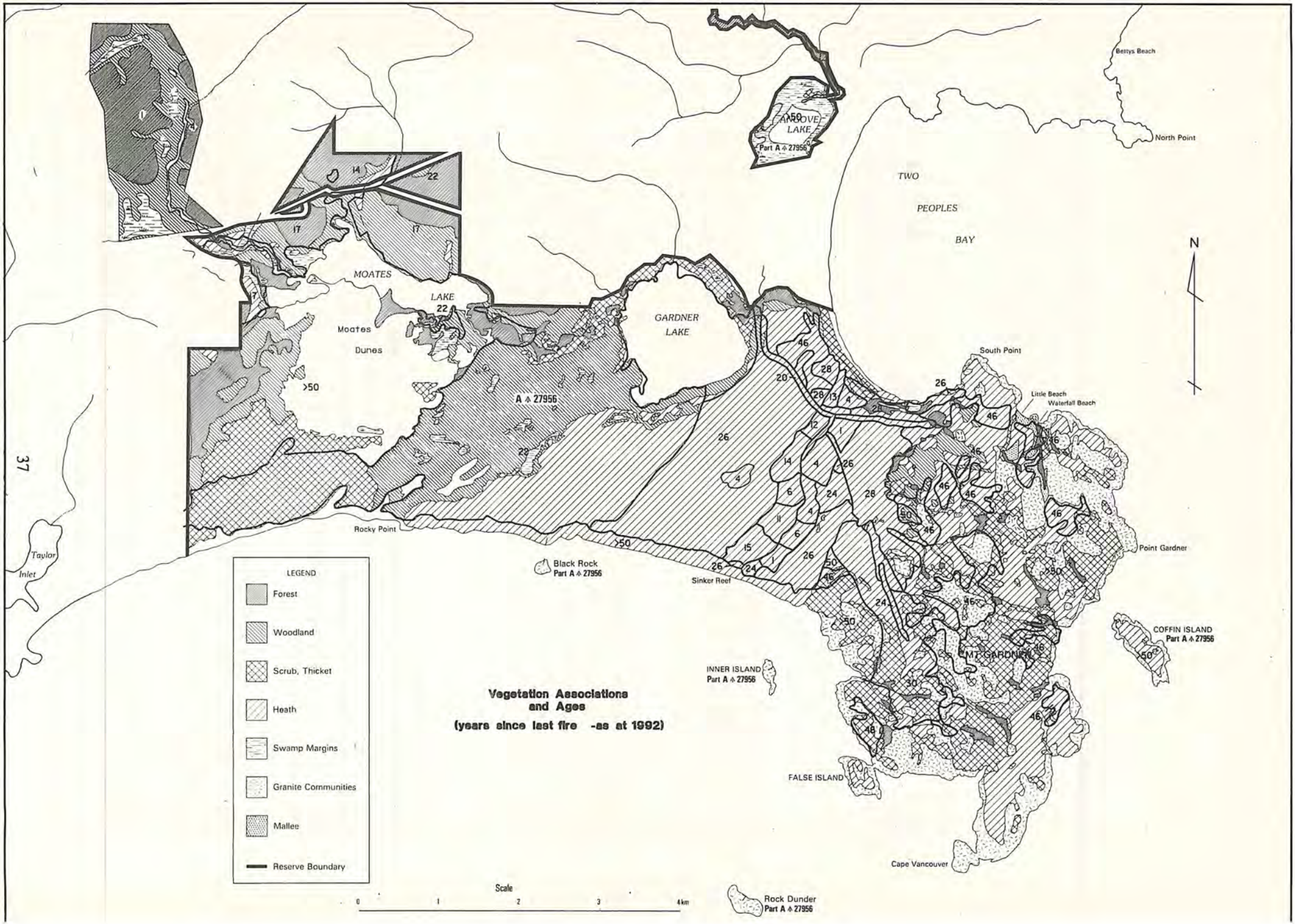

Bettys Beach
North Point
MANGROVE LAKE
Part A ♧ 27956
TWO PEOPLES BAY
N
MOATES LAKE
Moates Dunes
GARDNER LAKE
A ♧ 27956
South Point
Little Beach
Waterfall Beach
Point Gardner
Rocky Point
Taylor Inlet
Black Rock
Part A ♧ 27956
Sinker Reef
COFFIN ISLAND
Part A ♧ 27956
MT GARDNER
INNER ISLAND
Part A ♧ 27956
FALSE ISLAND
Cape Vancouver
Rock Dunder
Part A ♧ 27956
LEGEND
Forest
Woodland
Scrub, Thicket
Heath
Swamp Margins
Granite Communities
Mallee
Reserve Boundary
Vegetation Associations and Ages
(years since last fire -as at 1992)
Scale
0 1 2 3 4km

TABLE 3. VEGETATION OF SPECIAL CONSERVATION INTEREST

Threatened bird habitat
Noisy Scrub-birds utilise predominantly thicket and scrub formations and low forest on Mt Gardner. *Agonis juniperina* forest, low forest, and scrub and thicket around the Lakes are also important habitat. Some territories also occur in low heath. Habitat of the Western Bristlebird includes low heath on the isthmus and headland. Habitat of the Western Whipbird includes low forest, scrub/thicket and low heath.

Swamp margin thicket
The swamp vegetation north of Moates and Gardner Lakes is the habitat of the insectivorous plant *Cephalotus follicularis* (Albany pitcher plant). This is the only species in the family Cephalotaceae and is found only in Western Australia between Busselton and Cheyne Beach.

Mixed mallee shrubland
Small isolated clumps of mallee occur in the isthmus heath.

***Melaleuca baxteri* forests/thickets**
Up to 7m high, these species occur in the vicinity of the bridge over Gardner Creek, and in some gullies and ridges around Mt Gardner. The long unburnt nature of these communities is a unique feature of the Reserve and these areas should be protected from fire. This species is also not widely spread.

Banksia open low woodland
An unusual combination of six species of *Banksia* occur on a small patch of sand near the western boundary of the Reserve. These include *Banksia praemorsa,* which is an unusual inland occurrence (at about 2 km from the coast), and *B. seminuda*, which is close to the eastern limits of its range. In addition the threatened *Adenanthos cunninghamii* occurs.

Vegetation Changes

Dieback disease caused by *Phytophthora cinnamomi* (see Section 13, Disease) has been present on the Reserve for a long time and has had a major effect on the vegetation. The disease was not detected until 1980 and the extent of the infection was not known until quite recently (M. Grant, pers. comm.). This has meant that temporal changes in the vegetation as a result of the disease have not been documented.

However, major changes linked to the presence of dieback disease have occurred. For example, the loss of *Banksia* from much of the isthmus and mountain areas may have resulted in a change from open woodland to open heath. Dieback disease is currently affecting *Hakea* and *Dryandra* dominated scrub and thicket on Mt Gardner leaving a more open sedge dominated community.

Successional changes after fire may also alter the structure of the vegetation over time. The fire free period experienced by the vegetation on the Reserve (see Section 12, Fire), which is unusually long for comparable coastal areas, has meant that succession may be relatively advanced. The growth and increasing dominance of *Agonis flexuosa* in heath areas in the north-

west part of the headland and increases in height and cover in *Dryandra sessilis* on limestone areas are examples.

The changes occurring in the vegetation after fire and the effects of dieback disease must have implications for the conservation of many species. So far these changes appear to suit the Noisy Scrub-bird, Western Bristlebird and Western Whipbird since their numbers have increased in the last 20 years. However, this may not always be the case and the effects of these changes are not known. In the future some manipulation of the vegetation may be required to sustain populations of threatened species that are particularly important on the Reserve (see Sections 12, Fire, and 13, Disease).

FLORA

Vascular Flora

Although the Reserve was gazetted because of the presence of rare birds, it also contributes to general nature conservation on the south coast since the flora is substantially different from that at national parks and other reserves in the Region, for example, the Porongurup, Stirling Range and Fitzgerald River national parks (Harvey *et al* ., in Hopkins and Smith, in prep.).

The 622 vascular plant species recorded in the Reserve reflect the great floristic richness of south-western Australia. The Reserve is comparatively rich in species of Orchidaceae (55) and Liliaceae (34). Other important families include Proteaceae (58 species), Myrtaceae (51), Papilionaceae (48), and Epacridaceae (39). The genera with the largest representation are *Stylidium* (18), *Leucopogon* (17), *Caladenia* (14), *Acacia* (14), *Banksia* (13) and *Hakea* (13).

Sixty percent of 425 of the Reserve's species were observed to flower in October. They declined to 20 percent in March and April. In this late summer-autumn period many species of the Myrtaceae and Proteaceae flower providing an important resource for nectivorous birds, mammals and insects.

Four species of vascular plants found on the Reserve are gazetted as threatened: *Banksia verticillata, Stylidium plantagineum, Adenanthos cunninghamii* and *Andersonia* sp (Two Peoples Bay G Keighery 829). *Eucalyptus missilis* is a rare hybrid between *E. angulosa* and *E. cornuta* and its declaration as rare will depend on it producing fertile seeds. Several other species are either presumed rare or occur in a restricted geographic range. Eighteen species of vascular plants that are of special conservation interest are listed in Table 4.

More research is required on the impact of different fire regimes and dieback disease on the flora. Dieback disease is eliminating many species, particularly members of the Proteaceae (*B. verticillata* has been virtually eliminated from the Reserve), Epacridaceae and Papilionaceae families.

Fire management must ensure that the intervals between fires are long enough to allow obligate-seed-regenerating species to flower and produce viable seed. Weeds are also a threat to flora in some areas, this is discussed in Section 14, Weeds, Pests and Domestic Animals.

TABLE 4. VASCULAR FLORA OF SPECIAL CONSERVATION INTEREST

VASCULAR PLANTS	CATEGORY	VEGETATION ASS.
Acacia luteola	A - Priority 3	swamp margins
Adenanthos cunninghamii	A - Declared Rare	heath (coastal), scrub
Andersonia simplex	C	scrub, thicket
Andersonia sp (TPB) G Keighery 8229	A - Declared Rare	heath
Anigozanthos preissii	C	heath
Banksia praemorsa	C	heath (coastal), scrub
Banksia verticillata	A - Declared Rare	heath, scrub
Caladenia granitora Ms	A - Priority 2	granite
Dryandra serra	A - Priority 2	forest
Eucalyptus missilis Ms	Rare hybrid - not listed	woodland
Gnaphalium gymnocephalum	B - Priority 2	heath
Gyrostemon thesioides	B - Priority 2	heath, forest
Hakea elliptica	B - Priority 2	scrub, thicket
Lepidium foliosum	B - Priority 2	heath (coastal)
Microcorys virgata	A - Priority 2	heath
Sphaerolobium alatum	C	woodland, heath
Stylidium plantagineum	A - Declared Rare	forest
Thomasia discolor	A - Priority 3	woodland

CATEGORIES

A Declared Rare Flora and Priority Flora Lists (1992)

B Declared Rare Flora and Priority Flora Lists (in prep). Collectors noted in Harvey *et al.* (in prep). No specimens from Reserve in WA Herbarium.

C Geographically restricted range but not rare. Not to be added to Priority Flora List (pers. comm. K Atkins, 1993).

Non-vascular Flora

The Reserve has a very rich and varied fungal flora, particularly the long-unburnt areas of heath and woodlands. A number of surveys have been conducted. The most extensive survey, which was conducted by K. Syme in 1991 and 1992, revealed 441 species, 365 of which are undescribed and many of which had not been previously collected. This abundance of species is associated with the exclusion of fire and resulting in plant growth and organic matter accumulating in and on the soil.

Wyatt *et al.*, (in prep.) collected 37 moss species and 11 liverwort species, with the majority of species from moist sites. Two species were new records for Western Australia (*Bryum inclinatum* and *Tortella dakinii*) and one was a new species (*Pleurophascum occidentale*). *P. occidentale* is now a declared threatened species. The closest relative of this distinctive, relatively large moss occurs in Tasmania and New Zealand and is considered a "famous bryological rarity" (Wyatt and Stoneburner, 1989).

RECOMMENDATIONS

1. **Implement the following strategies adapted from the Regional Management Plan for the South Coast Region, 1992 (Section 11.1 Flora and Fauna)**
   - **(i) Continue surveys to record the distribution, abundance and other details of flora including species Declared Rare and on the priority list.**
   - **(ii) Seek to control weeds (see Section 14, Weeds, Pests and Domestic Animals).**
   - **(iii) Protect and monitor populations of threatened and specially protected species and where appropriate, manage habitat to favour them.**
   - **(iv) Implement the Department's Recovery Plans for species for which they are prepared.**

Research and Monitoring

2. **Monitor changes in habitat of the Noisy Scrub-bird and other fauna of special conservation interest.**

3. **Monitor flora and vegetation of special conservation interest, especially in relation to disturbance (for example, fire) to determine time to reproductive maturity.**

4. **Continue research into the biology and ecology of flora and vegetation of special conservation interest, with emphasis on developing knowledge of the effects of fire and dieback disease on survival and regeneration.**

General

5. **Maintain and update location maps, photographic collections and other rare flora records. Where necessary, keep information confidential for management and research purposes.**

6. **Minimise disturbance to flora and vegetation of special conservation interest from visitor and management activities.**

7. **Minimise loss of, and disturbance to, habitats of the Noisy Scrub-bird and other species of special conservation interest, during all management operations.**

8. **Rehabilitate degraded areas (see Section 18, Rehabilitation).**

12. FIRE

The objectives are to:

- **Protect visitors, neighbours and fire fighters and property from fire.**
- **Maximise numbers of the Noisy Scrub-bird through the appropriate fire management of their habitat.**
- **Protect other conservation values through appropriate fire management.**

The significance of the Reserve for the conservation of particular species is strongly related to its long unburnt vegetation which on Mt Gardner is mostly over 30 years old and some over 50 years old. This is the most important habitat requirement of the Noisy Scrub-bird and also for some of the other threatened species. It provides thick leaf litter, and thus a good source of invertebrates for food and dense cover for protection.

In comparison, the south coast vegetation is generally much younger. This in itself is of conservation value and also of value for purposes of comparison with similar vegetation associations. It must be recognised, however, that this fire management regime while suitable for priority species may disadvantage others on the Reserve.

The long fire free periods result in heavy fuel loads and any fire under difficult conditions (high fire danger and above) will be very difficult to control. If a fire occurs an extensive area could be burnt. Natural ignition from lightning strikes is a threat although in the last 20 years only two fires from this cause have occurred. Appropriate and effective fire management is essential, including measures such as maintaining fuel reduced areas, and a committment to fire suppression.

Fire History

The vegetation ages are depicted in Figure 5. The old age of the vegetation is most likely to be the reason that the Noisy Scrub-bird survived on Mt Gardner. No information is available on fires on the Reserve before 1946 and little information is available between 1946-1961. Some parts of the Reserve marked as unburnt for more than 50 years may have been burnt in this period. Since the Reserve was gazetted in 1967, no fire has burned from the Reserve into neighbouring or privately owned lands.

In 1976, a strategic fuel-reduced buffer (100-200m wide) separating Mt Gardner headland from the rest of the Reserve was established across the isthmus to protect the Noisy Scrub-bird population. It contains firebreaks, Sinker Reef Road and fuel-reduced blocks. Since then, the Noisy Scrub-bird population has expanded and spread from Mt Gardner headland to the remainder of the Reserve. The buffer now has the additional function of preventing a single fire affecting both the original and dispersed populations.

Small fires have been recorded in the Reserve. In the 1980s two fires occured: one in 1988 west of the buffer and one east of the buffer in 1989, both resulting from lightning strikes. Both occurred under relatively mild conditions and were suppressed by CALM staff and the Lower Kalgan fire brigade.

Fire management has been primarily based on excluding fire from Noisy Scrub-bird habitat and this has resulted in ever increasing growth in the Noisy Scrub-bird population.

Ecological Requirements

Noisy Scrub-birds will generally recolonise a territory 10 to 12 years after fire. The earliest recolonisation is thought to be after four years with breeding probably occurring there two years later (Smith 1985b). Though the actual extent of the fire in the territory studied is unknown, there is no evidence of territories being abandoned as a result of being long unburnt. It is possible that birds move to the margins of the territories for nesting as *Lepidosperma* dies out through overshading. Numbers of Noisy Scrub-birds are still increasing in long unburnt areas. The relationship between fire and habitat requires investigation and if evidence indicates, prescribed burning may need to be used to re-establish habitat.

Western Bristlebirds are also eliminated from territories affected by fire. They recolonise areas after about four years. Some reduction in density of Bristlebird populations (but not elimination) occurs about 30 years after fire (Smith 1985b). The structure and composition of the vegetation on the buffer strip which is habitat for the Western Bristlebird has been changed owing to selective and concentrated grazing by kangaroos following burning. This change makes these areas unfavourable habitat in the long term. Control of kangaroo grazing involves kangaroo management (see Section 10, Fauna) and also appropriate fire management (see fire management strategy this section).

In the Mt Gardner area, Western Whipbirds are reported to establish territories in areas about 7 to 10 years after they have been burnt, there being one record of breeding 7 years after fire. In the heath and thicket of the isthmus area, territories are found to be established within 4 to 6 years (Smith 1985b).

The fire ecology of flora of special conservation interest (Table 4) requires research. At least four species are categorised vulnerable by Hopkins (1985) being fire sensitive obligate seed regenerators with on-plant storage: *Banskia praemosa, B. verticillata, Dryandra serra* and *Hakea elliptica.* Many other species are in the next most vulnerable category with seed storage in the soil, for example, *Adenanthos cunninghamii.* It is not known how long these vulnerable species take to regenerate from seed, reach reproductive maturity and then establish a seed bank sufficient to ensure continuation of the population.

The vegetation of special conservation interest, *Melaleuca baxteri* thickets, mixed mallee shrub, swamp margins and the *Banksia* open low woodland are also sensitive to, and should be protected from, too frequent fires.

Studies have been carried out in the buffer to determine fuel accumulation and plant regeneration rates in heathland after fire, the effects of grazing on plant regeneration and life histories of heath plants. These should be reviewed with regard to information on dieback disease. The continuation of these studies is desirable.

Protection of People and Property

The high fuel levels often associated with long unburnt vegetation make wildfires difficult to control and increases the risk to the safety of visitors, staff and neighbours and to damage

occuring to facilities and adjacent properties. Conditions leading to extreme fire danger may necessitate the temporary closure of the Reserve to visitors to ensure their safety. Emergency plans detailing actions to take in case of wildfire will be established.

Effect of Disease, Weeds, Erosion and Landform

Fire management operations, such as maintaining fuel reduced buffers and suppressing wildfire with earthmoving equipment, may contribute to introducing and spreading disease and weeds, and erosion. The soils of Mt Gardner headland and the dunes in the Lakes area are particularly sensitive to erosion.

The large mobile dunes in the western half of the Reserve, Moates and Gardner Lakes and numerous granite outcrops on Mt Gardner headland provide natural barriers to fire. Also, the narrow isthmus joining Mt Gardner headland to the rest of the Reserve means that a buffer traversing this isthmus can minimise the risk of wildfires moving between these areas. The steep slopes and gullies make wildfires difficult to control.

Weather

Weather conditions are an important factor when fire management regimes and wildfire control strategies are formulated. The wind is mainly from the east and south-west in summer and the north-west to south-west in winter. The region experiences warm, dry summers and cool, wet winters. The long-term mean annual rainfall is between 850 - 900 mm, falling on an average of about 130 days a year. Evaporation is estimated to be about 900 mm per annum. Temperatures are mild, with mean values of 12° C for winter and 19° C for summer. However, during summer maximum temperatures of over 30° C are common.

Liaison

CALM has cooperative fire management arrangements with the Bush Fires Board, the local bush fires brigade, and managers of adjacent land including WAWA and Shire of Albany. They manage important natural areas near the Reserve.

FIRE MANAGEMENT STRATEGY

A detailed fire management program based on the principles for fire management detailed in this plan will be prepared and implemented annually in liaison with relevant bodies.

Risks associated with fire include fuel levels, types and dryness in relation to wildfire control, particularly under extreme conditions, likelihood of ignition from natural and human means, predominant weather conditions (air temperature and wind speed) and topography.

Factors taken into consideration include: distribution of Noisy Scrub-bird and other rare species; safety of visitors, staff and neighbours, particularly in the picnic area which adjoins Noisy Scrub-bird habitat; introduction and spread of disease and weeds; susceptibility to erosion; use of natural fuel reduced areas; and protection of Reserve facilities and adjacent properties.

Wildfire suppression will involve attempting to contain wildfires to as small an area as possible while minimising the impacts of suppression on Reserve values in accordance with the District fire control plan.

A cooperative approach to fire management with managers of nearby lands will continue to be sought and visitors will be educated regarding the effects and dangers of fire.

Two regimes provide the basis for fire management (see Figure 6):

1. Habitat Management (fire exclusion) Regime

Prescribed fire will be excluded from these areas for the life of this plan unless the continuing research and monitoring program into the effect of changes in vegetation on the Noisy Scrub-bird, other threatened, specially protected and priority species indicates that habitat is becoming unfavourable.

If habitat is becoming unfavourable as a result of fire exclusion a carefully considered and managed prescribed burning program for specific areas may be initiated for habitat management purposes.

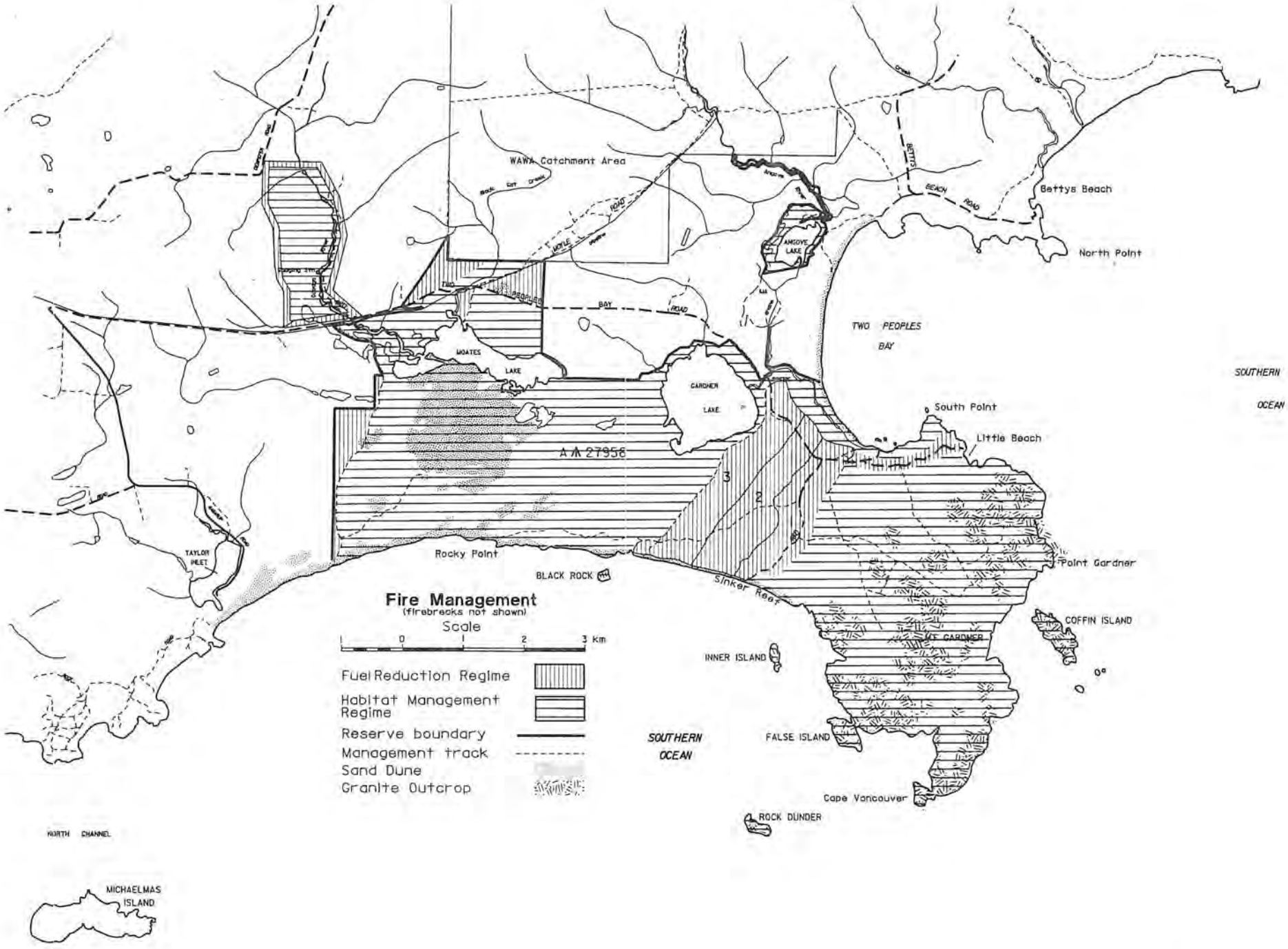
2. Fuel Reduction Regime

These are areas where the fuel will be reduced by prescribed burning, slashing and other methods, to improve management capability in minimising wildfire damaging the Noisy Scrub-bird habitat and other priority values. The location, area, frequency and season when reducing fuel will depend on the values and the risk of fire detrimentally affecting them.

A fuel-reduced area across the isthmus between Mount Gardner and the Lakes will continue to be maintained to minimise the likelihood of a single fire affecting the two major sub-populations of the Noisy Scrub-bird. This will consist of three buffer strips (see Figure 6).

Buffer 1 is the existing strip of small blocks. The vegetation has been altered in this buffer because of grazing by kangaroos. This has resulted in the area becoming unfavourable habitat for Western Bristlebirds and the prevalence of woody species which, though difficult to prescribe burn, will burn in a wildfire.

The burning program will be completed in buffer 1 then commenced in buffer 2 and if necessary buffer 3. To reduce the impact of kangaroo grazing buffers 2 and 3 will not be subdivided into small blocks. The interval between burning will mostly depend upon the extent of the regeneration in previously burnt areas and their suitability for use by Western Bristlebirds.


WAWA Catchment Area
Bettys Beach
North Point
TWO PEOPLES BAY
SOUTHERN OCEAN
South Point
Little Beach
A A 27956
Rocky Point
BLACK ROCK
Sinker Reef
Point Gardner
COFFIN ISLAND
INNER ISLAND
FALSE ISLAND
Cape Vancouver
ROCK DUNDER
NORTH CHANNEL
MICHAELMAS ISLAND
Fire Management
(firebreaks not shown)
Scale
0 1 2 3 Km
Fuel Reduction Regime
Habitat Management Regime
Reserve boundary
Management track
Sand Dune
Granite Outcrop

RECOMMENDATIONS

1. **Implement the following strategies adapted from the Regional Management Plan for the South Coast Region, 1992 (Section 13.2 Fire)**
   - **(i) Establish and maintain an efficient fire detection system and improve the effective fire fighting forces and equipment within the resources available.**
   - **(ii) Use fire to develop or favour habitat for specific flora and fauna species where appropriate.**
   - **(iii) Maintain close liaison with local bush fires brigades, neighbours of the CALM managed estate, local authorities and other agencies and through the mechanism of District Fire Plans, establish mutual aid arrangements.**
   - **(iv) Develop neighbour and public knowledge about community fire protection needs and Departmental fire management objectives and response procedures.**
   - **(v) Assist with research into fire behaviour and fire ecology.**
   - **(vi) Monitor the effectiveness and impacts of fire management measures and make any necessary changes to procedures in the light of research and experience.**

Research and monitoring

2. **Record and analyse details of all fires, including fire behaviour information.**

3. **Continue research on the value of different aged vegetation for habitat of the Noisy Scrub-bird and other fauna of special conservation interest. If there is evidence that habitat is becoming unfavourable for these species due to fire exclusion, consider use of prescribed burning to return vegetation to an earlier successional stage.**

4. **Continue research on:**
   - **fuel accumulation and plant regeneration rates in heathland after fire**
   - **the effects of kangaroo grazing on regeneration after fire**
   - **the life histories of heath flora.**

5. **Monitor the requirements and regeneration of Western Bristlebird habitat on the fuel reduced buffer.**

Fire management and prevention

6. **Prepare and implement a fire management program annually, based on the fire management strategy (Figure 6). Prepare a detailed map showing information such as, fire regimes, firebreaks, facilities and important conservation areas.**

7. **Establish and continue to maintain water points at strategic locations, particularly on Mt Gardner.**

8. Close the Reserve to visitors when an extreme fire danger is considered to exist.

9. Protect facilities from fire by careful site design and management.

10. Continue to prohibit barbecue fires and provide alternative facilities, such as gas barbecues, as appropriate.

11. If research and monitoring (see Recommendation above) indicates the need for prescribed burning in the habitat management (fire exclusion) regime initiate a carefully considered and managed program of prescribed burning in specific areas of this regime.

12. Maintain firebreaks by the most appropriate means.

13. Control kangaroo grazing through appropriate fire management and kangaroo management (see Section 10, Fauna).

Wildfire Suppression

14. Base wildfire suppression action on strategies outlined in the District Fire Control plan and the specific management requirements of Two Peoples Bay Reserve.

15. Contain wildfires to the smallest possible area. Base suppression methods on the values threatened, particularly Noisy Scrub-bird habitat, the impact of the suppression activity on these values, sensitivity to erosion, fire behaviour and resources available.

Liaison

16. Liaise with the local Bush Fires Brigade, Bush Fires Board and the Shire of Albany, WAWA and other neighbours regarding fire management of the Reserve and adjacent areas. Encourage a cooperative approach and fire management complementary to that of the Reserve, particularly of the adjacent areas of natural vegetation.

17. Conduct Reserve prescribed burning and suppression activities in conjunction with local fire brigades and neighbours, where appropriate.

18. Develop a fire contingency plan in case of fire. Review annually. Inform and educate visitors regarding fire management and safety.

13. DISEASE

The objectives are to:

- **Control the spread and intensification of dieback disease and other plant diseases where they are already present.**
- **Prevent their introduction into disease-free areas.**
- **Prevent the introduction of animal diseases.**

Plant Disease

Dieback disease is caused by the microscopic soil borne fungus *Phytophthora* spp. The fungi produce small motile spores which are spread in water and moist soil. They are also able to survive for prolonged periods in soil.

The movement of soil by earthworks and on the wheels and underbodies of vehicles is a major artificial means of disease spread. However, walkers can also carry infected soil on their boots. Evidence indicates that the large kangaroo population at Two Peoples Bay has contributed to dieback disease spread through a network of well developed trails linking disease with disease free areas. The situation is exacerbated by a climate and soil types favourable to this disease in an area that supports very susceptible flora.

Disease activity was confirmed in 1980, however, it has been present in western parts of the Reserve for at least 40 years and it is thought to have been introduced through disease infected gravel used on the Two Peoples Bay Road. Most of the tracks and roads in the Reserve were developed between the years 1946 and 1975 and during this time the disease was undoubtedly spread by vehicles, horses and walkers.

A comprehensive survey was conducted at Two Peoples Bay between 1987 and 1989 to assess the extent and impact of dieback disease. This involved studies of aerial photography and satellite imagery complemented by intensive field reconnaissance and sampling.

Dieback disease is present in most of the Reserve. Vegetation structure and composition has been changed in many areas to such an extent that they now appear uninfected because susceptible species have been removed and a small number of resistant species now dominate these sites.

For conservation of genetic resources more intensive management is required focussing on;

- susceptible threatened species, for example *Banksia verticillata* , and
- representative samples of vegetation comprising susceptible species, particularly within the remaining pockets of minimally infected vegetation.

Current management techniques include the use of phosphorus acid foliar spray, others are likely to be developed during the life of this plan. All steps will be taken to minimise artificial spread.

For future management of the Reserve it is important to understand the longer term changes that will result from the impact of dieback disease on the priority Reserve values.

Honey-Fungus (*Armillaria luteobubalina)* has spores borne on gills similar to a mushroom, a golden yellow fruiting body 12 to 15 cm across, and generally grows in clumps on tree bases or stumps. The fungus appears in the wetter months of the year. *Armillaria* spp. feed on new wood and bark, eventually girdling and killing their host. They have a large host range and are widespread throughout the world.

Unlike *Phytophthora cinnamomi*, *Armillaria luteobubalina* occurs naturally in the south-west. In an undisturbed environment the fungus spreads by infected roots growing towards and touching uninfected roots or by fungal hyphal growth, both slow processes. Air-borne spores landing on damaged bark may also establish infections. Disturbance of the soil increases the activity and spread of the fungus. *Armillaria* has been recorded within the Reserve and is most prevalent within old *Phytophthora* infections and within communities on the limestone soils of the isthmus.

Aerial canker fungi including *Botryosphaeria* and *Diplodina* have been isolated from dying plants in the Albany area. However, they are not widespread in the Reserve. This is an unusual situation considering the intensity and impact within the Mt Manypeaks and Boulder Hill areas. It may be due to the low numbers of canker susceptible heaths now present in the Reserve as a result of the effects of dieback disease. As with *Armillaria,* spores of the canker fungi disperse in the wind. No effective control measures are known but research into both diseases is ongoing.

Animal disease

A number of diseases may affect populations of animals. For endangered species where populations are small the loss of even a few individuals can be significant to the species. Their effective management in the long term will require a knowledge of parasites and infectious diseases within such populations and of methods of control and treatment. This type of knowledge is almost completely lacking for most threatened species in Australia.

On the Reserve there is the potential for disease to have a considerable impact on threatened species. Control methods include preventing the entry of domestic animals. However, control of the entry of wild animals, which include dispersing, nomadic and migratory birds, is not feasible. The translocation program for the Noisy Scrub-bird, which involves the regular capture and handling of these birds, provides the opportunity to monitor disease in this species. Care must be taken to prevent introducing avian disease through contaminated equipment and food.

RECOMMENDATIONS

1. **Implement the following strategies adapted from the Regional Management Plan for the South Coast Region, 1992 (Section 13.1 Plant Disease)**
   - (i) **Prevent the establishment of dieback disease in new areas and minimise additional spread in areas where the disease already occurs by controlling access and operations in susceptible areas and by the implementation of other methods of control.**
   - (ii) **Assess all operations and uses with an evaluation test for potential dieback disease impact.**

(iii) Monitor the effectiveness of operations conducted under strict hygiene.
(iv) Improve understanding by the public and by CALM personnel of the dieback disease problem and protection measures.
(v) Regularly update the dieback disease distribution map.
(vi) Monitor the spread of infections at specific sites.
(vii) Develop and adopt appropriate strategies for other plant disease species including *Armillaria* and canker.
(viii) Encourage other Government departments, local authorities and neighbours to adopt similar dieback disease control strategies.

Research and Monitoring

2. Monitor threatened species susceptible to dieback disease and the minimally infected areas.

3. Investigate the impact of dieback and other plant disease on Noisy Scrub-bird and Western Bristlebird habitat.

4. Review management recommendations in the light of continuing research findings on the spread, impact and control of plant diseases.

General

5. Undertake more active dieback disease control methods, such as use of phosphorus acid foliar spray, where appropriate. Focus on protecting susceptible threatened species and suitable areas of representative vegetation, particularly those minimally infected.

6. Exclude public access and stringently control research and management access where required.

7. Establish a wash down station for CALM operational use.

8. Continue to train staff in plant disease recognition, sampling and hygiene.

9. Initiate screening for disease organisms as part of the translocation program.

10. Regularly clean and sterilise equipment used in the translocation program. Ensure this equipment is not used for pets or other birds from outside the Reserve.

11. Ensure that people involved in the translocation program, who have had contact with captive birds, follow hygienic procedures.

14. WEEDS, PESTS AND DOMESTIC ANIMALS

The objectives are to:

- **Minimise the impacts of weeds and pests and their control on indigenous species.**
- **Prohibit domestic animals.**

Pests

Animals introduced in the Reserve include foxes, feral dogs and cats, rabbits, feral birds (for example, pigeons and escaped aviary species), black rats, house mice and feral bees. Foxes and cats are known to prey on indigenous mammals and birds.

Foxes are controlled on the Reserve as part of an ongoing, long-term program. Other species are controlled opportunistically. Cats and black rats need to be controlled as they are known predators of birds, ground-dwelling birds are particularly vulnerable. Feral bees occur on the Reserve and also may require control. They can affect indigenous fauna by competing for nectar and pollen and outcompeting hollow-nesting birds, and can affect indigenous flora by interfering with their reproductive processes. Bee hives and swarms also pose a safety risk.

Weeds

Weeds may compete with, and may eventually replace, indigenous flora and can have a significant adverse impact on conservation values. Twenty-five species of introduced flora have been recorded on the Reserve. Many only occur near the picnic area that was previously the site of the squatters' huts. Species of particular concern include Cape Tulip, Pampas Grass, Taylorina and Watsonia. Small annuals have colonized disturbed areas such as the fuel-reduced buffer which crosses the isthmus.

Introduced lawn species are used and maintained in the picnic area. This practice will continue, but lawn will be contained within a defined area.

Methods of control must be chosen that have minimal impact on indigenous species and are safe to use. Priority should be given to control of pest species that are most detrimental to conservation values.

Domestic Animals

Domestic animals, including pet dogs, are not permitted in the Reserve. There are a number of reasons for this including disturbance to wildlife and visitors, potential for introducing disease and fouling recreation sites.

Guide dogs and tracker dogs for use in search and rescue may be permitted in the Reserve with permission from CALM under specified conditions.

RECOMMENDATIONS

1. **Implement the following strategies adapted from the Regional Management Plan for the South Coast Region, 1992 (Sections 13.3 Weeds, Feral Animals and Pests and 14.6 Pets)**
   - **(i) Maintain an inventory of pests and weeds.**
   - **(ii) In conjunction with the Agriculture Protection Board and nearby landholders, develop and implement programs to control declared and other pests and weeds as resources allow. Include regular monitoring.**
   - **(iii) Assess the efficiency of control on target species and any effects on non-target species, and make changes to procedures if required.**
   - **(iv) Provide information to the public on the impacts and control of weeds and pests.**
   - **(v) Continue to prohibit domestic animals (pets) from entering the Reserve and provide information explaining the Departmental policy on pets to the public. Enforce as necessary.**

2. **Liaise with neighbours to ensure that domestic animals from nearby privately owned lands do not enter the Reserve.**

3. **Contain the lawn in the facilities area to a defined area.**

15. HYDROLOGY

The objectives are to:

- **Maintain the quantity and quality of the Reserve's surface and ground water.**
- **Protect the special conservation values associated with wetland areas, particularly Noisy Scrub-bird habitat.**

The hydrology of the Reserve is integrally linked with Noisy Scrub-bird habitat and other areas of high conservation value, such as habitat of the Australasian Bittern. Surface water features such as the lakes and Goodga River are attractive to visitors. Three distinct drainage systems occur in the Reserve: the Goodga system, the Angove system, and the upland streams of the Mt Gardner headland.

The water catchment area for the Angove and Goodga systems arise outside the Reserve and are influenced by management practises and land uses within this area (see Figure 7). Consequently, the Reserve's environment may be detrimentally affected by management of these properties and reserves. Liaison with managers of all lands within the catchment area is an important component of managing the Reserves' water quality and quantity.

Water quality in these systems appears relatively unaffected by agricultural clearing. All three drainage systems are relatively undisturbed, especially the streams of the Mt Gardner headland and,

therefore, can provide benchmark data on water chemistry, vegetation and fauna for streams on the south coast of Western Australia (Coy *et al*, in prep).

Goodga Drainage System

The major elements of the Goodga drainage system are the Goodga River, Moates Lake, Juniperina Creek, Gardner Lake and Gardner Creek. The Goodga River begins in Water Supply Reserve 13802, flows 6 km through cleared farmland in a broad, swampy valley then through Goodga River Reserve 24991 (which is proposed to be added to the Two Peoples Bay Reserve).

The Water Authority of WA has a gauging weir in the Goodga River Reserve for monitoring water depth, salinity and volume. Water quality is slightly acidic, probably as a result of salts picked up from the cleared land upstream.

Goodga River enters Two Peoples Bay Reserve and empties into Moates Lake. This is one of the deepest natural lakes in south-western Australia with a maximum depth of about 5m. Three other main rivers/streams flow into this tannin-stained lake.

From Moates Lake a seasonal flow, known locally as Juniperina Creek, meanders between lagoons and swamps, through a channel into marsh and then Gardner Lake. This slightly stained, brackish lake is also fed by the tidal flow of Gardner Creek when open to the sea.

A sandbar generally closes Gardner Creek to the sea. Heavy rainfall is associated with flooding of the habitat of the Gardner Lake subpopulation of the Noisy Scrub-birds and in some years significant decline in Noisy Scrub-bird occupied territories. Flooding is a major management concern.

The sandbar is opened artificially most years. Water quality and quantity and the impact on Noisy Scrub-bird habitat requires research and monitoring to determine the best means of management, including artificial manipulation, owing to the very high conservation values at risk.

Angove Drainage System

The major elements of the Angove drainage system are the Angove River, Angove Lake and Angove Drain. The Angove River arises in swamps north of Water Supply Reserve 13802 then flows into this Reserve and a pipehead dam that provides a major part of Albany's water.

The river flows through a gauging weir below the dam then enters the Angove section of Two Peoples Bay Reserve. A channel, about 3 km long, has been constructed on private property from Angove Lake to Gardner River to drain farmlands between these separate components of the Reserve. This area of private property is a desirable addition to the Reserve (see Section 7, Additions to the Reserve).

The impact on fauna and flora of water treatment at the dam and the manipulation of water flow at the dam and the drain is not known and requires research and monitoring, particularly the potential to contribute to flooding of Noisy Scrub-bird habitat around Gardner Lake. Further liaison with the WAWA and the manager of the private property is required.

Mt Gardner Headland

The Mt Gardner headland is drained by 12 drainage systems, most flowing seasonally and some flowing throughout the year though receding to pools in dry years. The densely vegetated gullies, through which these streams flow, served as a refuge for the Noisy Scrub-bird when the species was extinct elsewhere and their significance as habitat continues to be very high. On the ocean side of the headland five main drainage systems flow into the ocean, while systems on the inland side descend to the isthmus area where they seep into the dunes and swales.

RECOMMENDATIONS

1. **Implement the following strategies adapted from the Regional Management Plan for the South Coast Region, 1992 (Section 10.5 Wetlands)**
   - **(i) Identify key values for each wetland.**
   - **(ii) As far as possible seek to prevent actions that adversely effect nature conservation values of the wetlands within their catchments.**
   - **(iii) Where appropriate, rehabilitate degraded wetlands.**
   - **(iv) Monitor the condition of wetlands and the management of wetland catchments in conjunction with other key organisations.**
   - **(v) Provide information to the public on the values, significance and management of wetlands.**

2. **Conduct a research and monitoring program to determine the relationship between water quantity and the habitat of the Gardner Lake subpopulation of Noisy Scrub-birds and techniques to manage the adverse impacts on habitat. Implement appropriate management actions.**

3. **Consider surface and ground water quality and quantity during all management activities, with particular consideration to its relationship to Noisy Scrub-bird habitat.**

4. **Continue to liaise with the WAWA, particularly in regard to the impacts of water treatment and manipulation at Water Reserve 13802, and to the impacts the gauging station in Goodga River Reserve 24991 has on fauna and flora and their management.**

5. **Liaise with the managers of other properties in the catchment areas of the drainage systems (Figure 7) to seek management compatible with Reserve management objectives.**

6. **Control visitor access and activities (see Section 23, Day Use)**


Bettya Beach
North Point
TWO PEOPLES BAY
SOUTHERN OCEAN
South Point
Facilities Area
Little Beach
AA 27956
Point Gardner
COFFIN ISLAND
MT GARDNER
Rocky Point
BLACK ROCK
Sinker Reef
INNER ISLAND
FALSE ISLAND
SOUTHERN OCEAN
Cape Vancouver
ROCK DUNDER
NORTH CHANNEL
MICHAELMAS ISLAND
Catchments
Scale
0 1 2 3 km
Catchment Boundaries

16. GEOLOGY, LANDFORMS AND SOILS

The objective is to protect the rock formations, landforms and soils from degradation.

The Reserve contains a number of geological elements. It is underlain by rocks of the Albany-Fraser Orogen formed from 1200 to 1400 million years ago. These rocks are ancient sediments that were intruded by bodies of granite. The granites form isolated hills with boldly rounded shapes such as Mt Gardner (408m ASL).

During the past two million years sea level has fluctuated between 70m above and 100m below present levels. At high sea level Mt Gardner is believed to have been an island 'tied' to the mainland by lime sand deposits. These sands have since been cemented together to form sandstone that is exposed along the 50m high cliffs along the coast west of Mt Gardner.

The granite coastline to the east, north and south of Mt Gardner is very steep and deeply incised which form streams that descend to the sea. The islands that surround the Reserve are the crests of granite hills now drowned.

Angove, Gardner and Moates Lakes were almost certainly linked to form an extensive estuary system during the last interglacial, approximately 120 000 years ago when the sea level was higher than at present. The western entrance of this estuary may have been located between the dunes at Rocky Point. The lakes are fringed by peaty sands that mark these earlier extensions of the lakes and associated swamps. Fossil shell beds have been found in Gardner Lake. These indicate the change from an estuarine to a freshwater system, and are estimated to be between 4000 and 6000 years old.

Coastal dunes, which formed approximatley 10 000 years ago, occur in the western part of the Reserve and have been blown inland covering parts of the landscape. Most of these dunes are stabilised by vegetation though a large blowout exists with mobile dunes south of Moates Lake and some coastal dunes are active near Rocky Point.

About 5500 years ago the sea level fell by about 3m to its present position. The wave cut bench formed at the higher level was stranded and it remains as important evidence of sea level changes. It is best expressed along the coast between Sinker Reef and Rocky Point.

The Two Peoples Bay Beach foredune can be severely eroded during winter storms. South-easterly storms have caused major erosion in recent years. Recovery after storms is slow. Sand transport is low to moderate on this beach because there is little sediment delivery by waves and limited exposure to strong winds.

Nanarup Beach along the southern coast of the Reserve receives much higher energy waves than other beaches on the Reserve as it faces into the predominant southern swells. Beach mobility is high and considerable quantities of sediment are transported. The beach and barrier systems are both dynamic and robust although they may be fragile if not sensitively managed.

RECOMMENDATIONS

1. **Identify areas that are vulnerable to damage because of the nature of the geology, landforms and soils.**

2. **Monitor the stability of vehicle and pedestrian access and take management action if required.**

3. **Realign or close and rehabilitate vehicle and pedestrian access that can not be effectively stabilised.**

4. **Consider the vulnerability of geological features, landforms and soils when assessing future vehicle and pedestrian access, firebreaks and site developments.**

5. **Monitor the movement of the sand blowouts and rehabilitate if required (see Section 18, Rehabilitation).**

17. VISUAL LANDSCAPE

The objectives are to:
- **Conserve the Reserve's visual landscape values.**
- **Plan and implement all management activities to complement the positive visual qualities of the Reserve and surrounding landscapes.**
- **Restore visually degraded landscapes.**

The Reserve's landscapes[3] are among the most spectacular found on the South Coast. The undisturbed coastline and diversity of landscape features, such as the shoreline, cliffs, beaches, reefs, offshore islands, headlands, mountain peaks, dunes, lakes and various vegetation associations, contribute to the area's outstanding scenery.

Regionally the Reserve's landscape is surrounded by a diverse range of visually significant south coastal landscapes that includes mountain peaks, harbours, bays, Albany township, nearby settlements, offshore islands and ocean. In this regional context, the extensive surrounding natural landscapes are as significant as the Reserve's internal landscape features.

In the north of the Reserve, the Angove Lake and River sections are accessed through private farmland that provides a distinct visual contrast to the Reserve's naturalness and predominantly undisturbed nature. Adjoining landuses may however detract from the Reserve's inherent visual

3 The term landscape in this context refers to the appearance, scenery or visual expression of the environment. Other nonvisual components of the landscape, such as touch, smell and sound, have not been assessed.

qualities. Therefore, the Reserve's and surrounding landscape should be managed in similar ways.

A broad-scale, visual landscape analysis was carried out for the Reserve. This assessment follows CALM's Visual Management System and focussed primarily on the Reserve's *landscape character types* and *scenic quality*. Landscape character types are defined by assessing broad areas of land with common visual characteristics, such as landform, vegetation, waterform and land use. The overall value of the visual impression held by the community is defined as its scenic quality.

Two landscape character types were identified in the Reserve: the *Coastline* and the far eastern reaches of the *Scott Coastal Plain* (Stuart-Street and Kirkpatrick, in prep.). For management purposes, differences in scenic quality within each landscape character type have been defined (Figure 8).

Areas with outstanding or diverse features are identified as having high scenic quality. For example, the feature of the Coastline landscape character type, such as cliffs, islands, rock outcrops, windshaped vegetation and unusual shoreline motion, contribute to high scenic value quality.

Areas with the features and diversity commonly found in a particular character type are given a moderate classification. For example, features of the Scott Coastal Plain landscape character types such as gently rounded slopes, predominantly uniform vegetation and seasonal wetlands contribute to moderate scenic quality.

Areas lacking distinct features and/or diversity or are dominated by human-imposed changes are rated as low scenic quality. For example, features of Scott Coastal Plain landscape character type such as extensive flat areas with limited features of specific visual interest, areas of similar vegetation and areas where waterforms are absent contribute to low scenic quality. None of the coastline landscape character types falls into this category. Appendix 1 identifies high, moderate and low scenic quality classes.

Visual landscape management in the Reserve involves maintaining, restoring or enhancing the landscape (including landform, vegetation, waterform), and planning and designing land-use activities and developments so as to provide diverse views in a natural setting. Human-imposed changes to the landscape should be subordinate to the established natural visual character. The desired outcome is a positive response and sense of place for the Reserve's visitors and local residents.

Visual landscape management ranges from broad scale to site specific analysis, and includes sensitive planning, design and construction. Specific guidelines for managing visual landscape values in and surrounding the Reserve are provided in Table 5 below.

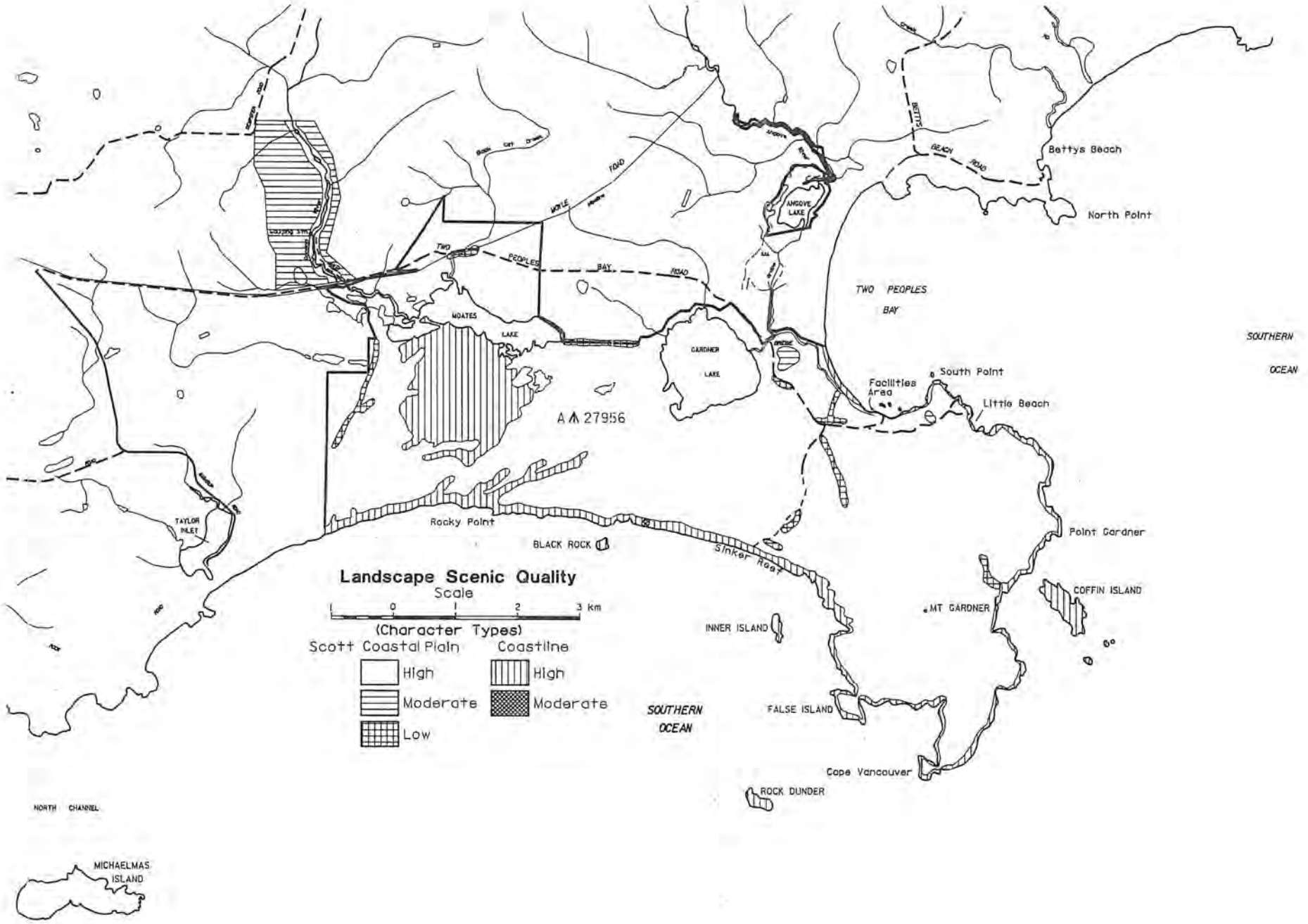

Landscape Scenic Quality
Scale
0
2
3 Km
(Character Types)
Scott Coastal Plain
High
Moderate
Low
Coastline
High
Moderate
Bettys Beach
North Point
TWO PEOPLES BAY
SOUTHERN OCEAN
South Point
Facilities Area
Little Beach
Point Gardner
COFFIN ISLAND
MT GARDNER
INNER ISLAND
FALSE ISLAND
Cape Vancouver
ROCK DUNDER
BLACK ROCK
Rocky Point
Sinker Reef
TAYLOR INLET
NORTH CHANNEL
MICHAELMAS ISLAND
MOATES LAKE
GARDNER LAKE
MANGROVE LAKE
A 27956

TABLE 5 GUIDELINES FOR VISUAL LANDSCAPE MANAGEMENT

COASTLINE	SCOTT COASTAL PLAIN
High Scenic Quality - • Alterations should remain subordinate to natural landscape elements such as cliffs, beaches, inlets and vegetation by borrowing extensively from their form, line, colour, texture and scale. • Activities that minimally disturb the environment should be encouraged, for example, beach recreation, walking, nature study and sight seeing. • Boat trailer and vehicle storage should be screened from prominent views. • The number of access tracks should be minimised, with well designed features such as steps and railings. Roads should enter these landscapes only to reach specific sites rather than transverse the coastal edge or cross ridgelines. • Fire management should, where possible, integrate visual impact minimising prescriptions. • Bare-earth/ploughed firebreaks should not be constructed. • Previously disturbed areas should be given the highest priority for rehabilitation or redevelopment until the desired standard of scenic quality is achieved, for example, Two Peoples Bay foredune area and vehicle turn-around.	**High Scenic Quality -** • Alterations should remain subordinate to natural landscape elements such as Mt Gardner peak, granite outcroppings, steep and shallow valleys, flats, major water bodies, and areas of high vegetation diversity, borrowing from their form, line, colour, texture and scale. • Activities which minimally disturb the environment should be encouraged, for example, walking, nature study, picnicing. • Road, carpark and facility design, construction and maintenance should remain subordinate to landscape elements by maximum use of existing disturbed areas, minimum clearing width, undulating edges, sensitive alignment, colours and materials, and immediate revegetation of all remaining disturbed areas. • All site improvements should be visually unobtrusive from vantage points. • Fire management should, where possible, integrate visual impact minimising prescriptions. • Mown fire buffers should be encouraged, sensitively located following contours and with undulating edges. • Minimise the number of signs throughout the Reserve. • Encourage sensitive road and associated vegetation maintenance along the Reserve's entry route.
Moderate Scenic Quality - • Alterations may be apparent but they should not dominate; they should borrow form, line, colour, texture and scale from natural elements. • Mown fire breaks should follow the contour, where possible, with irregular shaped edges as per vegetation types, etc. • Relocate and maintain Sinker Reef carpark and access track according to an approved site developent plan.	**Moderate Scenic Quality -** • Alterations may be apparent but they should not dominate; they should borrow form, line, colour, texture and scale from natural elements. • Encourage indigenous planting of surrounding cleared farmland. • Liaise with Shire and private landholders concerning the visual impact of future developments in major focal areas, for example lands east of Goodga River and north and south of Two Peoples Bay Road. Encourage sensitive siting and design guidelines and consideration of conservation easements, the transfer of development rights and other more permanent means of protection.
Low Scenic Quality - • None of the Coastline landscape falls in this class.	**Low Scenic Quality -** • Minimise the visual intrusion of the toilet facility in picnic areas for example cement render, bag and paint. • Rehabilitate disused vehicle tracks throughout the Reserve, particularly tracks on the north-west face of Mt Gardner. • Encourage planting of indigenous species on surrounding cleared farmland. • Encourage Water Authority to paint pipeline and revegetate easement at major roadside focal areas. • Minimise the visual impact of the CSIRO research facility on Mount Gardner.

RECOMMENDATIONS

1. **Implement the following strategies adapted from the Regional Management Plan (Section 10.1 Landscape)**
   - **(i) Classify landscape features according to the Department's Visual Management System (see Appendix 1 for classification);**
   - **(ii) Minimise impacts of any management activities or developments on the Reserve and surrounding landscape values.**

Research and monitoring

2. **Research and monitor perceived public landscape values and the impacts visitors and management actions have on these values.**

General

3. **Use guidelines outlined in Table 5 for relevant management activities.**

4. **Design, construct and maintain all facilities and undertake management activities to maintain the Reserve's naturally established landscape character.**

5. **Liaise with neighbours, shires and other government agencies to encourage visual landscape management of lands and waters surrounding the Reserve.**

6. **Seek advice from CALM's landscape planning and design specialists to manage the Reserve's landscape values.**

18. REHABILITATION

The objective is to restore degraded areas to a stable condition resembling the natural environment as closely as possible.

Areas requiring rehabilitation include gravel pits, disused tracks and firebreaks, and blow-outs in coastal foredunes, particularly Little Beach.

The inland dunes near Moates Lake are thought to be natural. Rehabilitation of some areas may be required if important conservation values, particularly Noisy Scrub-bird habitat, are at risk.

Wherever possible in rehabilitation programs the seeds and cuttings from species in the immediate location should be used and landforms should be re-created to resemble as closely as possible the natural landforms in the vicinity. Rehabilitation should be ongoing and periodically monitored.

RECOMMENDATIONS

1. **Implement the following strategies adapted from the Regional Management Plan for the South Coast Region, 1992 (Section 13.4 Rehabilitation)**
   (i) **Implement rehabilitation programs for all disturbed areas as resources permit. Monitor the effectiveness of these programs.**
   (ii) **Where rehabilitation is the responsibility of the user, establish a schedule of conditions between the user and CALM.**

2. **Rehabilitate disused roads, tracks and firebreaks. Monitor these areas.**

3. **Continue coastal dune rehabilitation work where necessary.**

19. ABORIGINAL HISTORY AND CULTURE

The objectives are to:
- **Identify and protect Aboriginal sites.**
- **Provide for contemporary Aboriginal cultural activities.**
- **Increase visitors awareness, appreciation and understanding of the use and significance of the area to Aboriginal people, where appropriate.**

Aboriginal people have occupied south-western Australia for at least 40 000 years. The oldest date obtained for a site in the Albany region is 18 850 years (R. Reynolds, pers. comm. in Herford, 1992). The area of Two Peoples Bay was occupied by the Minang people (Tindale, 1974 *in* Herford, I., 1992) who migrated seasonally between the coast and inland forest.

Non-Aboriginal encroachment changed traditional Aboriginal culture considerably. Early accounts indicated that relations between Aboriginal people and sealers in the area were poor but improved after a whaling station was established in the Bay. Aboriginal people feasted on the carcass of whales that drifted on shore. They were employed as messengers, and later as crew in the settlers' bay-whaling enterprises.

Epidemics of measles and influenza in the late nineteenth century caused widespread death among Aboriginal people. Many aspects of traditional life had been affected by 1900, particularly the economic basis of the Aboriginal culture.

Four Aboriginal sites have been identified in the Reserve and it is likely that others exist. All sites are protected by the provisions of the Aboriginal Heritage Act (1972-1980) regardless of whether they are known to the Department of Aboriginal Sites or not. Section 17 of the Act makes it an offence to excavate, destroy, damage, conceal or in any way alter an Aboriginal site without the written permission of the Minister for Aboriginal Affairs.

The significance of Aboriginal history and the Two Peoples Bay area provides an important element in understanding the Reserve and its environment and will be recognised in Reserve management. CALM is working with local Aboriginal people to determine how these values can be appropriately protected and managed.

Aboriginal people have sought access to conservation reserves on the south coast for cultural activities. Requests will be considered within the context of other Reserve values.

RECOMMENDATIONS

1. **Implement the following strategies adapted from the Regional Management Plan for the South Coast Region, 1992 (Section 12.1 Aboriginal Cultural Resources)**
   - **(i) Ensure that CALM's activities do not impact detrimentally upon known Aboriginal sites.**
   - **(ii) Train staff, in liaison with the Department of Aboriginal Sites, to recognise and report sites so that registers can be updated.**
   - **(iii) Implement management guidelines for Aboriginal sites. Liaise with the WA Museum, tertiary institutions and Aboriginal organisations.**
   - **(iv) Where appropriate incorporate material on Aboriginal cultural resources in interpretive displays and community education programs.**

2. **Conduct ethnographic/archaeological surveys before undertaking new development work.**

3. **Liaise with the local Aboriginal community concerning protecting sites and the significance of the Reserve to Aboriginal people.**

20. EUROPEAN HISTORY AND CULTURE

The objectives are to:

- **Protect the Reserve's European cultural resources and make visitors aware of its European history.**

Two Peoples Bay received its name because of a chance meeting between French and American mariners in 1803. Its sheltered anchorage and ready supply of fresh meat and water resulted in the bay and nearby areas becoming a focus for sealing and whaling activities in the first half of the nineteenth century. A whaling station was established on the small beach near South Point, but, like the sealing industry, whaling in the Bay gradually declined through the depletion of whale numbers. Whale bones and some stonework from whaling ovens are still evident.

The Beverley-Albany railway line was completed in 1889 but, in order to attract valuable overseas capital needed to complete the line the Government offered large tracts of land to the investment company. Most of the present Two Peoples Bay Reserve was granted to the W.A. Land Company except for Mt Gardner and a small landing place which were reserved for defence purposes. The Government eventually purchased back the land around Two Peoples Bay and long-term leases were taken out for various parts of the area.

In 1912 the Angove weir and pumping station were built to supply water to Albany. The water supply scheme was converted from steam to electric power in 1953 and the present pumphouse and steel pipelines were installed. The Angove River still provides a major part of Albany's water supply.

Two Peoples Bay became a popular recreation area for Albany residents with picnics and fishing being the main activities. Holiday shacks were first erected in the early 1930s and their development over the ensuing years resulted in a small reserve for Camping and Recreation (No. 22180) being set aside. Increased interest in the Bay as a holiday resort and private applications for sites prompted the Department of Lands and Surveys to consider declaring a townsite at the Bay. Casuarina townsite was formally gazetted in March 1961. However, a resurvey of the blocks was not completed until March 1962 by which time, in December 1961, the existence of the Noisy Scrub-bird had been confirmed.

On rediscovery of the Noisy Scrub-bird at Two Peoples Bay, many national and international representations were made to the Government to protect the areas conservation values. The area of conflict centred around the Public Utility Reserve No. 2028 where townsite and Scrub-bird territory overlapped. After several years of debate and discussion with conservation groups, government departments, individuals and parts of the international conservation community, it was agreed that Casuarina townsite plan should be cancelled and a reserve created for the conservation of fauna.

It is understood that HRH Prince Phillip, a keen naturalist and bird lover, was also instrumental in having the area set aside as a Nature Reserve. Two Peoples Bay Nature Reserve was gazetted on 28 April 1967 and vested in the Fauna Protection Advisory Committee. It was classified as a class 'A' reserve on 2 June 1967.

The Baie de Deux Peuples heritage trail was established in the facilities area. This is maintained by volunteers. It is proposed to extend this trail (see Section 23, Day Use - Facilities and Access).

RECOMMENDATIONS

1. Implement the following strategies adapted from the Regional Management Plan for the South Coast Region, 1992 (Section 12.2 Historic Sites)

(i) Collate existing information on historic sites and maintain an up-to-date register of sites. Liaise closely with the National Trust and the Heritage Commission to prepare and maintain registers and evaluate potential additions.

(ii) In accordance with the "Burra Charter", develop guidelines for management of historic sites on CALM managed land. Liaise with the W.A. Museum, National Trust, Heritage Commission, tertiary institutions and historical societies for this purpose.
(iii) Where appropriate, establish programs to conserve historical sites.
(iv) Continue liaison with local historical societies regarding volunteer work and other activities.

2. Incorporate material on European history and culture in interpretive displays and community education programs, where appropriate.

3. Consider preserving archaeological sites of historic value in all management activities.

COMMUNITY RELATIONS

Community Relations Goal
Promote informed appreciation and public support for the protection of natural and cultural values and facilitate liaison with the community.

21. INFORMATION, INTERPRETATION AND EDUCATION

The objectives are to:

- **Increase visitors' awareness, appreciation and understanding of the reserve's natural and cultural values, particularly the conservation of threatened species and management concerns.**
- **Provide enjoyable and safe experiences.**
- **Encourage use of the Reserve for education.**

Two Peoples Bay is the most important coastal conservation reserve near Albany. The Reserve's high conservation values, particularly for threatened species, combined with its attractive setting and close proximity to Albany, a major population and tourist centre, provide CALM with the opportunity to promote the area. One of the most important components in managing visitors is providing them with meaningful educational experiences that improves their understanding of the Reserve's values and gains their support for its management.

The Reserve's unique fauna and their special management requirements, including the translocation of the Noisy Scrub-bird, will be the primary interpretive theme. The story behind the intensive management required to bring this species back from the brink of extinction provides a valuable conservation message. Opportunities to learn about the Noisy Scrub-bird include listening to and possibly viewing the birds and discovering details about their history and management.

Visitors are already attracted to the recreation value of the Reserve. The opportunity exists to refocus visitor interest and activity on conservation values and on uses based on appreciating and understanding natural values. Some visitors are already seeking advanced levels of information and learning experiences; for example, tour groups specifically interested in rare birds. Visitors will be seeking different levels of information and experiences. This changes over time.

Information on facilities, activities, and regulations, will be available to visitors both before their visit and on site, and the Reserve's natural and cultural values and their management will be interpreted. Education opportunities designed to assist groups with different levels of knowledge will be provided.

Interpretive facilities will encourage visitors to experience the Reserve through bushwalking, sightseeing, nature study and similar activities.

The primary visitor location will continue to be the picnic area referred to as the Facilities Area. The redevelopment of this areas is presented in the Facilities Area Concept Plan (Figure 10). A focal point for visitors will be an information facility located near the main carpark. A small facility in the picnic area to provide a meeting place for self-guided and guided walks will complement the main facility.

From the Facility Area visitors will be encouraged to visit other locations in the Reserve. Appropriate information, such as interpretive and directional signs, will be provided at these locations.

Information, interpretation and education will be provided within a regional context. Specific themes for the Reserve are:

- unique fauna and flora, particulary the Noisy Scrub-bird and other rare species.
- CALM's management role, including, wildlife, fire and disease management.
- wetland and marine ecology.
- care on the coast.

These themes complement those planned elsewhere and are particularly relevant to the Reserve's special values.

Nature-Based Tourism

The quality of the nature-based tourism experience is linked with the information, interpretation and education program. Nature-based tourism is a rapidly growing industry. Tourism has the potential to contribute to achieving management goals provided the advantages and disadvantages of any activity are considered. Commercial visitor services require approval from CALM (see Section 25, Commercial Visitor Services). Benefits include:

- attracting external funds to meet management goals, the primary goal being protection of conservation values;
- greater community support for the Reserve and its management;
- education.

Funds must be directed to managing visitors and protecting the Reserve's values. Two Peoples Bay's unique conservation values provide nature-based tourism opportunities, which should be aimed at high quality (and value added) educational experiences that do not degrade the Reserve's values.

RECOMMENDATIONS

1. **Further develop and implement a visitor information, interpretation and education program for the Reserve within the Regional context.**

2. **Continue to encourage State and local tourist organisations to promote the Reserve as an area for nature appreciation and study (as opposed to a major recreation destination). Encourage visits during off-peak periods.**

3. **Focus provision of interpretation facilities in the Facilities Area (see Figure 10). Progressively provide appropriate facilities at other locations in the Reserve.**

4. **Provide interpretive activity programs, including guided and self-guided nature walks for schools, community groups and other visitors.**

5. **Liaise with the Western Australian Tourism Commission, tourist bureaus, commercial operators and the local and broader communities to inform them about the Reserve and its management and seek their feedback on issues of concern to them.**

22. COMMUNITY INVOLVEMENT

The objective is to foster a good relationship with the community, particularly those people and groups interested in helping implement the plan and conserving the Reserve's values.

The need to keep in contact with neighbours, local community groups and associations that live nearby or have an interest in or use Two Peoples Bay Reserve is important, as is liaison with people further afield such as, researchers, academic institutions and other government agencies.

Community Liaison is discussed throughout the plan including in the sections listed in Table 6. Extensive liaison with key contacts including neighbours, the Shire of Albany and the WAWA, is required.

Volunteers

Volunteers are involved in the Noisy Scrub-bird Translocation program and in maintaining and enhancing the Heritage Trail. This is part of a volunteer program established by CALM.

Further opportunities exist for the public to become involved in various programs outlined in this plan, including the information, interpretation and education program. Volunteer programs should continue to be nurtured and supported by CALM.

Community support may also include funding (see Section 31, Funding).

RECOMMENDATIONS

1. **Implement the following strategy adapted from the Regional Management Plan for the South Coast Region, 1992 (Section 25 Community Involvement)**
   - **(i) Continue existing involvement with local individuals and organisations with an interest in conservation and land management.**

2. **Encourage community involvement in implementing this plan. Continue to nurture and support volunteers, including training. Expand the interpretation and environmental education role.**

TABLE 6. COMMUNITY LIAISON

Section 8	**Interaction with Nearby Lands and Waters** Neighbours, Government authorities such as Shire of Albany, WAWA, EPA and DPUD.
Section 10	**Fauna** Neighbours, government authorities.
Section 12	**Fire** Bush Fires Board, Local Bush Fires Brigades, Shire of Albany, WAWA, neighbours.
Section 13	**Disease** Neighbours, public, Government Authorities.
Section 14	**Pest Flora and Fauna and Domestic Animals** Agriculture Protection Board, neighbours.
Section 15	**Hydrology** Managers within the catchment area, such as WAWA.
Section 17	**Visual Landscape** Neighbours, Shire of Albany, other Government authorities.
Section 19	**Aboriginal History and Cultural Resources** Local Aboriginal community, Department of Aboriginal Sites.
Section 20	**European History and Cultural Resources** WA Museum.
Section 21	**Information, Interpretation and Education** Visitors, local and broader community, school and other education groups, Shire of Albany.
Section 23	**Day Use and Facilities** Shire of Albany, other managers of recreation sites, WA Tourism Commission.
Section 24	**Visitor Safety** Police, State Emergency Service, Department of Marine and Harbours.
Section 25	**Commercial Visitor Services** WATC, tour operators, local tourist bureaus.
Section 26	**Commercial Fishing** Commercial fishers, Fisheries Department.
Section 27	**Mining** Department of Minerals and Energy, Environmental Protection Authority.
Section 29	**Research and Monitoring** Government authorities, Tertiary Institutions.

RECREATION

Recreation Goal

Facilitate public enjoyment of the natural and cultural values in a manner compatible with conservation and other goals.

23. DAY USE - FACILITIES AND ACCESS

The objectives are to:

- **Promote and facilitate recreational activities such as picnicking, sightseeing, bushwalking and nature study, which are compatible with and seek to encourage an appreciation and understanding of the Reserve's values.**
- **Integrate recreational activities with interpretation and education programs.**
- **Minimise visitor impacts through the sensitive location and design of all public access routes and facilities.**
- **Provide and maintain a structured system of foot and vehicle access.**

ATTRACTIONS AND EXISTING USE

Two Peoples Bay has always been popular even before its gazettal as a conservation reserve in 1967. Its natural features including its protected beaches, interesting landscape, significant fauna and flora, and its close proximity to Albany, attract visitors. It is a popular destination for local people and, with the increasing growth of the nature-based tourism industry, for increasing numbers of tourists. Recreational activities undertaken in the Reserve must be compatible with the primary goal of protecting and enhancing the Reserve's conservation values.

People visit the Reserve to picnic, fish, swim and pursue other day-time activities. Camping is prohibited. A growing number of people, including ornithologists from intrastate, interstate and overseas and school students from the Albany region, visit the Reserve for conservation and natural history interests. Visitors use the picnic area at the southern end of Two Peoples Bay Beach and Little Beach. Facilities provided at the picnic area include barbecues and toilets/change rooms. Boats are launched from the southern end of Two Peoples Bay beach. A heritage trail, information board and pamphlets have been provided to encourage interest in, and to facilitate education about, the Reserve's conservation values.

About 34 000 people visit the Reserve annually (1991- 1992), mainly during summer. On average about 150 people visit the Reserve on summer weekdays while over peak holiday weekends during December and January as many as 700-800 people may be present. This use far exceeds the capacity of existing facilities.

During the rest of the year numbers are far less, with a peak of about 50 visitors on a fine Saturday or Sunday and much less during the week. The high levels of public use demands a high input of day-to-day management resources, particularly during peak periods.

FUTURE USE

Two Peoples Bay Reserve will continue to accommodate visitors on a day use basis (see Figure 9 for recreation areas and access). It is proposed to redevelop the picnic area, the major facility area in the Reserve. The Reserve will be closed to further visitors when it is full.

Access and facilities for the disabled will be considered during the planning of new developments.

A user pays system to assist in Reserve management will also be considered.

The Reserve will continue to be closed on days when the fire danger is considered to be extreme so as to protect public and staff and conservation values. Installing a gate in the Gardner Creek area would be a way of closing the Reserve. This and other methods will be investigated.

Picnic area

A site concept plan has been prepared for the facilities area, which includes the picnic area and management facilities (Figure 10). The following issues have been considered:

- Noisy Scrub-birds are affected as this area is in the middle of occupied territories
- vehicle flow is poor as the road currently finishes at a dead-end on the beach
- the car-park is congested and includes vehicles with trailers and buses
- boat launching and parking of vehicles and trailers on the beach causes conflict with other users
- part of the heritage trail coincides with a management track creating a potential safety risk to pedestrians
- a potential safety risk to visitors, CALM staff and facilities exists because of the fire risk from high fuel levels in Noisy Scrub-bird habitat
- additional interpretive opportunities are needed
- flexibility regarding the future of the management facilities must be ensured
- access to the office and workshop is difficult on the busiest summer days due to high visitor numbers in the picnic area and this also coincides with the days of highest fire danger.

The concept plan includes providing new facilities, such as the interpretation facility and redesigning the car-park to improve vehicle flow and safety, and also continuing to allow boat launching. Beach parking and parking in the small car-park will be monitored and reviewed as necessary. On busy days all visitors will be directed to the main car-park at the discretion of the CALM officer on duty.

Figure 10 is a concept plan only and the specific locations of access and facilities will be subject to a detailed site development plan. In particular the locations of foot and vehicle access, from the main carpark, to the picnic area and research facility respectively, require further investigation.

Other areas

Most visitor facilities are associated with vehicle access. Currently (1993) most car parks are informal except Little Beach which has been redeveloped with car-parking and a toilet provided. Development of the other areas will generally only be to the extent of formalising car-parking.

The Sinker Reef area includes 2WD and 4WD access. The 2WD parking area is the beginning of a number of walks. The 4WD site needs to be located further from the cliff and access to the reef stabilised.

The Moates Lake car park combines a viewing point across the lake and dunes and the beginning of the walk to the lake. The Moates Dunes and lake walk begins at the next car park (located closest to the Reserve boundary).

The Goodga River area is a 4WD site and the beginning of a walk. Another area has been allocated near Gardner Creek to allow for an entrance facility if required in the future.

Vehicle Access

Two wheel drive (2WD) and four wheel drive (4WD) have access to major sites in the Reserve (see Figure 9). Roads within the Reserve will be maintained to a standard appropriate for their use. Improvements to roads that may result in significant increases in visitor numbers should not occur before the picnic area is redeveloped. For maintainence reasons sealing the main access road may be desirable in the long term. Liaison with the Shire of Albany is required regarding their maintenance program for any improvements to their section of the road as this has implications for CALM management.

The size of buses, trucks and other vehicles allowed in the Reserve will be limited according to the capability of roads and carparks to cope with them and the capability of facilities, such as toilets, to cope with the number visitors (see also Section 25, Commercial Visitor Services).

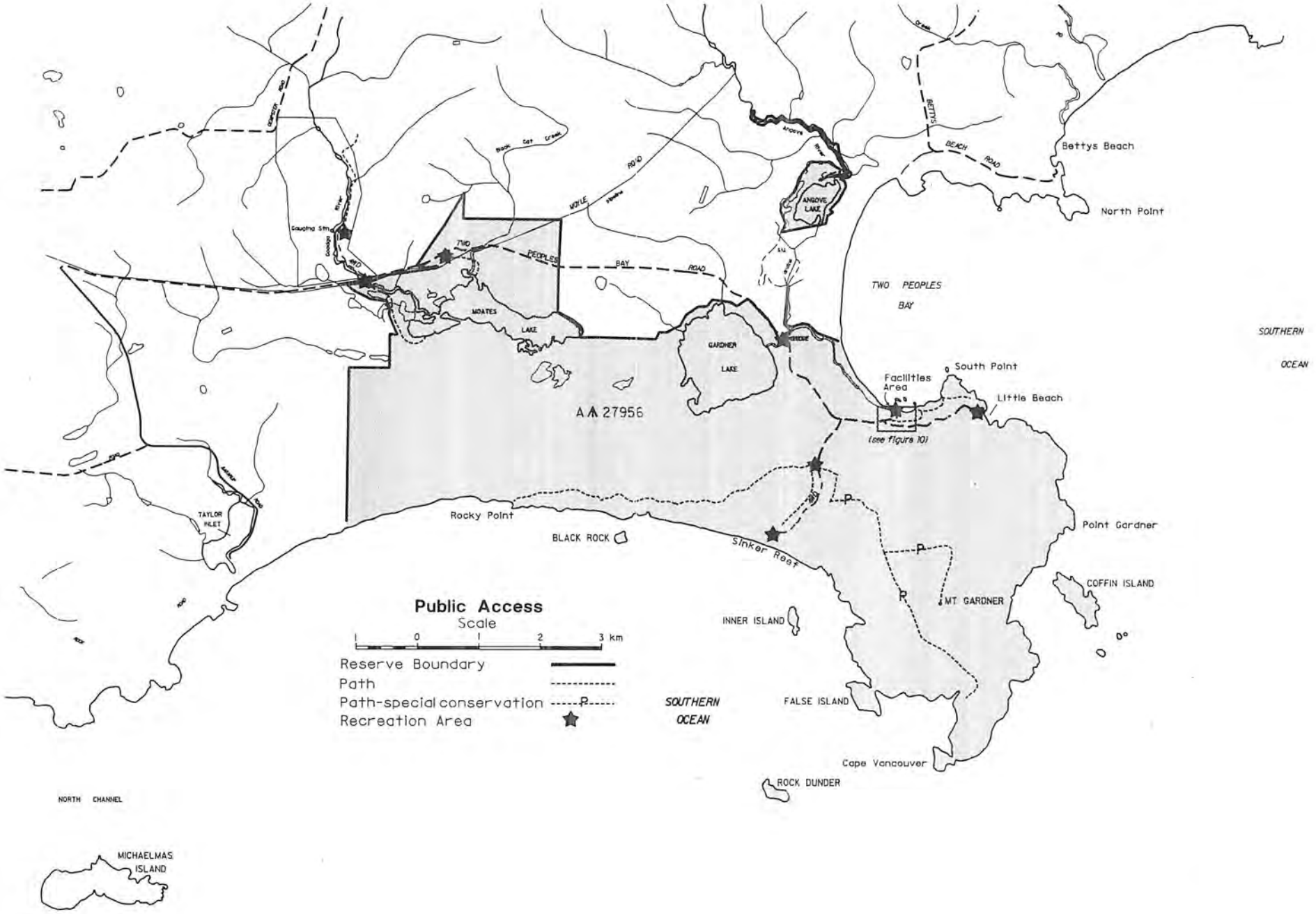
Access to Goodga River will be reassessed annually on the basis of impact on Noisy Scrub-birds (the area is potential habitat) and restricted, possibly discontinued, if necessary. Owing to dieback disease roads may be closed temporarily depending on weather conditions.

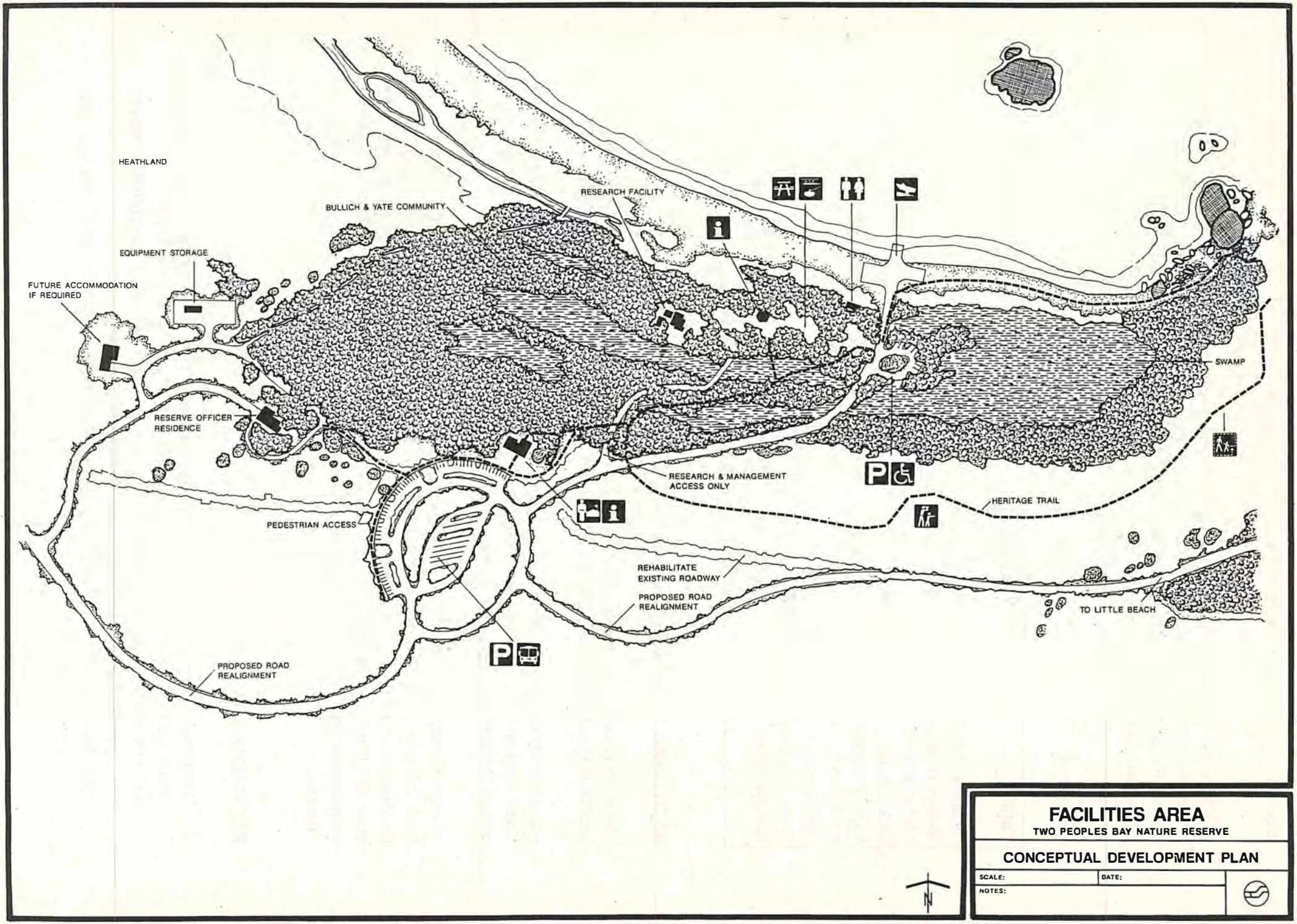
Foot Access

Many opportunities for bushwalking exist with a range of levels of difficulty. A **walk** is the easiest and is relatively short and well formed. It is constructed to shoe standard and is suitable for people of all ages and fitness levels. A **track** is more difficult requiring some skill or experience. Tracks are generally well designed, marked and suitable for people of average fitness and designed to boot standard. A **route** is most difficult, being lightly marked to unmarked and requiring a high degree of experience. It is only suitable for well equipped walkers.

Walks are listed in Table 7 and shown on Figure 9. Most paths are in place with the exception of paths to Moates Lake and along Goodga River which are proposed but will require site assessments to determine the best locations. Paths to Moates Lake already exist but these will be closed when the new path is established.

Some paths are in the special conservation zone. Self registration at the beginning of these paths and/or other means of monitoring and, if necessary, controlling visitor access, including periodic or seasonal closures and limits on numbers, will be implemented in this zone. Paths will be appropriately marked. For example, paths will be well marked in specific areas, such as Mt Gardner to ensure walkers stay on them. Paths may not be provided in the Cape Vancouver area, however, access for walking and climbing will be allowed (non-defined access). The impact of visitor use will be monitored and reviewed with paths being defined if future pressure makes this necessary.


Bettys Beach
North Point
BETTYS BEACH ROAD
ANGOVE LAKE
TWO PEOPLES BAY ROAD
TWO PEOPLES BAY
SOUTHERN OCEAN
MOATES LAKE
GARDNER LAKE
A A 27956
Facilities Area
South Point
Little Beach
(see figure 10)
Rocky Point
BLACK ROCK
Sinker Reef
Point Gardner
COFFIN ISLAND
MT GARDNER
INNER ISLAND
FALSE ISLAND
Cape Vancouver
ROCK DUNDER
TAYLOR INLET
NORTH CHANNEL
MICHAELMAS ISLAND
Public Access
Scale
0 1 2 3 km
Reserve Boundary
Path
Path-special conservation
Recreation Area
SOUTHERN OCEAN


HEATHLAND
BULLICH & YATE COMMUNITY
RESEARCH FACILITY
EQUIPMENT STORAGE
FUTURE ACCOMMODATION IF REQUIRED
SWAMP
RESERVE OFFICER RESIDENCE
RESEARCH & MANAGEMENT ACCESS ONLY
HERITAGE TRAIL
PEDESTRIAN ACCESS
REHABILITATE EXISTING ROADWAY
PROPOSED ROAD REALIGNMENT
TO LITTLE BEACH
PROPOSED ROAD REALIGNMENT
N
FACILITIES AREA
TWO PEOPLES BAY NATURE RESERVE
CONCEPTUAL DEVELOPMENT PLAN
SCALE:
DATE:
NOTES:

The impact of walkers on paths introducing and spreading dieback disease, which is widespread in the Reserve (see Section 13, Disease), has been assessed. No areas that can be protected from spread of dieback disease are placed at risk by these alignments. Access will be restricted or other management actions taken, if necessary, to minimise spread of the disease.

TABLE 7 BUSHWALKING OPPORTUNITIES

Path	Classification	Approximate Time Return
Moates Lake	walk/track	1 hour
Moates Dune and Lake	track	2 - 3 hours
Mt Gardner	track	2 - 3 hours (special conservation zone)
Sinker Reef	track	1 - 2 hours
Cape Vancouver	track/route	4 hours (special conservation zone)
Rocky Point	track	5 - 6 hours
Heritage Trail	walk	1 hour
Picnic area to Little Beach	track	3 - 4 hours
Goodga River	track	1 - 2 hours

REGIONAL CONTEXT

The Reserve is one of a number of attractive natural areas close to Albany. The Reserve provides recreation opportunities that generally require minimum facilities and have minimum impact.

Providing visitor activities on CALM-managed lands within the region is considered in the South Coast Regional Management Plan. This ensures that reserves are managed according to their special conservation, recreation and other values.

Visitors should be informed of other opportunities on both CALM and non-CALM managed lands in the area and where necessary directed to other areas that allow activities not available at the Reserve, such as camping and more active recreational pursuits. Continued liaison with the Shire of Albany and other relevant authorities managing similar visitor attractions to CALM will encourage an integrated approach to management of the area. (Refer also to Section 3, Regional Context).

RECOMMENDATIONS

1. **Implement the following strategies adapted from the Regional Management Plan for the South Coast Region, 1992 (Section 14.2 Day Use)**
   - **(i) Provide facilities suitable for use by visitors with disabilities where practicable when new facilities are designed.**
   - **(ii) Minimise conflicts between the general public and commercial operations.**

(iii) Minimise impacts of recreation activities on nature conservation and aesthetic values. Instigate management actions, including restrictions on access, if necessary.
(iv) Provide visitors with accurate and up to date information on opportunities for various types of recreation.

Research and Monitoring

2. Monitor visitor and vehicle numbers within the Reserve.

3. Survey patterns of use, visitor perceptions and other aspects of use as required.

4. Monitor the condition of roads and paths.

General

5. Prepare and implement a site development plan for the picnic and Facilities Area based on the concept plan (Figure 10).

6. Allow launching of boats from trailers in a designated area at the southern end of Two Peoples Bay beach.

7. Allow trailer and vehicle parking on a designated area of the beach during off-peak periods. Introduce permits or other forms of management control if required. Direct traffic to the car-park during peak periods and close the beach to parking (when the site development plan is implemented).

8. Provide appropriate facilities, such as car-parking, at the other recreation areas in accordance with site development plans.

9. Introduce fees where it is practical and economic to collect them.

10. Provide access within the Reserve as indicated on Figure 9.

11. Maintain and improve roads in keeping with the development of facilities and according to CALM's roading standards.

12. Design and maintain public access to minimise the risk of spreading dieback disease and causing erosion.

13. Ensure, where possible, the facilities area is redeveloped before any significant improvements to roads are made.

14. Restrict the speed limit on the Reserve roads to an appropriate level.

15. Develop new paths, including to Moates Lake (close existing paths) and along Goodga River. Extend the heritage path from the picnic area at Two Peoples Bay Beach to Little Beach. Maintain paths as classified in Table 7. Encourage visitors to use paths.

16. Allow visitors with self registration and/or other means of monitoring and control into special conservation zones.

17. Provide interpretative and educational material for paths with emphasis on the Reserve's conservation values.

18. Continue to close the Reserve during days considered to be an extreme fire danger and advise the public of this action via community radio broadcasts, temporary signs or other means where possible.

19. Close the Reserve to additional visitors when facilities are full on peak visitor days (using the capacity of the car parks as a major criteria).

20. Prohibit, if necessary, visitor access to specific areas for wildlife conservation, safety or other reasons.

21. Apply limits, where necessary, on the size of buses, trucks and other vehicles (larger than cars) that may use the roads and facilities.

22. Continue to prohibit fishing and marroning in lakes, creeks and other water courses in the Reserve.

23. Inform visitors of recreation facilities available elsewhere particularly those not available in the Reserve.

24. Continue to develop recreation facilities on other CALM managed lands in the area considering the regional context including those facilities provided on the Reserve.

25. Encourage an integrated approach to providing recreational facilities on lands not managed by CALM. Liaise with the Shire of Albany and other relevant management authorities.

24. VISITOR SAFETY

The objective is to minimise risks to visitors' safety while not unnecessarily detracting from Reserve values.

In addition to the dangers inherent in any natural area, the south coast of WA poses some particular safety problems for visitors, including fragile cliff edges, 'king waves' and heavy swells. The danger of wildfire occurring (owing to high fuel levels associated with old aged vegetation) and snakebite, particularly in the high use picnic area, are also of concern. In addition jet skiers using Two Peoples Bay are a potential risk to swimmers. As in all reserves, road traffic is a potential safety problem.

CALM, the Police and the State Emergency Service manage accidents and search and rescue operations in the Albany area. Guidelines have been prepared and these are reviewed annually.

Management actions to reduce safety hazards should, if possible, be planned in sympathy with the purpose of the Reserve and should not intrude unduly on the experience of visitors.

RECOMMENDATIONS

1. **Implement the following strategies adapted from the Regional Management Plan for the South Coast Region, 1992 (Section 14.0 Visitor Safety)**
   - (i) **Actively promote visitor safety and safe working practices for CALM personnel within the region.**
   - (ii) **Continue to liaise with the Police Department and SES in accordance with plans for dealing with accidents and search and rescue operations.**
   - (iii) **Provide information for visitors that highlights potentially hazardous areas and activities.**
   - (iv) **Regularly inspect roads and recreation sites for potential hazards and initiate appropriate action.**

2. **Develop a contingency visitor and CALM staff evacuation plan in case of fire.**

3. **Liaise with the Department of Marine and Harbours to minimise risks to swimmers in Two Peoples Bay.**

COMMERCIAL AND OTHER USES

Commercial and Other Uses Goal

Ensure that commercial and other uses are managed in a manner that minimises their impact on other values.

25. COMMERCIAL VISITOR SERVICES

The objectives are to:

- **Encourage commercial visitor services that promote an appreciation of the natural environment and complement CALM's interpretation programs.**
- **Minimise the impact of commercial operations on the Reserve's values, including the experience of other visitors.**

To enhance visitor use and enjoyment of CALM managed lands commercial concessions providing appropriate services may be granted. Nature-based tourism can provide quality, worthwhile experiences, including some not normally available, and of an educational nature. The potential exists to generate income to assist CALM manage the Reserve. Some commercial operators are currently making use of the Reserve including bus tours from Albany.

New concessions will be assessed upon application. Proposals are carefully considered by CALM and may require approval of the NPNCA and the Minister for the Environment. If approved, conditions will be established according to the potential impacts of the operation on the Reserve, particularly its conservation values, and its use by other visitors. Conditions may include specifying numbers of visitors, areas of use, times of use and the size of vehicles transporting visitors. Providing appropriate commercial visitor services will continue to be considered in design of access and facilities.

RECOMMENDATIONS

1. **Implement the following strategies adapted from the Regional Management Plan for the South Coast Region, 1992 (Section 16.10 Tourist Operations and Other Concessions)**
   - **(i) Require all commercial tourist operators wishing to make use of the Reserve to obtain permission and to pay the necessary fees for their activities.**
   - **(ii) Protect the Reserve from any undue environmental impact caused by concession activities and require operators to adopt safe procedures for the activities they provide.**
   - **(iii) Ensure commercial operators maintain appropriate standards with respect to information and quality of service provided.**
   - **(iv) Identify the level of use by commercial operators the Reserve can sustain and monitor the impacts and regulate activities as required.**
   - **(v) Establish and promote regular contact with tour operators, the WA Tourism Commission and Albany and other Tourist Bureaus so that they are kept abreast of management initiatives, developments and road conditions. Ensure the promotion of the Reserve by these agencies is consistent with management.**

2. **Encourage commercial operators to use the Reserve in periods outside peak visitor use.**

3. **Establish appropriate conditions according to the nature of the commercial operation and its impact on the Reserve and its use.**

26. COMMERCIAL FISHING IN NEARBY WATERS

The objective is to minimise the potential for conflict between the commercial fishery, which operates in nearby waters, and conservation and visitor management.

Commercial fishing occurs in waters near the Reserve. Species sought include pilchards, abalone, salmon and herring. Fishers access the Two Peoples Bay and Nannarup Beach (Sinker Reef) through the Reserve via public and management roads and use facilities such as car parks and the launching site. They require permits from CALM.

The numbers of fishers vary widely depending on the available catch. Up to eight boats operate at peak periods and generally two to three year round. Two Peoples Bay is favoured by the pilchard fishers over summer as, at this time pilchards are less abundant in King George Sound.

There is potential conflict with conservation values and users of the Reserve. Competition for parking areas and use of Two Peoples Bay Beach (including launching of boats) occurs between commercial fishers and visitors.

Abalone (*Haliotis roei)* fishers are shore-based and fish predominantly at Sinker Reef through to Rocky Point. This species may occur in the Reserve above low water mark where the taking of fauna, including abalone, is illegal. Low water mark is difficult to define practically. However, as a guide abalone can only be taken in waters below the reef flat but not on the reef flat. This also applies to recreational fishers. The commercial operators use the Rocky Point management track. If additional expenses associated with keeping management tracks open for use by commercial fishers are incurred then expenses should be sought from them.

Permit conditions should be set in consultation with commercial fishers and representative organisations and may include:

- allowing commercial fishers access to Two Peoples Bay launching area, except during peak periods (for example, Boxing Day and New Years Day).
- allowing vehicles and trailers to park in the public parking areas.
- allowing loading and unloading of equipment on the beach. However, no equipment is to be left there.
- allowing one vehicle only per commercial operation in the Reserve.

Conditions will be regularly reviewed in liaison with commercial fishers and amendments made as necessary.

Commercial and recreational fishing in waters in the Reserve is not permitted.

RECOMMENDATIONS

1. **Continue to liaise with the Fisheries Department, Department of Marine and Harbours, Albany Shire Council and South Coast Licenced Fishermen's Association and other relevant bodies regarding use of the Reserve by commercial fishers.**

2. **Continue to require commercial fishers using the Reserve to obtain permits. Regularly review and amend conditions as necessary. Cancel permits if conditions are not met.**

3. **Seek to recoup from commercial fishers costs required to keep non-public access open, if necessary.**

27. MINING

The objective is to protect the Reserve's values from deleterious effects of exploration and mining.

Gravel was extracted from small areas of the Reserve for use in road maintainence. These sites have been rehabilitated and this practice has been discontinued for some time. All requirements for gravel and industrial minerals are and should to continue to be met from sources outside the Reserve.

No exploration licences or mining leases currently exist over the Reserve (1992). The Reserve has low prospectivity. It is closed to petroleum resource development, although it may be specifically declared open for exploration or production under the Petroleum Act. However, exploration efforts have been focussed elsewhere and the potential of the area is unknown.

Any exploration and mining activity is likely to have a significant impact on the Reserves' values and, given its very high conservation values, should be strongly opposed. If approved, exploration and mining should be subject to, and meet with, conditions that will ensure the impact on conservation values, particularly the Noisy Scrub-bird, are minimised.

RECOMMENDATIONS

1. **Obtain supplies of gravel and industrial minerals from outside the Reserve's boundaries ensuring their use will not contribute to the spread of dieback disease.**

2. **Oppose exploration, mining and petroleum resource development that would have a deleterious impact on the Reserves values.**

3. **Liaise with the EPA, the Department of Minerals and Energy and the mining industry over any proposals for mineral or petroleum resource development adjacent to the Reserve to ensure the Reserve's values are protected.**

28. SERVICES

The objective is to minimise the impact of service corridors in or near the Reserve.

The only service through the Reserve is a Telecom cable. Reserve facilities, however, are powered by a generator which is costly to run. The power supply is inadequate and options to improve it need to be investigated with due consideration to the impact on the Reserve's values. Providing power by overhead lines is likely to have too great an impact and has been disregarded as an option in the past. If Reserve management facilities are relocated (see Section 30, Management and Research Facilities and Staff) providing services will be cheaper.

A corridor used by the WAWA, Telecom and SECWA, is located along the Two Peoples Bay Road Reserve. The visual impact of these facilities should be reduced (see Section 17, Visual Landscape). Owing to the location of the Reserve on a peninsula, it is unlikely that further services will be installed to provide for adjoining lands. Providing future service corridors in or near the Reserve should be carefully assessed to see what impact they have on the Reserve's values, and they generally should not be located in the Reserve.

RECOMMENDATIONS

1. **Investigate ways to improve the Reserve's power supply, considering impacts on its values.**

2. **Minimise the visual impact of existing service corridors near the Reserve (see Section 17, Visual Landscape).**

3. **Carefully assess future service corridors proposed in or near the Reserve, and seek alternative locations to the Reserve.**

RESEARCH AND MONITORING

Research and Monitoring

Seek a better understanding of the Reserve, particularly the Noisy Scrub-bird and other threatened, specially protected and priority fauna and flora and the impacts visitors and management actions have on them.

29. RESEARCH AND MONITORING

The objectives are to:

- **Improve our knowledge and understanding of the Reserve's flora and fauna particularly those species of special conservation interest and the natural environment overall.**
- **Monitor flora and fauna to assess undesirable changes and the impact of management actions.**
- **Monitor use of the Reserve by visitors and their impacts.**

Biological Research

The Reserve has a history of integrated research and management and the need for research and monitoring is specified in the CALM Act. Research and monitoring are an integral component of this management plan. Effective conservation of flora and fauna requires the monitoring of important populations so that demographic changes can be determined, appropriate management actions instigated and the effects of management assessed.

Close monitoring of changes in population trends and distribution of the Noisy Scrub-bird over the last 22 years has been an important feature of the management program for this species. Future management of this and other threatened species will depend on the results of monitoring programs that can detect population trends and assess the effectiveness of management actions.

Improved understanding of the habitat requirements, life history, behavior and ecology of a threatened species will improve our ability to manage that species and secure its future. While considerable knowledge of the Noisy Scrub-bird, Western Bristlebird and Western Whipbird have been developed as a result of CSIRO's research in the 1970s, many questions are still to be answered concerning the social behaviour, diet and habitat (particularly successional effects) of Noisy Scrub-birds and more fundamental questions about the taxonomy, habitat requirements and life history of Western Bristlebirds and Western Whipbirds.

As a result of research undertaken over the past 30 years Two Peoples Bay is one of the most comprehensively documented areas in WA. The results of this work are reported in the Natural History of Two Peoples Bay Nature Reserve (Hopkins and Smith, in prep.). Research already undertaken includes detailed recording and mapping of the flora and fauna, life history and ecology of the rare birds, studies of climate, geology, landscape and the aquatic systems, the effects of fire and the distribution of dieback disease. The history of the Two Peoples Bay area and the management of the Reserve have also been documented.

Recent research at the Reserve has included documenting Noisy Scrub-bird population trends and mapping changes in the distribution of the rare birds, studing the diet of the Noisy Scrub-bird, investigating the aquatic invertebrate fauna, surveying the larger fungi, and investigating the effectiveness of phosphorous acid in controlling dieback disease.

The large body of work already carried out should form the basis of enlightened management and future research at the Reserve. Hopkins *et al* (in prep.) identified four major priority areas for research. They are:

- the composition and ecology of the native terrestrial and aquatic invertebrate fauna.
- the impacts of *Phytophthora cinnamomi* and long-term fire exclusion on habitat and food resources of the rare bird species.
- the composition of the fauna in coastal and nearshore marine habitats adjoining the Reserve.
- the distribution and significance of the cultural heritage resources.

Research facility

Much of the site-based research already carried out at the Reserve was made possible by the availability of accomodation facilities near the Reserve office and on Mt Gardner. Accomodation near the office is currently used by visiting management and scientific staff and by people involved in the Noisy Scrub-bird translocation program. This facility is essential to continue the Noisy Scrub-bird program and future research work at the Reserve. It must be maintained and, where possible, upgraded to adequately fulfil this function.

Social Research

Visitor surveys can be conducted to ascertain the quantitative (visitor numbers) and qualitative (types and patterns of use) aspects of visitor use and visitor expectations, perceptions and preferences.

These surveys range from simple observation studies to more elaborate user surveys. It is important that visitor use is monitored and visitor expectations, perceptions and preferences ascertained to determine the effectiveness of the plan's implementation, including the appropriateness of programs, site improvements and other management activities.

CALM monitors visitor numbers at the Reserve (as part of CALM's VISTAT program) and this will be continued.

TABLE 8 RESEARCH AND MONITORING

Section 10. Fauna

1. (i) Continue surveys to record the distribution, abundance and other details of flora and fauna including species declared rare or specially protected.
   (iv) Protect and monitor populations of threatened and specially protected species.
2. Continue to regularly monitor Noisy Scrub-bird, Western Bristlebird and Western Whipbird populations (adapted from the Noisy Scrub-bird recovery plan).
3. Monitor numbers of other species of special conservation interest to determine appropriate management practices.
4. Investigate the impact of removing Noisy Scrub-birds for translocation, including their rate of replacement (adapted from the Noisy Scrub-bird recovery plan).
5. Investigate the genetic variability of the original Mount Gardner Noisy Scrub-bird subpopulation and the subpopulations derived from this group (adapted from the Noisy Scrub-bird recovery plan).
6. Investigate the relationship between the number of singing male Noisy Scrub-birds and population size.
7. Investigate decreases in Noisy Scrub-bird populations which cannot be explained by known actions or phenomena (adapted from the Noisy Scrub-bird recovery plan).

Section 10. Fauna Cont.

8. Investigate the effects of habitat changes on Noisy Scrub-bird, Western Bristlebird and Western Whipbird populations and methods by which their habitat can be improved if changes are found to be detrimental to them, including physical manipulation of habitat.
9. Continue research on the biology, ecology and behaviour of the Noisy Scrub-bird (adapted from the Noisy Scrub-bird recovery plan).
10. Investigate the numbers and movements of kangaroos in the vicinity of the fuel reduced buffer (figure 7) and methods to control kangaroo grazing. Where necessary implement control programs. Ensure the appropriate procedures are stringently followed.
11. Investigate the invertebrate fauna, including an inventory.
12. Investigate the Noisy Scrub-bird diet.
13. Investigate the wetland fauna, including the impact of introduced species.

Section 11. Vegetation and Flora

1. (i) Continue surveys to record the distribution, abundance and other details of flora including species Declared Rare and on the priority list.
   (iv) Protect and monitor populations of threatened and specially protected species.
2. Monitor changes in habitat of the Noisy Scrub-bird and other fauna of special conservation interest.
3. Monitor flora and vegetation of special conservation interest, especially in relation to disturbance (for example, fire) to determine time to reproductive maturity.
4. Continue research into the biology and ecology of flora and vegetation of special conservation interest, with emphasis on developing knowledge of the effects of fire and dieback disease on survival and regeneration.

Section 12. Fire

1. (v) Assist with research into fire behaviour and fire ecology.
   (vi) Monitor the effectiveness and impacts of fire management measures and make any necessary changes to procedures in the light of research and experience.
2. Record and analyse details of all fires, including fire behaviour information.
3. Continue research on the value of different aged vegetation for habitat of the Noisy Scrub-bird and other fauna of special conservation interest. If there is evidence that habitat is becoming unfavourable for these species due to fire exclusion, consider use of prescribed burning to return vegetation to an earlier successional stage.
4. Continue research on:
   - fuel accumulation and plant regeneration rates in heathland after fire
   - the effects of kangaroo grazing on regeneration after fire
   - the life histories of heath flora.
5. Monitor the requirements and regeneration of Western Bristlebird habitat on the fuel reduced buffer.

Section 13. Disease

1. (ii) Assess all operations and uses with an evaluation test for potential dieback disease impact.
   (v) Regularly update the dieback disease distribution map.
   (vi) Monitor the spread of infections at specific sites.
2. Monitor the minimally infected areas for presence of dieback disease. Undertake active control methods as appropriate if there is a risk of major disease impact in these currently minimally infected pockets.

Section 13. Disease Cont.

3. Investigate the impact of dieback and other plant disease on Noisy Scrub-bird and Western Bristlebird habitat.
4. Review management recommendations in the light of continuing research findings on the introduction, spread, impact and control of plant diseases.

Section 14. Pest Flora and Fauna and Domestic Animals

1. (i) Maintain an inventory of pests and weeds.
   (iii) Assess the efficiency of control on target species and any effects on non-target species, and make changes to procedures if required.

Section 15. Hydrology

1. (iv) Monitor the condition of wetlands and the management of wetland catchments in conjunction with other key organisations.
2. Conduct a research and monitoring program to determine the relationship between water quantity and the habitat of the Gardner Lake subpopulation of Noisy Scrub-birds and techniques to manage the adverse impacts on habitat. Implement appropriate management actions.
4. Continue to liaise with the WAWA, particularly in regard to the impacts of water treatment and manipulation at Water Reserve 13802, and the impacts the gauging station in Goodga River Reserve 24991 has on fauna and flora and their management.

Section 16. Geology, Landforms and Soils

1. Identify areas that are vulnerable to damage because of the nature of the geology, landforms and soils.
2. Monitor the stability of vehicle and pedestrian access and take management action if required.
5. Monitor the movement of the sand blowouts and rehabilitate if required (see section 18, Rehabilitation).

Section 17. Visual Landscape

2. Provide an ongoing research and monitoring program of perceived public landscape values and the impacts of visitor use and management actions.

Section 19. Aboriginal History and Culture

2. Conduct ethnographic/archaelogical surveys before undertaking new development work.

Section 20. Colonial History and Culture

1. (i) Collate existing information on historic sites and maintain an up-to-date register of sites.

Section 23. Day Use - Facilities and Access

2. Monitor visitor and vehicle numbers within the Reserve.
3. Survey patterns of use, visitor perceptions and other aspects of use as required.
4. Monitor the condition of roads and paths.

RECOMMENDATIONS

1. **Implement research and monitoring according to Table 8 of research and monitoring recommendations.**

2. **Undertake specific projects to assess impacts of management actions.**

3. **Encourage and promote appropriate research by other agencies and tertiary institutions. Support projects through logistic or financial means where possible.**

4. **Continue to regulate research projects through a permit system to ensure projects are appropriate.**

5. **Regularly monitor visitor use including numbers of visitors (VISTAT program) and boats, types of recreational activities taking place and patterns of use (such as the effectiveness of the zoning scheme).**

6. **Carry out more detailed surveys to assess visitor impacts, expectations, perceptions and preferences of facilities and management activities.**

7. **Ensure social surveys are in accordance with CALM's social research program.**

IMPLEMENTATION

30. MANAGEMENT AND RESEARCH FACILITIES AND STAFF

The objective is to provide appropriate management and research facilities and staff to implement this Plan.

The Reserve currently has two staff - a reserve management officer, who is mostly involved in Noisy Scrub-bird management, and an assistant, who is mostly involved in day-to-day visitor management. These are supplemented by staff from the Albany District and other areas when required. To implement this plan, particularly Noisy Scrub-bird management in accordance with the Recovery Plan, additional support will be required. CALM will endeavour to provide appropriate levels of staff within their overall staffing priorities. From a management perspective it is preferable that the officer responsible for day-to-day activities resides on the Reserve.

Infrastructure on the Reserve includes:
- CALM staff residence and associated facilities;
- reserve office, research facility, a workshop, a storage shed and other associated facilities near the picnic area;
- a small research facility on Mt Gardner.

The most effective management would be achieved by providing another residence on the Reserve.

The Facilities Area includes the major management facilities, refer to section 23, Day Use-facilities and access for discussion of issues and Figure 10 for location of facilities. This includes a new Reserve office.

Some of the management facilities located at the site adjacent to the picnic area should be relocated to the area near the staff residence.

In the long-term, management facilities could be relocated to a more suitable location in relation to access, fire risk and services. The preferred location is a site outside the Reserve between Gardner Lake and Two Peoples Bay Road. However, this is subject to availability of this site.

The Research facility located adjacent to the picnic area will be improved to a standard suitable for current needs. If funding permits, a better facility will be constructed at a more suitable location. The Mt Gardner facility requires regular maintainence and its use results in additional track maintenance costs. CALM will liaise with CSIRO to determine future use of the Mt Gardner research facility. Other facilities are located throughout the Reserve.

RECOMMENDATIONS

Within CALM's overall staffing priorities the Department will seek to:

1. **Ensure staff have adequate financial resources.**

2. **Provide sufficient staff to implement this plan and to maintain new developments.**

3. **Provide ongoing training for staff.**

Management facilities

4. **Provide management and research facilities (see Facilities Area Concept Plan Figure 10).**

5. **Seek to obtain an area of private property between Gardner Lake and Two Peoples Bay Road as a site for major management facilities in the long term.**

6. **Relocate management facilities that are near the research facility to the area in the vicinity of the CALM staff residence.**

7. **Seek to establish a second residence on or near the Reserve for management staff.**

8. **Liaise with CSIRO about the future of the research facility on Mt Gardner.**

31. FUNDING

The objective is to have funds available to implement this plan.

Funding for management of the Reserve is allocated from CALM's annual budget according to State-wide priorities. Funding from other sources will also be actively sought. This includes seeking financial support from the community in addition to voluntary work (see Section 22, Community Involvement).

RECOMMENDATIONS

1. **Seek an increased budget allocation for the first two to three years of this plan to carry out high priority projects and then sufficient funds to maintain this level of work.**

2. **Identify potential sources of external funding and projects or operations capable of attracting external funding. Pursue these sources according to departmental policy and procedure.**

3. **Investigate fees or other revenue raising measures to recoup costs of providing specific services or opportunities to the public. Consider the practicality of collecting fees. For example, charging fees for Reserve entry and visitor attractions.**

4. **Provide opportunities for people to contribute directly to the Reserves budget, for example, through donations.**

5. **Enter into partnerships with local organisations, community groups, and local and State Government departments where economies of scale can be obtained in joint or cooperative operations.**

6. **Utilise volunteers where appropriate to support and complement the work of CALM staff.**

32. PRIORITIES AND REVIEW

The objective is to regularly review implementation of the plan according to priorities.

The NPNCA monitors the implementation of management plans. CALM's South Coast Region, Albany District and Two Peoples Bay Reserve officers are primarily responsible for implementing the recommendations within this plan. To facilitate plan review and implementation a team of CALM officers could be formed.

Priorities will be assigned to all recommendations in this Plan as it is not possible for CALM to implement all of these at once. The rate of implementation will depend on the availability of funds and staff for the Reserve and every effort will be made to attract resources.

Review will include:
- examining the extent to which the objectives have been achieved.
- examining the extent to which recommendations have been implemented.
- examining the reasons for lack of achievement or implementation.
- providing a summary of information which may affect future management.
- establishing and re-assessing the priorities.
- reporting results to the NPNCA.

Management plans can be amended if required (Section 61 of the CALM Act). Changes to plans must be released for public comment.

The term of this plan is 10 years.

RECOMMENDATIONS

1. **Assign priorities to the management recommendations and review implementation of the plan and priorities at least annually.**

2. **Review the plan within 10 years.**

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APPENDIX 1 LANDSCAPE CHARACTER TYPES

LANDSCAPE CHARACTER TYPE	SCENIC QUALITY	LANDFORM	VEGETATION	WATERFORM	LANDUSE
Coastline	**General Description**	• Extends to landward limit of marine influences. • Includes steep granite & sandstone cliffs rising 50 m, elevated shoreline platforms, islands, points & headlands, rocky and sandy beaches, sandbar, extensive mobile dune systems and deeply incised Gardner Creek inlet.	• Open low woodland-low heath with *E. staeri, Allocasuarina fraseriana & Banksia coccinea* fringing western dunes. • Sand dune thicket/scrub fronting Two Peoples Bay with *Agonis flexuosa* (peppermint) dominant, with Spinifex on seaward margins. • Coastal dune scrub west of Rocky Point & behind Little Beach. • Cliff heath above Sinker Reef. • Dense low heath on offshore islands.	• Southern Ocean & Two Peoples Bay. • Gardner Creek Inlet.	• Two Peoples Bay Beach - boat launch and vehicle turn around area. • Little Beach & Sinker Reef beach access.
	High*	• Cliffs & points. • Islands, reefs & sandbars. • Rock outcrops. • Irregular coastline edges emphasised by distinctive rock outcropping, wave cut platforms, bays, sandy beaches, inlets & sand deposition patterns. • Dune systems which display areas of colour contrast, active weathering, steep slopes and/or sand blown edges, for example, dunes south of Moates Lake and west of Rocky Point.	• Windshaped, gnarled or dwarfed vegetation, unusual in form, colour or texture. • Single tree, shrubs or patches of vegetation which become focal points, for example, offshore island heath. • Strongly defined patterns of woodland, heath scrub and dune thicket and grasslands, for example, peppermints and Spinifex.	• Unusual ocean shoreline motion such as as eddies and breakers due to islands, reefs and shoreline configuration, for example, Sinker Reef. • Water bodies with motion and dynamic characteristics, for example Rocky Point rock pools, Waterfall Beach waterfall.	• Human-imposed site developments which are in harmony with naturally established landscape forms, lines, colours, textures and scales. • Harsh edge contrasts not evident.

* Note : An area is classified as High Scenic Quality if one or more of these elements are present in the landscape.

LANDSCAPE CHARACTER TYPE	SCENIC QUALITY	LANDFORM	VEGETATION	WATERFORM	LANDUSE
Coastline	**Moderate**	• Expanses of beach of uniform width and colour without rock outcroppings or focal features. • Regular coast edges without bays, inlets, headlands, points or cliffs.	•Predominantly heath or beach grasses with some variation in colour, texture or pattern. • Some contrast caused by different colours.	• Uniform ocean shoreline and motion characteristics with little diversity.	• Human-imposed site developments or activities in which landscape form, line, colour, texture and scale of introduced elements borrow significantly from natural factors but some discordant visual impacts are clearly apparent, for example, beach access paths at Little Beach & Sinker Reef, and mown firebreak on north face of Little Beach Road.
	Low	• None of the Coastline landscape falls in this class.	-	-	-

LANDSCAPE CHARACTER TYPE	SCENIC QUALITY	LANDFORM	VEGETATION	WATERFORM	LANDUSE
Scott Coastal Plain	**General Description**	• Granite headlands dominated by Mt Gardner mass, with deeply incised and broad valleys, former estuarine flats and fixed dune systems.	• Mixed heath between Mt Gardner & Cape Vancouver. • *Agonis flexuosa* (peppermint) scrub heath west of granitic outcrops & south of Moates and Gardner Lakes. • Low forest to the north of Moates Lake - *E. marginata* (jarrah), *E. staeri*, *Allocasuarina fraseriana*. • Patches of mixed mallee shrublands throughout Mt Gardner headland. • Reeds, sedges & heath shrubs north of Gardner Lake & around Angove Lake.	• Coastal inland lakes, swamps, permanent & intermittent creeks and inundated valleys.	• Two Peoples Bay Beach Recreation facilities - carparking, picnic area, toilets, nature trail and Reserve Office & Residence. • Little Beach & Sinker Reef carparks. • Minor public & management vehicle access tracks.
	High*	• Peaks, hills, ridges and remnant dunes of distinctive form which become focal points, for example, Mt Gardner (408 ASL). • Deeply incised and broad valleys descending to the sea. • Rock outcropping at Mt Gardner granite mass.	• Strongly defined patterns of vegetation such as combinations of Eucalypt forest, Melalueca & Banksia woodland and sedgeland species.	• Lakes,estuaries, swamps of a permanent nature. • Water courses of permanent or intermittent flow continually changing in flow character, for example - Moates, Gardner & Angove Lakes & associated swamps & creeks.	• Human-imposed developments which are in harmony with naturally established landscape forms, lines, colours, textures & scales, for example, Reserve Office & entry drive, Little Beach Road.

* Note : An area is classified as High Scenic Quality if one or more of these elements are present in the landscape.

LANDSCAPE CHARACTER TYPE	SCENIC QUALITY	LANDFORM	VEGETATION	WATERFORM	LANDUSE
Scott Coastal Plain	**High* (Cont)**	• Extensive external views to neighboring highpoints - Mt Manypeaks, Boulder Hill, Mt Taylor & Mt Mason South.	• Single tree, shrubs or patches of vegetation which become focal points by their unusual form, colour or texture, for example, rounded olive green peppermint clumps emerging from carpet heathland on north-western face of Mt Gardner, canopied Melaleuca woodland at Gardner River bridge, Yate & Bullich wood/parkland at picnic area, and in Mt Gardner valleys.	• Goodga & Angove Rivers. • Mt Gardner headland permanent streams. • Rock pools, and waterfall at Waterfall Beach.	• Harsh edge contrasts not evident, with introduced elements providing visual diversity, for example, southern views across cleared farmland to Gardner Lake & Mt Gardner peak and heathland.
	Moderate	• Gently rounded or undulating slopes and shallow valleys similar in gradient to surrounding landform.	• Predominantly uniform cover with some natural openings. • Patterns evident in vegetation but lacking uniqueness or distinction relative to surrounding vegetation.	• Seasonal swamps or wetlands.	• Human-imposed developments in which form, line, colour, texture and scale of introduced elements borrow significantly from the natural landscape but some discordant visual impacts are clearly apparent, for example, fire damage vegetation at Goodga Creek area, mown firebreak on north face of Little Beach Road and beach carpark materials.

* Note : An area is classified as High Scenic Quality if one or more of these elements are present in the landscape.

LANDSCAPE CHARACTER TYPE	SCENIC QUALITY	LANDFORM	VEGETATION	WATERFORM	LANDUSE
Scott Coastal Plain	**Moderate (Cont)**	•Flat to gently sloping areas with limited features of visual interest.	• Transition from low coastline vegetation to heath, woodland, forest and sedgelands gradual.	• Shallow creeklines with stretches of similar flow character..	• Transition between landuses combining both gradual and abrupt edges, seldom appearing as an unbroken line, for example, northern views of heathland and Reservoir Hill contrasting with cleared farmland from Sinker Reef access track.
	Low	• Extensive flat area with limited features of specific visual interest.	• Extensive areas of similar vegetation cover. • Extensive areas of fire or disease damaged vegetation.	• Waterforms absent.	• Developments in which form, line colour, texture and scale of introduced elements contrast sharply with natural features, for example, pipeline and private pine plantation along Reserve entry road, CSIRO hut, water tanks & picnic area toilet block. • Severely disturbed areas with little natural vegetation, for example, vehicle tracks on north-west face of Mt Gardner, and SECWA easement gravel pit on Reserve entry road disturbing spectacular views to Moates Lake mobile dunes. • Transition between landuses sharp and geometric, appearing as a line, for example, east-west cleared private property line viewed from Mt Mason South.