



Mount Hallowell Reserve Management Plan 2008

*The Reserve is a conservation priority area for the maintenance of the flora, fungi and fauna
and all ecological processes pertaining to the natural environment.
It is recognised that the Reserve is a significant scientific reference site.*



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Mount Hallowell Reserve Management Plan 2008

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Cover photograph: View from near Mount Hallowell summit towards Ocean Beach



TABLE OF CONTENTS

FOREWORD	3
PART 1: BACKGROUND	4
1.1 PURPOSE OF THE MANAGEMENT PLAN	4
1.2 MANAGEMENT GOALS	4
1.2.1 Conservation	4
1.2.2 Recreation	4
1.2.3 Protection from Fire	4
1.3 LOCATION AND TENURE	4
1.3.1 Access	4
1.3.2 Reserve History	4
1.4 PHYSICAL ENVIRONMENT	5
1.4.1 Climate	5
1.4.2 Landforms, Geology and Soils	5
1.4.3 Hydrology	6
1.4.4 Vegetation	6
1.4.5 Threatened Ecological Communities	7
1.4.6 <i>Phytophthora</i> Dieback	7
1.4.7 Fungi	7
1.4.8 Fauna	8
1.5 HUMAN ACTIVITIES	8
1.5.1 Aboriginal History	8
1.5.2 European History	8
1.5.3 Recreational Uses	8
1.5.4 Adjoining Farm and Residential Properties	9
1.5.5 Community Involvement	9
1.5.6 Scientific Research	9
PART 2: MANAGEMENT ISSUES AND ACTIONS	10
2.1 TENURE AND PURPOSE OF RESERVES	10
2.2 CONSERVATION	10
2.2.1 Preservation of the Reserve	10
2.2.2 Preservation of Core Area	11
2.2.3 Scientific Research	11

2.2.4	Adjoining Development	12
2.2.5	<i>Phytophthora</i> Dieback	13
2.2.6	Introduced Animals.....	13
2.2.7	Environmental Weeds	13
2.2.8	Rehabilitation Areas	14
2.2.9	Climate Change.....	15
2.3	RECREATION.....	15
2.4	FIRE MANAGEMENT.....	17
PART 3:	IMPLEMENTATION	21
3.1	MANAGEMENT PRIORITIES REVIEW	21
3.2	MANAGEMENT PLAN REVIEW	21
3.3	IMPLEMENTATION PLANS	21
3.3.1	Tenure	21
3.3.2	Conservation	21
3.3.3	Recreation	23
3.3.4	Fire Management	25
	BIBLIOGRAPHY	27
	APPENDIX 1 – Landforms and Soil Complexes	28
	APPENDIX 2 – Vegetation Types	29
	APPENDIX 3 – Mount Hallowell Reserve Flora List	33
	APPENDIX 4 – Fauna Lists.....	47
	APPENDIX 5 – Fungi of the Mount Hallowell Reserve	53
	APPENDIX 6 – Mount Hallowell Fire Management Plan	57
	MAPS	60

FOREWORD

Mount Hallowell is an iconic reserve located between the town of Denmark and the Southern Coast of Western Australia. With sweeping views, natural bushland and rock features the reserve is much loved and visited by locals and tourists in increasing numbers. It can be accessed from the bordering Ocean Beach Road to the east and Lights Road to the south and is traversed by the recreational walk trail, the Sheila Hill Memorial Trail, which forms a section of the Bibbulmun Track.

In 1993 the Mount Hallowell Management Committee, comprising Shire Councillors and local residents, prepared a Draft Management Plan which:

- aimed to manage the Reserve as a conservation priority area
- provided for bush walking with scenic views, while maintaining the conservation priorities
- included a Fire Management Plan prepared by the Mount Hallowell Fire Management Group.

Following community consultation, the Plan was finalised and adopted by Council in 1995. The three key management goals in the 1993 draft were reiterated, and strategies were developed to meet these goals, with a revision of the Plan to take place after five years.

In 2003 the Shire formed a community based committee to review the Plan. In 2003-2004, the Denmark Environment Centre carried out the Mt Hallowell Reserve Survey & Research Project, specifically aimed at providing information to support the goals of the 1995 Management Plan and to contribute to the review of the Plan.

The reviewed Plan was completed in 2006 and adopted by Council as the Mt Hallowell Reserve Management Plan in March 2006. The Plan incorporated information provided by the Mt Hallowell Reserve Survey & Research Project 2004, and brought other sections up to date. This plan required a revision of priorities after two years.

The flora, fungi and fauna database developed from the Mt Hallowell Reserve Survey & Research Project 2004 will facilitate measures for the protection and maintenance of viable populations of existing flora and fauna species, particularly those with special status.

Some of the recommendations from these documents have been carried out, some have become redundant, and outstanding matters are prioritised in this Plan of 2008.

Acknowledgments

Many individuals contributed time, ideas and information in the development of Mount Hallowell Management Plans.

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PART 1: BACKGROUND

1.1 PURPOSE OF THE MANAGEMENT PLAN

This plan is intended to guide activities within and adjoining the Reserve so that the management goals as described below are achieved.

1.2 MANAGEMENT GOALS

1.2.1 Conservation

The Reserve is a conservation priority area for the maintenance of the flora, fungi and fauna and all ecological processes pertaining to the natural environment. It is recognised that the Reserve is a significant scientific reference site.

Management should maintain the integrity and conservation value of the vegetation, and the habitat values for fungi and fauna as well as ensure that the edges of the reserve are not compromised.

1.2.2 Recreation

Recreational amenities are to be provided for the public on existing walk trails in the reserve, whilst maintaining the conservation values of the Reserve.

1.2.3 Protection from Fire

The protection of life, property and environmental values from uncontrolled fires is to be maximised through an appropriate fire management plan. This plan should minimise potential fire risks to the Reserve and adjoining properties while being mindful of the Reserve's conservation and scientific values.

1.3 LOCATION AND TENURE

Mount Hallowell Reserve, Number 46618, is an A Class reserve with an area of 532ha, located approximately 5km south-west of the town of Denmark, Western Australia. It is close to William Bay National Park. Management is vested in the Shire of Denmark for the purpose of Conservation and Recreation.

1.3.1 Access

The Reserve is accessed by pedestrians via the Bibbulmun Track/Sheila Hill Memorial Trail both from Ocean Beach Road and from Lights Road towards Monkey Rock. There is limited emergency vehicle access along old tracks on the south-east corner, as well as others to the top side of Monkey Rock and along the northern boundary.

1.3.2 Reserve History

Tenure

Part of the Mount Hallowell Reserve was originally gazetted as a timber reserve in 1913 and then as a Timber and National Park Reserve in 1927. Other parts were vested in the Shire of Denmark for the purpose of Recreation, and 27ha was set aside for sand and gravel extraction. On 14 May 2002 Reserves Numbers 12182, 14959, 18077, 30080 and 38844, as well as vacant crown land south of Location 2897, were amalgamated into one A Class Reserve Number 46618 comprising Plantagenet Locations 7560 and 8065 for the purpose of Conservation and Recreation. The summit of Mount Hallowell remains as Crown Land Reserve No. 14239 (Location 7572) for the purpose of a trigonometrical station. A trigonometrical station, triangulation pillar or trig point is a fixed surveying station for the geodetic surveying and other surveying projects on nearby areas.

When the Reserve was amalgamated in 2002, the name adopted for the Reserve was Mount Hallowell Nature Reserve. The technical conversion to the name Mount Hallowell Reserve was formally approved for Reserve Number 46618 by the Department of Land Information on 23 January 2008. ("Nature Reserve" is now only used for reserves vested with the Department of Environment and Conservation with the purpose of Conservation of Flora and/or Fauna as per the Conservation and Land Management Act 1984).

Biodiversity Values

Mount Hallowell Reserve consists of mostly virgin (unlogged) old growth forest and has long been regarded as an area of high biodiversity in a region listed as one of the biodiversity hotspots on the planet (Myers et al 2000).

The Management Plan produced in 1995 and its review in 2006 by the Shire of Denmark has listed as its management priority the conservation value of the park, and highlighted the many species of flora, fungi and fauna present.

Heritage Listing

The Shire of Denmark nominated the Reserve for inclusion on the Register of National Estate. The Reserve was placed on the Register of National Estate database as an 'Indicative Natural Place' in 2002.

In order for the Reserve to be assessed by the Australian Heritage Commission more detailed information pertaining to its heritage significance was required, including a relevant description and detail of its condition.

Indicative Natural Place means that:

"Data provided to or obtained by the Heritage Division has been entered into the database. However, a formal nomination has not been made and the Department has not prepared all the data necessary for a nomination".

In 2006 the Environment Protection and Biodiversity Conservation Act 1999 (the EPBC Act), and the Australian Heritage Council 2003 were amended to stop changes to the Register. Therefore the Reserve does not have sufficient status for its long-term protection.

Fire History

Apart from its high biodiversity and conservation values, the Reserve serves as a key benchmark for fire management research as it is one of the few remnant long-unburnt areas in the South West that remains a 'no planned burn area' (Christensen and Abbott 1989). The last reported burn over the majority of the Reserve was in 1937, making it one of the longest unburnt areas in the South West.

Over the past two decades, there has been further population growth on the boundaries of the Reserve, leading to a controlled burn on the north side of the Reserve in 1986. Since 1995 two small management burns have taken place on the north and south-east edges of the Reserve.

Zoning

During the middle of the last century land clearing in and around the reserve was undertaken for residential dwellings. Large portions of land were excised from the area to the south and to the north-east. This populating of the area also brought with it the opening of many previously inaccessible areas and increased impact of introduced flora and fauna species on the Reserve.

Recreational Walk Trails

In the 1990s the Reserve took on a further significant role for the Denmark community with the building of the Sheila Hill Memorial Trail as part of the extension of the Perth to Albany Bibbulmun Track, providing recreational resources and attractions for residents and tourists.

1.4 PHYSICAL ENVIRONMENT

1.4.1 Climate

The climate in the Denmark area is Mediterranean, with cool, wet winters and warm, dry summers. The long-term average rainfall for the Denmark Research station (1951-1984) is 1000.1mm, although slightly more could be expected on Mount Hallowell due to localised effects. Climate change is likely to have a significant impact on this region. Lower rainfall and higher temperatures will challenge many species. The healthier the reserve the more resilient it will be.

1.4.2 Landforms, Geology and Soils

A profile of the Reserve from north to south shows the Reserve elevation rising from the Little River valley at 20m, through sandy soils to 75m. These sandy soils include moist and peaty flats and creek valleys. Above 75m the Reserve rises rapidly through loamy gravel soils, which support tall forest. Lateritic gravel soils with numerous granite outcrops are found on the higher slopes. The most prominent massive outcrops are

Monkey Rock and the peak of Mount Hallowell, which rise to nearly 300m above sea level and are visible from surrounding vantage points. Smaller granite outcrops and surface granite are often hidden by vegetation.

Laterite is igneous rock which is formed by solidification of cooled magma (molten rock). It weathers to a red-brown sandy soil. The granite bedrock is 2,700 million years old. The large granite batholiths (the big granite outcrops, formed by large volumes of molten granite) intruded below the surface millions of years ago and have since been exposed by erosion of overlying soils.

The great age of the landscape, the underlying geology and the aspect have led to quite different soils and microclimates in the reserve. These have led to diverse floral associations, as is enlarged upon in the vegetation section.

For a definition of landforms and soil complexes from McArthur, Churchward, Sewell and Bartle see Appendix 1.

1.4.3 Hydrology

Several first-order creeks flow from the northern slopes of Mount Hallowell towards the Little River. These creeks can provide unique habitats and are sensitive to disturbance. No permanent standing water bodies occur within the Reserve.

1.4.4 Vegetation

The Mt Hallowell Reserve Management Plan produced by the Shire of Denmark in November 1995 indicated a broad delineation of the predominant vegetation types: Jarrah/Marri (*Eucalyptus marginate/Corymbia calophylla*) on the lower slopes below 60m contour and Karri/Yate (*Eucalyptus diversicolor/Eucalyptus cornuta*) above the 60m contour. A flora list was compiled by Brenda Hammersley and the Denmark Naturalists' Group, and a need for more detailed flora work was identified.

The strategies outlined in that plan included the rehabilitation of the old sand pits and tracks, preparation of flora and fauna data bases, protection and maintenance of viable populations of existing flora and fauna species and the prevention of further introductions of plant pathogens (*Phytophthora* sp).

The Mt Hallowell Survey & Research Project 2004, conducted by the Denmark Environment Centre, collected more detailed flora information. A complete flora list taken from this project is included at Appendix 3. This replaces the earlier list of flora presented in the 1995 Management Plan. A flora list obtained from the WA Herbarium in May 2008 is included in Appendix 3. According to information from the Department of Environment and Conservation in May 2008 there is no listed Declared Rare Flora within the Reserve.

The sandy soils in the north of the Reserve with elevations below 75m include moist and peaty flats and creek valleys. The vegetation on these lower slopes is a mosaic of tall Marri/Jarrah forest, low Jarrah/Casuarina and Banksia Woodlands, moist shrublands and sedge lands. The creeks are first-order with Yari (*Eucalyptus patens*), and taller Marri, Jarrah and Karri trees growing in the small moist fertile valleys. Above 75m, the Reserve rises rapidly through loamy gravel soils, which support tall forest. Jarrah and Marri dominate the lower part of this section whilst Karri and Karri/Marri forest dominate the higher reaches of the northern slope and the entire southern slope. Granite outcrops are numerous on the higher slopes, some being visible from surrounding vantage points whilst smaller granite outcrops and surface granite are often hidden by vegetation. On the southern boundary of the Reserve, Jarrah, Marri and Casuarina again dominate the vegetation in a narrow belt of transition from Karri forest. The sandy dune country south of Lights Road is dominated by Peppermint (*Agonis flexuosa*).

The granite batholiths and outcrops, with elevations of nearly 300m, create special niches for vegetation, both on the rock and in the surrounding fringes. These niches around the granite outcrops on the Hallowell Reserve are created by areas of shallow soil, pockets of deep soil, water drainage, nutrient from rock catchments, and microclimates caused by aspect and shelter. These soil conditions and microclimates differ from one outcrop to another and result in unique floral associations. Arnica (*Taxandria marginate*) is present on many outcrops but absent on others. Blind Grass (*Stypandra glauca*) is similarly common but not omnipresent on the granite outcrops. Surrounding Yate trees are a feature of the granite summit and some other outcrops, but absent from others where *Agonis flexuosa* or *Allocasuarina decussata* (Karri Oak) is a dominant fringing component of the vegetation.

A full description of the vegetation types found in the Reserve is contained in Appendix 2.

1.4.5 Threatened Ecological Communities

A search was undertaken of the Department of Environment and Conservation's Threatened Ecological Communities database on 7 May 2008. There are no known occurrences of threatened or priority ecological communities recorded within the Reserve, although there are individual threatened species present.

1.4.6 *Phytophthora Dieback*

The 1995 Management Plan indicated that Dieback (*Phytophthora cinnamomi*) is present in the northern area of the Mount Hallowell Reserve.

The Dieback susceptible areas of the Reserve extend into all the low-lying Jarrah, Jarrah/Marri, and moist shrubland areas. Indications of Dieback have been noted in an area that was not mapped as Dieback affected in the 1995 plan. This area is along the western boundary of the Reserve, 200m south of the northern boundary. Dieback is an important issue in the management of the Reserve and access tracks. *Banksia serra* (P4¹) is a rare species that is susceptible to Dieback. The occurrence of this species is diminishing and dead and dying individual plants are scattered throughout the area where they exist in the north-east and south-east corners of the Reserve.

There is an hypothesis that burning makes areas more susceptible to Dieback, this may be a factor here.

'A Study into the Risk of Dieback within the Shire of Denmark Reserves' is due for completion in June 2008. Mount Hallowell is one of the sites included in this study.

1.4.7 Fungi

Fungi are globally the second most diverse group of organisms, behind arthropods (Buchanan & May 2003). They underpin all life yet they are among the least studied. In some cases, fungi may be 'keystone species' which if lost would lead to a major change in the ecosystem. Fungi have a major role as indicators of ecosystem health as monitors of the disturbance of the soil (Hawksworth 1990). In their many roles, fungi contribute to ecosystem health and vitality. For example, species of Eucalyptus rely on fungi to extract nutrients from the soil for them. Fungi are crucial to the viability and stability of Australia's nutrient-poor soils.

Although there have been no detailed fungi surveys carried on Mount Hallowell, an indicative list has been prepared based on collections taken during a range of field trips to the Reserve, opportunistic collections as well as lists and collections of fungi from similar vegetation types in the Denmark Shire. This list is given in Appendix 5.

The Mount Hallowell Reserve is not only an important area for fungi but more importantly still, the fungi which inhabit the area form an integral part of the ecosystem and are vital to the health of the vegetation and ecosystem functioning, including native mammals and invertebrates within the Reserve. The Reserve's extremely diverse landscape contains a significant diversity of vegetation, providing a wide variety of habitats and associations for fungi.

From the small amount of fungi work conducted in the Reserve, two species have been identified which have not been collected elsewhere in the Shire:

Leucopaxillus lilacinus - a rare species of fungus found across southern Australia.

Amanita sp. 'pink gills' - has only been found once, at the foot of the northern slope of Mount Hallowell. When described, this vouchered collection could prove to be the type for the species. (Type is considered to be the definitive specimen for a given species.)

Mount Hallowell is also close to the site of the type collection of two rare species:

Cortinarius phalarus - the type collection of which is on private property on Minsterly Road. Its status would be more secure within the Reserve, where it is likely to occur.

Phaeocollybia graveolens - which is only known from the Mount Shadforth Reserve.

Certain native animals, including the Southern Brown Bandicoot (*Isodon obesulus*) and the Bush Rat (*Rattus fuscipes*), depend on truffle-like and above-ground macrofungi as part of their diet. Most truffle-like fungi form mycorrhizal partnerships with plants, so a three-way symbiosis is formed on which the good health of all partners depends. Invertebrates also perform a vital role in spore dispersal.

¹ (Priority Four - Rare: taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5–10 years.

1.4.8 Fauna

Native fauna are an integral part of the Australian landscape. Gathering and analysing information on fauna in a given area provides a valuable snapshot of the health and vitality contained within. From December 2003 to January 2004, the Denmark Environment Centre conducted an extensive small mammal survey of the Mount Hallowell Reserve to add to the knowledge of small mammals in the Reserve and to recommend strategies to maintain and enhance those populations.

Prior to this, the study of small mammals in the Mount Hallowell Reserve was limited to two published reports: the Mt Hallowell Reserve Management Plan 1995, which relied on unconfirmed sightings and/or scat observations of native and exotic mammals and also included unconfirmed lists of birds and reptiles within the Reserve, and The Results of Critical Weight Range Mammal Survey (Beck 1996), which used cage trapping, ground searches and spotlighting, but was limited in duration and scope to two areas adjacent to the Bibbulmun Track.

The animals found in the fauna survey conducted as part of the Mt Hallowell Survey and Research Project 2004 are listed in Appendix 4.

The Department of Environment and Conservation (DEC) South Coast Region has been contracted by South Coast NRM to deliver a Biodiversity Inventory Program for the South Coast region. DEC is using consultants to provide expertise and conduct on-ground survey work. One of the aims of the program is to improve information on the location and distribution of Short Range Endemic Invertebrates on the South Coast. The program has provided the list of short range endemic invertebrates in the Reserve in Appendix 4.

Two species of threatened fauna occur in the Reserve. Baudin's Black Cockatoo (*Calyptorhynchus baudinii*), listed as threatened under both the Commonwealth Environment Protection and Biodiversity Conservation Act and the WA Wildlife Conservation Act, resides in the area during spring and summer when breeding, moving away during autumn and winter. While in residence, many of the birds cross the inlet to feed in heaths on the Nullaki Peninsula, but they also feed in other nearby areas. Marri seeds are an important food, but they also extract pine seeds from cones. In addition, Main's Assassin Spider (*Austrarchaea mainae*) was found in the Reserve in the study conducted by Dr Mark Harvey and Michael Rix in March to May 2008. The 'assassin spiders' (family *Archaeidae*) are a group of ancient and extremely unusual spiders known only from Madagascar, South Africa and mainland Australia. Main's Assassin Spider has very specific habitat requirements. Within the coastal forests in which it occurs, the species can only be found in the complex understorey layer of 'elevated leaf-litter' which forms in low-growing grasses, 'wiry' herbs (e.g. *Restionaceae*) and sedges (e.g. *Lepidosperma* spp). As leaves and twigs fall into the crowns of these grasses and sedges over time, a complex, elevated and inter-connected 'matrix' of debris forms above the ground, providing habitat for many small invertebrates, including 'assassin spiders' and the other small spiders on which they feed.

1.5 HUMAN ACTIVITIES

1.5.1 Aboriginal History

Although there is evidence of Aboriginal people's long association with Mount Hallowell, there are no Aboriginal Heritage Sites in the Reserve listed on the Department of Indigenous Affairs website.

1.5.2 European History

Sand mining and gravel extraction took place on part of the 27ha of the Reserve formerly Number 30080. Timber was also taken from the adjacent Reserve Number 18077, an area of 8ha.

It was suggested at the public input session that Mount Hallowell was used as a coastal observation post during the World War II by the Volunteer Defence Corps.

There are no listings for Mount Hallowell with the Western Australia Heritage Council.

1.5.3 Recreational Uses

The Mount Hallowell Reserve affords spectacular ocean, coastal and inlet views from the Bibbulmun Track/Sheila Hill Memorial Trail. Walkers enjoy views of the magnificent stands of old Karri, Jarrah and Marri close to the residential areas near Heather Road and unparalleled vistas from the granite-strewn ridgeline towards the summit. Along the northern boundary, a fire access way doubles as a walk track through low Casuarina and Jarrah forest with views to Mount Shadforth.

The walk trails allow Denmark residents and visitors to enjoy passive recreational pursuits without contributing to the decline of the conservation values of the reserve.

In the past, school groups and outdoor education tour operators have been allowed to use an area near Monkey Rock for abseiling and rock climbing. Case specific permission is required from the Shire CEO or endorsed by Council for these activities to take place.

1.5.4 Adjoining Farm and Residential Properties

The Mount Hallowell Reserve is almost entirely surrounded by cleared land: extensive paddocks to the north, medium density residential area to the east, and low density residential with significant disturbance for infrastructure (fire access ways and roadways) to the south and west.

1.5.5 Community Involvement

Since 1999, local residents and members of the Denmark Weed Action Group Inc have carried out weed survey and control work.

In 2007, the Shire of Denmark supported the formation of a Friends of Mount Hallowell group.

1.5.6 Scientific Research

The Mount Hallowell Reserve serves as a key benchmark for scientific research because it is one of the few remaining long-unburnt areas in the South West. The Reserve was designated a 'no planned burn area' in 1987 as an important scientific 'control' (Christensen and Abbott 1989). This designation was given to provide researchers with an important comparison between areas that receive frequent fuel reduction burning and areas that do not receive burning on a regular basis. With extremely limited areas in the South West not systematically burnt on a rotating basis, the Mount Hallowell Reserve holds a wealth of untapped scientific data.

Research could include:

- The study of bacteria, fungi, algae and bryophytes in the soil
- The study of the regeneration and lifecycles of native flora
- The study of soil-stored seed
- The study of weed spread and reproduction
- The study of folivorous and xylophagous insects
- The study of impacts of fire regimes on reptiles and amphibians
- The study of accumulation and decomposition of biomass

PART 2: MANAGEMENT ISSUES AND ACTIONS

2.1 TENURE AND PURPOSE OF RESERVES

There are two adjacent Reserves, 35464 and 32861, on the Lights Road boundary. These could be considered for inclusion in the Mount Hallowell Reserve to enable consistency of management activities and provide enhanced connectivity and corridors for flora and fauna.

Recommendation:

2.1 It is recommended that the adjacent Reserves, 35464 and 32861, be considered for inclusion in the Mount Hallowell Reserve.

Action:

- Investigate the feasibility of including Reserves 35464 and 32861 in the Mount Hallowell Reserve.

2.2 CONSERVATION

The Mount Hallowell Reserve has high conservation values including a diverse range of flora, fungi and fauna.

The island of vegetation comprising the Mount Hallowell Reserve together with its undisturbed surrounds is diminishing. The integrity and conservation value of the vegetation is therefore under pressure and may be reduced.

With the continued growth and development in the region, the conservation and integrity of the Mount Hallowell Reserve are of increasing importance. Monitoring, identification and protection of these values are essential. Many studies, including the Mt Hallowell Reserve Survey & Research Project 2004, and also comments from participants in the April 2008 public input session, indicate that the development and use of the surrounding area of a reserve has a significant impact on what happens within the Reserve.

The Reserve faces many threats to its integrity as the network of corridors and linkages that connect the Mount Hallowell Reserve with coastal and inland areas continues to diminish with denser residential development along its borders.

The Mt Hallowell Reserve Survey & Research Project 2004 indicated that the following factors are impacting on the integrity of the vegetation:

- Adjoining sub-divisions
- Numerous multi-use access paths in some areas
- Tourist and local walker numbers increasing
- Disturbance/Clearing/Fire breaks on the perimeter
- Increased walkers/dogs on the northern track/access
- Increased disturbance and access in Dieback (*Phytophthora* sp) susceptible areas
- Increased perceived need for fire security by adjoining landowners
- A reduction in undisturbed corridors joining the Reserve and the coastal vegetation

All the above factors are still relevant, and are evidence of the pressure that people inevitably exert on their surrounding environment. Holding the ecological integrity of the Mount Hallowell Reserve at present levels will require careful consideration when planning surrounding land use, fire breaks, access tracks and tourist facilities. This is particularly true for the surrounding sub-divisions, which are increasingly places of residence.

2.2.1 Preservation of the Reserve

The Reserve is a conservation priority area for the maintenance of the flora, fungi and fauna and all ecological processes pertaining to the natural environment. Maintaining old growth Karri and other Eucalypts in which Baudin's Cockatoo can breed is a priority for their continued presence in the Reserve. It is

recognised that the Reserve is a significant scientific reference site. Its nomination for the Register of the National Estate was intended to ensure that this is officially recognised.

Recommendation:

2.2.1 It is recommended that listing for the Reserve under the appropriate heading on the relevant Heritage List be undertaken to formally indicate the importance and relevance of this reserve.

Action:

- Initiate the listing of the Reserve under the appropriate heading on the relevant Heritage List.

2.2.2 Preservation of Core Area

The results of the Mt Hallowell Survey and Research Project 2004 indicate that the intact core of the Reserve is diminishing. The core is the area that has limited intrusion from introduced species and limited environmental disturbance and so it has the highest biodiversity value. The core provides valuable information when viewed in the context of island biogeography and has important implications for the biodiversity of the area.

When the intrusions of introduced species and environmental disturbance of the Mount Hallowell Reserve were taken into consideration, the intact core in 2004 was less than 190ha. If the size of the core area decreases the number of indigenous species able to be sustained will decrease accordingly. To ensure protection of the biodiversity of the Reserve there must be an increased management presence.

Recommendation:

2.2.2 The Core Area of the Reserve should be protected from any further impacts, including clearing, feral animals and walk-tracks.

Actions:

- Control feral animals, invasive plants species and diseases, as described in the sections below.
- Encourage and support the development of the aims and objectives of a Friends of Mount Hallowell group: to monitor and report to the Shire of Denmark any issues relevant to the good management of the Reserve for its conservation values.
- Develop and implement a Code of Practice to assist Shire staff, DEC and contractors when carrying out construction and maintenance within or adjacent to the Reserve.

2.2.3 Scientific Research

Knowledge of all factors affecting the health of the Reserve is essential in determining necessary management strategies. To achieve this, ongoing scientific research is necessary.

Previous studies have identified the majority of flora and fauna in the Reserve. However the fungi have not been fully investigated. The Mt Hallowell Reserve Survey & Research Project 2004 recommended that a systematic fungi survey and a further fauna survey be conducted.

As the climatic and environmental conditions surrounding the Reserve change, it is essential to continue to survey the vegetation to monitor the health of the Reserve.

In addition, the study of the accumulation and decomposition of biomass can have important implications for fire management in a broader context than just Mount Hallowell.

Recommendations:

- 2.2.3 a) The recommendations from the Mt Hallowell Reserve Survey & Research Project 2004 for a systematic fungi survey and a further fauna survey be fulfilled.
- 2.2.3 b) A study of the accumulation and decomposition of biomass in the Reserve be undertaken.
- 2.2.3 c) Continue to survey the vegetation, on an ongoing basis.

Actions:

- Obtain funding to conduct a systematic fungi survey in the Reserve to add to the existing data.
- Obtain funding to conduct a further fauna survey in the Reserve.
- Obtain funding for a study of the accumulation and decomposition of biomass in the Reserve.
- Obtain funding to conduct vegetation surveys, initially every five years.

2.2.4 Adjoining Development

Appropriate use of land surrounding the Reserve is critical to its survival as an important natural place.

The surrounding development effectively severs any access from adjacent areas and does not allow for the immigration of native species to the area. A further limiting factor for native species immigration to the Reserve is the surrounding edge of the Reserve being extensively inhabited by significant numbers of introduced species.

Recommendations:

- 2.2.4 a) Ensure that development surrounding the Reserve is consistent with the objective of preserving it as a conservation priority area.
- 2.2.4 b) Place greater emphasis on the covenanting of remnant vegetation on private properties surrounding the Reserve.

Actions:

- Place appropriate conditions on all future development surrounding the Reserve to preserve it as a conservation priority area.
- Ensure that conditions placed on developments are satisfied.
- Inform residents of the options for covenanting their land.

Residents and tenants of properties surrounding the Reserve are not always aware of the consequences of their actions on their properties. The following activities can cause irreparable damage:

- Clearing along boundaries, particularly lopping trees
- Making driveways into the Reserve
- Planting invasive species
- Starting fires on hot and windy days
- Allowing domestic pets to roam into the Reserve
- Removing fallen or standing timber
- Dumping rubbish and garden refuse in the Reserve

Recommendation:

- 2.2.4 c) Educate the adjoining residents and landowners so that they understand their responsibilities and they adhere to regulations.

Actions:

- Promote membership of the Friends of Mount Hallowell Reserve group to adjoining residents and landowners.
- Conduct invasive species information sessions for residents and landowners.
- Conduct fire awareness training for residents and landowners.
- Monitor the Reserve boundaries for unauthorised activities and follow these up.

2.2.5 *Phytophthora Dieback*

Phytophthora cinnamomi has been identified as present in areas of the Reserve. The report from the Dieback study, due for completion in June 2008, will document the results of an assessment of the presence of Dieback in selected reserves in the Shire of Denmark. This study was developed to identify healthy and infected bush remnants within these reserves and make specific management recommendations for individual reserves as well as overall recommendations. Mount Hallowell is one of the sites included in this study.

Recommendation:

2.2.5 Prevent further spread of Dieback.

Actions:

- Continue to follow the Shire of Denmark Policy No. 1 Dieback Management.
- Implement the recommended actions from the Dieback study.
- Obtain funding to monitor and map instances of Dieback and its spread on an ongoing basis.

2.2.6 Introduced Animals

With human population and development surrounding the Reserve continuing to increase, the presence of predatory domestic and feral animals can be expected to increase. Unless the conservation management of the area with respect to introduced animals increases correspondingly, the actual size of the intact core area of the Reserve will be further reduced and will lead to the subsequent reduction in the small mammal populations and species diversity.

Recommendation:

2.2.6 Ensure compliance with domestic animal control regulations and initiate a programme of control of feral animals.

Actions:

- Identify and install appropriate signage to indicate that domestic animals must be kept under control at all times and not venture beyond designated areas.
- Ensure compliance with domestic animal control regulations by following up complaints.
- Implement a regular programme to control feral animals in both the core and non-core areas of the Reserve.
- Conduct an awareness campaign on value, extent and diversity of the native fauna.

2.2.7 Environmental Weeds

The Reserve generally has very few weeds where the indigenous vegetation is intact.

In January 2006 the Mount Hallowell Weed Mapping and Control Report was completed by the Denmark Weed Action Group Inc. This report supports former observations that most weeds are adjacent to the surrounding subdivisions, and other weed infestations are associated with previously disturbed areas: the former sandpit on the north-eastern side, soil dumps in the former gravel pits on the south-eastern side and the former refuse dump adjacent to the Ocean Beach Fire Station.

Eastern States acacias and other invasive species have been planted in adjoining residential areas.

It is possible to control the weeds noted, as the area covered by each species is comparatively small: approximately 10m².

The weed species present were probably introduced by the following means:

- *Acacia longifolia* (Sydney golden wattle) – garden refuse and birds
- *Acacia podalyriifolia* (Queensland silver wattle) – garden escapee
- *Agapanthus praecox* (Agapanthus) – escape from neighbouring property
- *Avena* sp (Wild oats) – in soil dump
- *Chamaecytisus palmensis* (Tagasaste) – garden refuse
- *Dipogon lignosus* (Dolichos) – garden refuse
- *Disa bracteata* (South African Orchid) – in soil dump
- *Eragrostis curvula* (African love grass) – invaded from road verge.
- *Gladiolus undulatus* (Wavy gladiolus) – in soil dump
- *Holcus lanatus* (Yorkshire fog) – in soil dump
- *Kunzea baxteri* – planted by former neighbouring resident
- *Leptospermum laevigatum* (Victorian ti-tree) – garden refuse and birds
- *Phytolacca octandra* (Inkweed) – birds or garden refuse
- *Plantago lanceolata* (Plantain) – in soil dump
- *Polygala myrtifolia* (Butterfly bush) – garden refuse
- *Rubus* spp (Blackberries) – in soil dump and garden refuse
- *Watsonia* spp – in soil dump

These species have self-sown only into the immediate vicinity, except for *Kunzea baxteri*, *Leptospermum laevigatum* and *Acacia longifolia*, which have all been found up to 200m from the disturbed areas.

Recommendation:

2.2.7 The Shire continues to support the current weed management regime and to formalise it in a Weed Management Work Programme.

Actions:

- Develop and document a formal Weed Management Work Programme for the Reserve.
- Secure funding to contract bush regenerators to continue with implementation of the weed control programme.
- Train Shire of Denmark staff in environmental weed management.
- Advise adjacent residents of the problems caused by invasive species escaping from their gardens.
- Promote the use of non-invasive plants.
- Hold field trips and workshops to educate the public about the native flora, fungi and fauna and the identification and control of invasive species.

2.2.8 Rehabilitation Areas

Revegetation with local and exotic species has been carried out in the former sand-pit areas. This work needs to be monitored, exotic species removed and infill planting done as required.

Where new areas are identified, such as disused or redundant tracks, appropriate rehabilitation will be needed. The preferred method is to leave to regenerate naturally, with regular monitoring.

Recommendations:

2.2.8 a) Continue to revegetate the former sand-pit areas with local native species and remove exotic species.

2.2.8 b) Allow new areas to regenerate naturally where possible.

Actions:

- Shire of Denmark to monitor and continue with rehabilitation of sand-pit area and remove exotic species.
- Rehabilitate redundant and disused tracks by leaving to regenerate naturally and monitoring regularly.

2.2.9 Climate Change

Predictions of higher temperatures, severe winds and changes to rainfall patterns have implications for all aspects of management.

Recommendation:

2.2.9 a) Follow progress of scientific research and implement relevant advice.

2.2.9 b) Employ the precautionary principle, and avoid any unnecessary disturbance.

Action:

- The Shire of Denmark to identify relevant advice and initiate actions to deal with the effects of climate change as necessary.
- Avoid unnecessary disturbance within the Reserve.

2.3 RECREATION

It is necessary to manage recreational access to ensure it does not degrade conservation values of the Reserve.

The Mount Hallowell Reserve is a significant recreational destination, in part due to the development of the Bibbulmun Track which traverses the Reserve. This increased activity brings with it greater environmental disturbance, which has a significant impact on the biodiversity in the Reserve. The introduction of Dieback, feral animals and weeds, and accidental fire ignitions all become more likely as pedestrian access increases. Monitoring of, and controlling access to, fragile areas such as granite outcrops which harbour specific and restricted vegetation habitats such as moss beds is particularly important.

Recommendation:

2.3 a) Ensure that information about appropriate use of the Reserve is readily available to residents and visitors, and that the effects of recreational activities are monitored, and controlled where required.

Actions:

- Develop interpretive information outlining the conservation value and importance of the Reserve and reasons for keeping to paths for display at the Denmark Visitor Centre and the Denmark Environment Centre.
- Keep paths and trails well-defined, marked and maintained to ensure that walkers do not stray into the bush.
- Close and rehabilitate non-designated tracks and walk trails to reduce damage, spread of Dieback and feral animal access to the Reserve.
- Install appropriate signage to indicate that domestic animals should be restricted from accessing the Reserve.
- Designate the fire access track on the north side of the Reserve as a mandatory leash area for domestic animals.
- Monitor and control recreational activities on fragile areas such as granite outcrops.

The Bibbulmun Track as a whole is managed by DEC. Essential maintenance on the Bibbulmun Track will continue to be carried out by volunteers, Pardelup Prison Workers and DEC employees under the direction of DEC staff and in partnership with the Shire of Denmark.

Recommendation:

2.3 b) All maintenance works on the Bibbulmun Track shall comply with this Management Plan. Note: Approval will be sought from the Shire for activities that are outside the day to day maintenance works that have already been endorsed e.g. any realignments.

Action:

- DEC and the Shire of Denmark to continue to work in partnership to address management issues relating to this section of the Bibbulmun Track.

There are currently car parking facilities at Monkey Rock/Lights Road and on Ocean Beach Road, near Heather Road. However, there are no formal facilities at the junction of the Bibbulmun Track and Ocean Beach Road. Walkers currently either use the car park near Heather Road or park on the road verges adjacent to the junction with Ocean Beach Road.

Recommendation:

2.3 c) Encourage walkers arriving at the Ocean Beach junction by car to use the Heather Road car park.

Actions:

- Place a sign at the Ocean Beach junction of the Bibbulmun Track showing the direction of the Heather Road car park.
- Provide signs for walkers from the Heather Road car park along existing tracks back to the Bibbulmun Track.
- Monitor car park usage to determine the need for additional facilities.

There are a great number of both formal and informal walk tracks through the Reserve. This proliferation increases the potential for introduction of weeds and plant disease, the possibility of injury on unmaintained tracks with subsequent legal actions, erosion and difficulty for Fire and Rescue Services in finding and evacuating lost or injured walkers.

The spur of the Sheila Hill Memorial Trail from the car park near Heather Road to the junction with the Bibbulmun Track is poorly aligned and difficult to maintain.

Recommendations:

2.3 d) Remove the spur of the Sheila Hill Memorial Trail from the car park near Heather Road to the junction with the Bibbulmun Track and designate the section of the Bibbulmun Track that traverses Mount Hallowell the Sheila Hill Memorial Trail.

2.3 e) Conduct an audit and rationalise walk tracks in the Reserve.

Actions:

- Modify the sign at the junction of the Sheila Hill Memorial Trail and the Bibbulmun Track to remove the spur to the car park near Heather Road.
- Remove the pine poles along the spur of the Sheila Hill Memorial Trail.
- Allow the spur of the Sheila Hill Memorial Trail to regenerate naturally.
- Set up a project to identify and map all walk tracks in the Reserve.
- Identify those tracks that should be removed or upgraded.
- Conduct a full impact assessment of all proposed works on walk tracks.
- Adopt appropriate guidelines to ensure minimal impact of works on walk tracks.
- Allocate funding and draw up a programme for track maintenance.

2.4 FIRE MANAGEMENT

Fire risk to residential areas surrounding the Reserve must be minimised and appropriate planning and fire management measures must be put in place. In addition, fire management must be tailored to maintain conservation values of the Reserve, in particular those associated with its long unburnt status.

The scientific importance of the Mount Hallowell Reserve takes on added significance when viewed in a regional context. With the majority of crown and private land in the South West burnt on a rotational basis, the Reserve contains some of the last examples of long unburnt vegetation in Western Australia and should be protected accordingly.

In a time of accelerating climate change, drying, and the risk of increased fire frequency and intensity, it is a matter of urgency to document and monitor biological diversity in ecosystems such as the fire-prone relictual tall forests of south-western Australia and fragmented ecosystems in the agricultural areas.

For example, in order to support the breeding population of Baudin's Black Cockatoos there need to be mixed age stands of Karri, so there are maturing trees with large hollows to replace old dead trees as they fall. This should be a priority when considering fire management. Large hot fires that kill Karri and result in even-aged, younger stands will not help this species.

Development proposals in the Mount Hallowell area have to take fire threat into consideration. Proposals must incorporate "Planning for Bush Fire Protection". Furthermore, they have to nominate adequate strategies to protect life, property and the environment from fire.

Approval for development is only granted after Council's Director of Planning (or nominated representative) and Fire and Emergency Services Authority are satisfied that the nominated fire protection strategies are adequate.

Bush Fire Brigades:

Mount Hallowell lies in the designated brigade areas of both the Ocean Beach Bush Fire Brigade and the William Bay Bush Fire Brigade. These are made up of volunteers who take responsibility for dealing with emergencies and events as quickly and effectively as possible. They depend on the Shire of Denmark for such activities as maintenance of hydrants and stand pipes, maintenance of fire access ways and buffer zones and provision of current and accurate maps.

Fire Management Plan:

The current Fire Management Plan in Appendix 6 is taken from the 2006 Mt Hallowell Reserve Management Plan. Since then there has been limited implementation of the Fire Management Plan and further developments adjoining the Reserve have been approved.

Recommendations:

2.4 a) Ensure that the Fire Management Plan covers all necessary components for effective fire management as a matter of urgency, or in any case no later than the commencement of the 2008 fire season.

2.4 b) Ensure all relevant agencies and stakeholders are aware of the Fire Management Plan and its recommended actions.

Actions:

- Ensure the Fire Management Plan incorporates, but is not limited to:
 - Assessment of fire hazard levels and biomass in both the Reserve and adjoining properties
 - Fire Prevention Plan with medium to long term mitigation strategies
 - Fire Response Plan outlining predetermined fire suppression responses
 - Revised Strategic Fire Access Route System
 - New or proposed developments
 - Building Protection Zones
 - Hazard Reduction Zones
 - Current Water Supplies
 - Current maps.
- Ensure implementation of the Fire Management Plan, particularly for adjoining developments.

Public Awareness:

Within the local community and visitors there are varying levels of understanding and awareness of bushfire risk. This poses a threat to both the Reserve and surrounding properties.

Recommendation:

2.4 c) Undertake a public education programme to reduce the likelihood of bush fire events.

Actions:

- Develop and implement a public education programme aimed at residents as well as visitors and tourists, incorporating the following:
 - Notification of High Fire Risk Days at all entrances to the Mount Hallowell Reserve.
 - “No open fire” signs installed on access tracks and walk tracks as necessary.
 - Where ownership changes occur within the area the Shire of Denmark shall forward appropriate fire related literature (e.g. “The Home Owner’s Bushfire Survival Manual”) and information to new residents to increase their fire awareness as well as to advise them of their obligations in terms of fire protection requirements.
 - Develop and implement a process for ensuring that tenants of rental properties and holiday homes are informed of fire protection requirements.
 - Before and during each fire season conduct a public fire awareness campaign that particularly targets residents in the area. This may be in the form of general publicity, seminars or a door knock. Ownership of this campaign by Denmark Community Fire Manager with assistance from Ocean Beach Bush Fire Brigade and William Bay Bush Fire Brigade.
 - Emphasis on the benchmark status of the Reserve as a ‘no planned burn area’ to adjacent landowners.

Access ways:

The current system of fire access ways is not adequate for effective fire control. This includes tracks on adjacent private properties, the access to the Water Corporation storage tank as well as other tracks within the Reserve. In addition, up-to-date maps of these tracks are not readily available to fire fighters.

Recommendations:

- 2.4 d) Review the current system of fire access tracks and make necessary changes.
- 2.4 e) Ensure current, appropriate maps are available to fire fighters.

Actions:

- Initiate a review of the current system of fire access tracks and implement construction and maintenance programmes as required.
- Ensure that construction and maintenance keeps erosion, Dieback and invasive plants under control.
- Erect and maintain appropriate barriers.
- Ensure maps are current and readily accessible and show contours, the location of all dwellings, access, strategic fire breaks and water supply, as well as buffer areas. A grid and a legend should be included for easy reference.

Fuel management:

Within the Reserve the management of the biomass in the buffer zones is currently satisfactory.

On private properties surrounding the Reserve, the requirement for fuel management to be in accordance with the Shire of Denmark Fire Break Notice is not always satisfied adequately.

Recommendation:

- 2.4 f) The Shire of Denmark to ensure compliance with the requirements of the Fire Break Notice.

Action:

- The Shire of Denmark to identify property owners who do not comply with the requirements of the Fire Break Notice and issue work orders.

PART 3: IMPLEMENTATION

3.1 MANAGEMENT PRIORITIES REVIEW

A review of the management priorities should be undertaken by the Shire of Denmark every two years, in consultation with community groups.

3.2 MANAGEMENT PLAN REVIEW

The entire Plan should be reviewed, through a community-based committee, every ten years.

3.3 IMPLEMENTATION PLANS

3.3.1 Tenure

Recommendation	Action required	Responsibility	Priority	When
2.1	Investigate the feasibility of including Reserves 35464 and 32861 in the Mount Hallowell Reserve.	Shire	L	

3.3.2 Conservation

Recommendation	Action required	Responsibility	Priority	When
2.2.1	Initiate the listing of the Reserve under the appropriate heading on the relevant Heritage List.	Shire	M	
2.2.2	Encourage and support the development of the Friends of Mount Hallowell group aims and objectives: to monitor and report to the Shire of Denmark any issues relevant to the good management of the Reserve for its conservation values	Shire NRMO	H	ASAP
2.2.2, 2.3 b)	Develop and implement a Code of Practice to assist Shire staff, DEC and contractors when carrying out construction and maintenance within or adjacent to the Reserve.	Shire NRMO and Shire Engineer	H	Urgent
2.3 e)	Conduct a full impact assessment of all proposed works on walk tracks.	Shire NRMO and Shire Engineer	H	Ongoing
2.3 e)	Adopt appropriate guidelines to ensure minimal impact of works on walk tracks.	Shire NRMO and Shire Engineer	H	Ongoing
2.2.3 a)	Obtain funding to conduct a systematic fungi survey in the Reserve to add to the existing data.	Denmark Environment Centre and Friends of Mount Hallowell group	M	ASAP
2.2.3 a)	Obtain funding to conduct a further fauna survey in the Reserve.	Denmark Environment Centre and Friends of Mount Hallowell group	M	ASAP

Recommendation	Action required	Responsibility	Priority	When
2.2.3 b)	Obtain funding for a study of the accumulation and decomposition of biomass in the Reserve.	Denmark Environment Centre and Friends of Mount Hallowell group	M	ASAP
2.2.3 c)	Obtain funding to conduct vegetation surveys, initially every five years.	Denmark Environment Centre and Friends of Mount Hallowell group	M	2009
2.2.4 b)	Inform residents of the options for covenanting their land.	Shire, Department of Environment and Conservation and National Trust (WA)	M	Ongoing
2.2.4 a)	Place appropriate conditions on all future development surrounding the Reserve to preserve it as a conservation priority area.	Shire	M	ASAP
2.2.4 a)	Ensure that conditions placed on developments are satisfied.	Shire	M	Ongoing
2.2.4 c)	Monitor the Reserve boundaries for unauthorised activities and follow these up.	Shire Ranger and Friends of Mount Hallowell group	H	Ongoing
2.2.5	Continue to follow the Shire of Denmark Policy No. 1 Dieback Management.	Shire Engineer and Bush Fire Brigades	H	Ongoing
2.2.5	Implement the recommended actions from the Dieback study.	Shire	H	ASAP
2.2.5	Obtain funding to monitor and map instances of Dieback and its spread on an ongoing basis.	Green Skills and Denmark PC Working Group	M	Ongoing
2.2.6	Identify and install appropriate signage to indicate that domestic animals must be kept under control at all times and not venture beyond designated areas.	Shire and Friends of Mount Hallowell group	M	ASAP
2.2.6	Ensure compliance with domestic animal control regulations by following up complaints.	Shire Ranger	M	Ongoing
2.2.6	Implement a regular programme to control feral animals in both the core and non-core areas of the Reserve.	Shire Ranger	M	Ongoing
2.2.7	Develop and document a formal Weed Management Work Programme for the Reserve.	Shire NRMO and Denmark Weed Action Group Inc.	M	2009
2.2.7	Secure funding to contract bush regenerators to continue with implementation of the weed control programme.	Shire and Denmark Weed Action Group Inc.	M	2009

Recommendation	Action required	Responsibility	Priority	When
2.2.7	Train Shire of Denmark staff in environmental weed management.	Shire NRMO	M	ASAP
2.2.4 c)	Promote membership of the Friends of Mount Hallowell group to adjoining residents and landowners.	Shire and Friends of Mount Hallowell group	M	Ongoing
2.2.4 c)	Conduct invasive species information sessions for residents and landowners.	Shire NRMO and Friends of Mount Hallowell group	M	Ongoing
2.2.7	Advise adjacent residents of the problems caused by invasive species escaping from their gardens.	Shire NRMO, Denmark Weed Action Group and Friends of Mount Hallowell group	M	Ongoing
2.2.7	Promote the use of non-invasive plants.	Shire NRMO and Friends of Mount Hallowell group	M	Ongoing
2.2.6, 2.2.7	Hold field trips and workshops to educate the public about the value, extent and diversity of the native flora, fungi and fauna and the identification and control of invasive species.	Shire NRMO and Friends of Mount Hallowell group	M	Ongoing
2.2.8 a)	Shire of Denmark to monitor and continue with rehabilitation of sand-pit areas and remove exotic species.	Shire Nursery Manager and Denmark Weed Action Group Inc.	L	Ongoing
2.2.8 b)	Rehabilitate redundant and disused tracks by leaving to regenerate naturally and monitoring regularly.	Shire NRMO, Denmark Weed Action Group Inc and Friends of Mount Hallowell group	M	Ongoing
2.2.9 a)	The Shire of Denmark to identify relevant advice and initiate actions to deal with the effects of climate change as necessary.	Shire NRMO	M	Ongoing
2.2.9 b)	Avoid unnecessary disturbance within the Reserve.	Shire	M	Ongoing

3.3.3 Recreation

Recommendation	Action required	Responsibility	Priority	When
2.3 a)	Develop interpretive information outlining the conservation value and importance of the Reserve and reasons for keeping to paths for display at the Denmark Visitor Centre and the Denmark Environment Centre.	Shire NRMO, Denmark Environment Centre	M	2009
2.3 b)	DEC and the Shire of Denmark to continue to work in partnership to address management issues relating to this section of the Bibbulmun Track.	Shire and DEC	M	Ongoing

Recommendation	Action required	Responsibility	Priority	When
2.3 c)	Place a sign at the Ocean Beach junction of the Bibbulmun Track showing the direction of the Heather Road car park.	Shire and Paths and Trails Advisory Committee	M	ASAP
2.3 c)	Provide signs for walkers from the Heather Road car park along existing tracks back to the Bibbulmun Track.	Shire and Paths and Trails Advisory Committee	M	ASAP
2.3 d)	Modify the sign at the junction of the Sheila Hill Memorial Trail and the Bibbulmun Track to remove the spur to the car park near Heather Road.	Shire and Paths and Trails Advisory Committee	M	ASAP
2.3 d)	Remove the pine poles along the spur of the Sheila Hill Memorial Trail.	Shire and Paths and Trails Advisory Committee	M	ASAP
2.3 d)	Allow the spur of the Sheila Hill Memorial Trail to regenerate naturally.	Shire and Paths and Trails Advisory Committee	M	ASAP
2.3 e)	Set up a project to identify and map all walk tracks in the Reserve.	Shire and Paths and Trails Advisory Committee	L	
2.3 e)	Identify those tracks that should be removed or upgraded.	Shire and Paths and Trails Advisory Committee	L	
2.3 e)	Allocate funding and draw up a programme for track maintenance.	Shire	M	Ongoing
2.3 a)	Close and rehabilitate non-designated tracks and walk trails to reduce damage, spread of Dieback and feral animal access to the Reserve.	Shire	M	Ongoing
2.3 a)	Keep paths and trails well-defined, marked and maintained to ensure that walkers do not stray into the bush.	Shire and Friends of Mount Hallowell group	M	Ongoing
2.3 a)	Install appropriate signage to indicate that domestic animals should be restricted from accessing the Reserve.	Shire	M	ASAP
2.3 a)	Designate the fire access track on the north side of the Reserve as a mandatory leash area for domestic animals.	Shire	M	ASAP
2.3 a)	Monitor and control recreational activities on fragile areas such as granite outcrops.	Shire and Friends of Mount Hallowell group	M	Ongoing
2.3 c)	Monitor car park usage to determine the need for additional facilities.	Shire and Friends of Mount Hallowell group	L	Ongoing

3.3.4 Fire Management

Recommendation	Action required	Responsibility	Priority	When
2.4 a)	<p>Ensure the Fire Management Plan incorporates, but is not limited to:</p> <ul style="list-style-type: none"> ▪ Assessment of fire hazard levels and biomass in both the Reserve and adjoining properties ▪ Fire Prevention Plan with medium to long term mitigation strategies ▪ Fire Response Plan outlining predetermined fire suppression responses ▪ Revised Strategic Fire Access Route System ▪ New or proposed developments ▪ Building Protection Zones ▪ Hazard Reduction Zones ▪ Current Water Supplies ▪ Current maps 	Shire and FESA, in consultation with the Bush Fire Brigades	H	Urgent, must be completed no later than the commencement of the 2008 fire season
2.4 b)	Ensure implementation of the Fire Management Plan, particularly for adjoining developments.	Shire and FESA	H	Ongoing
2.4 c)	<p>Develop and implement a public education programme aimed at residents as well as visitors and tourists, incorporating the following:</p> <ul style="list-style-type: none"> ▪ Notification of High Fire Risk Days at all entrances to the Mount Hallowell Reserve. ▪ “No open fire” signs installed on access tracks and walk tracks as necessary ▪ Where ownership changes occur within the area the Shire of Denmark shall forward appropriate fire related literature (e.g. “The Home Owner’s Bushfire Survival Manual”) and information to new residents to increase their fire awareness as well as to advise them of their obligations in terms of fire protection requirements. ▪ Develop and implement a process for ensuring that tenants of rental properties and holiday homes are informed of 	Shire and FESA	H	Annually and Ongoing

Recommendation	Action required	Responsibility	Priority	When
	<p>fire protection requirements.</p> <ul style="list-style-type: none"> ▪ Before and during each fire season conduct a public fire awareness campaign that particularly targets residents in the area. This may be in the form of general publicity, seminars or a door knock. Ownership of this campaign by Denmark Community Fire Manager with assistance from Ocean Beach Bush Fire Brigade and William Bay Bush Fire Brigade. ▪ Emphasis on the benchmark status of the Reserve as a 'no planned burn area' to adjacent landowners. 			
2.4 d)	Initiate a review of the current system of fire access tracks and implement construction and maintenance programmes as required.	Shire and FESA	H	ASAP
2.4 d)	Ensure that construction and maintenance of fire access ways keeps erosion, Dieback and invasive plants under control.	Shire	H	Ongoing
2.4 d)	Erect and maintain appropriate barriers to fire access ways.	Shire	H	Ongoing
2.4 e)	Ensure maps are current and readily accessible to fire fighters and show contours, the location of all dwellings, access, strategic fire breaks and water supply, as well as buffer areas. A grid and a legend should be included for easy reference.	Shire	H	Urgent and Ongoing
2.4 f)	The Shire of Denmark to identify property owners who do not comply with the requirements of the Fire Break Notice and issue work orders.	Shire Ranger	H	Ongoing

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APPENDIX 1 – Landforms and Soil Complexes

Hills and Hilly Terrain

Source: McArthur, Churchward, Sewell and Bartle *Landforms and soils of the south coast and hinterland WA Northcliffe to Manypeaks*

Keystone (K)

Hills and ridges generally within 60 to 100m local relief: some hills rise directly from sea level, such as near Walpole, and here local relief is 200m. Mid-slopes are generally smooth but with an occasional ravine.

Some granite outcrops on the upper slopes as prominent domes or peaks. Granite and gneiss, generally deeply weathered on lower and middle slopes. Sporadic thin cover of sand.

Duplex soils dominant but significant areas of red earths and red duplex soils: some granite outcrops. Five subdivisions recognized: criteria are incidence of rock outcrop, surface texture, and hue of the subsoil.

Kg – granite outcrops as pinnacles, pavements, and domes and, sometimes, scattered tors. On middle slopes there may be shallow, brown, gritty, loamy soil associated with outcrops.

Kb – broad crests and flanking slopes; sometimes occupies flanking slopes that are steeper than in Ky. Duplex soils with brown gravelly surface horizons, 30-60cm thick, over a yellow-brown and red-brown clay subsoil with a hue of 7.5YR; red or yellow earths may occur. Lateritic duricrust may be on crests and upper slopes.

Profile numbers: 33, 41, 65, 66, 68, 83.

Ks – represents pockets of sand in areas of low local relief on the Keystone hills, such as saddles and gently sloping concavities. These areas generally have smooth, gentle slopes and are often poorly-drained. The soils are usually podzols with a grey sandy surface, bleached A₂ horizons, and dark brown B horizons which may be cemented; weathering granite often occurs within 2m.

Profile number: 7.

APPENDIX 2 – Vegetation Types

As identified by the Denmark Environment Centre Mt Hallowell Reserve Survey & Research Project 2004.

The vegetation types identified during the survey are listed below with a short description and list of indicative species. The division of vegetation into structural types and sub-types was achieved under the following categories. The number in brackets indicates the number of areas in that category.

Structural types and sub-types

Tall Forest (Forest > 20m tall) (8)

- Pure Karri (2)
- Karri/Marri (3)
- Jarrah/Marri/Karri (2)
- Jarrah/Marri

Medium Forest (Forest between 10m & 20m tall) (5)

- Jarrah/Marri (3)
- Karri/Marri (2)

Medium/Low Forest (Forest between 5 & 10m tall) (5)

- Jarrah/Marri (2)
- Allocasuarina/Jarrah (3)

Low Forest (< 5m) (4)

- Allocasuarina/Jarrah (2)
- Allocasuarina/Banksia (2)

Woodland (As for Low Forest but < 30 % tree cover) (4)

- Allocasuarina (2)
- Jarrah (1)
- Jarrah/Marri/Banksia (1)

Shrubland (< 5% tree cover) (9)

- Agonis/Beaufortia (3)
- Agonis/Astartea (2)
- Agonis/Callistemon (1)
- Agonis/Jarrah/Marri (1)
- Agonis/Kunzea (1)
- Agonis/Xanthorrhoea (1)

Sedgeland (1)

Tall Forest

Karri – pure archetypal Karri exists in large areas of the reserve. Within this forest type are small areas dominated by Sheoak (*Allocasuarina decussata*) Peppermint (*Agonis flexuosa*) and Karri Hazel (*Trymalium floribundum*).

Indicative species:-

<i>Acacia pentadenia</i>	<i>Dampiera linearis</i>	<i>Scaevola striata</i>
<i>Agonis flexuosa</i>	<i>Hardenbergia comptoniana</i>	<i>Sollya heterophylla</i>
<i>Allocasuarina decussata</i>	<i>Hibbertia furfuraceae</i>	<i>Stylidium sp.</i>
<i>Billardiera floribunda</i>	<i>Lasiopetalum floribundum</i>	<i>Thomasia heterophylla</i>
<i>Boronia gracilipes</i>	<i>Leucopogon propinquus</i>	<i>Tremandra stelligera</i>
<i>Cassytha glabella</i>	<i>Leucopogon verticillatus</i>	<i>Trymalium floribundum</i>
<i>Chorilaena quercifolia</i>	<i>Ozothamnus ramosus</i>	
<i>Clematis pubescens</i>	<i>Paraserianthes lapantha</i>	

Karri/Marri – typically very tall forest, with a very similar understorey to the pure Karri forest. The boundaries of the Karri and Karri/Marri were hard to define but in some cases changing soil type were present between the Karri and the Marri/Jarrah forest. On the ridge of Hallowell five hundred metres east of Kooryunderup, Marri is significant component of the upper canopy.

Indicative species - as above with *Corymbia calophylla*.

Karri/Marri/Jarrah – some magnificent mixed tree areas again typically in belts between the Karri and Marri/Jarrah forest. Understorey plants also mixed between those typical of the forest types but tending more to the Karri understorey.

Marri/Jarrah – located primarily on the mid-slope of the northern and eastern slope aspect. These forests have a diverse understorey, indicative species list below:

<i>Acacia browniana</i> var. <i>obscura</i>	<i>Dampiera hederaceae</i>	<i>Persoonia longifolia</i>
<i>Acacia myrtifolia</i>	<i>Banksia serra</i>	<i>Petrophile diversifolia</i>
<i>Agonis theiformis</i>	<i>Eucalyptus marginata</i>	<i>Podocarpus drouynianus</i>
<i>Allocasuarina fraseriana</i>	<i>Hakea amplexicaulis</i>	<i>Taxandria parviceps</i>
<i>Banksia grandis</i>	<i>Hibbertia furfuraceae</i>	<i>Xanthosia rotundifolia</i>
<i>Bossiaea linophylla</i>	<i>Macrozamia riedlei</i>	
<i>Chorizema retrorsum</i>	<i>Hypocalymma strictum</i>	
<i>Corymbia calophylla</i>	<i>Monotoca tamariscina</i>	

Medium Forest

Jarrah/Marri - these medium forests occupy the gravelly soils above the sands and winter wet flats. The understorey is interesting and varied. *Allocasuarina fraseriana* and *Banksia grandis* are typical lower canopy in this plant community type. Also:

<i>Acacia myrtifolia</i>	<i>Macrozamia riedlei</i>
<i>Acacia pentadenia</i>	<i>Mesomelaena tetragona</i>
<i>Agonis theiformis</i>	<i>Taxandria parviceps</i>
<i>Anarthria prolifera</i>	<i>Thomasia integrifolia</i>
<i>Hakea amplexicaulis</i>	<i>Xanthorrhoea preissii</i>

Woodland

Jarrah – the Jarrah woodlands existed as moderately thick stands and as sparse woodland with sedge and *Agonis* understory. Where Jarrah is less than 5% of the total canopy, this report considered the vegetation type as a shrubland with scattered tree occurrence.

<i>Acacia myrtifolia</i>	<i>Eucalyptus marginata</i>
<i>Banksia ilicifolia</i>	<i>Lepidosperma</i> sp.
<i>Corymbia calophylla</i>	<i>Taxandria parviceps</i>

Jarrah/Marri – often existing adjacent to the Jarrah/Marri forest types these woodlands indicated the change from gravel soils to poorer sandy soils.

<i>Acacia pentadenia</i>	<i>Astartea</i> sp. (aff. <i>fascicularis</i>)
<i>Adenanthos cuneatus</i>	<i>Banksia grandis</i>
<i>Agonis theiformis</i>	<i>Johnsonia lupulina</i>
<i>Allocasuarina fraseriana</i>	<i>Taxandria parviceps</i>

Sheoak/Banksia – these woodlands existed on the nutrient poor sandy soils. The tree species are all Dieback susceptible and are found within these moist sandy flats where Dieback incursions are the most common.

<i>Allocasuarina fraseriana</i>	<i>Banksia quercifolia</i>
<i>Banksia grandis</i>	<i>Hypocalymma strictum</i>
<i>Banksia ilicifolia</i>	

Sheoak/Jarrah - sedge and rush spp. are dominant understorey in these areas of woodland. Other species include:

<i>Acacia myrtifolia</i>	<i>Taxandria parviceps</i>
<i>Dasypogon bromeliifolius</i>	<i>Xanthorrhoea preissii</i>
<i>Persoonia longifolia</i>	

Shrubland

The shrublands have a similar composition but varied dominant species mixes gives all the shrubland areas a different feel and habitat niche.

These mixes included, as the dominant species:

- Agonis/Xanthohrea
- Agonis/Beaufortia
- Agonis/Callistemon
- Agonis/Kunzea
- Agonis/Astartea
- Agonis/Jarrah/Marri

Species in the shrubland vegetation types include:

<i>Acacia myrtifolia</i>	<i>Beaufortia sparsa</i>	<i>Kunzea sulphurea</i>
<i>Adenanthos cuneatus</i>	<i>Boronia molloyae</i>	<i>Stackhousia monogyna</i>
<i>Agonis theiformis</i>	<i>Callistemon glauca</i>	<i>Taxandria parviceps</i>
<i>Andersonia caerulea</i>	<i>Cassytha glabella</i>	<i>Thelymitra antennifera</i>
<i>Astartea fascicularis</i>	<i>Hypocalymma strictum</i>	<i>Thelymitra flexuosa</i>

Sedgelands

Occupying the moist flats, sedgelands are typically present as an understorey in shrublands and woodland areas. One exception was notable and in this area the sedges formed a thick low carpet with species including:

<i>Anarthria prolifera</i>	<i>Lepidosperma angustatum</i>
<i>Anarthria scabra</i>	<i>Lepidosperma effusum</i>
<i>Dasyopogon bromeliifolius</i>	<i>Lepidosperma gladiatum</i>
<i>Evandra aristata</i>	<i>Mesomelaena tetragona</i>

Monadnocks and granite outcrops

The granite outcrops are a dominant feature of the Mount Hallowell Reserve. The typical monadnock is a large protuberance visible from surrounding vantage points. These are impressive features when viewed proximately. The smaller granite outcrops are widespread throughout the Reserve and vary from exposed sheets to large boulders the height of medium trees.

The granite outcrops create special niches for vegetation, both on the rock and in the surrounding fringes. These niches around the granite outcrops on the Mount Hallowell Reserve are created by:

- areas of shallow soil
- pockets of deep soil
- water drainage
- nutrient from rock catchments
- microclimates caused by aspect and shelter

These soil conditions and micro-climates differ from one outcrop to another and result in unique floral associations. *Agonis marginata* is present on many outcrops but absent on others. *Stypandra glauca* is similarly common but not omnipresent on the granite outcrops. Surrounding Yate (*Eucalyptus cornuta*) trees are a feature of the granite summit and some other outcrops, but absent from others where *Agonis flexuosa* or *Allocasuarina decussata* is a dominant fringing component of the vegetation.

The smaller outcrops have a less significant effect on the surrounding vegetation composition which reflects soil type and landscape position. These outcrops are predominantly in the areas designated in this report as Karri and Karri/Marri Tall Forest areas. Species commonly associated with the granite Monadnocks are:

<i>Agonis flexuosa</i>	<i>Eucalyptus cornuta</i>	<i>Lepidosperma sp.</i>
<i>Allocasuarina decussata</i>	<i>Eucalyptus diversicolor</i>	<i>Leucopogon revolutus</i>
<i>Andersonia sprengelioides</i>	<i>Eucalyptus megacarpa</i>	<i>Stypandra glauca</i>
<i>Bossiaea linophylla</i>	<i>Eutaxia obovate</i>	<i>Taxandria marginata</i>
<i>Corymbia calophylla</i>	<i>Hibbertia furfuraceae</i>	<i>Taxandria parviceps</i>

Monkey Rock and surrounds:

<i>Agonis flexuosa</i>	<i>Eucalyptus diversicolor</i>
<i>Bossiaea linophylla</i>	<i>Lepidosperma sp.</i>
<i>Eucalyptus cornuta</i>	<i>Leucopogon revolutus</i>

Mount Hallowell (Kooryunderup) and surrounds:

<i>Agonis flexuosa</i>	<i>Eucalyptus marginata</i>	<i>Stypandra glauca</i>
<i>Allocasuarina decussata</i>	<i>Eutaxia obovate</i>	<i>Taxandria linearifolia</i>
<i>Bossiaea linophylla</i>	<i>Lepidosperma sp.</i>	<i>Taxandria marginata</i>
<i>Corymbia calophylla</i>	<i>Leucopogon revolutus</i>	<i>Taxandria parviceps</i>
<i>Eucalyptus cornuta</i>		

The Mount Hallowell (Kooryunderup) outcrop influences the largest area of vegetation of any granite outcrop visited during the survey.

Hills and Hilly Terrain

Source: McArthur, Churchward, Sewell and Bartle *Landforms and soils of the south coast and hinterland WA Northcliffe to Manypeaks*

Keystone (K) subdivisions:

Kg – Scattered bullich (*Eucalyptus megacarpa*) and shrub communities of *Taxandria linearifolia*, *T. marginata*, *Verticordia plumosa*, *Acacia tryptycha*, *Andersonia sprengelioides*: several ferns, mosses, liverworts, lichens.

Kb – karri-tingle-marri tall open forest with understorey dominated by *Acacia pentadenia*, *Trymallium spathulatum*, *Hovea elliptica*, *Pimelea clavate*, *Chorilaena quercifolia*, *Bossiaea aquifolia*.

Ks – low open woodlands of depauperate jarrah and *Banksia verticillata* shrub layer of *Oxylobium lanceolatum*, *Taxandria parviceps*, *Acacia divergens*. *Allocasuarina fraseriana*, *Banksia grandis*, *B. attenuata* on drier sites comprising deep sand.

APPENDIX 3 – Mount Hallowell Reserve Flora List

Source: Denmark Environment Centre Mt Hallowell Reserve Survey & Research Project 2004, updated by Margaret Pieroni, May 2008

FERNS

ADIANTACEAE

Cheilanthes austrotenuifolia

DENNSTAEDTIACEAE

Pteridium esculentum

GYMNOSPERMS

ZAMIACEAE

Macrozamia riedlei

LINDSAEACEAE

Lindsaea linearis

ASPLENIACEAE

Asplenium aethiopicum – **Priority 4**

MONOCOTYLEDONS

CYPERACEAE

Evandra aristata

Lepidosperma angustatum

Lepidosperma effusum

Lepidosperma gladiatum

Mesomelaena tetragona

RESTIONACEAE

Anarthria prolifera

Anarthria scabra

Desmocladius fasciculatus

Desmocladius flexuosus

Leptocarpus elegans

Leptocarpus tenax

Lepyrodia extensa

Stenotalis ramosissima

DASYPOGONACEAE

Dasyogon bromeliifolius

Lomandra nigricans

Lomandra pauciflora

Lomandra sericea

PODOCARPACEAE

Podocarpus drouynianus

XANTHORRHOEACEAE

Xanthorrhoea gracilis

Xanthorrhoea preissii

PHORMIACEAE

Stypandra glauca

ANTHERICACEAE

Agrostocrinum scabrum

Borya sphaerocephala

Chamaescilla corymbosa var. *paradoxa*

Johnsonia lupulina

Laxmannia grandiflora

Laxmannia minor

Thyanotis multiflorus

Tricoryne humilis

COLCHICACEAE

Burchardia congesta

Wurmbea dioica subsp. *alba*

HAEMODORACEAE

Anigozanthos flavidus

Anigozanthos preissii

Conostylis setigera

Haemodorum paniculatum

Haemodorum spicatum

Tribonanthes australis

IRIDACEAE

Patersonia occidentalis

Patersonia umbrosa

MONOCOTYLEDONS (cont)**ORCHIDACEAE**

<i>Caladenia brownii</i>	<i>Paracaleana disjuncta</i>
<i>Caladenia cairnsiana</i>	<i>Paracaleana nigrita</i>
<i>Caladenia flava</i>	<i>Pheladenia deformis</i>
<i>Caladenia flava subsp.flava</i>	<i>Prasophyllum brownii</i>
<i>Caladenia latifolia</i>	<i>Prasophyllum cucullatum</i>
<i>Caladenia longicaudia</i>	<i>Prasophyllum fimbria</i>
<i>Caladenia macrostylis</i>	<i>Prasophyllum aff. parvifolium</i>
<i>Caladenia nana</i>	<i>Prasophyllum regium</i>
<i>Caladenia pectinata</i>	<i>Pterostylis pyramidalis</i>
<i>Caladenia reptans</i>	<i>Pterostylis aff.turfosa</i>
<i>Cryptostylis ovata</i>	<i>Pterostylis barbata</i>
<i>Cyanicula sericea</i>	<i>Pterostylis recurva</i>
<i>Cyrtostylis huegelii</i>	<i>Pterostylis sanguinea</i>
<i>Cyrtostylis robusta</i>	<i>Pterostylis vittata</i>
<i>Diuris longifolia</i>	<i>Pyrorchis nigricans</i>
<i>Drakaea glyptodont</i>	<i>Thelymitra antennifera</i>
<i>Drakaea thynniphila</i>	<i>Thelymitra benthamiana</i>
<i>Elythranthera brunonis</i>	<i>Thelymitra crinita</i>
<i>Eriochilus dilatatus</i>	<i>Thelymitra cucullata</i>
<i>Gastrodia lacista</i>	<i>Thelymitra flexuosa</i>
<i>Leporella fimbriata</i>	<i>Thelymitra fuscolutea</i>
<i>Leptoceras menziesii</i>	<i>Thelymitra graminea</i>
<i>Lyperanthus serratus</i>	<i>Thelymitra tigrina</i>
<i>Microtis media</i>	<i>Thelymitra sp. Denmark</i>
<i>Microtis media subsp.media</i>	

DICOTYLEDONS**APIACEAE**

Actinotus glomeratus
Actinotus omnifertilis
Hydrocotyle alata
Pentapeltis silvatica
Platysace filiformis
Platysace pendula
Trachymene grandis
Xanthosia huegelii
Xanthosia rotundifolia

ASTERACEAE

Euchiton collinus
Olearia muricata
Ozothamnus ramosus

CASUARINACEAE

Allocasuarina decussata
Allocasuarina fraseriana

CRASSULACEAE

Crassula decumbens

DILLENIACEAE

Hibbertia amplexicaulis
Hibbertia cuneiformis
Hibbertia cunninghamii
Hibbertia furfuracea
Hibbertia pilosa

DROSERACEAE

Drosera erythroyiza
Drosera glanduligera
Drosera macrantha
Drosera microphylla
Drosera pulchella

EPACRIDACEAE

Andersonia caerulea
Andersonia caerulea subsp. diminuta
Andersonia sprengeloides
Andersonia virolens
Astroloma baxteri
Astroloma pallidum
Leucopogon alternifolius
Leucopogon australis

EPACRIDACEAE (cont)

Leucopogon capitellatus
Leucopogon distans
Leucopogon glabellus
Leucopogon oxycedrus
Leucopogon parviflorus
Leucopogon propinquus
Leucopogon revolutus [L. obovatus]
Leucopogon unilateralis
Leucopogon verticillatus
Monotoca tamariscina
Sphenotoma gracilis

EUPHORBIACEAE

Amperea simulans
Poranthera huegelii
Ricinocarpus glaucus

GERANIACEAE

Pelargonium australe
Pelargonium littorale subsp. littorale

GOODENIACEAE

Dampiera alata
Dampiera diversifolia
Dampiera hederacea
Dampiera linearis
Goodenia eatoniana
Goodenia sp. Sth. Coast (A.R. Annel's 1846) – Priority 3
Scaevola microphylla
Scaevola striata
Velleia macrophylla

HALAGORACEAE

Gonocarpus benthamii
Gonocarpus diffusus
Haloragodendron racemosum

LAMIACEAE

Hemigenia humilis
Hemigenia podalyrina

LAURACEAE

Cassytha glabella

LOGANIACEAE

Logania serpyllifolia
Logania vaginalis

DICOTYLEDONS (cont)**MENYANTHACEAE***Villarsia parnassiifolia***MIMOSACEAE***Acacia browniana* var. *obscura**Acacia divergens**Acacia drummondii**Acacia hastulata**Acacia littorea**Acacia myrtifolia**Acacia pentadenia**Acacia pulchella* var. *pulchella**Acacia urophylla**Paraserianthes lophantha***MYOPORACEAE***Myoporum insulare***MYRTACEAE**Other *Agonis* species – now *Taxandria**Agonis flexuosa* var. *flexuosa**Agonis flexuosa* var. *latifolia**Agonis theiformis* [*A. hypericifolia*]*Beaufortia sparsa**Callistemon glaucus**Corymbia calophylla**Darwinia vestita**Eucalyptus diversicolor**Eucalyptus cornuta**Eucalyptus marginata**Eucalyptus megacarpa**Eucalyptus patens**Hypocalymma strictum**Kunzea ericifolia* subsp. *ericifolia**Kunzea sulphurea**Melaleuca microphylla**Melaleuca thymoides**Rinzia schollerifolia**Taxandria conspicua**Taxandria juniperina**Taxandria linearifolia**Taxandria marginata**Taxandria parviceps***PAPILIONACEAE***Aotus intermedia**Bossiaea linophylla**Bossiaea praetermissa**Chorizema diversifolium**Chorizema reticulatum* – **Priority 3***Chorizema retrorsum**Daviesia cordata**Daviesia inflata**Eutaxia myrtifolia**Eutaxia parvifolia**Gastrolobium brownii**Gompholobium confertum**Gompholobium knightianum**Gompholobium ovatum**Gompholobium polymorphum**Gompholobium shuttleworthii**Gompholobium tomentosum**Hardenbergia comptoniana**Hovea chorizemifolia**Hovea elliptica**Hovea trisperma**Jacksonia horrida**Kennedia coccinea**Mirbelia dilatata* var. *meissneri**Pultenaea reticulata**Sphaerolobium alatum**Sphaerolobium drummondii**Sphaerolobium grandiflorum**Sphaerolobium medium**Sphaerolobium vimineum***PITTOSPORACEAE***Billardiera floribunda**Billardiera heterophylla**Billardiera variifolia**Marianthus drummondianus**Marianthus tenuis***POLYGALACEAE***Comesperma virgatum**Comesperma volubile*

DICOTYLEDONS (cont)**PROTEACEAE**

Adenanthos cuneatus
Adenanthos obovatus
Banksia dallanneyi
Banksia grandis
Banksia ilicifolia
Banksia littoralis
Banksia quercifolia
Banksia serra – **Priority 4**
Grevillea quercifolia
Grevillea trifida
Hakea amplexicaulis
Hakea florida
Hakea linearis
Hakea ruscifolia
Hakea varia
Isopogon longifolius
Isopogon sphaerocephalus
Persoonia elliptica
Persoonia longifolia – **Priority 3**
Petrophile diversifolia

RANUNCULACEAE

Clematis pubescens

RHAMNACEAE

Trymalium floribundum
Trymalium ledifolium var. *rosmarinifolium*
Trymalium venustum

RUBIACEAE

Opercularia hispidula
Opercularia volubilis

RUTACEAE

Boronia alata
Boronia crenulata
Boronia gracilipes
Boronia molloyae
Boronia spathulata
Boronia stricta
Chorilaena quercifolia
Crowea angustifolia var. *platyphylla*

SANTALACEAE

Choretrum lateriflorum
Leptomeria scrobiculata
Leptomeria squarrulosa

SOLANACEAE

Anthocercis sylvicola – **Priority 2**

STACKHOUSIACEAE

Stackhousia monogyna

STERCULIACEAE

Lasiopetalum floribundum
Rulingia corylifolia
Rulingia cygnorum
Thomasia heterophylla
Thomasia paniculata
Thomasia purpurea

STYLIDIACEAE

Levenhookia pusilla
Stylidium adnatum
Stylidium amoenum
Stylidium calcaratum
Stylidium crassifolium
Stylidium guttatum
Stylidium junceum
Stylidium piliferum
Stylidium pritzelianum
Stylidium repens
Stylidium rhynchocarpum
Stylidium scandens
Stylidium schoenoides
Stylidium spathulatum
Stylidium sp. Mt. Barker

THYMELAEACEAE

Pimelea clavata
Pimelea hispida
Pimelea longiflora
Pimelea spectabilis

TREMANDRACEAE

Platytheca juniperina
Tetratheca affinis
Tetratheca setigera
Tremandra stelligera

VIOLACEAE

Hybanthus debilissimus

BRYOPHYTES - MOSSES**BRYACEAE**

Bryum argenteum
Bryum caespiticium
Bryum dichotomum
Leptobryum pyriforme
Orthodontium lineare
Rosulabryum albolimbatum
Rosulabryum billardieri
Rosulabryum campylotheticum
Rosulabryum torquescens

DICRANACEAE

Campylopus australis
Campylopus bicolor
Campylopus introflexus
Dicranoloma diaphanoneurum

FISSIDENTACEAE

Fissidens curvatus
Fissidens taylorii
Fissidens tenellus
Fissidens sp.

HEDWIGIACEAE

Rhacocarpus purpurascens

HYPNACEAE

Hypnum cupressiforme

LEUCOBRYACEAE

Leucobryum subchlorophyllosum

BRYOPHYTES - LIVERWORTS**ACROBOLBACEAE**

Lethocolea pansa
Lethocolea squamata

ANEURACEAE

Riccardia aequicellularis
Riccardia bipinnatifida
Riccardia cochleata
Riccardia wattiana

CEPHALOZIELLIACEAE

Cephaloziella arctica subsp. subantarctica

CHAETOPHYLLOPSIDACEAE

Chaetophyllopsis whiteleggii

CODONIACEAE

Fossombronia sp.

PLEUROPHASCACEAE

Pleurophascum occidentale – Priority 4

POTTIACEAE

Barbula calycina
Didymodon subtorquatus
Gymnostomum calcareum
Tortula antarctica
Triquetrella papillata
Weissia controversa

RHACOPIACEAE

Rhacopilum convolutaceum

SEMATOPHYLLACEAE

Rhapidorrhynchium amoenum
Sematophyllum homomallum

SPLACHNACEAE

Tayloria octoblepharis

THUIDIACEAE

Thuidium sparsum var. hastatum

FRULLANIACEAE

Frullania falciloba
Frullania probosciphora

GEOCALYCEAE

Chiloscyphus semiteres

LEJEUNACEAE

Diplasiolejeuna plicatiloba

LEPIDOZIACEAE

Kurzea compacta

RADULACEAE

Radula buccinifera

Mount Hallowell Reserve Flora List – Common Names

Source: Dorothy Redreau, June 2008

FERNS

Family and Species	Common Name	Description
ADIANTACEAE		
<i>Cheilanthes austrotenuifolia</i>	Rock Fern	Fern 10 – 80cm
LINDSAEACEAE		
<i>Lindsaea linearis</i>	Screw Fern	Fern to 50cm purple/black vein
DENNSTAEDTIACEAE		
<i>Pteridium esculentum</i>	Bracken	Fern 50cm – 2m
ASPLENIACEAE		
<i>Asplenium aethiopicum</i> – Priority 4	Forked Spleenwort	Fern 10 - 40cm

GYMNOSPERMS

Family and Species	Common Name	Description
ZAMIACEAE		
<i>Macrozamia riedlei</i>	Zamia	Palm-like tree to 3m
PODOCARPACEAE		
<i>Podocarpus drouynianus</i>	Wild Plum, Emu Plum	Conifer shrub to 3m edible fruit

MONOCOTYLEDONS

Family and Species	Common Name	Description
CYPERACEAE		
<i>Evandra aristata</i>	Evandra	Grass-like 50cm – 2.2m
<i>Lepidosperma angustatum</i>	Sword-sedge	Sedge to 50cm
<i>Lepidosperma effusum</i>	Spreading Sword-sedge	Sedge to 2.3m marginal teeth
<i>Lepidosperma gladiatum</i>	Coast Sword-sedge	Sedge to 3m smooth margins
<i>Mesomelaena tetragona</i>	Semaphore Sedge	Globular flower heads to 1m
RESTIONACEAE		
<i>Anarthria prolifera</i>	Anarthria	Sedge-like, tufted, tangled per.
<i>Anarthria scabra</i>	Anarthria	Robust sedge-like herb
<i>Desmocladus fasciculatus</i>	Desmocladus	Sedge-like, short, whorled branchlets
<i>Desmocladus flexuosus</i>	Desmocladus	Sedge-like, zigzag branchlets
<i>Leptocarpus elegans</i>	Leptocarpus	Per. herb leaf blades, spikelets
<i>Leptocarpus tenax</i>	Slender Twine-rush	Per herb, needle-like leaf blades
<i>Lepyrodia extensa</i>	Lepyrodia	Sedge –like to 30cm
<i>Stenotalis ramosissima</i>	Stenotalis	Tufted sedge-like wide at top
DASYPOGONACEAE		
<i>Dasyogon bromeliifolius</i>	Pineapple Bush/Drumsticks	Tufted perennial, drumstick fl.
<i>Lomandra nigricans</i>	Lomandra	Tufted herb, whorled fl
<i>Lomandra pauciflora</i>	Lomandra	Grass-like, leafy stems
<i>Lomandra sericea</i>	Silky Mat Rush	Flat, narrow fringed leaves
XANTHORRHOACEAE		
<i>Xanthorrhoea gracilis</i>	Graceful Grass Tree	No trunk
<i>Xanthorrhoea preissii</i>	Grass Tree	Tree-like monocot
PHORMIACEAE		
<i>Stypantra glauca</i>	Blind Grass	Tufted, grass-like blue or wh fl
ANTHERICACEAE		
<i>Agrostocrinum scabrum</i>	Blue Grass Lily	Tufted perennial blue or wh fl
<i>Borya sphaerocephala</i>	Pincushions	Tufted per herb to 20cm
<i>Chamaescilla corymbosa</i> var. <i>paradoxa</i>	Chamaescilla	Rosetted per herb blue fl
<i>Johnsonia lupulina</i>	Hooded Lily/Dutchman's Pipe	Clumping grass-like to 90cm
<i>Laxmannia grandiflora</i>	Laxmannia	Tufted herb to 25cm
<i>Laxmannia minor</i>	Laxmannia	Tufted herb to 25cm
<i>Thysanotus multiflorus</i>	Many-flowered Fringe Lily	Clumping lily to 70cm
<i>Tricoryne humilis</i>	Yellow Lily	Per herb to 40cm yellow fl
COLCHICACEAE		
<i>Burchardia congesta</i>	Milkmaids	Tuberous per to 80cm wh fl
<i>Wurmbea dioica</i> subsp. <i>alba</i>	Wurmbea	Per heb to 30cm hermaphodite

MONOCOTYLEDONS (cont)

Family and Species	Common Name	Description
HAEMODORACEAE		
<i>Anigozanthos flavidus</i>	Tall Kangaroo Paw	Green yellow red fl
<i>Anigozanthos preissii</i>	Albany Catspaw	Yellow, orange red fl 15-80cm
<i>Conostylis setigera</i>	Bristly Cottonhead	Tufted to 35cm yellow red fl
<i>Haemodorum paniculatum</i>	Mardja	Bulbaceous per herb to 1.8m
<i>Haemodorum spicatum</i>	Mardja	Bulbaceous per herb to 2m
<i>Tribonanthes australis</i>		Tuberous per herb to 40cm
IRIDACEAE		
<i>Patersonia occidentalis</i>	Purple Flag	Rhizomatous tufted herb to 80cm
<i>Patersonia umbrosa</i>	Yellow Flag	Rhizomatous tufted herb to 75cm
ORCHIDACEAE		
<i>Caladenia brownii</i>	Karri Spider Orchid	Green, brown, red fl
<i>Caladenia cairnsiana</i>	Zebra Orchid	Green, yellow, red fl
<i>Caladenia flava</i>	Cowslip Orchid	Yellow
<i>Caladenia flava subsp.flava</i>	Cowslip Orchid	Yellow
<i>Caladenia latifolia</i>	Pink Fairy Orchid	Pink
<i>Caladenia longicauda</i>	Common White Spider Orchid	White
<i>Caladenia macrostylis</i>	Leaping Spider Orchid	Yellow, cream
<i>Caladenia nana</i>	Pink Fan Orchid	Pink
<i>Caladenia pectinata</i>	King Spider Orchid	Green, yellow
<i>Caladenia reptans</i>	Little Pink Fairy Orchid	Pink
<i>Cryptostylis ovata</i>	Slipper Orchid	Green, red
<i>Cyrtostylis huegelii</i>	Midge Orchid	Dull reddish-green
<i>Cyanicula sericea</i>	Silky Blue Orchid	Blue, violet
<i>Cyrtostylis robusta</i>	Mosquito Orchid	Pale reddish-green
<i>Diuris longifolia</i>	Donkey Orchid/Purple Pansy Orc	Mauve, yellow eye
<i>Drakaea glyptodon</i>	King-in-his-carriage	Red, green, yellow
<i>Drakaea thynniphila</i>	Narrow-lipped Hammer Orchid	Purple
<i>Elythranthera brunonis</i>	Purple Enamel Orchid	Shiny purple
<i>Eriochilus dilatatus</i>	White Bunny Orchid	White
<i>Gastrodia lacista</i>	Potato Orchid/Bell Orchid	White, brown, yello
<i>Leporella fimbriata</i>	Hare Orchid	Green, brown, red
<i>Leptoceras menziesii</i>	Rabbit Orchid	White, pink, red
<i>Lyperanthus serratus</i>	Rattlebeak Orchid	Green, brown, yellow
<i>Microtis media subsp.media</i>	Tall Mignonette Orchid	Yellow-green
<i>Microtis media</i>	Mignonette Orchid	Yellow-green
<i>Paracaleana disjuncta</i>	Duck Orchid	
<i>Paracaleana nigrita</i>	Flying Duck Orchid	Red, green
<i>Pheladenia deformis</i>	Blue Fairy Orchid	Blue, violet
<i>Prasophyllum brownii</i>	Christmas Leek Orchid	Green, cream, brown
<i>Prasophyllum cucullatum</i>	Hooded Leek Orchid	White, brown
<i>Prasophyllum fimbria</i>	Fringed Leek Orchid	Green, white purple
<i>Prasophyllum parvifolium</i>	Autumn Leek Orchid	Green, white
<i>Prasophyllum regium</i>	King Leek Orchid	Green, brown, purple
<i>Pterostylis nana</i>	Snail Orchid	Green
<i>Pterostylis turfosa</i>	Bearded Bird Orchid	Green
<i>Pterostylis barbata</i>	Bird Orchid	Green
<i>Pterostylis recurva</i>	Jug Orchid	Green, white
<i>Pterostylis sanguinea</i>		Green, brown
<i>Pterostylis vittata</i>	Banded Greenhood	Green, white
<i>Pyrorchis nigricans</i>	Red Beaks	White, red
<i>Thelymitra antennifera</i>	Vanilla Orchid	Yellow
<i>Thelymitra benthamiana</i>	Cinnamon Sun Orchid	Yellow, brown
<i>Thelymitra crinita</i>	Blue Lady Orchid	Blue
<i>Thelymitra cucullata</i>	Swamp Sun Orchid	Green, cream, purple
<i>Thelymitra flexuosa</i>	Twisted Sun Orchid	Yellow
<i>Thelymitra fuscolutea</i>	Leopard Orchid	Brown, yellow
<i>Thelymitra graminea</i>	Sun Orchid	Blue
<i>Thelymitra tigrina</i>	Tiger Orchid	Yellow
<i>Thelymitra sp. Denmark</i>		

DICOTYLEDONS

Family and Species	Common Name	Description
APIACEAE		
<i>Actinotus glomeratus</i>	Actinotus	Herb to 23cm white, green fl
<i>Actinotus omnifertilis</i>	Actinotus	Herb to 50cm white fl
<i>Hydrocotyle alata</i>	Hydrocotyle	Annual fleshy herb to 10cm
<i>Pentapeltis silvatica</i>	Southern Pentapeltis	Prostrate herb trailing stems
<i>Platysace filiformis</i>	Platysace	Apparently leafless herb to 1m
<i>Platysace pendula</i>	Platysace	Slender herb to 25cm
<i>Trachymene grandis</i>	Trachymene	Per herb 0.2-2m white, blue fl
<i>Xanthosia huegelii</i>		Hairy trailing herb to 15cm y, g,w
<i>Xanthosia rotundifolia</i>	Southern Cross	Layering shrub to 80cm white fl
ASTERACEAE		
<i>Euchiton collinus</i>	Creeping Cudweed	Herb, with basal rosette y, brown
<i>Olearia muricata</i>	Rough-leaved Daisy Bush	Blue, purple, pink, white, yellow
<i>Ozothamnus ramosus</i>		Erect straggling to 1.3m wh,p
CASUARINACEAE		
<i>Allocasuarina decussata</i>	Karri Sheoak	Tree deeply fissure bark to 15m
<i>Allocasuarina fraseriana</i>	Sheoak	Tree 5 – 15 m
CRASSULACEAE		
<i>Crassula decumbens</i>	Rufous Stonecrop	Annual herb to 10cm
DILLENIACEAE		
<i>Hibbertia amplexicaulis</i>		Prostrate, sprawling or ascending
<i>Hibbertia cuneiformis</i>	Cutleaf Hibbertia	Low sprawling to 3m
<i>Hibbertia cunninghamii</i>		Sprawling 20 – 70cm
<i>Hibbertia furfuracea</i>		Erect 0.5 – 2m
<i>Hibbertia pilosa</i>	Hairy Guinea Flower	Erect or sprawling 0.3 – 1.5m
DROSERACEAE		
<i>Drosera erythrorhiza</i>	Red Ink Sundew	Rosetted, tuberous to 12cm white
<i>Drosera glanduligera</i>	Pimpernel Sundew	Rosetted, tuberous to 6cm orange
<i>Drosera macrantha</i>	Bridal Rainbow	Herb or climber white, pink, red
<i>Drosera microphylla</i>	Golden Rainbow	Herb to 40cm red, pink, white ft
<i>Drosera pulchella</i>	Pretty Sundew	Herb to 3cm pink, white, orange
EPACRIDACEAE		
<i>Andersonia caerulea</i>	Foxtails	Erect or spreading pink blue wh
<i>Andersonia caerulea subsp.diminuta</i>		
<i>Andersonia sprengelioides</i>		Dense cushion shr pink blue pur
<i>Andersonia virolens</i>		Dwarf shrub to 20cm white
<i>Astroloma baxteri</i>		Prostrate or erect to 60cm r,or,pi
<i>Astroloma pallida</i>	Kick Bush	Prostrate shrub to 60cm wh, cr
<i>Leucopogon alternifolius</i>		Erect or semi scrambling to 2m
<i>Leucopogon australis</i>	Spiked Beard-heath	Erect shrub to 2m white fl
<i>Leucopogon capitellatus</i>		Erect shrub to 2m white fl
<i>Leucopogon distans</i>		Erect shrub to 1.2m white fl
<i>Leucopogon glabellus</i>		Slender shrub to 1.5m
<i>Leucopogon oxycedrus</i>		Erect to 1m white, pink red fl
<i>Leucopogon parviflorus</i>	Coast Beard-heath	Erect densely branched to 3.5m
<i>Leucopogon propinquus</i>		Erect rigid shrub to 2m white fl
<i>Leucopogon revolutus</i>		Compact or open to 4m white fl
<i>Leucopogon unilateralis</i>		Upright to 1.5m white fl
<i>Leucopogon verticillatus</i>	Tassell Flower/Native Bamboo	Erect to 4m pink, red flowers
<i>Monotoca tamariscina</i>		Erect or straggling to 2.5 y, g, c,w
<i>Sphenotoma gracilis</i>	Swamp Paper-heath	Slender erect or straggling to 1.5
EUPHORBIACEAE		
<i>Amperea simulans</i>		Tufted bushy per herb to 75cm
<i>Poranthera huegelii</i>	Poranthera	Shrub to 60cm white fl in heads
<i>Ricinocarpos glaucus</i>	Wedding Bush	Shrub to 2m white fl
GERANIACEAE		
<i>Pelargonium australe</i>	Wild Geranium	Decumbent or ascending pi,pu,wh
<i>Pelargonium littorale subsp.littorale</i>		Decumbent or ascending sm pi fl
GOODENIACEAE		
<i>Dampiera alata</i>	Winged-stem Dampiera	Erect to 60cm, winged stem blue
<i>Dampiera diversifolia</i>		Prostrate to 75cm blue, purple
<i>Dampiera hederaceae</i>	Karri Dampiera	Variable herb to 1m blue, white
<i>Dampiera linearis</i>	Common Dampiera	Erect herb to 60cm blue fl
<i>Goodenia eatoniana</i>		Sub-shrub to 30cm blue fl
<i>Scaevola microphylla</i>	Small-leaved Scaevola	Woody-base per herb to 1m bl, pu
<i>Scaevola striata</i>	Royal Robe	Ascending to prostrate blue purple
<i>Velleia macrophylla</i>	Large-leaved Velleia	Per herb to 2m yellow fl

DICOTYLEDONS (cont)

Family and Species	Common Name	Description
HALAGORACEAE		
<i>Gonocarpus benthamii</i>		Slender leafy sprays red, gr fl
<i>Gonocarpus diffusus</i>		Slender leafy sprays pink, red fl
<i>Haloragodendron racemosum</i>	Shrubby Rasp-wort	Small tree or shrub to 4m wh,cr,g
LAMIACEAE		
<i>Hemigenia humilis</i>		Slender erect shub to 1.5 blue pur fl
<i>Hemigenia podalyrina</i>		Erect greyish leaves to 2m b,pu,pi
LAURACEAE		
<i>Cassytha glabella</i>	Tangled Dodder Laurel	Parasitic climber white, yellow fl
LOGANIACEAE		
<i>Logania serpyllifolia</i>		Erect to spreading to 40cm wh fl
<i>Logania vaginalis</i>	White Spray	Shrub to 4m big leaves sm wh fl
MENYANTHACEAE		
<i>Villarsia parnassiifolia</i>		Aquatic to semi-aquatic yellow fl
MIMOSACEAE		
<i>Acacia browniana</i> var. <i>obscura</i>		Openly branched shrub to 2m y fl
<i>Acacia divergens</i>		Diffuse open slender spiny shrub
<i>Acacia drummondii</i>	Drummond's Wattle	Shrub to 1m yellow fl
<i>Acacia hastulata</i>		Slender erect to spread, v prickly
<i>Acacia littorea</i>		Dense, pungent to 3m yellow fl
<i>Acacia myrtifolia</i>	Myrtle Wattle/Red Stem Wattle	Galbrous, bushy to 3m y, cr fl
<i>Acacia pentadenia</i>	Karri Wattle	Willow shrub or tree, strong smell
<i>Acacia pulchella</i> var. <i>pulchella</i>	Prickly Moses	Diffuse spinescent shrub
<i>Acacia urophylla</i>		Erect, open yellow cream or wh fl
<i>Paraserianthes lophantha</i>	Albizia	Tree or shrub to 10m yellow gr fl
MYOPORACEAE		
<i>Myoporum insulare</i>	Blueberry Tree	Dense shrub or occ tree white fl
MYRTACEAE		
<i>Agonis flexuosa</i> var. <i>flexuosa</i>	WA Peppermint	Tree or shrub to 10m white fl
<i>Agonis flexuosa</i> var. <i>latifolia</i>		Shrub or tree to 4m white fl
<i>Agonis theiformis</i>		Shrub to 2m white flowers
<i>Beaufortia sparsa</i>	Swamp Bottlebrush	Shrub to 3m red, orange bb flo
<i>Callistemon glaucus</i>	Albany Bottlebrush	Slender erect sh to 30 red bb
<i>Corymbia calophylla</i>	Marri/Red Gum	Tree to 60m rough brkwh occ pi fl
<i>Darwinia vestita</i>	Pom-pom Darwinia	Erect bushy to 1m white red pink
<i>Eucalyptus diversicolor</i>	Karri	Tree to 90m smooth bark wh fl
<i>Eucalyptus cornuta</i>	Yate	Tree to 25m rough bark, y g fl
<i>Eucalyptus marginata</i>	Jarra	Tree to 40m stringy bark w,cr,p fl
<i>Eucalyptus megacarpa</i>	Bullich	Tree to 35m smooth wh bark whfl
<i>Eucalyptus patens</i>	Blackbutt/Yarri	Tree to 25m rough furrowed bark
<i>Hypocalymma strictum</i>	Myrtle	Shrub to 1.5m pink, white flo
<i>Kunzea ericifolia</i> subsp. <i>ericifolia</i>	Spearwood	Shrub to 4m yellow cream white fl
<i>Kunzea sulphurea</i>		Erect comp sh or tree to 6m y fl
<i>Melaleuca microphylla</i>		Shrub to 5m yellow, cream fl
<i>Melaleuca thymoides</i>		Shrub to 2m cream, yellow fl
<i>Rinzia schollerifolia</i>		Sprawling shrub to 30cm wh, pi fl
<i>Taxandria conspicua</i>		Dense shrub to 2.5m white fl
<i>Taxandria juniperina</i>	Wattie/Warren River Cedar	Tree or shrub to 27m white fl
<i>Taxandria linearifolia</i>	Swamp Peppermint	Tree or shrub to 5m white fl
<i>Taxandria marginata</i>	Arnica	Shrub to 3m large white fl
<i>Taxandria parviceps</i>		Erect shrub to 4m white fl
OLACACEAE		
<i>Olax phyllanthi</i>	Olax	Silvery shrub, alt leaves cr, wh fl
PAPILIONACEAE		
<i>Aotus intermedia</i>		Erect sh to 2m yellow, red, brown
<i>Bossiaea linophylla</i>	Narrow-leaved Bossiaea	Erect shrub to 2.2m yellow red fl
<i>Bossiaea praetermissa</i>		Tangled shrub to 1m y,r, brown fl
<i>Chorizema diversifolium</i>		Twining, trailing, climbing pi,or,red
<i>Chorizema reticulatum</i> – Priority 3	Showy Flame Pea	Erect wiry to 50cm pink red
<i>Chorizema retrorsum</i>		Trail, erect to climb or,red, y, pi
<i>Daviesia cordata</i>	Bookleaf	Erect slender to 2m y,or, red, br
<i>Daviesia inflata</i>		Erect spreading 1-5m or, red fl
<i>Eutaxia parvifolia</i>		Erect to 1m yellow orange red
<i>Eutaxia myrtifolia</i>		Pros to erect to 2m or,y,red fl
<i>Gastrolobium brownii</i>	Poison	Tall, bushy to 3m yellow red fl
<i>Gompholobium confertum</i>		Erect shrub to 1.2m bl/pur heads
<i>Gompholobium knightianum</i>	Handsome Wedge Pea	Slender erect to 50cm pink purple
<i>Gompholobium ovatum</i>		Shrub to 50cm y,or,r,br,pu,pi

DICOTYLEDONS (cont)

Family and Species	Common Name	Description
PAPILIONACEAE (cont)		
<i>Gompholobium polymorphum</i>		Straggly climber to 1.2m y,or,red
<i>Gompholobium shuttleworthii</i>		Erect shrub to 50cm pink purple
<i>Gompholobium tomentosum</i>	Hairy Yellow Pea	Erect shrub to 1m ellow
<i>Hardenbergia comptoniana</i>	Native Wisteria	Climbing shrub blue, purple, wh
<i>Hovea chorizemifolia</i>	Holly-leaved Hovea	Er, slender, prickly to 6cm b,pu
<i>Hovea elliptica</i>	Tree Hovea	Slender er tr or shr to 3m b,pu,wh
<i>Hovea trisperma</i>	Common Hovea	Straggling shrub to 7cm pu, blue
<i>Jacksonia horrida</i>		Shrub to 2.3 orange, yellow, red
<i>Kennedia coccinea</i>	Coral Vine	Twining orange,pink,red,purple
<i>Mirbelia dilatata var.meissneri</i>	Holly-leaved Mirbelia	Prickly shrub to 3m pink,violet,p
<i>Pultenaea reticulata</i>		Erect shrub to 3m y, or, red, brown
<i>Sphaerolobium alatum</i>		Slender open leafless y, red, br
<i>Sphaerolobium drummondii</i>		Erect leafless red, yellow, orange
<i>Sphaerolobium grandiflorum</i>		Erect slender leafless r, y, or
<i>Sphaerolobium medium</i>		Erect slender leafless y, or,red
<i>Sphaerolobium vimineum</i>	Leafless Globe Pea	Erect sl.llessmulti stemmed or,y,r
PITTOSPORACEAE		
<i>Marianthus drummondianus</i>		Shrub/climber white blue purple l
<i>Billardiera floribunda</i>	White-flowered Billardiera	Robust sh or climber white fl
<i>Billardiera heterophylla</i>	Australian Bluebell	Woody shrub blue, white,pink
<i>Billardiera variifolia</i>		Twining sh or climber cr,y,bl,pu
<i>Marianthus tenuis</i>		Twining sh to 60cm blue, white
POLYGALACEAE		
<i>Comesperma virgatum</i>	Milkwort	Erect slender sh to 1.6 pink, pur
<i>Comesperma volubile</i>	Love Creeper	Creeping herb or climber blue
PROTEACEAE		
<i>Adenanthos cuneatus</i>	Coastal Jugflower	Erect or spreading to 5m red pink
<i>Adenanthos obovatus</i>	Basket Flower	Erect to 2m red flowers
<i>Banksia grandis</i>	Bull Banksia	Tree or shrub to 10m yellow,gr fl
<i>Banksia ilicifolia</i>	Holly-leaved Banksia	Tree or shrub to 12m r,or,y,cr fl
<i>Banksia littoralis</i>	Swamp Banksia	Tree or shrub to 12m y, or fl
<i>Banksia quercifolia</i>	Oak-leaved Banksia	Shrub to 3m yellow, orange, brown
<i>Banksia dallanneyi</i>	Couch Honeypot	Dryandra shrub to 1.3m or/y fl
<i>Banksia serra – Priority 4</i>	Serrate-leaved Dryandra	Shrub to 7m yellow flowers
<i>Grevillea quercifolia</i>	Oak-leaf Grevillea	Shrub to 60cm pink,red,purple
<i>Grevillea trifida</i>		Spreading spiny shrub to 1.7m wh
<i>Hakea amplexicaulis</i>	Prickly Hakea	Shrub to 3m white cream pink fl
<i>Hakea florida</i>		Erect bushy to 2.5m lots of wh cr
<i>Hakea linearis</i>		Shrub or tree to 4m wh cream
<i>Hakea ruscifolia</i>	Candle Hakea	Shrub to 3m white cream
<i>Hakea varia</i>	Variable-leaved Hakea	Shrub to 4m white cream yellow
<i>Isopogon longifolius</i>		Shrub to 2.5m yellow flowers
<i>Isopogon sphaerocephalus</i>	Drumstick Isopogon	Erect spreading sh to 2m yellow
<i>Persoonia elliptica</i>	Spreading Snottygobble	Shrub or tree to 8m y, gr flowers
<i>Persoonia longifolia</i>	Snottygobble	Graceful sh or tree to 5m yellow
PROTEACEAE		
<i>Petrophile diversifolia</i>		Slender single stem sh wh pi
<i>Petrophile longifolia</i>	Long Leaved Cone Bush	
RANUNCULACEAE		
<i>Clematis pubescens</i>	Common Clematis/Old Man's Beard	Woody sh or climber to 5m wh,cr
RHAMNACEAE		
<i>Trymalium floribundum</i>	Trymalium	Shrub to 9m wh,cr,y, green fl
<i>Trymalium ledifolium var.rosmarinifolium</i>	Trymalium	Shrub to 2m white, cream fl
<i>Trymalium venustum</i>	Trymalium	Erect shrub to 6m white, cream
RUBIACEAE		
<i>Opercularia hispidula</i>	Hispid Stinkweed	Herb or sh to 1m g,cr,y,pu fl
<i>Opercularia volubilis</i>	Twining Stinkweed	Twining climbing herb to 2m g,wh
RUTACEAE		
<i>Boronia alata</i>	Winged Boronia	Upright spreading sh pi, wh fl
<i>Boronia crenulata</i>	Aniseed Boronia	Shrub to 1,2m pink, purple, red fl
<i>Boronia gracilipes</i>	Karri Boronia	Erect, spindly to 2m pink fl
<i>Boronia molloyae</i>	Tall Boronia	Slender sh to 5m pink, red fl
<i>Boronia spathulata</i>	Boronia	Erect slender sh to 1m pink, red f
<i>Boronia stricta</i>	Boronia	Erect, slender shrub to 2m pink
<i>Chorilaena quercifolia</i>	Chorilaena	Shrub or tree to 5m y,cr,wh,g fl
<i>Crowea angustifolia var.platyphylla</i>	Crowea	Erect or spreading to 3.5m wh

DICOTYLEDONS (cont)

Family and Species	Common Name	Description
SANTALACEAE		
<i>Choretrum lateriflorum</i>	Dwarf Sour Bush	Weeping hemiparasitic sh wh,cr
<i>Leptomeria scrobiculata</i>	Leptomeria	Hemisparasitic sh to 1.5 or,br,cr,w
<i>Leptomeria squarrolosa</i>	Leptomeria	Hemisparasitic sh to 1.5 or,br fl
SOLANACEAE		
<i>Anthocercis sylvicola</i> – Priority 2		Shrub to 1.3 yellow, purple flowers
STACKHOUSIACEAE		
<i>Stackhousia monogyna</i>	Stackhousia	Herb to 70cm white, cream, yellow
STERCULIACEAE		
<i>Lasiopetalum floribundum</i>	Free-flowering Lasiopetalum	Erect or spr to 3m pi,bl,pu,wh fl
<i>Rulingia corylifolia</i>	Hazel-leaved Rulingia	Shrub to 3m cream, white fl
<i>Rulingia cygnorum</i>		Pros or erect to 1m white, cream
<i>Thomasia heterophylla</i>	Thomasia	Erect or sprawl to 1.5m, pi,pu,wh
<i>Thomasia paniculata</i>	Thomasia	Spreading sh to 3m pink, purple
<i>Thomasia purpurea</i>	Thomasia	Erect slender sh to 2m pi,pu
STYLIDIACEAE		
<i>Levenhookia pusilla</i>	Midget Stylewort	Herb to 10cm pink, white
<i>Stylidium adnatum</i>	Common Beaked Triggerplant	Herb to 30cm pink, white
<i>Stylidium amoenum</i>	Lovely Triggerplant	Rosetted per to 50cm w,bl,pu,v
<i>Stylidium calcaratum</i>	Book Triggerplant	Rosetted per to 20cm wh,pink
<i>Stylidium crassifolium</i>	Thick-leaved Triggerplant	Herb to 90cm white, pink
<i>Stylidium guttatum</i>	Dotted Triggerplant	Rosetted per to 15cm white
<i>Stylidium junceum</i>	Reed Triggerplant	Rosetted per to 50cm pi,cr,orange
<i>Stylidium piliferum</i>	Common Butterfly Triggerplant	Rosetted per to 50cm wh,cr,y fl
<i>Stylidium pritzelianum</i>	Royal Triggerplant	Lax per herb to 40cm purple
<i>Stylidium repens</i>	Matted Triggerplant	Creeping herb to 10cm wh,pink
<i>Stylidium rhynchocarpum</i>	Black-beaked Triggerplant	Er or spreading to 50cm w,cr,y,pi
<i>Stylidium scandens</i>	Climbing Triggerplant	Herb to 85cm white, pink, purple
<i>Stylidium schoenoides</i>	Cow Kicks	Rosetted per to 50cm lge wh,cr fl
<i>Stylidium spathulatum</i>	Creamy Triggerplant	Rosetted perennial herb yellow fl
<i>Stylidium</i> sp. Mt. Barker		Herb to 25cm cream fl
THYMELAEACEAE		
<i>Pimelea clavata</i>		Erect shrub to 6m wh,cre,y fl
<i>Pimelea hispida</i>	Bristly Pimelea	Erect shrub to 1.5m pink fl
<i>Pimelea longiflora</i>		Erect spindly shrub to 1.3m wh, cr
<i>Pimelea spectabilis</i>	Bunjong	Erect shrub to 2m white, pink, y fl
TREMANDRACEAE		
<i>Platytheca juniperina</i>		Erect or sprawl sh to 1m bl, violet
<i>Tetratheca affinis</i>		Erect open leafless to 1m pi,pu
<i>Tetratheca setigera</i>		Erect or diffuse to 80cm pi,pu
<i>Tremandra stelligera</i>		Erect spreading to pi,pu,blue
VIOLACEAE		
<i>Hybanthus debilissimus</i>		Perennial herb to 30cm blue, purp

Flora species report from the Western Australian Herbarium

Source: Western Australian Herbarium

THIS DATA HAS BEEN PROVIDED BY THE WESTERN AUSTRALIAN HERBARIUM ON 19 JUNE 2008.

Amanitaceae

Amanita sp.

Aneuraceae

Riccardia bipinnatifida

Riccardia cochleata

Apiaceae

Pentapeltis silvatica (Diels) Domin

Xanthosia eichleri J.M.Hart & Henwood P3

Arthoniaceae

Arthonia ilicina Taylor

Aspleniaceae

Asplenium aethiopicum (Burm.f.) Bech. P4

Bryaceae

Ptychostomum angustifolium (Brid.) J.R.Spence & H.P.Ramsay

Rosulabryum albolimbatum (Hampe) J.R.Spence

Cladoniaceae

? *Myelorrhiza* sp.

Cladia aggregata (Sw.) Nyl.

Cladonia southlandica W. Martin

Cladonia sp.

Coriolaceae

Trametes versicolor

Cortinariaceae

Cortinarius violaceus

Cyperaceae

Baumea preissii Nees subsp. *preissii* ms

Lepidosperma ? *effusum*

Lepidosperma sp.

Schoenus nitens (R.Br.) Roem. & Schult.

Dicranaceae

Dicranoloma diaphanoneuron (Hampe) Paris

Leucobryum subchlorophyllosum Hampe

Dilleniaceae

Hibbertia furfuracea (DC.) Benth.

Hibbertia pilosa Steud.

Epacridaceae

Acrotiche cordata (Labill.) R.Br.

Andersonia virolens Lemson ms P2

Epacridaceae (cont)

Leucopogon parviflorus (Andrews) Lindl.

Leucopogon revolutus R.Br.

Lysinema ciliatum forma S.W. Coastal (N.G. Marchant 71/719) PN

Euphorbiaceae

Calycopeplus oligandrus P.I.Forst.

Ricinocarpos glaucus Endl.

Fissidentaceae

Fissidens tenellus Hook.f. & Wilson

Frullaniaceae

Frullania probosciphora

Geocalyceae

Chiloscyphus semiteres var. *semiteres*

Graphidaceae

Graphis sp.

Lamiaceae

Westringia dampieri R.Br.

Lecanoraceae

Tephromela atra (Huds.) Hafellner

Lejeuneaceae

Austrolejeunea occidentalis Pocs

Diplasiolejeunea plicatiloba (Hook.f. & Taylor) Grolle

Myrtaceae

Agonis flexuosa var. *latifolia* Schauer

Astartea sp. long stalks (D. Foreman 1490) PN

Darwinia citriodora (Endl.) Benth.

Eucalyptus patens Benth.

Melaleuca microphylla Sm.

Taxandria parviceps (Schauer) J.R.Wheeler & N.G.Marchant

Onagraceae

Epilobium billardioreanum subsp. *intermedium* Raven & Engelhorn

Orchidaceae

Microtis pulchella R.Br. P4

Orthodontiaceae

Orthodontium lineare Schwägr.

Physciaceae

Heterodermia obscurata (Nyl.) Trevis.

Pittosporaceae

Billardiera drummondii (C.Morren) L.Cayzer & Crisp P4

Pottiaceae

Didymodon torquatus (Taylor) Catches.

Proteaceae

Adenanthos cuneatus Labill.

Adenanthos obovatus Labill.

Banksia serra (R.Br.) A.R.Mast & K.R.Thiele P4

Lambertia uniflora R.Br.

Radulaceae

Radula buccinifera

Restionaceae

Taraxis grossa B.G.Briggs & L.A.S.Johnson

Rhamnaceae

Trymalium floribundum subsp. *trifidum*

Rutaceae

Boronia virgata Paul G.Wilson P3

Sterculiaceae

Lasiopetalum floribundum Benth.

Thomasia heterophylla E.M.Benn. & K.Shepherd ms

Tremandraceae

Tremandra stelligera DC.

APPENDIX 4 – Fauna Lists

Fauna Survey Results

Source: Denmark Environment Centre Mt Hallowell Reserve Survey & Research Project 2004

A total of 527 hair tubes were set with 537 samples collected during the survey. The results indicate nine species of mammal positively being present in the survey area. Of these, five were native mammals and four were exotic animals.

Fauna Survey - Hair Tubing Results

Species	Week 2	Week 3	Week 4	Total
Native Species				
<i>Rattus Sp</i>	2	1	6	9
Brush Tail Possum (<i>Trichosurus vulpecular</i>)	11	30	32	73
Bush Rat (<i>Rattus fuscipes</i>)	91	128	134	353
Mardo (<i>Antichinus flavipes</i>)	4	1	3	8
Southern Brown Bandicoot (<i>Isoodon obesulus</i>)	11	12	12	35
Western Grey Kangaroo (<i>Macropus fuliginosus</i>)	1	0	2	3
Exotic Species				
Black Rat (<i>Rattus rattus</i>)	3	3	4	10
Dog (<i>Canine familiaris</i>)	11	10	9	30
Feral Cat (<i>Feline catus</i>)	5	5	3	13
House Mouse (<i>Mus musculus</i>)	1	2	0	3
Total Tubes Set	144	193	190	527
Samples Collected	140	192	205	537

Native Animals

Brush Tail Possum (*Trichosurus vulpecular*)

A total of 73 brush tail possum samples were recorded in the survey area. The majority of recordings were in the central 'intact' portion of the reserve. The former range of this possum has been considerably reduced over the years and they have also disappeared from large areas of more arid country (Johnson & Thompson 1996). Introduced predators are one of the most significant impacts on this species (Beck 1996).

Bush Rat (*Rattus fuscipes*)

A total of 353 bush rat samples were positively identified. Samples were attained throughout the survey area and the results indicate a large population of this species. Bush rats, as do all native fauna, form an integral part of the forest ecosystem. Native fauna encourage the breakdown of fallen vegetation and add to the nutrient level of the soil, giving the soil greater capacity to hold micro-organisms and water.

Mardo (*Antichinus flavipes*)

A total of eight mardo samples were recorded in the survey area. Like the brush tail possum locations recorded, the majority of mardos were in the central 'intact' area of the reserve. Mardos also prefer areas that are long unburnt (10 years or more) (Christensen and Kimber 1975). As the mardo is a carnivorous mammal and feeds largely on invertebrates on the forest floor (Sawle 1979) the presence of mardos is a good indication of a healthy understorey.

Southern Brown Bandicoot (*Isoodon obesulus*)

Thirty-five southern brown bandicoot samples were recorded in the survey area. Clearing for farmland and urban development has considerably reduced its range and this bandicoot has only recently been removed from the endangered species list (Johnson & Thompson 1996).

Western Grey Kangaroo (*Macropus fuliginosus*)

A total of three western grey kangaroo samples were recorded in the survey area. The number of samples collect does not give an adequate representation of kangaroo population, as the design of the hair tubes used does not accommodate the larger macropods. Numerous sightings of western grey kangaroos occurred on the northern boundary of the reserve during the survey, indicating a significant population.

Feral Animals

Black Rat (*Rattus rattus*)

A total of 10 black rat samples were recorded in varying vegetation zones throughout the survey area. Black rats are usually associated with human settlement and disturbed environments. This rodent impacts on native populations by successfully competing for similar food sources (Johnson & Thompson 1996). The black rat is a continuous breeder in good conditions and produces 5-10 young per litter (Menkhorst and Knight 2001). This can have significant impacts on native mammals if black rat populations continue to expand.

Dog (*Canine familiaris*)

A total of 30 dog samples were recorded indicating a significant presence in the survey area. The majority of dogs were recorded in disturbed areas and areas with significant access; the central core of the reserve showed little presence of dogs. Numerous sightings of unrestrained dogs occurred on fire breaks and walking tracks. This allows the opportunity for dogs to harass native fauna and the scent left has been shown to affect the movement of some native species throughout their home range (Beck 1996).

Feral Cat (*Feline catus*)

A total of 13 feral cat samples were recorded in the survey area. This indicates a significant population, as cats are generally wary of hair tubes and conventional trapping methods. However, as with dogs recorded, the central core of the reserve showed little presence of this species. Feral cats are highly adaptable and supreme hunters. A cat can consume up to 20 individual lizards and small mammals in a single night's hunting (Johnson & Thompson 1996).

House Mouse (*Mus musculus*)

A total of three house mouse samples were recorded in the survey area. Due to the fine nature of house mouse hairs, samples may not appear on sample tapes or may easily be missed. As with black rats, this species rat is usually associated with human settlement and disturbed environments. The house mouse impacts on native populations by successfully competing for similar food sources (Johnson & Thompson 1996). A house mouse can produce up to nine litters of 4-6 young per year (Menkhorst and Knight 2001).

Mammals not likely to leave a hair sample

The following mammals indicated in the Mt Hallowell Management Plan (Shire of Denmark 1995) may be present, but would be unlikely to leave a hair sample:

Species	Why hair sample would be unlikely
Echidna (<i>Tachyglossus aculeatus</i>)	Robust nature of hair and root
Dunnart (<i>Sminthopsis</i> species)	Fine nature of hair
Western Pygmy Possum (<i>Cercartetus concinnus</i>)	Fine nature of hair
Honey Possum (<i>Tarsipes rostratus</i>)	Fine nature of hair
Rabbit (<i>Oryctolagus cuniculus</i>)	Further research required
Western Brush Wallaby (<i>Macropus irma</i>)	Large size of macropod

Bird List

Compiled by L M Broadhurst, 13 Dec 1991.

Source: 1995 Mt Hallowell Reserve Management Plan

White-faced Heron	<i>Ardea novaehollandiae</i>
Australian Shelduck	<i>Tadorna tadornoides</i>
Pacific Black Duck	<i>Anas superciliosa</i>
Grey Teal	<i>Anas gibberifrons</i>
Maned Duck	<i>Chenonetta jubata</i>
Osprey	<i>Pandion haliaetus</i>
Square-tailed Kite	<i>Lophoictinia isura</i>
Brown Goshawk	<i>Accipiter fasciatus</i>
Collared Sparrowhawk	<i>Accipiter cirrhocephalus</i>
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>
Wedge-tailed Eagle	<i>Aquila audax</i>
Little Eagle	<i>Hieraaetus morphnoides</i>
Marsh Harrier	<i>Circus aeruginosus</i>
Australian Hobby	<i>Falco longipennis</i>
Brown Falcon	<i>Falco berigora</i>
Australian Kestrel	<i>Falco cenchroides</i>
Painted Button-quail	<i>Turnix varia</i>
Common Bronzewing	<i>Phaps chalcoptera</i>
Brush Bronzewing	<i>Phaps elegans</i>
Red-tailed Black-Cockatoo	<i>Calyptorhynchus magnificus</i>
White-tailed Black-Cockatoo	<i>Calyptorhynchus baudinii</i>
Purple-crowned Lorikeet	<i>Clossopsitta porphyrocephala</i>
Red-capped Parrot	<i>Purpureicephalus spurius</i>
Western Rosella	<i>Platyercus icterotis</i>
Port Lincoln Ringneck	<i>Barnardius zonarius</i>
Fan-tailed Cuckoo	<i>Cuculus pyrrhophanus</i>
Horsfield's Bronze-Cuckoo	<i>Chrysococcyx basalis</i>
Shining Bronze-Cuckoo	<i>Chrysococcyx lucidus</i>
Southern Boobook	<i>Ninox novaeseelandiae</i>
Tawny Frogmouth	<i>Podargus strigoides</i>
Laughing Kookaburra	<i>Dacelo novaeguineae</i>
Sacred Kingfisher	<i>Halcyon sancta</i>
Rainbow Bee-eater	<i>Merops ornatus</i>
Welcome Swallow	<i>Hirunclo neoxena</i>
Tree Martin	<i>Cecropis nigricans</i>
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>
Scarlet Robin	<i>Petroica multicolor</i>
White-breasted Robin	<i>Eopsaltria georgiana</i>
Western Yellow Robin	<i>Eopsaltria griseogularis</i>
Crested Shrike-tit	<i>Falcunculus frontatus</i>
Golden Whistler	<i>Pachycephalus pectoralis</i>

Grey Shrike-thrush	<i>Colluricincla harmonica</i>
Restless Flycatcher	<i>Myiagra inquieta</i>
Grey Fantail	<i>Rhipidura fuliginosa</i>
Willie Wagtail	<i>Rhipidura leucophrys</i>
White-browed Babbler	<i>Pomatostomus superciliosus</i>
Splendid Fairy-wren	<i>Malurus splendens</i>
Red-winged Fairy-wren	<i>Malurus elegans</i>
White-browed Scrubwren	<i>Sericornis frontalis</i>
Western Gerygone	<i>Gerygone fusca</i>
Inland Thornbill	<i>Acanthiza apicalis</i>
Western Thornbill	<i>Acanthiza inornata</i>
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>
Varied Sittella	<i>Dapoenositta chrysoptera</i>
Rufous Treecreeper	<i>Climacteris rufa</i>
Red Wattlebird	<i>Anthochaera carunculata</i>
Little Wattlebird	<i>Anthochaera chrysoptera</i>
White-naped Honeyeater	<i>Melithreptus lunatus</i>
Brown Honeyeater	<i>Lichmera indistincta</i>
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>
Tawny-crowned Honeyeater	<i>Phylidonyris melanops</i>
Western Spinebill	<i>Acanthorhynchus superciliosus</i>
Spotted Pardalote	<i>Pardalotus punctatus</i>
Striated Pardalote	<i>Pardalotus striatus</i>
Silvereye	<i>Zosterops lateralis</i>
*Redeared Firetail	<i>Emblema oculatum</i>
Australian Magpie-lark	<i>Grallina cyanoleuca</i>
Dusky Woodswallow	<i>Artamus cyanopterus</i>
Grey Butcherbird	<i>Cracticus torquatus</i>
Australian Magpie	<i>Gymnorhina tibicen</i>
Grey Currawong	<i>Strepera versicolor</i>
Australian Raven	<i>Corvus coronoides</i>

*Included on list of Rare & Endangered Species:- WA Government Gazette, 16 Nov 1990. "In need of special protection."

Reptile List

This list is compiled from unconfirmed sightings and/or scat observations.

Source: 1995 Mt Hallowell Reserve Management Plan

Order Squamata

Family Gekkonidae

Marbled Gecko

(Phylladactylus marmoratus)

Family Scincidae

Bobtail

(Tiliqua rugosa)

Smith's Skink

(Egernia napoleonis)

King's Skink

(Egernia kingii)

Burrowing Skink

(Hemiegis peronii peronii)

New Holland Skink

(Leiopisma trilineatum)

Bungarra

(Varanus rosenbergi)

Family Elapidae

Dugite

(Pseudonaja affinis affinis)

Black Tiger Snake

(Notechis ater occidentalis)

Crowned Snake

(Drysdalia coronata)

Square-nosed Snake

(Rhinoplocephalus bicolor)

Short Range Endemic Invertebrates List

Source: Department of Environment and Conservation, May 2008

Arachnida

Order Araneae

Family Araneidae

Araneus senicaudatus

Araneus cyphoxis

Family Archaeidae

Austrarchaea `sp.`

Family Nemesiidae

Chenistonia `paludigena`

Chenistonia `sp. indet.`

Order Opiliones

Family Monoscutidae

Order Pseudoscorpiones

Family Garypinidae

Aldabrinus

Diplopoda

Order Polyzoniida

Family Siphonotidae

`*Hesperisiphon diversus*`

`*Megalosiphon*` *flavomarginatus*

Order Sphaerotheriida

Family Sphaerotheriidae

Cynotelopus notabilis

Order Spirostreptida

Family Iulomorphidae

Atelomastix `ellenae`

Threatened Fauna

Source: Department of Environment and Conservation, May 2008

Common Name	Scientific Name	Conservation Status
Within the reserve		
Baudin's Black Cockatoo	<i>Calyptorhynchus baudinii</i>	EN
Main's Assassin Spider	<i>Austrarchaea mainae</i>	EN
Within 100m of the reserve		
Carnaby Black-Cockatoo	<i>Calyptorhynchus latirostris</i>	EN
Within 5000m of the reserve		
Western Ground Parrot ²	<i>Pezoporus wallicus flaviventris</i>	CR
Chuditch	<i>Dasyurus geoffroyi</i>	VU
Quokka	<i>Setonix brachyurus</i>	VU
Western Ringtail Possum	<i>Pseudocheirus occidentalis</i>	VU
Quenda	<i>Isoodon obesulus fusciventer</i>	Conservation Dependant
WA Pill Millipede	<i>Cynotelopus notabilis</i>	EN

EN – Endangered, VU – Vulnerable, CR – Critically Endangered

² Western Ground Parrot has not been heard at the William Bay National Park post 1980 and is considered to be locally extinct.

APPENDIX 5 – Fungi of the Mount Hallowell Reserve

Source: Denmark Environment Centre Mt Hallowell Reserve Survey & Research Project 2004, updated July 2008 by Katrina Syme.

Background

The majority of plant species in the Mount Hallowell Reserve are known, with around 300 species listed (R. Gretton, pers. comm. 2004), but accurate numbers of fungi cannot be given, because despite being one of the most diverse groups of organisms, this Kingdom has never been adequately surveyed. Around 80% of the State's vascular plants have been named, in contrast to half the estimated 10,000 species of macrofungi and 2% of fungi overall (Syme, 2008). It is currently estimated that there are seven times more fungi (including microfungi) than vascular plants.

Fungi play a vital role in the environment, as decomposers and recyclers of organic matter (including large fallen trees) and as partners in mycorrhizal relationships with 90% of plants, including native orchids. Many native animals and invertebrates rely on fungi – especially an enormous variety of truffle-like species - as food.

Methodology

There have been no planned, funded or unfunded fungi surveys in the Mount Hallowell Reserve. It has been possible however, to compile a species list from lists assembled through volunteer efforts such as:

- Opportunistic collecting resulting in vouchered collections held in the Western Australian Herbarium.
- Lists made during field trips held as part of the 2001 Inaugural National Fungimap Conference.
- Lists made during field trips held as part of the 2003 International Fungi and Fibre Symposium.
- Observations in the field.
- Lists and collections of fungi from similar vegetation types in the Denmark Shire.

In 2006, data was collected on a one-day foray as part of the *Survey of Fungi of the South Coast Natural Resource Management Region*. This was produced as part of the Department of Environment and Conservation's Biodiversity Inventory Program, funded through South Coast Natural Resource Management Inc., the regional group for NRM on the South Coast of Western Australia, funded by the Australian and Western Australian Governments through the joint National Action Plan for Salinity and Water Quality Program and the Natural Heritage Trust. (Ref.: *Biodiversity Inventory; Survey of fungi in the South Coast Natural Resource Management Region 2006-2007* Katrina Syme, 2008)

All the data was combined and sorted and a list of named and un-named distinguishable species extracted. With the data collected in 2006, some fungi could not be identified to genera, while others required microscopy to aid identification, therefore these species were excluded.

Mount Hallowell Fungi Species List

Two hundred and fifty-one species of macrofungi are included on the current list. These represent a broad range of species of all sizes including earthstars, puffballs, coral fungi, truffles, jelly fungi, gilled and pored fungi on stalks, bracket fungi, paint fungi and polypores.

<i>Aecidium eburneum</i>	<i>Camarophyllopsis</i> sp. 'yellow naphthalene' sp. 557
<i>Agaricus bitorquis</i>	<i>Cantharellus concinnus</i>
<i>Agaricus</i> sp. 'small with red-brown fibrils' sp. 240	<i>Castoreum radicum</i>
<i>Agaricus aff. xanthodermus</i>	<i>Chlorociboria aerugenascens</i>
<i>Aleuria aurantia</i>	<i>Clavaria alboglobospora</i>
<i>Aleuria rhenana</i>	<i>Clavicornia piperata</i>
<i>Aleurina ferruginea</i>	<i>Clavulina amethystina</i>
<i>Amanita aff. preissii</i>	<i>Clavulina</i> sp. 'yellow tiny' sp. 1566K
<i>Amanita ananiceps</i>	<i>Clavulinopsis aff. aurantia</i>
<i>Amanita basiorubra</i>	<i>Clavulinopsis miniata</i>
<i>Amanita brunneibulbosa</i>	<i>Clitocybe semioculta</i>
<i>Amanita brunneistriatula</i>	<i>Coltricia cinnamomea</i>
<i>Amanita eucalypti</i>	<i>Coltriciella dependens</i>
<i>Amanita flaviphylla</i>	<i>Colus pusillus</i>
<i>Amanita luteivolvata</i>	<i>Coprinellus disseminatus</i>
<i>Amanita ochrophyloides</i>	<i>Coprinellus micaceus</i>
<i>Amanita punctata</i> sp.405	<i>Coprinus comatus</i>
<i>Amanita</i> sp. 'salmon-pink margin' sp. 588	<i>Cordyceps militaris</i>
<i>Amanita umbrinella</i>	<i>Cortinarius abnormis</i>
<i>Amanita walpolei</i>	<i>Cortinarius alboviolaceus</i>
<i>Amanita xanthocephala</i>	<i>Cortinarius archeri</i>
<i>Anthracobia muelleri</i>	<i>Cortinarius australiensis</i>
<i>Anthracophyllum archeri</i>	<i>Cortinarius austroviolaceus</i>
<i>Armillaria luteobubalina</i>	<i>Cortinarius basipurpureus</i>
<i>Arrhenia umbellifera</i>	<i>Cortinarius basirubescens</i>
<i>Ascocoryne sarcoides</i>	<i>Cortinarius fibrillosus</i>
<i>Austroboletus lacunosus</i>	<i>Cortinarius lavendulensis</i>
<i>Austroboletus occidentalis</i>	<i>Cortinarius luteirufescens</i>
<i>Austrogautieria manjimupana</i>	<i>Cortinarius microarcheri</i>
<i>Austropaxillus infundibuliformis</i>	<i>Cortinarius ochraceus</i>
<i>Austropaxillus</i> sp. 'pale yellow' sp. 179	<i>Cortinarius phalarus</i>
<i>Beauveria bassiana</i> sp. 436	<i>Cortinarius radicans</i>
<i>Bolbitius vitellinus</i>	<i>Cortinarius rotundisporus</i>
<i>Boletus</i> sp. 'peach' sp.253	<i>Cortinarius sinapicolor</i>
<i>Boletellus ananiceps</i>	<i>Cortinarius</i> sp. 'orange brown viscid cap' sp. 146
<i>Boletellus obscurecoccineus</i>	<i>Cortinarius</i> sp. 'pointy cap' sp. 98
<i>Boletellus</i> sp. 'brown & maroon'	<i>Cortinarius</i> sp. 'small purple umbonate' sp. 609
<i>Calocera guepinioides</i>	<i>Cortinarius</i> sp. 'vinaceous lilac' sp. 171b
<i>Calostoma fuscum</i>	<i>Cortinarius</i> sp. 'yellow with orange brown fibrils' sp. 237
<i>Calostoma fuhreri</i>	<i>Cortinarius symeae</i>

<i>Cortinarius vinaceolamellatus</i>	<i>Gyroporus</i> aff. <i>cyanescens</i>
<i>Crepidotus nephrodes</i>	<i>Hebeloma aminophilum</i>
<i>Crepidotus uber</i>	<i>Hebeloma westraliense</i>
<i>Crepidotus variabilis</i>	<i>Heterotextus peziziformis</i>
<i>Crepidotus applanatus</i>	<i>Hohenbuehelia</i> sp. 'grey brown' sp. 422
<i>Crucibulum laeve</i>	<i>Hydnangium carneum</i>
<i>Cystangium balpineum</i>	<i>Hydnangium sublamellatum</i>
<i>Cystangium pisiglarea</i>	<i>Hydnoplicata whitei</i>
<i>Dacrymyces</i> sp. 'tiny yellow knobs' sp. 289	<i>Hydnum</i> aff. <i>repandum</i>
<i>Daldinia concentrica</i>	<i>Hydnum</i> sp. 'chestnut' sp. 380
<i>Dermocybe austroveneta</i>	<i>Hydnellum</i> sp. 'red brown' sp. 87
<i>Dermocybe clelandii</i>	<i>Hygrocybe austropratensis</i>
<i>Dermocybe erythrocephala</i>	<i>Hygrocybe cantharellus</i>
<i>Dermocybe globuliformis</i>	<i>Hygrocybe coccinea</i>
<i>Dermocybe splendida</i>	<i>Hygrocybe conica</i>
<i>Descolea maculata</i>	<i>Hygrocybe miniata</i>
<i>Descomyces albus</i>	<i>Hygrocybe polychroma</i>
<i>Entoloma</i> sp. aff. <i>incana</i> sp. 409	<i>Hygrocybe</i> sp. 'yellow red' sp. 564
<i>Entoloma</i> sp. 'dimpled pale tan' sp. 471	<i>Hygrocybe viscidibrunnea</i>
<i>Entoloma sericellum</i>	<i>Hygrophorus involutus</i>
<i>Entoloma</i> sp. 'dimpled pale tan' sp. 1574K	<i>Hypholoma australe</i>
<i>Entoloma</i> sp. 'moongum' sp. 31	<i>Hypholoma brunneum</i>
<i>Entoloma</i> sp. 'tall brown' sp. 135	<i>Hypomyces chrysospermus</i>
<i>Exidia glandulosa</i>	<i>Hymenochaete</i> sp. 'brown' sp. 416
<i>Fistulina hepatica</i>	<i>Hysterangium inflatum</i>
<i>Fistulinella mollis</i>	<i>Ileodictyon gracile</i>
<i>Fomitopsis lilacinogilva</i>	<i>Inocybe arenacolens</i>
<i>Galerina</i> sp. aff. <i>patagonica</i> sp. 111	<i>Inocybe australiensis</i>
<i>Galerina hypnorum</i>	<i>Inocybe exigua</i>
<i>Galerina</i> sp. 'long, thin-stemmed' sp. 626	<i>Inocybe violaceocaulis</i>
<i>Galerina</i> sp. 'small umbonate' sp. 1573K	<i>Labyrinthomyces varius</i>
<i>Galerina unicolor</i>	<i>Laccaria</i> sp. 'pale' sp. 74
<i>Ganoderma australe</i>	<i>Laccaria</i> sp. 'pink' sp. 36
<i>Geastrum javanicum</i>	<i>Laccocephalum mylittae</i>
<i>Geoglossum glutinosum</i>	<i>Laccocephalum sclerotinium</i>
<i>Gummivena potorooi</i>	<i>Laccocephalum tumulosum</i>
<i>Gymnomyces wirraborensis</i>	<i>Laetiporus portentosus</i>
<i>Gymnopilus allantopus</i>	<i>Lactarius eucalypti</i>
<i>Gymnopilus eucalyptorum</i>	<i>Lactarius clarkeae</i>
<i>Gymnopilus ferruginosus</i>	<i>Lepiota aspera</i>
<i>Gymnopilus junonius</i>	<i>Lepiota haemorrhagica</i>
<i>Gymnopilus purpuratus</i>	<i>Leucopaxillus liacinus</i>
<i>Gymnopus dryophilus</i>	<i>Lichenomphalia chromacea</i>

<i>Lyophyllum</i> sp. 'viscid buff' sp. 329	<i>Ramaria lorithamnus</i>
<i>Macrolepiota clelandii</i>	<i>Ramaria ochraceosalmonicolor</i>
<i>Macrotyphula juncea</i>	<i>Ramaria versatilis</i>
<i>Marasmius crinisequi</i>	<i>Ramariopsis depokensis</i>
<i>Marasmius elegans</i>	<i>Resupinatus applicatus</i>
<i>Marasmius</i> sp. 'orange cap' sp. 341	<i>Rhodocollybia</i> aff. <i>butyracea</i>
<i>Marasmius</i> sp. 'large tough brown' sp. 309	<i>Rickenella fibula</i>
<i>Melanoleuca melaleuca</i>	<i>Russula adusta</i>
<i>Melanophyllum haematospermum</i>	<i>Russula</i> aff. <i>albonigra</i>
<i>Morchella elata</i>	<i>Russula</i> aff. <i>cyanoxantha</i>
<i>Mycena carmeliana</i>	<i>Russula clelandii</i>
<i>Mycena kurramura</i>	<i>Russula erumpens</i>
<i>Mycena kuurkacea</i>	<i>Russula flocktoniae</i>
<i>Mycena mijoii</i>	<i>Russula luteiroseus</i>
<i>Mycena</i> sp. 'buff umbrella' sp. 51	<i>Russula neerimea</i>
<i>Mycena subgalericulata</i>	<i>Russula persanguinea</i>
<i>Mycena vinacea</i>	<i>Russula pumicoides</i>
<i>Mycena viscidocruenta</i>	<i>Scleroderma areolatum</i>
<i>Mycoacia subceracea</i>	<i>Scleroderma cepa</i>
<i>Neolentinus dactyloides</i>	<i>Scutellinea</i> aff. <i>margaritacea</i>
<i>Nothocastoreum cretaceum</i>	<i>Sphaerobolus stellatus</i>
<i>Omphalotus nidiformis</i>	<i>Stereum hirsutum</i>
<i>Panaeolus campanulatus</i>	<i>Stereum illudens</i>
<i>Panellus ligulatus</i>	<i>Stropharia semiglobata</i>
<i>Parasola plicatilis</i>	<i>Thelephora terrestris</i>
<i>Perreniporia ochroleuca</i>	<i>Thelephora</i> sp. 'white with orange margin' sp. 266
<i>Peziza</i> sp. 'hollow spheres' sp. 442	<i>Torrendia arenaria</i>
<i>Peziza tenacella</i>	<i>Tremella globispora</i>
<i>Phaeocollybia ratticauda</i>	<i>Tremella mesenterica</i>
<i>Phellinus gilvus</i>	<i>Trichoglossum hirsutum</i>
<i>Phellodon</i> sp. aff. <i>niger</i> sp. 70	<i>Tricholoma eucalypticum</i>
<i>Phellodon</i> sp. 'brown' sp. 435	<i>Tricholoma</i> sp. 'ring'
<i>Phlebia rufa</i>	<i>Tricholomopsis rutilans</i>
<i>Pholiota highlandensis</i>	<i>Tubaria rufofulva</i>
<i>Pholiota multicingulata</i>	<i>Vascellum pratense</i>
<i>Piptoporus australiensis</i>	<i>Volvariella speciosa</i>
<i>Pisolithus albus</i>	<i>Xerula australis</i>
<i>Postia pelliculosa</i>	<i>Xylaria hypoxylon</i>
<i>Protrubera canescens</i>	<i>Xylaria polymorpha</i>
<i>Psilocybe coprophila</i>	<i>Zelleromyces daucus</i>
<i>Psilocybe musci</i>	
<i>Punctularia strigosozonata</i>	
<i>Pycnoporus coccineus</i>	
<i>Ramaria australiana</i>	

APPENDIX 6 – Mount Hallowell Fire Management Plan

This Fire Management Plan is from the 2006 Mount Hallowell Management Plan.

1. CALENDAR OF EVENTS

Private properties adjacent to Mount. Hallowell Reserve will be inspected in October of each year, prior to the Fire Season. The Shire is responsible for these inspections which will be carried out by the Shire Ranger as part of the pre-fire season firebreak inspection program.

All residents of properties inspected will be provided with a current Firebreak Notice at time of inspection and advice may be given as to work required to conform to the relevant standard of the Firebreak Notice. Work Orders will be issued to property owners deemed not to have complied with these standards after the 1st December in each year.

Shire Rangers will also provide property owners with guidelines for fire protection upon inspection. These guidelines shall be in the form of those detailed in Section 6 of this Appendix.

2. WORKS PROGRAMME

Earth works on fire breaks and buffer breaks will be carried out by the end of November of each year, with regard to the relevant hygiene standards for the Reserve.

Machinery and slashing work will be conducted in dry soil conditions during November and where necessary during the fire season, to minimise Dieback spread risk.

Areas of firebreaks will be inspected in October of each year, by the Shire Ranger/Community Fire Manager and the works programme to be updated at this time. Machinery and labour will be requested from the Shire in October, for work to commence in November of each year.

Reports of any major additional earth works will be provided to Council by May of each year, for budget and finance consideration.

Buffer burning will be conducted by local Volunteer Bushfire Brigades, in areas designated on relevant maps, in Autumn of 2007, and thereafter on a five year rotational basis.

Maintenance of buffer areas will be carried out in November of each year by slashing and selective parkland clearing to maintain a low fuel load. This work will be carried out in accordance with relevant Hygiene Requirements.

Standpipes have been provided as shown on relevant maps and will be inspected in October of each year to ensure correct maintenance and water tanks are full prior to the fire season. Any work required on these water tanks and standpipes will be reported to the Community Fire Manager for action by the Manager, Emergency Services.

Private water sources are also detailed on relevant maps, and liaison with private owners will be continued throughout the year to include any additional water sources, and for permission to access these water points in a fire emergency.

Maps will be updated as additional information is obtained.

3. RELEVANT MAPS

Maps detailing access, water points, fuel loadings etc. will be updated by November in each year.

Relevant maps will be held by the Shire and appropriate Fire Brigades (e.g. William Bay, Ocean Beach and Town Brigades) with sufficient copies to be provided to any assisting Fire Brigades.

Maps will also include fuel loading in the Reserve and adjacent areas.

4. FIRE REPORTING SYSTEM

Ocean Beach Bush Fire Brigade has the Spectrum Preset Conference Bridge system installed on volunteers' phones. The group call system is activated by a single number which allows the volunteers to obtain information and organise crews in a "party line" format. Due to contractual requirements from the telecommunications organisation, Telstra will not allow this number to be displayed and therefore this system is activated through the Chief Fire Control Officer.

General reporting of all fires and emergency incidents should be conveyed using the national emergency number 000. Residents and tourists alike should be encouraged to report fires and other emergency incidents to this number to avoid any confusion.

Council funds will be made available through the Emergency Services Levy to accommodate this.

5. DETAILS OF MINIMUM REQUIREMENTS FOR A FIRE SERVICE

Ocean Beach Bush Fire Brigade has been provided with a 2 bay fire station with meeting/training facilities. The Station currently houses the following operational appliances:

- Ocean Beach 2.4 Isuzu FSS 550
- Ocean Beach Light Tanker Toyota Landcruiser

Due to the life and property risk in the Mount Hallowell area the location of two operational fire appliances should be maintained.

Liaison and support will be provided by William Bay BFB, Shadforth/Scotsdale BFB and Denmark Town BFB as adjoining brigades who can provide the following resources:

William Bay 2.4R Isuzu FSS 550

Mount Shadforth Light Tanker Toyota Landcruiser

Mount Shadforth 2.4 Hino Kestrel

Denmark Fire & Rescue Service Light Tanker Toyota Landcruiser

Denmark Town 2.4 Isuzu FSS 550 Isuzu FSS 750

Denmark Fire & Rescue Service 3.4U

In high threat emergencies, the Local Emergency Response Plan as accepted by the Local Emergency Management Group will be utilised.

6. GUIDELINES FOR RESIDENTS, COVERING PROTECTION AROUND THE HOUSE AND WHAT TO DO WHEN A FIRE APPROACHES

Guidelines shall be as provided in the publication "The Homeowners' Bushfire Survival Manual". Guidance to home/property owners shall be in the form of providing copies of the publications and others such as Bush Fire ready publications as deemed relevant by Local Government.

These publications should be made available to residents adjacent to Mount Hallowell Reserve during inspections as detailed in (1) and through the Ocean Beach BFB as part of their preparedness strategies.

All residents should comply with the requirements of the annual Shire of Denmark Firebreak Notice.

7. DETAILS OF SIGNS TO BE USED

At major access points to tracks proceeding into Mount Hallowell Reserve, signs shall be erected indicating the high fire risk within the reserve (see Public Education Strategy section).

"No Open Fires" signs will be erected at appropriate points on walk trails and at Monkey Rock.

Access points to Strategic Firebreaks and/or water points will be signposted, and improved/updated where necessary.

8. HYGIENE REQUIREMENTS

Hygiene Requirements will be as provided in the publication "Dieback Disease - Hygiene Manual" as produced by the Department of Conservation and Land Management.

Dieback surveys will be conducted on a bi-annual basis.

The first survey was conducted in February, 1995 and the next will be due in February, 2007. This provision should however, be reviewed annually, depending upon future public use of the Reserve.

9. RELEVANT STANDARDS

Future buildings within close proximity to Mount Hallowell Reserve should reflect the high fire risk of the area.

Subdividers/builders shall make arrangements to the satisfaction of Council to ensure prospective purchasers, in the transfer of lots, are aware of the fire management guidelines of the Homeowners Bushfire Survival Manual, the Firebreak Notice, and the Australian Standard 3959-1991 - 'Construction of Buildings in Fire Prone Area', the latter being governed through Council's Development Control Unit.

Text from the body of the 2006 Mount Hallowell Management Plan that may be required for consideration in the revision of this Fire Management Plan.

Any signs should be of a general warning and advice nature and not Fire Danger Index signs as used in the entrances to the townsite. The general warning signs should say:

Fire Danger in this area exists from
October to May

Please do not smoke.

Please do not light camp fires.

Keep to designated tracks.

Do not enter the Mount Hallowell
Reserve if the fire danger is Very
High to Extreme.

For further details contact 9848 0300.

Detail of exact wording should be a consultative process between members of the Friends of Mount Hallowell group and the Senior Ranger / Fire Services who will need to manage the day to day inquiries. Symbolic "no smoking" and "no campfire" signs will accompany each warning sign.

Water supply:

A network of water supply sources for fire suppression shall be established. A turn around time of 20 minutes for refilling fire appliances is considered the minimum standard. In the case where Council water supply sources cannot meet this standard, it is recommended that dams on private properties be used and that property owners be approached for permission to use these.

Fire hydrants shall be installed in areas which have a reticulated water supply (e.g. Lights Road Residential Subdivision, Hallowell east, Iluka Rd, Heavitree Rd etc.). The local fire brigade, Ocean Beach, will then assume responsibility for the annual maintenance of these hydrants.

All water supply sources shall be signposted and maintained in a serviceable condition. As the above may be a long term project, it may be necessary for the Shire of Denmark to develop a works programme which outlines proposed work to be undertaken.

MAPS



Location maps of Mount Hallowell Reserve

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12 June 2008







