



Wilson Inlet Foreshore Reserves Management Plan 2008

To manage the foreshore so that it remains a beautiful natural surround to the Inlet, while continuing to provide for a range of compatible recreational activities.



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Wilson Inlet Foreshore Reserves Management Plan 2008

Produced by Green Skills for the Shire of Denmark

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Cover photograph: Wilson Inlet – rocks on foreshore area between Honeymoon Island and

Little River mouth. Photograph taken by Basil Schur.



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PREAMBLE

NULLAKI - WILSON INLET

A SIGNIFICANT CULTURAL AND NATURAL LANDSCAPE

The Wilson Inlet is a cultural and natural landscape of exceptional beauty that continues to inspire the local community and the many visitors who come to Denmark each year. For Aboriginal people, the Inlet has special cultural significance and we look forward to working with the Shire and other community partners in preserving its heritage and environmental values into the future.

Aboriginal people of the south west of Western Australia are known collectively as Noongar (meaning “man” or “the people”). The Noongar lived in and around the *Nullaki* (Wilson Inlet) within the Minang and Bibbulman territories to the east and west of Denmark. The term *Nullaki* means “narrow place of seaweed” and refers to the Inlet as a water body that flows out to the sea at Ocean Beach.

In the beginning there was the earth around which the spirits roamed. Some spirits became trees, plants and stones. Others became birds, animals and fish and together they created the living earth and the oceans. Then to complete their work they created the Noongar. The Noongar was given the role of caring for the Boodja (land), just as we care for our mothers, for the land is the sustainer of life and the keeper of the spirit of nature. The spirit of Nature can be seen in all its glory around the *Nullaki*.

The Minang-Bibbulman people gathered on the shores of the *Nullaki* for thousands of years, utilising the Inlet’s plentiful natural resources and looking after cultural sites. Fish traps, artefacts, grinding sites and rock shelters in and around the Inlet foreshore are part of this heritage. Two major rivers (Denmark and Hay), flow southward and replenish the Inlet in the rainy season. The large fish traps at the southern end of the Inlet were, and still are, an important place for Noongar people. In the summer months, with plentiful freshwater in the area, small groups would travel from inland areas to enjoy the Inlet’s rich natural resources and hold ceremonies on the water’s edge. This was done to sustain the land and to look after the water on which all life depends.

Today, these cultural sites, and the Wilson Inlet itself, need protecting and preserving. We are all part of this landscape and its heritage. The *Nullaki* belongs to the whole community and we need to respect and look after this place for our children and future generations.

Minang and Bibbulman Community Elders

(Vernice Gillies and Wayne Webb)

FOREWORD

Wilson Inlet is a seasonally closed estuary on the south coast of Western Australia adjacent to the town of Denmark. It is approximately 48 square kilometres in area, with an average depth of less than 2 metres. It is an important public asset, providing environmental, aesthetic, recreational and commercial resources. The foreshore is a beautiful surround to the Inlet, supporting natural vegetation and fauna while providing for a range of recreational facilities.

The foreshore fulfils a great variety of roles by:

- Providing a natural vegetation buffer that protects the soil from erosion, reduces sedimentation of the Inlet, and helps prevent pollutants from entering the Inlet.
- Providing habitat for birds and other fauna.
- Protecting natural, heritage and landscape values in the area.
- Providing opportunities for passive and active recreation, for residents and visitors.
- Contributing to the region's tourism industry.

The foreshore to the east of the Hay River, including the Nullaki Peninsula, falls within the City of Albany; the foreshore between the mouth of Wilson Inlet and the Hay River is within the Shire of Denmark.

The management of the foreshore areas within the City of Albany is covered in the „Nullaki Peninsula Foreshore Management Plan“ (1997) and the „Wilson Inlet Foreshore Management Plan Hay River to Nullaki“ (2002).

The Wilson Inlet Foreshore Reserves Management Plan covers the Foreshore Reserves within the Shire for which the Shire has management responsibility. This plan also considers areas and activities adjacent to the Shire's Foreshore Reserves that may affect the Reserves.

Objectives of the Management Plan

This plan has been prepared with the following objectives:

- To be consistent with the previous Wilson Inlet Foreshore Management Plans .
- To identify and protect ecologically sensitive areas.
- To protect and enhance compatible uses of the foreshore.
- To reduce impacts on the foreshore from development and recreational activities.
- To maximise opportunities for community participation in the management of the foreshore.
- To provide guidelines for recreation areas and facilities which are compatible with the foreshore landscape and have minimal environmental impact.

History of the Management Plan

This Management Plan is an amalgamation and update of the 1996 „Denmark Foreshore Wilson Inlet Management Plan“ and the 2002 „Wilson Inlet Foreshore Management Plan Denmark to Hay Rivers“. It includes information from the 1996 Foreshore Rehabilitation Plan, the 1999 and 2008 Vegetation Surveys and the Wilson Inlet Community Cultural Management Project 2008.

Both of the Foreshore Management Plans were developed with community input and involvement through a series of walks, workshops and invitations to provide written comment. A similar process was applied to the development of this plan.

Public submissions were carefully considered with outside expertise sought where necessary. Where appropriate, points were adopted. The submissions have been included in Appendix 6 along with the responses.

PART 1: BACKGROUND

1.1 PURPOSE OF THE MANAGEMENT PLAN

A key aspect of this Plan is to protect the unique ecological, landscape and heritage values of the Foreshore Reserves. The Plan provides management direction for existing and potential uses and developments that may be proposed in or adjacent to public Foreshore Reserves.

Some impacts in foreshore areas can include vegetation loss, weed invasion, erosion, and nutrients or pollution entering waterways. Remnant vegetation in the foreshore contains flora of regional importance and should be protected. It has been identified as also having significant local value and assists in maintaining water quality.

This Plan is intended to guide activities within and adjoining the Foreshore Reserves so that the management objectives as described below are achieved.

1.1.1 Community Vision for Foreshore

The Denmark Foreshore, Wilson Inlet Management Plan defines this as:

“The Denmark foreshore in twenty years” time is a place where....

The vegetation and landforms around the Inlet provide a natural green belt and a buffer between the urban/rural development of Denmark and Wilson Inlet;

The natural vegetation has been enhanced from its present state through revegetation and rehabilitation of degraded areas; and

A range of well-designed and well-managed recreational facilities, highly valued by the community, are available in specific development nodes.”

This vision was reaffirmed at the public input sessions for the development of this plan.

1.1.2 Community Values for Foreshore

These values were identified at the public input sessions and in submissions.

Conservation

Very high biodiversity conservation values of estuarine fringing vegetation

Corridor linking rivers and reserves

Fauna protection

Bird habitat and breeding – significant wading birds, for example at Morley Beach

Management of foreshore erosion

Natural vegetation buffer reducing nutrient, sediment and pollutant influx to Wilson Inlet

Landscape

Importance of foreshore to views for all Shire residents

Importance of landscapes to tourism

Culture and Heritage

The Register of Aboriginal sites records rock shelter, fish trap, stone arrangement, quarry artefacts and a burial site

Recent Aboriginal cultural mapping identified more sites along the length of the foreshore

Historic railway reserve

1930s cement benches at Springdale Beach

Farming sites

Fishing history

Recreation

Water pursuits – fishing, boating, sailing, swimming, jet skiing, water skiing

On shore pursuits – walking, horse riding, cycling, sitting, picnicking, photography, bird watching, painting, exercising dogs

Commercial

Tourist attraction

Launching points for commercial fishers

Knowledge

Scientific research

Education

1.2 RESERVE MANAGEMENT

The Foreshore Reserves form a natural vegetation buffer for the Inlet. They contain sites of historical and cultural significance and support a variety of recreational activities. Management of the Reserves must achieve a balance between the needs for conservation, recreation and protection from damage by fire.

The Foreshore Zoning Plan was developed in the original Management Plans to provide for protection of the special values of the Foreshore while accommodating the largest possible range of land uses. The three zones are Conservation, Conservation and Passive Recreation and Recreational Development; these are shown on the attached maps. Each zone has its own management objective, with an overriding objective for protection from fire, as follows:

1.2.1 Conservation Zone Objectives

To maintain the integrity and conservation value of the vegetation, including the habitat values for fauna; to ensure that the edges of the Reserves are not compromised; and to maintain sites of historical and cultural significance.

1.2.2 Conservation and Passive Recreation Zone Objectives

To ensure the conservation of ecological, historical and landscape values of the Foreshore Reserves, while providing for recreational activities that cause no detrimental impact on the environment.

1.2.3 Recreational Development Zone Objectives

To manage recreational development on the Foreshore Reserves in a manner that minimises the impact on other values, and is compatible with the long-term maintenance of the entire foreshore environment.

1.2.4 Protection from Fire Objectives

To maximise the protection of life, property and environmental values from uncontrolled fires through an appropriate fire management plan. This plan should minimise potential fire risks to the Foreshore Reserves and adjoining properties while being mindful of the Reserves' conservation and recreational values.

1.3 LOCATION AND TENURE

The foreshore of Wilson Inlet lies in the Shire of Denmark and the City of Albany.

The foreshore area between the Hay River and the mouth of Wilson Inlet is within the Shire of Denmark and is either reserved or Unallocated Crown Land and therefore in public ownership.

Table 1: Shire Managed Reserves on or adjacent to the foreshore

Reserve Number	Zoning	Area (ha)	Approximate Location	Purpose
43923	C	33.2	Below Springdale Heights subdivision	Foreshore Management
14132	C,CPR,RD		Between 12232 and 43923	Road Reserve
41815	C	8.4	Old Railway Track	Heritage Trail
24452	C	6.9	Between 12232 and the Denmark River Reserve	Recreation
14376	CPR,C	13.8	Between the Denmark River mouth and the Yacht Club Reserve	Parklands and Recreation
36714	RD	1.2	Yacht Club Reserve on Inlet Drive	Recreation
28998	C	0.3	End of Harper Street	Public Recreation
12344	C,CPR,RD	9.4	Poison Point	Recreation
28993	C,CPR,RD	0.9	Above 12344	Public Recreation
34742	C,CPR	13.5	Paynes Bay to Little River	Recreation
26480	C	8.8	Little River to Poddy Shot	Recreation
25347	C,CPR	3.8	Poddy Shot to Greenbury Place	Foreshore Management
43490	C,CPR	0.2	Greenbury Place	Recreation
24596	RD	0.07	Ocean Beach Road near Prawn Rock Channel	Recreation
20578	RD	13.1	Ocean Beach Road from caravan park to bar	Camping

C Conservation, CPR Conservation and Passive Recreation, RD Recreational Development

Table 2: Reserves on or adjacent to the foreshore not managed by the Shire

Reserve Number	Approximate Location	Purpose	Responsible Agency/ Management Order
23579	Hay River	Camping and Recreation (proposed that it be changed to Conservation)	DPI / Currently not vested; DEC in process of proposing that it be vested in the Conservation Commission
Unallocated Crown Land	Along foreshore, between Reserve number 23579 and Rudgyard Beach		DPI
23120	Rudgyard Beach Nature Reserve	Conservation of flora and fauna	DEC / Vesting: Conservation Commission

Reserve Number	Approximate Location	Purpose	Responsible Agency/ Management Order
12232	Below the golf course	Parklands and Recreation	DPI / Not vested
Unallocated Crown Land	From the Yacht Club Reserve to Harper Street		DPI
22248	Above Poison Point	Government Requirements	DPI / Not vested
Unallocated Crown Land	Greenbury Place to Ocean Beach		DPI

There is a Memorandum of Understanding (MOU) between DEC and DPI which states that DEC will manage Unallocated Crown Land (8.8 million ha) and unmanaged Reserves in Western Australia for purposes of fire prevention and control of plants and animals (as stipulated in CALM Act Sec 33 (2)) – excluding land in metropolitan areas or townsites. This MOU was from September 2004 for a period of 5 years. This was approved as a formal agreement by the Minister for Lands and the Minister for Environment and was printed as a Notice in the Government Gazette of 5 September 2006.

13.1 Access

There are a number of points onto the Foreshore Reserves which variously allow access for vehicles, pedestrians, cyclists and for horse-riders.

Table 3: Access to reserves on or adjacent to the foreshore

Reserve #	Access Point	Access Type	Parking Facilities
23579	South Coast Highway at Hay River	Narrow track to the foreshore (informal, seasonal vehicle access)	Informal
23120	Crusoe Beach Road	Pedestrian access to Crusoe Beach via steps and Reserve 23120 via track Vehicle access to professional fishers" boat launching site	On road verge adjacent to Reserve 23120
43923	Lake View Place	Pedestrian and cyclist access to the Denmark-Nornalup Heritage Rail Trail (Heritage Trail)	On road verge
14132	Springdale Beach subdivision	Will provide pedestrian and cyclist access to the Heritage Trail and Springdale Beach	To be determined
14376	Denmark River mouth adjacent to the caravan park	Pedestrian access to Reserve 14376 Vehicle access to public boat launching site	Sealed car park
14376	Inlet Drive, Yacht Club Reserve	Vehicle and pedestrian	Gravel car park
UAC	Roberts Street	Pedestrian, via informal path	On road verge
22248 12344	Inlet Crescent	Vehicle access to professional fishers" boat launching site at Poison Point	Informal
22248 12344	Inlet Drive Lookout	Pedestrian access to Poison Point	Road verge parking for less than 5 cars

Reserve #	Access Point	Access Type	Parking Facilities
34742	Campbell Road	Pedestrian access to Bibbulmun Track and Reserve 34742	Parking for less than 5 cars
34742 26480	Ridley Place	Pedestrian access to the Bibbulmun Track and Reserve 34742	Limited parking on road verge
34742 26480	Maraveen Place	Pedestrian access to the Bibbulmun Track, Little River Walk Trail	Limited parking on road verge
26480	Rainbow Close	Pedestrian access to the Bibbulmun Track, Little River Walk Trail. Vehicle access to professional fishers' boat launching site	Limited parking on road verge
26480 25347	Poddyshot Place	Pedestrian access to reserves Vehicle access to public boat launching site	Sealed car park
24596	Ocean Beach Road opposite the caravan park	Pedestrian and vehicle access to Ocean Beach Dog Exercise Area	Parking for up to 10 cars
24596 20578	Ocean Beach Road at Prawn Rock Channel	Pedestrian and vehicle access	Car park for up to 10 cars
20578	Ocean Beach Sandbar Lookout	Pedestrian and vehicle access	Parking for up to 20 cars

Table 4: Access to tracks and trails on or adjacent to the foreshore

Track/Trail	Access Points	Users
Heritage Trail	At South Coast Highway east of Sunny Glen Road. Lake View Place Springdale Beach subdivision (future) Via the Old Railway Bridge near the Denmark River mouth	Pedestrian, cyclist and equestrian
The Bibbulmun Track	Denmark River mouth, Campbell Road, Maraveen Place and Rainbow Close	Pedestrian
Little River Walk Trail	Maraveen Place and Rainbow Close	Pedestrian

1.3.2 History of the Reserves

Tenure

The Shire's records show that the Reserves under its management were originally gazetted as follows:

Table 5: Original Gazettal Date of Reserves

Reserve Number	Approximate Location	Original Gazettal Date
43923	Below Springdale Heights subdivision	14 November 1995
41815	Old Railway Track	2 August 1991
24452	Between 12232 and the Denmark River Reserve	6 July 1956
14376	Between the Denmark River mouth and the Yacht Club Reserve	12 June 1906
36714	Yacht Club Reserve on Inlet Drive	18 July 1980

Reserve Number	Approximate Location	Original Gazettal Date
28998	End of Harper Street	15 March 1968
12344	Poison Point	10 September 1909
28993	Above 12344	24 May 1968
34742	Paynes Bay to Little River	9 September 1977
26480	Little River to Poddy Shot	28 September 1962
25347	Poddy Shot to Greenbury Place	8 June 1959
43490	Greenbury Place	27 June 1995
24596	Ocean Beach Road near Prawn Rock Channel	9 November 1956
20578	Ocean Beach Road from caravan park to bar	28 November 1930

Fire History

There do not appear to be any readily available records of history of fire on the Shire's Wilson Inlet Foreshore Reserves.

Anecdotal evidence suggests that:

- In 1975 a fire started in the Springdale area and burned along the foreshore past the golf course and trotting track, jumped the Denmark River and was controlled in or near Weedon Hill.
- In 1984 a planned burn along the foreshore below Inlet Drive/Campbell Road escaped into the foreshore below Payne Road, and was contained below no. 85 Payne Road.
- About 1990 there was a fire south of the Heritage Trail near the trotting track.
- There was fire of about 4 ha in the DEC Nature Reserve near Crusoe Beach in 1995-1996.
- In 1998 a prescribed burn was carried out on the foreshore below Lots 780 to 738 Minsterly Road, and in 1999 below Lots 573 to 671.
- In 2000 a fire was deliberately lit near the Hay River bridge that burned about 1 ha.

The 2008 vegetation survey reported that there had been fires in the Foreshore Reserves between Denmark and the Hay River since the previous survey in 1999. These were at the mouth of the Hay River and to the north of the Heritage Trail, adjacent to the Pony Club.

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 mean annual rainfall at Denmark is around 1200 mm. Climate change is likely to have a significant impact on this region. Lower rainfall, higher temperatures, higher evaporation rates and more frequent stochastic weather events will challenge many species; the healthier the vegetation, the more resilient all species will be.

Key findings from CSIRO: Climate change in Australia: technical report 2007

The key findings of this report include that by 2030, temperatures will rise by about 1°C over Australia – a little less in coastal areas, and a little more inland – later in the century, warming depends on the extent of greenhouse gas emissions. If emissions are low, warming of between 1°C and 2.5°C is likely by around 2070, with a best estimate of 1.8°C. Under a high emission scenario, the best estimate warming is 3.4°C, with a range of 2.2°C to 5°C.

Further, the report indicates there will be changes in temperature extremes, with fewer frosts and substantially more days over 35°C.

It also predicts that decreases in annual average rainfall are likely in southern Australia – rainfall is likely to decrease in southern areas during winter, in southern and eastern areas during spring, and along the west coast during autumn.

As with temperature, the report indicates that rainfall projections for later in the century are more dependent on greenhouse gas emissions. Under a low emission scenario in 2070, the best estimate of rainfall decrease is 7.5%. Under a high emission scenario the best estimate is a decrease of 10%.

The report indicates that although there will be more dry days, when it does rain, rainfall is likely to be more intense.

Other findings include:

- Droughts are likely to become more frequent, particularly in the south-west.
- Evaporation rates are likely to increase, particularly in the north and east.
- High-fire-danger weather is likely to increase in the south-east.
- Tropical cyclones are likely to become more intense.
- Sea levels will continue to rise.

(Extract from <http://www.csiro.au/resources/ps3j6.html>)

Increased severity of rainfall events will make the fringing vegetation even more essential for stabilising the Inlet. Climate change elsewhere is also likely to impact on this area through relocation of people and infrastructure.

1.4.2 Landforms, Geology and Soils

Wilson Inlet lies between 117°19'35.4642" - 117°28'49.0944" east and -34°58'11.7078" - -35°1'18.1812" south. There is road access to the north and west shores with boat ramps at Poddy Shot Bay, Rivermouth Caravan Park and Crusoe Beach. The mouth of the estuary and adjacent beaches are reached by Ocean Beach Road. Access to eastern and southern shores is by boat or through private property. The greater part of the Inlet catchment lies in the Albany/Frazer geological province with its Precambrian granitic rock overlain by Quaternary sands and laterite.

Wilson Inlet is a lagoonal system with relatively small estuarine reaches of its tributaries: the Hay, Denmark, Sleeman and Little Rivers. The Hay River marks the boundary of the Shire of Denmark and the City of Albany. The Denmark River was dammed in 1961 to supply water to Denmark. Since the decline in water quality due to clearing, the Quickup Dam has provided water for the town (Quickup is a tributary of the Denmark River). The dams on the Denmark and Quickup Rivers have reduced the flow into the Inlet. Water also enters the Inlet through drains from adjoining properties, stormwater and groundwater.

Table 6: River lengths and volume

River	Length	m³ pa to Inlet
Hay	80 kilometre	70 million
Denmark	60 kilometre	37 million
Sleeman	22 kilometre	11.3 million
Little	5 kilometre	3.2 million

Wilson Inlet is of very recent geologic origin. Two million years ago an open seaway extended from Irwin Inlet to the hills west of Wilson Inlet as far as Princess Royal Harbour. The granite headlands would then have been islands. The Nullaki was formed as sand dunes at this time and hardened into rock. Just 20,000 years ago, in the last major freeze, sea level was more than 100 m lower than today and the coastline was several kilometres to the south. Wilson Inlet was a river valley, much deeper than at present.

The valley was flooded by the sea 6-8,000 years ago, when the sea level was as much as 2 m above today's level. Ocean Beach formed during and after the rise in sea level from sand eroded from the seabed. Lighter sand formed dunes while wave action moved the sand along and in and out of the Inlet, and currents carried more sand into the Inlet. As the ocean receded the bar formed and probably closed for the first time about 3,000 years ago. Since then the water has been brackish with extreme seasonal variations. In the last 6,000 years siltation and organic material have filled the river bed, creating the relatively flat bottom of the Inlet.

Erosion and sedimentation have accelerated in the last 100 years or so. Siltation from the rivers and sand from dune slippage and ocean movements are filling the Inlet. Irwin Inlet is further along in this process than Wilson Inlet.

1.4.3 Landscape

The visual landscape of the Wilson Inlet and adjoining environs is very much a part of the physical environment. There are largely unobstructed horizons close to and clearly visible from a substantial part of the Inlet and its Foreshore Reserves.

The landscape changes substantially around the perimeter of the Inlet. There is a stark contrast between the largely flat landscape to the north-east and east of the Inlet, as opposed to the substantially elevated nature of the landscape from Wilson Head eastwards towards part of the Nullaki Peninsula and westwards to Mount Hallowell. The view of the Karri skyline to the north is a distinctive feature.

Wilson Head has low heath vegetation and visibility from popular public recreation areas and lookout points making it a visually significant and sensitive landscape. Equally, the views around the foreshore from the coast encompass the varying vegetation communities for which Denmark is noted, particularly Karri, Marri and Paperbark.

1.4.4 Acid Sulfate Soils

Wilson Inlet as a whole has been identified as at high to moderate risk of acid sulfate soils (ASS) within 3 m of the natural soil surface. There is evidence of ASS at Ocean Beach and Springdale Beach subdivision.

ASS are naturally occurring soils that contain iron sulphide minerals, predominantly as the mineral pyrite. ASS that have not been exposed to air are known as potential ASS. While they remain waterlogged the iron sulfides in the soil are stable and the soil pH is usually around neutral at pH of 7. When exposed to air due to drainage or disturbance these soils produce sulphuric acid, and may release toxic quantities of iron, aluminium and heavy metals. This in turn can kill fish, other aquatic organisms and vegetation, and can degrade concrete and steel infrastructure to the point of failure. Stunted or dead vegetation, acid scalds and poor vegetation regrowth in previously disturbed areas are indicative of the impacts of acid sulfate soil exposure.

1.4.5 Hydrology

Wilson Inlet receives discharge from rivers, constructed drains, surface runoff, and groundwater from a catchment of 2280 km².

Wilson Inlet is fed by the Denmark, Hay, Little and Sleeman Rivers, Cuppup Creek and by smaller creeks which rise in surrounding high ground.

In 2002 the then Waters and Rivers Commission carried out flood mapping of the Wilson Inlet. It covered the western end, Hay River and the Lake Nemanup and Lake Saide area.

1.4.6 Vegetation

Foreshore vegetation plays an important role in the natural function of waterways, providing valuable habitat for waterbirds and other fauna. Foreshore vegetation reduces nutrients and pollutants draining from surrounding land, and may help to minimise erosion by stabilising the waterway's banks.

The Denmark Region lies in the South West Botanical Province, Darling Botanical District, Warren sub-district. This sub-district is typified by tall forests of Karri, with forests of Jarrah and Marri on leached sands. Paperbarks and sedge swamps occur in the valleys.

The vegetation along the Denmark Foreshore can be grouped into the following main vegetation associations:

- Foreshore fringing vegetation – rushes and sedges, mainly *Juncus kraussi* and *Ficinia nodosa*, and paperbarks *Melaleuca densa* and *M. cuticularis* along the edge of the Inlet. Above the high water mark, overstorey species include *Agonis juniperina*, *M. raphiophylla* and *Callistachys lanceolata* with understorey rushes *Lepidosperma* species.
- Swamp heathland – seasonally inundated heathland dominated by *Beaufortia sparsa*.
- Swamp woodland – occurrence of stands of *M. preissiana* (paperbark).
- Sclerophyll woodland – areas of *Eucalyptus cornuta* (Yate) and *Banksia* species.
- Sclerophyll forest – dominated by *E. marginata* (Jarrah), *Corymbia callophylla* (Marri), *E. patens* (Blackbutt) with *Agonis* species.
- Sclerophyll tall forest – stands of *E. diversicolor* (Karri).



Foreshore fringing vegetation



Swamp heathland



Swamp woodland



Sclerophyll woodland



Sclerophyll forest



Sclerophyll tall forest

Dominant species in each vegetation type vary with differences in elevation, soil type and drainage.

See the Vegetation Communities maps for the locations of these vegetation types.

A flora list obtained from the Western Australian Herbarium on 15 May 2008 is included in Appendix 2. The coordinates used took in some adjoining areas. A survey is needed to obtain a more focussed and comprehensive list.

The following significant flora species were on the Western Australian Herbarium's list of species provided for the coordinates:

34°57S 117°27E, 34°57S 117°24E, 34°59S 117°27E, 34°59S 117°24E
 34°57S 117°24E, 34°57S 117°21E, 34°59S 117°24E, 34°59S 117°21E
 34°58S 117°21E, 34°59S 117°21E, 34°58S 117°19E, 34°59S 117°19E
 34°59S 117°19E, 34°59S 117°20E, 35°01S 117°19E, 35°01S 117°20E

The four lists received were amalgamated and used to produce the list in the appendix and includes those below. DEC officers from Walpole modified the list for the foreshore and added the species with asterisks in communication on 19/9/08 (see public submissions), no Declared Rare Flora (DRF)¹ have been recorded.

THIS DATA HAS BEEN PROVIDED BY THE WESTERN AUSTRALIAN HERBARIUM ON 15 MAY 2008

Synaphea incurva – Priority 1², a clumped, spreading shrub; flowers yellow, September – November. Grows in gravelly loam, sandy soils, on slopes.

*Anthocercis sylvicola** Priority 2³ delicate shrub with spiny stems 0.45–1.3 m high. Fl. yellow, purple, Oct. Sand and clay-loam soil.*

Selliera radicans – Priority 2, a small herbaceous plant that grows in saline mud in places around the Inlet shore. It occurs in the Southern United States, New Zealand, Chile, and Wilson Inlet.

DRF - Extant: taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.

² **Priority One – Poorly Known:** taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as „rare flora“, but are in urgent need of further survey.

³ **Priority Two – Poorly Known:** taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as „rare flora“, but are in urgent need of further survey.

*Thomasia quercifolia** - Priority 2, Shrub to 1.3m hairy oak-like leaves, small pink flowers in spring, coastal heath on secondary limestone.

Andersonia sp. Mitchell River* Priority 3 Low, spreading, cushion-like shrub, 0.05–0.4 m high. Fl. blue, white, pink, Jun–Sep. Grey sand over laterite or granite.

Boronia virgata – Priority 3⁴, a slender, erect or sprawling shrub, 0.3 – 2 m high; flowers pink, August – February. Grows in peaty sand or clay in swampy or waterlogged places.

Chorizema reticulatum (Showy Flame Pea) – Priority 3, an erect, wiry shrub, 0.1 – 0.5 m high; flowers pink, orange, August –October. Grows in sand over laterite.

Marianthus sylvaticus – Priority 3, a slender climber; blue, flowers white, April – May. Grows in grey sand in Eucalyptus woodland and forest.

*Sphenotoma parviflora**– Priority 3, a slender, erect or straggling shrub, 0.15 – 1 m high; flowers white, February – April/September – November. Grows in grey or white sand, granite, in swampy areas, hills, (Note parviflorum is a misspelling of parviflora)

Xanthosia eichleri – Priority 3, an erect, procumbent or decumbent shrub (subshrub), 0.05 – 0.25 m high; leaves simple, cuneate; umbels simple; petals shorter than sepals; flowers white, cream, October – November. Grows in grey sand over granite, sandy loam, on granite outcrops, Jarrah/Marri woodland.

Asplenium aethiopicum – Priority 4⁵, a rhizomatous, perennial, herb (fern), 0.1 – 0.4 m high; fronds 1-2-pinnate, glabrous, coriaceous; sori numerous; indusium present; flowers March. Grows in loam over granite, sandy loam, sandy clay, in rock crevices of rocky outcrops, in niches beneath overhanging rocks.

Astartea arbuscula – Priority 4, a spreading, single-stemmed shrub, to 0.25 m high; flowers pink, white, January –March/August. Grows in grey-yellow sand, peaty or silty sand, black sandy clay, on flats, plains, valley floors, seasonal wetlands.

*Banksia serra** (Serrate-leaved Dryandra) Priority 4 Erect, slender, non-lignotuberous shrub, 1–4(–7) m high. Fl. yellow, cream, green, Jul–Sep. Gravel, sand or clay loam over laterite. Hillslopes

Bilardiera drummondii – Priority 4, a slender climber; flowers blue, purple, January. Grows in coastal soils, in Eucalypt woodland.

Laxmannia jamesii – Priority 4, a tufted, stilt-rooted perennial, herb, 0.05 – 0.2 m high; flowers red, white, May – July. Grows in grey sand in winter-wet locations.

Lepidium pseudotasmanicum – Priority 4, an erect annual or biennial, herb, 0.2 – 0.4(–1) m high; flowers white, green, February/December. Grows in loam, sand.

Vilarsia submersa – Priority 4, an aquatic, extremely slender perennial, herb; flowers white, August – November. Grows in freshwater 0.05-0.6 m deep, in pools, lakes, swamps, winter-wet depressions, claypans.

1.4.7 Threatened Ecological Communities

In May 2008 a search was undertaken on the DEC's Threatened Ecological Communities database. There were no known occurrences of threatened or priority ecological communities recorded within the Shire's Foreshore Reserves.

1.4.8 *Phytophthora Dieback*

Phytophthora cinnamomi (*Phytophthora Dieback*) was reviewed in „A study into the Risk of Phytophthora Dieback in ten peri-urban Reserves in the Shire of Denmark, July 2008“. Part of the Heritage Trail on the foreshore, between Rudgyard Beach and Lake View Place was included in the study. *Phytophthora Dieback*

Priority Three – Poorly Known: taxa which are known from several populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as „rare flora“, but are in need of further survey.

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.

infestation was found on the lower southern side of the Heritage Trail and on the northern side in the Reserve and private bush blocks. The pathogen appears to be spreading downhill.

In addition, *Phytophthora* Dieback has been found in the foreshore area at the Hay River which is inundated in winter.

1.4.9 Fungi

Fungi are one of the most diverse groups of organisms on the planet and they are crucial to effective conservation and management of biodiversity. Nonetheless, little is known about fungi in Australia generally and far less about fungi in the Wilson Inlet Foreshore Reserves.

Fungi belong in a Kingdom of their own and are also found in two other Kingdoms of organisms. They can be conveniently divided into macrofungi, whose fruiting bodies can be readily seen with the naked eye and microfungi, which need to be examined microscopically. Macrofungi include coral fungi, earthstars, truffles, mushrooms and toadstools. Microfungi include moulds, mildews, leaf spots, rust fungi and smut fungi.

Although most fungi are microfungi there are many thousands of macrofungi species that have a vital role in the ecology, most importantly in nutrient cycling, where they decompose organic matter and in symbiosis with plants. Most of our native plants, including Eucalypts, need fungi to help them extract nutrients from our poor soils. The seeds of native orchids will not germinate without a fungal partner. Truffle-like fungi are an important food source for native mammals and invertebrates, which help in the dispersal of their spores. Nonetheless, much still remains to be learned about fungi, the roles they play and their association with major habitats.

A true picture of the health and biodiversity of the foreshore reserves must include greater knowledge of the fungi. A fungi research project should be undertaken to collect and identify the species and start to build our knowledge of these organisms, many of which evolved when Gondwana was a super continent. As there are no comprehensive modern guides for fungi, the services of a person skilled in fungi identification should be secured to carry out this project.

1.4.10 Fauna

Native fauna is 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. The fauna of the Foreshore Reserves is generally not well studied.

Wilson Inlet has been identified as one of 119 internationally important sites for migratory shorebirds in Australia. (Bamford M., Watkins D., Bancroft W., Tischler G. and Wahl J. (2008)).

Migratory shorebirds are protected under the Environment Protection and Biodiversity Conservation (EPBC) Act 1999 as well as several international treaties to which Australia is a signatory. Any decisions about the future management of the Wilson Inlet sandbar need to take into account the environmental requirements of shorebirds.

A bird survey „Birds as an indicator of biodiversity changes at Wilson Inlet foreshore reserves“ was commissioned for this report in mid 2008. It found that the diversity of resident birds in the foreshore reserves appears to have remained unchanged within this decade. 109 species of birds have been recorded at the Wilson Inlet foreshore within the past nine years (Birds Australia's Atlas of Australian Birds database 1999 – 2007). It was noted in „Birds as an indicator of biodiversity changes at Wilson Inlet foreshore reserves“ that changes in the water levels of the Inlet have had a huge impact on populations of migratory shorebird species protected under the EPBC Act „with the non-opening of the Wilson Inlet sandbar in 2007, water levels remained high throughout the year flooding important shorebird habitat. Shorebird numbers plummeted by 98% during last summer. However, with the breaching of the sandbar in July 2008, water levels will presumably return to lower levels making shorebird habitat available again in the future.“

Migratory shorebird species are generally only present from mid-spring to mid-autumn and some species of birds found along the Wilson Inlet foreshore are highly nomadic visiting only when conditions are favourable. This means that the Bird Atlas data, held by Birds Australia, is vital to our understanding of the dynamics involved.

Both Carnaby's Black-Cockatoo and Baudin's Black-Cockatoo, which are declared threatened species under the Western Australian Wildlife Conservation Act 1950, have been recorded at Foreshore Reserves. The

Forest Red-tailed Black Cockatoo has been recorded in the general area (Peter Keppel, Regional Manager DEC, see Public submissions).

The report „Birds as an indicator of biodiversity changes at Wilson Inlet foreshore reserves“ noted that recreational use of foreshore areas can lead to unnecessary disturbance of waterbirds and recommended that domestic pets should not be allowed to interfere with birds.

Reserve 23579, which borders the Hay River mouth, is an area with high conservation values as it contains shorebird habitat during the summer months. DEC is currently in the process of proposing that it be vested in the Conservation Commission and its purpose be changed to Conservation.

Regular outbreaks of toxic algal blooms have the potential to harm waterbirds. Measures taken to reduce the inflow of nutrients will minimize the risk of such algal blooms in the future.

Bird species provide a handy and accessible way of measuring ecosystem health, since they are more readily seen and heard than many other types of animals. They do not provide the whole picture. Non-avian species identified on the foreshore include 15 native mammals, 7 introduced mammals, 12 reptiles, 12 frogs and 12 commercial fish species, which are dependent on foreshore health, though not foreshore residents. These records come from small surveys carried out in 1988 and 1997. The animals found in the fauna surveys are listed in Appendix 1.

Australian mammals are often nocturnal and secretive. They can be very difficult to see in natural bush settings. Some native animal species have been considered to be almost extinct because they were not seen. In addition, many of areas of the foreshore are inaccessible making a thorough fauna survey a large undertaking. There is much to be done, for example potentially significant differences have been discovered in the skulls of small mammals in the WA Museum, indicating that there may be more species than have so far been described (pers comm. Sylvia Leighton, June 2008).

Fauna needs to be able to move between remnants in order to use resources such as fruits and flowers in season, and to find new territories for the young or after disturbance. Many smaller fauna will not cross open spaces or will travel only short distances in the open. To reach all remnants, they need to be connected by 'bush corridors'. The foreshore vegetation forms a corridor that enables the movement of fauna across the landscape, being well-connected both east and west through the coastal vegetation reserves, as well as north through the Denmark and Hay Rivers. It is highly likely that there are more species of animals using the Foreshore Reserves than has been recorded, due to seasonal and annual variations.

The Foreshore Reserves are likely to play an even more significant role in times of disturbance and habitat alteration. This could, for example, be associated with wildfire and disturbances that impact on habitats nearby. The bushland areas of the foreshore should not be “tidied up” as the presence of logs, rocks and debris provides important microhabitats for fauna. Wilson Inlet foreshore invertebrates have not been well studied, but it is likely that given the mesic nature of parts of the habitat that these areas are potentially important as refugia.

The control of domestic animals and feral predators would greatly enhance the habitat values of the Foreshore Reserves. The development of an appropriate fire management regime, completion of biological surveys to determine the potential importance of the reserves and management of recreational activities such as boat access are also critical to the maintenance of habitat values.

1.5 HUMAN ACTIVITIES

1.5.1 Aboriginal History

Wilson Inlet is the focal point of a large catchment area and home to complex and varied ecosystems. The Inlet formed a focal point for Noongar people who managed and utilised the Inlet and its abundant natural resources during the later Holocene period (anytime from around 6,000 years ago after the Inlet formed). Extensive archaeological remains found at multiple locations in and around Wilson Inlet attest to its function during traditional times as a significant cultural landscape that was utilized by Noongar people for a variety of cultural activities and resource acquisition.

Fish traps, lizard traps, gnamma holes (man-made granite waterholes), burials, stone artefacts, tool making sites and ceremonial materials all exist at different locations around Wilson Inlet today as physical manifestations of the ways in which Noongar people engaged with the Inlet in the past. None of the archaeological features exist in isolation from one another or from the ecosystems and natural features of which they are a part. The features are all important components of a cultural landscape now, just as they were important components in a cultural system in the past. Noongar cultural systems at Wilson Inlet in the past were interwoven with the landscape and its ecosystems, just as today the cultural landscape is an inherent part of the natural landscape.

If we are to recognise and value the Noongar cultural features associated with Wilson Inlet we need to understand that each and every feature is part of an extended eco-cultural landscape and does not exist in isolation. The term "eco-cultural landscape" refers to the interaction of natural and cultural features within the landscape. In isolation, archaeological remains represent a static record of past activities. In their full natural context however, cultural features exist as part of a living, changing landscape and living culture. That is, information on past land-use activities and cultures (archaeological remains) is interacting with changing natural processes and land-use practices to form a living cultural landscape. Archaeological evidence of past cultural systems is static but the interaction of modern Noongar people with this cultural landscape is dynamic and forms the basis of a living cultural landscape.

The Noongar community, as cultural custodians at Wilson Inlet wish to care for and conserve the natural health and beauty of the Inlet and its catchment. Noongar custodians place a high importance on the whole of the Inlet and its tributaries as a cultural landscape. The preservation of cultural values at Wilson Inlet is dependent upon maintaining ecological values and on the active involvement of Traditional Owners in managing the Inlet.

Wilson Inlet spans across two distinct cultural zones in Noongar country. Denmark itself and the western part of Wilson Inlet are generally considered to be part of the Pibulmun country that stretches west and north to the Manjimup district. The eastern end of Wilson Inlet is generally considered to be part of Menang country which incorporates Albany and surrounding districts. As such, Wilson Inlet can be considered to have been an area of cultural interaction during traditional times and this still holds true today.

During the early colonial period Noongar populations living around the Inlet were decimated by European diseases and early colonial conflict. Few Noongar people have returned to live in the area since this time but cultural ties to the area still exist for the Pibulmun and Menang people. Archaeological signatures and natural features comprise the eco-cultural landscape, and the interactions of contemporary Custodians form the basis for a living cultural landscape at Wilson Inlet.

Caring for country forms an important element in maintaining and reclaiming Noongar cultural connections to Wilson Inlet and its surrounds. The Wilson Inlet Community Cultural Management Project 2008 forms a basis for ongoing Noongar community engagement in caring for the Inlet and sustaining cultural custodianship into the future.

There are six Aboriginal Heritage sites on Foreshore Reserves listed on the Department of Indigenous Affairs' website.

1.5.2 European History

European Heritage

European history between the Denmark and Hay rivers includes farming, fishing, the historic railway line, the Springdale guesthouse and Rudgyard Beach Holiday Park.

During the 1930s and 1940s many people spent the summer holidays in the Prawn Rock area of Ocean Beach, the majority camping along both sides of the road. There were Tea Rooms, a Store and picnic facilities.

A number of long-time resident families still hold strong connections to the Inlet and the surrounding area.

Railway

The extension of the South Coast Railway from Torbay to Denmark was built in 1895 when Millars started sawmilling at Denmark. With the start of the Group Settlement Scheme in Denmark in 1923 demand grew for an extension of the railway to Nornalup. When this extension was being built a section of the railway was relocated close to the northern shore of the Inlet, crossing the river at a bridge near the river mouth. Sidings were located at Springdale, Rudgyard and Cherryup. The Nornalup extension was opened in 1929. The railway carried freight and passengers until the closure of the railway from Elleker to Nornalup in 1954.

Old Railway Reserve

In 1921 Springdale siding was opened by local resident Charles Smith as a tourist attraction. Springdale Guesthouse and Tea Gardens had furnished camps and camping grounds with fishing, shooting and tennis available. A cement bench made by Mr Smith in 1934 can still be seen near the Heritage Trail shelter at Springdale Beach.

Between 1936 and 1938 a train was organised to bring people from the city and other country areas to the south coast and included a stop at Springdale for sightseeing and swimming.

The section of the railway from Denmark to the Hay River is now part of the popular Heritage Trail.

Commercial Fishing

The Department of Fisheries Report 62 indicates that commercial fishing in the estuaries adjacent to Albany was occurring in the early 1890s. No specific date is referred to, but it is expected that settlers in the areas would have relied on the natural resources for food, and fish would have been a product that would have been traded in early settlement times. It was not until the late 1920s and early 1930s that the cool storage on rail systems permitted some catch to reach Perth markets, allowing commercial catches to increase.

In the early 1900s J.D. Smith and brothers began operating as professional fishermen on the Inlet. The railway was used by the Smiths and other families to supply fish to the Goldfields. Descendents of the Smith family continue to fish the Inlet.

1.5.3 Recreational Uses

This Management Plan considers recreation in two categories: Conservation and Passive Recreation and Recreational Development.

Passive recreation includes low impact activities such as photography, painting, walking and bird-watching; that is, those which do not need supporting infrastructure other than walk trails, lookouts and board walks. These activities are encouraged in the areas designated Conservation – Passive Recreation on the maps.

A planned approach to recreational development includes concentrating facilities in specific sites, these being within the Recreational Development areas indicated on the maps.

Careful management is required to ensure sustainable use of foreshore recreational areas. Any recreational use of the foreshore, in particular intensive use, can degrade soils, vegetation or the foreshore landscape.

A list of current recreational facilities is included in Appendix 4.

1.5.4 Tourism Industry

Denmark has a thriving tourism industry, with peak periods for visitors at the Christmas and Easter school holidays. The Rivermouth Caravan Park, Ocean Beach Caravan Park, the Waterfront Motel, other holiday

accommodation and the proposed developments at Springdale Beach and in the Weedon Hill area are on or adjacent to Foreshore Reserves.

Other tourism operators offer tours that include the Foreshore Reserves to take advantage of the scenery, flora and fauna found there.

Fishing boat charters take visitors onto the Inlet from the Denmark River mouth and Poddy Shot boat launching sites.

Tourists also bring and hire boats, canoes, kayaks and other craft.

1.5.5 Fishing and Boating

Commercial Fishing

Currently there are 25 fishing licences giving access to Wilson Inlet for commercial fishing purposes. Historically the number of commercial fishers that could have accessed Wilson Inlet has been as high as 72 in 1979. Whilst both of these figures represent who can fish Wilson Inlet, fishermen also had access to the other estuaries that were part of the estuarine fishery of the time and therefore it is unlikely that all would have fished in Wilson Inlet.

The commercial fishers use the following launching places:

- Denmark River mouth
- Sharp's camp
- Cherryup
- Hay River
- Inlet Drive, near Roberts Street
- Rainbow Close
- Poison Point
- Crusoe Beach

It is noted that degradation is occurring at Cherryup, east of Crusoe Beach, and at Inlet Drive near Roberts Street.

Recreational Fishing

The favourite recreational fishing spots along the Inlet foreshore are Hay River mouth, Denmark River mouth, Poison Point and Prawn Rock Channel.

During winter, just prior to the bar being breached, snapper accumulate near the Inlet mouth, which creates an ideal fishing opportunity. During the autumn months many people like to fish the river systems that feed into the Inlet.

Recreational fishers use the following public boat launching places:

- Denmark River mouth
- Poddy Shot Bay

Other commonly used boat launching places include:

- Hay River
- Crusoe Beach
- Campbell Road
- Poison Point

Boating Strategy

The Denmark Strategic Boating Plan (Estill & Associates, 2007) was prepared for the Shire in 2006 – 2007 and received by Council in October 2007. It was stated that the strategy document provides direction for the long-term usage of the Denmark River and Wilson Inlet, in terms of boating.

Some of the recommendations in the Plan have been implemented, such as:

- The finger jetty at the Denmark River mouth.
- The expansion of the Yacht set-up area at the Denmark River mouth.

Boat Launching

The Shire provides boat launching facilities with jetties and ramps at Denmark River mouth and at Poddy Shot Bay. There is also a boat ramp at Crusoe Beach, used by commercial fishers.

A number of other sites (informal) on Foreshore Reserves are used to launch boats.

Private Jetties

There are around 15 private jetties, both registered and unregistered, mostly on the western foreshore.

Water Skiing

There is a water ski area at Rudgyard Beach, though there is no direct public access to the beach. Water skiing is permitted in those waters contained within an area commencing at the south-eastern end of Rudyard Beach extending due south for 900 m thence generally north-west at 300° true for 900 m thence back to the foreshore at 045° true for 900 m (DPI, 2007).

Personal Watercraft

Personal Watercraft (PWC) also use the Inlet. There are restrictions on what activities they may carry out: freestyle driving, wave jumping and surfing are prohibited in all waters of the Wilson Inlet and Denmark River. In addition, all water ski areas and water ski take off areas are closed to navigation of PWC unless conducting water ski operations or transiting directly through the area (DPI, 2007).

1.5.6 Adjoining Farming and Residential Properties

The majority of the Foreshore Reserves are adjacent to farming and residential properties. A number of large properties are being subdivided for residential use; these developments and the associated earthworks are having visual and environmental impacts on the foreshore and the Inlet.

1.5.7 Waste Water

The outfall from the creek which passes the Waste Water Treatment Plant enters the Inlet through the Foreshore Reserve, north of the designated Yacht Club site. The Water Corporation carries out regular monitoring of the water quality of the outfall.

Older properties surrounding the Inlet that are not on town sewerage leach nutrients through the Foreshore Reserves into the Inlet. This is affecting plant growth on the foreshore and in the Inlet and is evidenced by the rampant Kikuyu growth in many affected areas (Denmark Environment Centre, 1995). The Shire no longer permits the construction of septic systems adjacent to the Inlet. In addition the State Government is working towards providing deep sewerage to properties around the Inlet.

Stormwater comes from urban areas and roads. Poorly controlled stormwater brings weeds and disease into the foreshore area, causes erosion and contributes silt and nutrients and chemicals from gardens and agricultural holdings.

Stormwater must be retained on site where it can drain into the groundwater or slowly filter down through soils and vegetation to the Inlet. The vegetation on the Reserves assists in removing pollutants and silt from stormwater prior to its entering the Inlet.

Design of stormwater drains must be addressed at re-zoning, subdivision and development stages. Native vegetation should only be removed when it is unavoidable and has been factored into the planning.

1.5.8 Community Involvement

There are some individuals living near the foreshore who take an active interest in the Reserves. They and Denmark Weed Action Group Inc. carry out invasive plant removal and control, and revegetation where required, with prior notification to and approval from the Shire.

1.5.9 Research

The Foreshore Reserves are included in research projects into a variety of topics. Current and recent research includes the following:

Groundwater monitoring and urban sewerage

In 1995 the Denmark Environment Centre released a report called „Understanding and Reducing Urban Impacts on Waterways in Denmark Western Australia“. This study was undertaken to identify the contribution urban areas of Denmark were making to nutrient loads entering Wilson Inlet and locate any occurrence and possible pollution by heavy metals and pesticides entering waterways.

The need to monitor groundwater flow and nutrients discharged into Wilson Inlet from urban sources, in particular the residential areas of Weedon Hill, Little River and Minsterly Road, was identified in the 2006 Wilson Inlet Nutrient Action Plan (WINRAP) as a priority action.

In May 2006 a series of monitoring bores were established by the DoW along the Wilson Inlet foreshore down-gradient from the target residential areas. Groundwater samples were collected on a monthly basis between June 2006 and February 2007 from the bores. Analyses of the samples are included in the draft report published in December 2007. The draft report was inconclusive and has not been followed up as yet.

***Phytophthora* Dieback**

The project to study the risk of *Phytophthora* Dieback in ten peri-urban Reserves within the Shire of Denmark included part of the Heritage Trail in its scope because it contains a wide range of susceptible species, has a high potential for spread of the disease and has many social and cultural values (Green Skills, 2008).

Foreshore Rehabilitation Plan

In June 1996 a survey to identify degraded areas of foreshore vegetation and specify rehabilitation measures was conducted for the Shire from the Denmark River to the mouth of the Inlet. Priority areas for rehabilitation were identified and detailed in the report. More detail is provided in section 2.3.7 (Harwood, 1996).

Vegetation Surveys

In June 1999 and in June 2008 on-ground surveys of the condition of the vegetation on the Foreshore Reserves between Denmark and the Hay River were carried out (Green Skills, 1999). Four quadrats targeting two separate vegetation types were set up in 1999 and revisited in 2008 and changes noted in order to measure changes in biodiversity and enable effective management decisions to be made.

In the June 2008 follow-up of the 1999 survey of the vegetation on the Foreshore Reserves between Denmark and the Hay River (Parre, 2008) it was found that the overall condition of the vegetation in the Foreshore Reserves is good to excellent (Keighery's Vegetation Condition Scale) and that there was little change from the previous survey. Of the quadrats surveyed only the one at the mouth of the Hay River showed significant vegetation change and that may have been caused by the prolonged inundation due to the sandbar at Ocean Beach not being breached in the winter of 2007. Water-bird habitat was flooded in the same event.

The survey recommended that:

“Research into the effects of not opening the bar in some years needs to take into consideration the effect on the ecosystem of the Inlet as a whole rather than focusing on particular elements”.

Birds

A survey of the birds on the Foreshore Reserves from the mouth of the Hay River in the east to the sandbar at Ocean Beach in the west was conducted on 21 and 22 July 2008 as birds are a useful indicator for measuring changes in biodiversity because of their sensitivity to environmental changes (Bodin, 2008).

Wilson Inlet Community Cultural Management Plan

A project to provide a tangible, practical and broad assessment of Noongar cultural values associated with Wilson Inlet was undertaken in March and April 2008. The assessment addressed key management issues for immediate and future management of the Inlet and aimed to provide a mechanism for sustained Noongar community involvement in the management of Wilson Inlet.

European Cultural Heritage Values of Regional Estuaries, South Western Australia

A survey of 18 estuaries, including Wilson Inlet, was conducted in 2007 to identify physical evidence of historical cultural heritage values and create a database for use in the management of the estuaries and as baseline for further studies (Thom, 2008).

PART 2: MANAGEMENT ISSUES AND ACTIONS

21 TENURE AND PURPOSE OF RESERVES

The three bodies responsible for on-ground management of the foreshore – the Shire, the City of Albany and DEC – should ensure that their activities are co-ordinated in order to achieve consistency.

Recommendation:

2.1a) It is recommended that foreshore management activities be co-ordinated between the Shire, the City of Albany and DEC.

Actions:

- **Ensure that regular communication regarding management activities on the Foreshore is effective.**
- **Ensure that planning steps for any foreshore management activity include co-ordination and discussion between agencies.**

In order to manage the western Foreshore Reserves as a whole, the two areas of Unallocated Crown Land along the western foreshore, which are between the Yacht Club Reserve and Harper Street, and from near Poddy Shot Bay to Ocean Beach, should be vested in the Shire.

Similarly, management of Reserve Number 12232, below the golf course, should be vested in the Shire, as well as Reserve Number 22248 (Inlet Drive – Poison Point Lookout) which is currently (December 08) UCL.

Recommendation:

2.1b) It is recommended that the Shire obtain management responsibility of Reserve Number 12232, Reserve Number 22248, and the two areas of Unallocated Crown Land along the western side of the foreshore.

Actions:

- **The Shire to seek management responsibility of the two areas of Unallocated Crown Land along the western side of the foreshore.**
- **The Shire to seek management responsibility for Reserve Number 12232 and 22248.**
- **The Shire to include the two areas of Unallocated Crown Land along the western side of the foreshore in this Management Plan.**
- **The Shire to include Reserve Number 12232 and 22248 in this Management Plan.**

The management of the area of Unallocated Crown Land along the eastern foreshore, between Reserve Number 23579 and Rudgyard Beach, should be vested with either the Shire or DEC so that it is formally included in management plans.

Recommendation:

2.1c) It is recommended that the management of the area of Unallocated Crown Land along the eastern foreshore, between Reserve Number 23579 and Rudgyard Beach be formally vested in either the Shire or DEC.

Action:

The Shire and DEC to determine which is the most appropriate agency to manage the area of Unallocated Crown Land along the eastern foreshore, between Reserve Number 23579 and Rudgyard

Beach, and formalise the decision.

2.2 MANAGEMENT OF RESERVES

The Noongar community is actively engaged with the Wilson Inlet eco-cultural landscape. The Wilson Inlet Community Cultural Management Project offered a mechanism for that community engagement to be integrated with current and future management of the Inlet. Through management planning, on-ground project work, consultation and integration with key stakeholders, the Noongar community can develop a more active and integrated role in the management of Wilson Inlet. This will require an active and ongoing commitment from all stakeholders and members of the Noongar community to make this collaboration work for better management of the Inlet. The Albany Aboriginal Corporation Field Crew is available to undertake professional on-ground work.

There is a need for a Strategic Plan for the management of all the Reserves in the Shire of Denmark. This would give priority to works, such as signage, infrastructure, weed control and rehabilitation, in those Reserves that are faced with the greatest threat but have bushland in good condition.

This Strategic Plan would be a component of a Biodiversity Management Plan, itself a part of the overall Strategic Plan for Denmark currently under development.

Recommendations:

- **2.2a) It is recommended that the Shire maintain a working relationship with the Noongar Community and the Department of Indigenous Affairs to ensure that cultural heritage and environmental values are given due consideration in the development of plans.**
- **2.2b) It is recommended that a Biodiversity Management Plan for the Shire of Denmark be developed.**
- **2.2c) It is recommended that the Biodiversity Management Plan incorporates a Reserve Management Strategic Plan for all the Shire of Denmark Reserves.**

Actions:

- **The Shire to maintain a working relationship with the Noongar Community and the Department of Indigenous Affairs to ensure that cultural heritage and environmental values are given due consideration in the development of plans.**
- **The Shire to develop a Biodiversity Management Plan.**
- **The Shire to develop a Reserve Management Strategic Plan.**

2.3 CONSERVATION

The vegetation and landforms around the Inlet provide a natural green belt and a narrow buffer between the urban/rural development of Denmark and the Wilson Inlet.

The Foreshore Reserves are at risk from changes in water content, quality and levels in the Inlet and the pressures resulting from the increase in population from the development of adjoining subdivisions.

A commitment to avoid long-term deterioration of the foreshore environment underpins all decisions about land use in this Plan. The primary purpose of any land use decision is to maintain the environmental quality of the foreshore for the long-term enjoyment of the community. This is sustainable use of the foreshore.

Those areas of the Foreshore Reserves designated as Conservation Zones are to be managed to maintain and enhance habitat for flora, fungi and fauna, to protect cultural heritage sites and natural landscape values. They are suitable for low impact recreation activities such as:

- Walking
- Bird Watching
- Photography
- Painting (for example landscapes)



These activities are consistent with the primary purpose of these areas. No clearing of vegetation, development or building is required nor should it be permitted.

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

Recommendations:

- **2.3a) It is recommended that any path development in a Conservation Zone conform to the relevant management objective.**
- **2.3b) It is recommended that recreational activities in a Conservation Zone be monitored to ensure compliance with the relevant management objective.**

Actions:

- **Keep paths well-defined, marked and maintained to ensure that users of these facilities are encouraged to use them appropriately.**
- **Install appropriate signage to indicate that domestic animals should be restricted from accessing the Conservation Zones.**
- **Establish procedures for assessing proposals for path development in a Conservation Zone so that they conform to the relevant management objective.**
- **Ensure that path construction and maintenance activities follow minimum disturbance guidelines.**
- **Monitor activities in Conservation Zones and ensure compliance with the relevant management objective.**

Bibbulmun Track Realignments

It has been suggested that the Bibbulmun Track be realigned so that it follows the foreshore between Little River and Ridley Place instead of along roads.

Below the former Wilson Inlet Holiday Park the Bibbulmun Track crosses the boundary into the private property. The track should be realigned so that it is wholly on the Reserve. The foreshore in this area has been cleared and therefore should be considered for inclusion in the low fuel areas for fire and maintenance activities (see 2.3.3).

Recommendations:

- **2.3c) It is recommended that the Bibbulmun Track be realigned so that it follows the foreshore between Little River and Ridley Place.**
- **2.3d) It is recommended that the Bibbulmun Track below the former Wilson Inlet Holiday Park be realigned so that it is wholly on the Reserve.**

Actions:

- **Realign the Bibbulmun Track so that it follows the foreshore between Little River and Ridley Place.**
- **Realign the Bibbulmun Track below the former Wilson Inlet Holiday Park so that it is wholly on the Reserve.**

2.3.1 Preservation of the Ecology

Environmental deterioration can be slow and difficult to notice, taking place gradually over periods of many years. Constant checking is required to recognise and avoid such deterioration. Baseline information is needed in order to carry out ongoing monitoring. As part of the basis of the monitoring programmes, a series of photo points should be set up. Photographic records help to monitor the health and changing nature of remnant vegetation. Photos should be taken from selected points at least once each year at the same time, and when any unusual events occur.

The flora, fauna and fungi of the entire foreshore of the Inlet have not been formally surveyed. In order to achieve the management objective stated in 1.2.1 a better understanding of the ecology of the Reserves must be developed through observation and analysis.

Recommendations:

- **2.3.1a) It is recommended that surveys of the flora, fauna and fungi on the Foreshore Reserves be conducted.**
- **2.3.1b) It is recommended that ongoing monitoring programmes of the flora, fauna and fungi be conducted.**

Actions:

- **Obtain funding and carry out a survey of the flora on the Foreshore Reserves.**
- **Obtain funding and carry out a survey of the fauna on the Foreshore Reserves.**
- **Obtain funding and carry out a survey of the fungi on the Foreshore Reserves.**
- **Ensure that flora, fauna and fungi surveys comply with licensing requirements under the Wildlife Conservation Act 1950 and the Animal Welfare Act 2002.**
- **Set up ongoing monitoring programmes of the flora, fauna and fungi, including photo points where appropriate.**

A survey of the birds on the Foreshore Reserves from the mouth of the Hay River in the east to the sandbar at Ocean Beach in the west was conducted on 21 and 22 July 2008 (Bondin, 2008). Bird lists from the survey are included at Appendix 1.

The data studies in the survey found that the diversity of resident birds in the Foreshore Reserves in winter months appeared to remain unchanged within the decade (see Appendix 1). However for the summer season, high water levels in the Inlet due to the non-opening of the bar in 2007 flooded important shorebird habitat and their numbers reduced by 98%. With the breaching of the sandbar in July 2008, water levels would presumably return to lower levels making shorebird habitat available again in the future.

There is anecdotal evidence that numbers of some species in Wilson Inlet are declining. Fairy Terns and Hooded Plovers, bird species which nest on sandy beaches, have been rarely recorded at Wilson Inlet in recent years. Heavy recreational use of Ocean Beach may have contributed towards that diminishing trend. Although there is no apparent loss of diversity so far, continued monitoring of bird populations is required.

Recommendation:

- **2.3.1c) It is recommended key habitat users (e.g. waders) or endemic species be monitored as indicators of the ongoing suitability of the reserves as habitat. Key reserves or specific habitats within the reserves may also be monitored for species diversity or relative abundances. This should complement the ongoing Bird Atlas work.**

Action:

- **Obtain funding and carry out monitoring of the bird populations on the Foreshore Reserves.**

2.3.2 Friends of the Foreshore Reserves

Both the Boating Strategy and the *Phytophthora* Dieback study recommend the establishment of Friends groups for the Foreshore Reserves. Such groups can undertake monitoring and reporting activities as well as some maintenance under Shire direction.

Recommendation:

- **2.3.2a) It is recommended that Friends groups for areas of the Foreshore Reserves be established.**

Action:

- **Set up the terms of reference and coordinating structure for groups of Friends of areas of the foreshore.**
- **Provide ongoing assistance and support to the Friends groups.**

2.3.3 Adjoining Development

Land next to Wilson Inlet has great value for potential development, particularly residential subdivision. Development on any scale has visual and environmental impacts on the foreshore and the Inlet, through:

- Replacing natural vistas with built environments.
- Reducing natural vegetation which acts as a bio-filter for pollutants draining towards the Inlet.
- Adding additional nutrient loads to the Inlet in runoff from septic systems and fertilizers.
- Adding chemical runoff from pastures, crops and gardens.
- Increasing water runoff.
- Water extraction pressures
- Increasing pedestrian and vehicular traffic through foreshore vegetation.
- Increasing the likelihood of intrusion by invasive plants, animals and pathogens.

- Increasing the need for additional vehicle access points for maintenance and fire prevention activities.

These impacts can be managed by policies governing the size and type of developments permitted adjacent to the Inlet foreshore.

Recommendation:

2.3.3a) It is recommended that development adjoining the foreshore not adversely affect its integrity.

Actions:

- **Develop and implement a planning policy to ensure that development adjoining the foreshore protects its integrity.**
- **Place conditions on all future development adjoining Foreshore Reserves consistent with the objectives of the Management Plan.**
- **Ensure that conditions placed on developments are satisfied.**
- **Clearly delineate foreshore areas to prevent intrusions from livestock and discourage unauthorised use.**
- **Ensure that paths and trails guide pedestrians through the foreshore so that damage is minimised.**

Foreshore vegetation plays an important role in the natural function of waterways, providing valuable habitat for waterbirds and other fauna. Foreshore vegetation also reduces nutrients and pollutants draining from surrounding land, and may help minimise erosion by stabilising the waterway's banks. Maintenance and enhancement of this valuable resource is essential. Unauthorised vegetation clearing in Foreshore Reserves is prohibited.

Recommendation:

- **2.3.3b) It is recommended that the existing vegetation along the Foreshore Reserves be maintained in a natural and healthy state.**

Actions:

- **Undertake a program of public education regarding the values, uses and protection of foreshore vegetation.**
- **Issue foreshore clearing regulations and policies to owners of properties with a boundary in common with a Foreshore Reserve on receipt of rezoning applications, on receipt of subdivision applications, following transfer to new property owners and with the issue of a building licence.**
- **Issue clearing regulations under the Environmental Protection Act to owners of adjoining properties unless there is a subdivision approval with special clearing exemptions.**
- **Enforce penalties for unauthorised clearing of native vegetation in the Foreshore Reserves.**
- **Enforce penalties for dumping of garden waste in the Foreshore Reserves.**

Some existing unauthorised clearing on Foreshore Reserves may be useful as low fuel areas in case of fire and for maintenance activities. The remaining cleared areas should be rehabilitated with local species.

Recommendation:

2.3.3c) It is recommended that designated low fuel areas be maintained at existing cleared sites on the Foreshore Reserves.

Actions:

- **Conduct a survey of all areas of clearing on Foreshore Reserves to identify those suitable as low fuel areas for fire control and maintenance activities.**
- **Establish maintenance regimes for designated low fuel areas.**
- **Rehabilitate those areas of unauthorised clearing not designated as low fuel areas.**
- **Ensure that residents of properties adjoining Foreshore Reserves are aware that clearing is not permitted.**

Without guidelines for building design and siting (including associated structures such as car parks, signs, lighting, fences and railings), the quality and aesthetics of the foreshore may be impaired. Furthermore, without coordination different buildings or structures may jar and impact adversely on the landscape.

The community, Shire of Denmark and WIMAG have identified views not only of the Inlet but from the Inlet as valuable. Protection of these landscape values is important; structures within and adjacent to the foreshore must have minimal visual impacts.

The following guidelines were suggested in the 2002 Wilson Inlet Foreshore Management Plan Denmark to Hay Rivers and are still considered relevant:

- Alterations to the landscape should be subtle, remaining subordinate to natural elements by borrowing extensively from form, line, colour, texture and scale of the surrounding landscape.
- Where structures are required within or adjacent to the foreshore, their designs, materials and colours should complement surrounding landscape elements, and should be carefully sited away from major natural focal points (such as headlands or ridgelines). Vegetation or landform screening should be used.
- The visual impact of any development on the view from the Inlet should be included with applications for building consent to the Shire.
- Degraded landscapes, such as earthworks associated with a new facility or structure, should be rehabilitated as a condition of planning approval.

Recommendation:

2.3.3d) It is recommended that all structures located on or adjacent to the foreshore complement the visual qualities of the surrounding landscape.

Actions:

- **Ensure that the visual impact of any development on the view from the Inlet is included with applications for building consent.**
- **Ensure that the designs, materials and colours of structures complement surrounding landscape elements.**
- **Ensure that structures are sited away from major natural focal points such as headlands or ridgelines.**

Residents and tenants of properties adjoining the foreshore are not always aware that the following activities can cause irreparable damage:

- Unnecessary clearing along boundaries, particularly lopping trees.
- Making access ways into the foreshore.
- Planting invasive species on their properties.
- Starting fires on hot and windy days.
- Allowing domestic animals to roam into the Reserves.
- Allowing stock into the Reserves.

- Removing fallen or standing timber from the Reserves.
- Dumping rubbish and garden refuse in the Reserves.
- Leaving boats and trailers on foreshore vegetation.
- Directing storm water from their properties into the Reserves.
- Erecting structures on the Reserves.



Trailer at Poison Point



Stormwater directed from private property onto the Reserve at Springdale Heights



Derelict shed below Minsterly Road



Trees lopped below fire access way at Springdale Heights



Clearing below private property on Inlet Drive



Agapanthus on Foreshore Reserve near Roberts Street

Recommendations:

- 2.3.3e) It is recommended that the adjoining residents and landowners be provided with information so that they understand their responsibilities and they adhere to regulations.
- 2.3.3f) It is recommended that unauthorised vehicle access ways onto Foreshore Reserves at Lake View Place and Little River from Maraveen Place be closed.

Actions:

- Promote membership of Friends groups to adjoining residents and landowners.
- Conduct invasive species information sessions for residents and landowners.
- Conduct fire awareness training for residents and landowners.
- Provide information for residents and landowners on appropriate use of public land.
- Monitor the Reserves' boundaries for unauthorised activities.
- Prevent public vehicle access to the foreshore from Lake View Place, while allowing pedestrian access.
- Prevent further erosion on the track to the foreshore from Lake View Place.
- Prevent vehicle access to the foreshore at Little River through private properties on Maraveen

Place.

2.3.4 Waste Water



Access track to Crusoe Beach



Fire access way below Springdale Heights

Stormwater will continue to collect on land adjacent to the Foreshore. Active management is required to minimise the impact of nutrients, chemicals and minerals on water quality. Unmanaged stormwater causes erosion to access ways, trails and other infrastructure.

Access track at Lake View

Place

Recommendations:

- **2.3.4a) It is recommended that stormwater reaching the Inlet be managed, so as to reduce the amounts of pollutants and silt contained in it.**
- **2.3.4b) It is recommended that stormwater on Foreshore Reserves be managed to prevent damage by erosion.**

Actions:

- **A stormwater management policy should be prepared which includes:**
 - Controls on discharge of water.**
 - Maintenance of waterway vegetation.**
 - Road drainage and upkeep of culverts.**
 - Maintenance of access ways and trails to prevent erosion.**
 - Careful design of access ways, walk trails, car parks and any other facility on the foreshore.**
- **Prevent direct stormwater discharge into the Foreshore Reserves.**
- **Locate nutrient stripping basins on land outside the foreshore.**

2.3.5 Introduced and Domestic Animals

With increasing human population and resultant development adjacent to the Reserves, the presence of introduced animals can be expected to increase. This will include predatory and other animals such as rabbits, fish and birds. There will be increased use of the designated dog exercise areas which is likely to increase impacts on adjacent areas.

Recommendations:

- **2.3.5a) It is recommended that compliance with domestic animal control regulations be ensured.**
- **2.3.5b) It is recommended that fox, feral cat and rabbit control measures be implemented.**

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 by following up complaints.**
- **Implement appropriate fox control measures in coordination with DEC activities on adjoining Reserves.**
- **Implement appropriate feral cat control measures in coordination with DEC activities on adjoining Reserves.**
- **Work with DEC on a rabbit baiting program where there is a specific biodiversity value at risk, otherwise investigate the use of traps for areas where rabbits are of concern.**

2.3.6 *Phytophthora* Dieback

Evidence of *Phytophthora* Dieback has been found in the Heritage Trail Reserve adjacent to Lake View Place and in the foreshore area at the Hay River which is inundated in winter. There are signs that the vegetation is changing to low woodland as a consequence of the death of susceptible species.

Possible vectors for the introduction of *Phytophthora* Dieback into the Foreshore Reserves are the vehicle access points and road works during establishment of adjoining subdivisions.

Recreational use and maintenance activities in the Reserves have the potential to further spread *Phytophthora* Dieback, as has the flow of infested water as it flows towards the Inlet and through culverts and drains under the Heritage Trail.

Recent research quoted in the *Phytophthora* Dieback study report, (Green Skills, 2008), suggests that fire in infested areas has the potential to increase both the severity and extent of disease to native plant communities, and impinge on the regeneration capabilities of susceptible species. Amongst other effects, fire reduces leaf litter and canopy cover which increases soil temperature thus making favourable conditions for the pathogen. The plant communities found to be most impacted by fire and the presence of *Phytophthora* Dieback are dominated by proteaceous species (i.e. *Banksia* sp., *Hakea* sp., *Dryandra* sp., *Adenanthos* sp.). Many of the susceptible species regenerate primarily from seed after fire.

Advice from DEC states „There is currently no known link between *Phytophthora* spread and mild prescribed burning; where large older *Banksias* persist they often require fire to stimulate seed release and germination. A cool mosaic burn in this area would be desirable to maintain part of the population unburnt and allow part of it to burn. If implemented properly there is a high possibility of ensuring adult *Banksias* are not killed by the fire and the result would be the establishment a multiple aged *Banksia* stand (i.e. seed-producing adults as well as young establishing plants), which provides the populations with resilience to future disturbance in the habitat. In the complete absence of fire, the *Banksias* may senesce and stop producing seed, which makes stand replacement in the event of a wildfire impossible.“

This makes a cautious approach essential. Each area should be studied on its particularities before applying strategic management.

In addition to the general recommendations applicable to all Shire Reserves, the *Phytophthora* Dieback study made the following recommendations. Those that relate specifically to the Foreshore Reserves as detailed in the report (Green Skills, 2008) are quoted below.

- All works within and around priority Reserves to strictly adhere to Town Planning Scheme Policy No. 1 for Dieback Disease Management, (Shire of Denmark, 1997) hygiene controls including but not limited to:

No soil movement or extraction within the Reserve

No operations (firebreaks, earthworks, fencing, etc) unless extremely dry soil conditions

No unauthorised vehicular access to reserves (closure of vehicular access where applicable)

- Firebreaks to be maintained during dry conditions. Fire can increase the severity of disease in this infested site. Other methods of fuel load reduction other than prescribed burning are investigated. Fire management should minimise disturbance in area around Quadrat C due to large older *Banksias* which may not survive fire. Fire in this region will also negatively impact on canopy cover and leaf litter causing a rise in soil temperature and pathogen presence. Cool mosaic burning further east of this site to manage fuel load and assist seed germination is recommended
- Installation of Project Dieback signage at *Phytophthora* Dieback free protection areas and at *Phytophthora* Dieback infested areas
- Installation of Project Dieback signage at entry to priority reserves to inform users of how to reduce risk of *Phytophthora* Dieback spread
- NOTE: Investigate educational signage overlaps between cultural heritage survey recommendations, foreshore management plan recommendations and this study to aid the potential development of a co-located signage
- Immediate treatment of susceptible species within and around Quadrat C site to stabilise disease movement and assist retention of unusual occurrence of red flowering *Banksia seminuda* (after above hygiene and signage recommendations implemented)
- Develop ongoing annual monitoring and treatment program around Quadrat C and future identified *Phytophthora* Dieback-free protection areas
- Traditional owners to be consulted and included in any treatment activity
- Full extent of Wilson Inlet Foreshore Heritage Trail to be surveyed in wet weather conditions to identify areas of muddy and wet pothole areas. Such wet areas need to be surfaced with limestone and or potholes filled to reduce risk of wet soil collecting on shoes, tyre treads and subsequent redistribution of pathogen
- Future culvert design along the Wilson Inlet Foreshore Heritage Trail should divert toward already infested areas rather than introducing water-borne pathogen to uninfested sites. Consultation with Green Skills and the Denmark *Phytophthora cinnamomi* Working Group recommended
- NRM Officer to support the development of community-based monitoring along Wilson Inlet Foreshore Heritage Trail and/or establishment of "Friends of Wilson Inlet Foreshore Heritage Trail"

Recommendation:

2.3.6 It is recommended that steps be taken to prevent further assisted spread of *Phytophthora* Dieback.

Actions:

- Continue to follow the Shire of Denmark Policy No. 1 Dieback Management.
- Implement the recommended actions from the *Phytophthora* Dieback study.
- Obtain funding to map instances of *Phytophthora* Dieback along with *Phytophthora* Diebackfree protectable areas.
- Obtain funding to monitor the spread of *Phytophthora* Dieback on an ongoing basis.

2.3.7 Environmental Weeds

Environmental weeds are plants that establish themselves in natural ecosystems and modify natural processes resulting in the decline of the communities they invade.

Where the native vegetation is intact the Reserves generally have very few weeds. Weeds occur in disturbed parts of the Foreshore Reserves, along paths, tracks and some areas of the water's edge.

The majority of environmental weeds on the Foreshore Reserves result from the planting of invasive species in neighbouring properties. These garden escapees are spread by birds, wind, water or dumping of refuse. Landowners have a responsibility to control such species if they choose to use them. A list of local environmental weeds is included in Appendix 3.

There are both Declared Plants and Pest Plants listed for the Shire of Denmark. Landowners should not plant either. These are listed in Appendix 3.

Horse riding along the Heritage Trail has the potential to impact upon native vegetation by weeds being introduced through horse manure. As this is usually confined to the track surface, spraying of the resultant weed growth may be possible.

Horse riding is not permitted on the Bibbulmun Track.

In the event of fire or other major disturbances, the foreshore will be vulnerable to weed invasion and provision must be made to react quickly to monitor and control weeds when such circumstances arise.

A priority recommendation of the 1996 Denmark Foreshore Wilson Inlet Management Plan was that a rehabilitation plan for degraded areas should be prepared and implemented. This was completed in June 1996. Consistent with this, weed control and rehabilitation work has been carried out. The primary weeding phase (February – September 1997) was funded by the Shire. Subsequently, weed control has been carried out by the Denmark Weed Action Group Inc with funds as follows:

- 1998 – 2005 Water and Rivers Commission (WRC) and the Shire (Coast Care)
- 2006 – 2007 Defeating the Weeds Menace (*Lantana camara*)
- 2007 – Green Skills (Weed survey and trial control *Acacia melanoxylon*)
- 2007 – 2008 SCNRM Southern Incentives 3 Round 4/1
- 2006 – 2008 DEC Biodiversity Conservation Initiative (*Asparagus scandens*)

The current good condition of the foreshore vegetation can only be maintained with ongoing weed control, revegetation and public education, particularly with large subdivisions in progress adjacent to the Foreshore.

Recommendation:

2.3.7 It is recommended that the Shire support the current weed management regime and formalise it in a Weed Management Work Programme.

Actions:

- **Develop and document a formal Weed Management Work Programme for the Reserves.**
- **Include the Weed Management Work Programme in the Shire's Weed Strategy and Action Plan.**
- **Secure funding to contract bush regenerators to continue with implementation of the weed control programme.**
- **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.**
- **Secure funding for a collaborative weed-management project to be conducted by Denmark Weed Action Group and the Noongar Community to protect flora and cultural heritage values.**

2.3.8 Acid Sulfate Soils

In Western Australia the main impacts associated with ASS to date have been:

- Wetlands degradation.

- Localised reduction in habitat and biodiversity.
- Deterioration of surface and groundwater quality.
- Loss of groundwater for irrigation.
- Increased health risks associated with arsenic and heavy metals contamination in surface and groundwater, and acid dust.
- Risk of long-term infrastructure damage through corrosion of sub-surface pipes and foundations by acid water.
- Invasion by acid-tolerant waterplants and dominance of acid tolerant plankton species causing loss of biodiversity.

Where possible, ASS should not be disturbed. ASS are benign when left in a waterlogged, undisturbed environment. Avoiding disturbance is often the most environmentally sustainable and economic option.

Wilson Inlet as a whole has been identified as at high to moderate risk of ASS within 3 m of the natural soil surface. There is evidence of ASS at Ocean Beach and Springdale Beach subdivision.

Development on the Foreshore Reserves should be restricted to those areas designated as Recreational Development Zones identified in 2.5 and then only undertaken if essential and appropriate, ensuring strategies and management techniques are employed to mitigate potential adverse effects of ASS.

Modified surface and groundwater flow patterns and drawdown cones associated with water extraction should be considered as potential ASS issues.

The Western Australian Planning Commission (WAPC) Planning Bulletin Number 64 specifies actions that need to be taken when development is proposed in an area at risk of ASS.

Recommendation:

2.3.8 It is recommended that development in an area at risk of acid sulfate soils be undertaken only where essential and appropriate, and that potential adverse effects be mitigated.

Actions:

- **Ensure that any development on a Foreshore Reserve is appropriate and essential.**
- **Ensure that strategies and management techniques are employed to mitigate potential adverse effects of acid sulfate soils for any development on or adjacent to a Foreshore Reserve.**

2.3.9 Rehabilitation Areas

Several sites requiring revegetation were identified in the vegetation survey undertaken in 2008 and during site visits:

- The area where pine trees were removed adjacent to the access track to the mouth of the Hay River.
- Following stabilisation of erosion points along the Heritage Trail.
- Following removal of pines along the Heritage Trail.
- Below the former Wilson Inlet Holiday Park. (Future Landscaping of the foreshore area in front of the former Wilson Inlet Holiday Park should recognise the need to utilise native plants such as rushes and sedges for protecting the foreshore area but also the need to maintain a fire exclusion buffer from the Weedon Hill area.)
- Below the Waterfront Motel.
- Areas between Little River and Rainbow Close.
- Areas of unauthorised clearing.

Recommendation:

2.3.9 It is recommended that a Revegetation Programme for priority areas be developed and

implemented.

Actions:

- **Determine priority areas for revegetation.**
- **Conduct a survey for details of species, numbers, site preparation and timing for revegetation.**
- **Develop and implement a Foreshore Reserves Revegetation Works Programme.**

2.3.10 Climate Change

Climate is a driver for almost every natural resource management issue and climate change will have far-reaching impacts on many ecological, hydrological and resource-degrading processes.

Climate change underlines the importance of implementing measures to encourage biodiversity conservation.

Invasive species may be among the more important and least predictable impacts of climate change in Australia. A particular challenge in this area is the potential for „sleeper“ weeds and feral species to begin to expand their range suddenly and dramatically in response to even moderate shifts in climate.

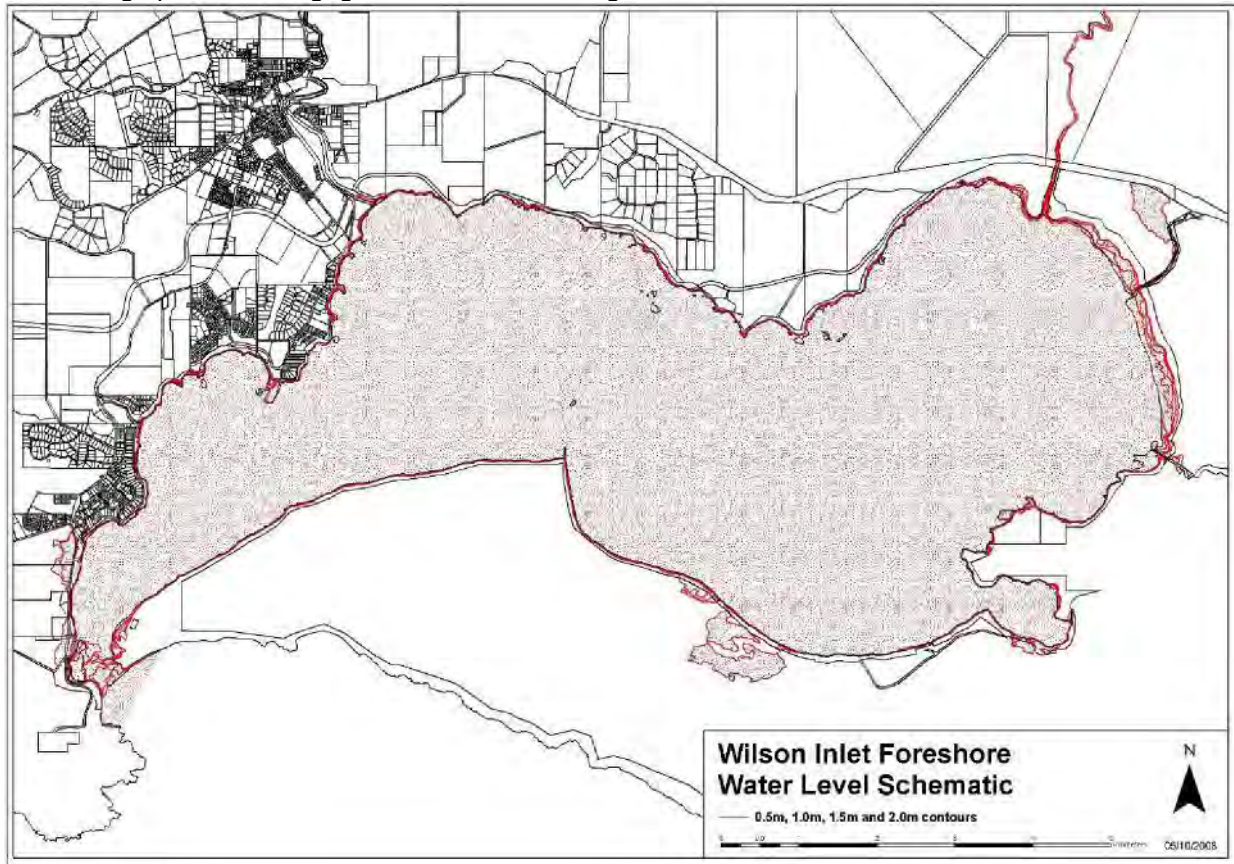
Fire is a classic example of how climate change affects other natural resources management issues and the interactions between them. From a management perspective, the biodiversity, water yield and water quality advantages from preventing huge fires and keeping fires as small as possible are considerable.

Predictions of higher temperatures, severe winds and changes to rainfall patterns have implications for all aspects of management. Employ the precautionary principle, avoid any unnecessary disturbance and undertake constructive climate change adaptation measures.

The Department of Climate Change has published a primer to assist land managers to tackle climate change issues (see <http://www.greenhouse.gov.au/impacts/publications/nrm.html>).

The DoW has carried out some climate change modelling and is producing a report entitled „The impact of climate change on rainfall and streamflow in the Denmark River catchment, Western Australia.“

The schematic below is based solely on the contours and thus does not take account of factors such as rivers backing up and flooding, groundwater level rising and the effects of wind.



The Shire of Denmark Climate Change Advisory Committee has been set up:

- To advise Council on matters relating to climate change.
- To promote achievable and practical activities for Council and the Denmark community, which are effective in reducing CO₂ emissions and the impacts of climate change.
- To identify opportunities and seek funding for CO₂ emissions reduction projects, energy efficiency and other practical climate change response initiatives, for Council and the Denmark community.
- To oversee the development of a Shire of Denmark Climate Change Action Plan for 2008–2015, with measurable milestones for Council and the Denmark community.
- To review the Climate Change Action Plan annually to identify high priority actions and ensure they are incorporated into the annual budgetary process.
- To extend the Environmental Planning and Management section of the Shire's Strategic Planning document to ensure linkages to the Climate Change Action Plan.
- To seek to develop partnerships with state and local governments and agencies, regarding Climate Change action initiatives, education and awareness-raising, and general funding resources and opportunities.

Recommendation:

2.3.10 It is recommended that progress of scientific research into climate change be followed and relevant advice be implemented.

Action:

The Shire, guided by the Climate Change Advisory Committee, to identify relevant advice and initiate actions as necessary.

2.3.11 Preservation of Heritage

Aboriginal Heritage

Preliminary findings of the Wilson Inlet Community Cultural Management Project are:

Maintaining the health of the Inlet in the face of increased development and population pressure is a core objective for the Noongar community in the management of Wilson Inlet. A key recommendation for addressing this objective is to maintain a vegetation „buffer zone“ around the extent of the Inlet's foreshore. This recommended buffer zone should extend to a minimum of 50 m above the high water mark.

Any development proposed on the Denmark River, or any other Aboriginal site within the Wilson Inlet Foreshore, especially those that require dredging, land reclamation or risk site damage, require further consultation with the Noongar community and relevant statutory approval to proceed under the Aboriginal Heritage Act 1972.

A burial is situated in the vicinity of Poddy Point and registered in a closed file with the Department of Indigenous Affairs. Information relating to this site is not available to the public. The area should be considered of high cultural significance.

Recommendation:

2.3.11a) It is recommended that the Shire of Denmark conduct consultation processes with the local indigenous community in regards indigenous heritage sites identified from the Wilson Inlet Community Cultural Management Project pertaining to management of the Foreshore Reserves.

Action:

The Shire of Denmark liaise with relevant indigenous stakeholders to conduct consultative processes in regards indigenous heritage sites identified from the Wilson Inlet Community Cultural Management Plan Project pertaining to management of the Foreshore Reserves.

European Heritage

There are few physical signs of European history on the Foreshore Reserves today, though there are photographs and documents that record places and events.

The 2008 Report on the European Cultural Heritage Values of the Regional Estuaries, South Western Australia (Volume 2) identifies twelve sites on Wilson Inlet and its surrounds. Of these one is considered of high significance and has management recommendations.

At Springdale Beach there are two concrete benches and the remains of a jetty constructed by Charlie Smith. The benches were built in 1934 and the jetty probably in the 1920s when Springdale Beach was a popular swimming and picnicking spot.

The report recommends that information and photographs relating to the history of Springdale Beach be displayed in the Heritage Trail Shelter at this site.

Recommendation:

2.3.11b) It is recommended that information and photographs relating to the European history of Springdale Beach be included in the display at the Heritage Trail Shelter.

Action:

Develop and display interpretive information on the European history of Springdale Beach at the Heritage Trail Shelter.

2.4 CONSERVATION AND PASSIVE RECREATION

Those areas of the Foreshore Reserves designated as Conservation and Passive Recreation Zones are to be managed so as to maintain and enhance habitat for flora, fungi and fauna, and protect cultural heritage sites, while allowing for some low impact recreational activities.

The areas of the Foreshore Reserves currently designated as Conservation and Passive Recreation are:

- Hay River mouth
- Crusoe Beach
- Rudgyard Beach
- Springdale Beach
- South of the Denmark Rivermouth caravan park
- Poison Point
- Adjacent to the former Wilson Inlet Holiday Park

DEC's proposal to change the purpose of Reserve 23579 (Hay River) may result in the area at the mouth of the Hay River no longer being designated a Conservation and Passive Recreation Zone.

The activities consistent with the primary purpose of these areas are:

- Walk Trails
- Bird Watching
- Photography
- Painting
- Lookouts
- Picnicking
- Dog Walking (on a leash at all times). Note: dogs are not permitted on Rudgyard Beach Nature Reserve



Development to be limited to lookouts, walk trails and board walks, using existing paths wherever possible. New requests for recreation facilities are to be assessed for suitability and necessity, and constructed in a manner such that there is minimal disturbance. Existing facilities should be well-maintained for both aesthetic and safety reasons.

Walk trail potential along the Wilson Inlet Foreshore:

- Extension of the Little River walk trail to Ridley Place and re-alignment of the Bibbulmun Track.
- Poddyshot Place to Rainbow Close is wet and steep and would need a boardwalk or similar if the track were to be extended through this area.

Recommendations:

- **2.4a) It is recommended that any development in a Conservation and Passive Recreation Zone conform to the relevant management objective.**
- **2.4b) It is recommended that recreational activities in a Conservation and Passive Recreation Zone be monitored to ensure compliance with the relevant management objective.**

Actions:

- **Keep paths, trails and access ways well-defined, marked and maintained to ensure that users of these facilities are encouraged to use them appropriately.**
- **Keep shelters, picnic tables and benches well-maintained.**
- **Install appropriate signage to indicate that domestic animals should be kept on a leash at all times.**
- **Establish procedures for assessing proposals for development in a Conservation and Passive Recreation Zone so that they conform to the relevant management objective.**
- **Ensure that construction and maintenance activities follow minimum disturbance guidelines.**
- **Monitor activities in Conservation and Passive Recreation Zones and ensure compliance with the relevant management objective.**

2.5 RECREATIONAL DEVELOPMENT

The areas of the foreshore designated as suitable for Recreational Development are:

- Denmark River mouth adjacent to the caravan park
- Yacht Club Reserve
- Poddy Shot Bay
- Ocean Beach Dog Exercise Area
- Prawn Rock Channel

Denmark River mouth and Prawn Rock Channel are priority areas for the provision of wheelchair access.

The following nodes within Conservation and Passive Recreation Zones are designated as Recreational Development Zones to allow for development of appropriate infrastructure:

- Node at the mouth of the Hay River
- Node at Crusoe Beach
- Node at Rudgyard Beach
- Node at the eastern end of Springdale Beach
- Node at Inlet Drive Lookout
- Nodes at Poison Point
-

Recommendation:

2.5a) It is recommended that any development in a Recreational Development Zone conform to the relevant management objective.

Actions:

- **Keep paths, trails, access ways, jetties and boat ramps well-defined, marked and maintained.**
- **Keep shelters, picnic tables and benches well maintained.**
- **Establish procedures for assessing proposals for development in a Recreational Development Zone so that they conform to the relevant management objective.**

Denmark River mouth



The development of the boat launching ramp and associated facilities did not include some features originally planned. The construction of a floating jetty has been funded. Other facilities needed to enable public enjoyment of this area are:

- Seating (wheelchair-accessible)
- Shade structures
- Car park modified to have a loop and marked boat-trailer parking

- Landscaping using local species

The path from the car park extends only a short distance along the foreshore. It should be extended to provide a wheelchair-accessible walk trail as far as the Yacht Club Reserve.

Recommendations:

- **2.5b) It is recommended that facilities for public recreation be installed on the foreshore at the Denmark River mouth.**
- **2.5c) It is recommended that the path from the car park at the Denmark River mouth be extended.**
- **2.5d) It is recommended that a sump be installed to the stormwater runoff from the new amenity block to strip nutrients from the water before it enters Denmark River.**

Actions:

- **Obtain funding to develop the following facilities on the foreshore at the Denmark River mouth:**
Seating (wheelchair-accessible)
Shade structures
Car park modified to have a loop and marked boat-trailer parking
Landscaping using local species
- **Obtain funding to extend the path along the foreshore from the car park at the Denmark River mouth to provide a wheelchair-accessible walk trail as far as the Yacht Club Reserve.**
- **Install a sump to the stormwater runoff from the new amenity block to strip nutrients from the water before it enters Denmark River.**

Yacht Club Reserve



The Boating Plan (2007) notes that the Yacht Club Reserve is currently unused as it is not suitable for vessels to launch from and does not have any shade areas or seating for short-term visits e.g. picnics. Although the Yacht Club site was originally intended for a yacht club site and boat launching it will take significant earth works and dredging for it to be suitable for this purpose. The site has views of the Wilson Inlet and is ideal for passive enjoyment of the area as it already has a car park and public toilets. Minor upgrades such as landscaping with local species, a picnic area with shade and wind protection, seating and a barbecue would greatly enhance this site.

Such enhancements would not affect future development of the site should the need arise.

Recommendation:

- **2.5e) It is recommended that the Yacht Club Reserve be upgraded as a picnic site.**

Actions:

- Provide picnic tables, seating, shaded areas and a barbeque at the Yacht Club Reserve.
- Delineate the parking areas at the Yacht Club Reserve.
- Ensure that facilities developed at the Yacht Club Reserve are wheelchair-accessible.

Poddy Shot Bay

This area has boat launching, fish cleaning, parking facilities and public toilets. The addition of shaded seating and picnic tables would greatly enhance its usefulness.

Recommendation:

2.5f) It is recommended that picnic facilities be added to the boat launching area at Poddy Shot Bay.

Actions:

- Provide picnic tables, seating, shaded areas at the boat launching area at Poddy Shot Bay.
- Ensure that facilities developed at the boat launching area at Poddy Shot Bay are wheelchair accessible.

Ocean Beach Dog Exercise Area

As this popular area is seasonally inundated, it has been suggested that making it an all-season facility be considered.

Recommendation:

2.5g) It is recommended that making the Ocean Beach Dog Exercise Area an all-season facility be considered.

Actions:

- Investigate the feasibility of making the Ocean Beach Dog Exercise Area an all-season facility.
- Inform residents of the outcome of the feasibility study.

Prawn Rock Channel



There is limited access to seating and shade at this site. The addition of picnic tables and seats in wheelchair accessible shaded areas would greatly enhance its attraction.

The path towards the Surf Club is unsealed as it passes alongside the road. This forces those users who are unable to negotiate the uneven surface onto the road, causing safety issues. The issues preventing the completion of the sealing of path should be resolved as soon as possible.

Recommendations:

- **2.5h) It is recommended that picnic facilities be added at Prawn Rock Channel.**
- **2.5i) It is recommended that as a priority Council investigates engineering solutions and completion of the path, to minimise the potential for vehicle, pedestrian and cyclist conflict between the Ocean Beach Lookout exit and Prawn Rock Channel Jetty.**

Actions:

- **Provide picnic tables, seating and shaded areas at Prawn Rock Channel.**
- **Ensure that facilities developed at Prawn Rock Channel are wheelchair-accessible.**
- **Resolve the issues and complete the sealing of the path towards the Surf Club from Prawn Rock Channel as soon as possible.**

Hay River Recreation Node

This is currently a popular boat launching site, particularly in the wet season when it is not possible to get under the bridge from the launch site to the north of South Coast Highway. There is urgent foreshore rehabilitation needed at the Hay River mouth and along the access track.

Until the proposed change of purpose and vesting of the Reserve is completed, it is recommended that the Shire continue to maintain the track and the boat launching area to prevent further degradation.

Recommendation:

2.5j) It is recommended that the Shire continue to maintain Reserve 23579 until the proposed change of purpose and vesting is completed.

Actions:

- **Maintain the track and the boat launching area at the Hay River mouth.**
- **Rehabilitate damaged areas at the Hay River mouth and along the access track.**

Crusoe Beach Recreation Node

This site is at the eastern end of Crusoe Beach. Currently there is a private licensed jetty and boat ramp used by commercial fishers.

This site has the potential to be upgraded to a public boat launching site. It would satisfy the need for a facility on the eastern foreshore for users of the current Hay River mouth site and for residents of the subdivisions adjoining Springdale Beach and visitors staying in tourist accommodation in the area.

Development that would be required includes:

- A finger jetty
- Upgrade of the boat ramp
- A defined car park and boat trailer parking area
- A fish-cleaning facility
- Picnic facilities and shade structures
- Composting toilets
- Upgrade of the access track from Crusoe Beach Road

Recommendation:

2.5k) It is recommended that Crusoe Beach Recreation Node be developed as the next public boat launching facility.

Actions:

- **When the need for an additional public boat launching facility is recognised, obtain funding to develop the Crusoe Beach Recreation Node.**
- **Ensure that development is restricted to the Crusoe Beach Recreation Node.**

Rudgyard Beach Recreation Node

Currently there is no public access to Rudgyard Beach. Redevelopment of the adjacent tourism-zoned property may occur in the future which may then allow public access.

Springdale Beach Recreation Node

This node is at the eastern end of Springdale Beach. It is a designated heritage site consisting of the pylons from an historic jetty and two cement benches from the 1930s. There is also one of the Heritage Trail shelters.



There are residential developments with a tourist zone located nearby, which will increase the use of the beach and the pressure for additional facilities.

WIMAG has provided specific planning advice regarding Springdale Beach in the minutes of the meeting on 25 June 2008.

There are European and Aboriginal heritage sites in the vicinity which should be considered in any development planning.

The node is unsuitable for vehicle access due to the conflict with use of the Heritage Trail and degradation of the ecology of the foreshore. A boat launching facility is not deemed appropriate at this site, although a fishing platform is appropriate.

Low impact development could include:

- Restoring the historic jetty, in keeping with its heritage aesthetic, as a fishing platform
- Establishing wheelchair-accessible paths from adjoining subdivisions to the Heritage Trail and from the Heritage Trail to Springdale Beach
- Redeveloping the shelter and the surrounding area (with minimal clearing) to provide seats and picnic facilities and pedestrian access to the fishing platform

Recommendations:

- **2.5l) It is recommended that WIMAG's advice regarding Springdale Beach be considered in the assessment of development proposals.**
- **2.5m) It is recommended that development at the Springdale Beach Recreation Node provide low-impact recreational facilities.**
- **2.5n) It is recommended that the Shire and relevant management bodies restrict any development or major disturbance at Springdale Beach to avoid impact on heritage sites.**

Actions:

- **Consider WIMAG's advice regarding Springdale Beach in the assessment of development proposals.**
- **Ensure that development proposals do not adversely impact on heritage sites.**
- **Consider the following low-impact recreational facilities for development at the Springdale Beach Recreation Node:**
 - Restoring the historic jetty, in keeping with its heritage aesthetic, as a fishing platform**
 - Establishing wheelchair-accessible walk trails up to the adjacent subdivisions**
 - Redeveloping the shelter and the surrounding area (with minimal clearing) to provide seats and picnic facilities and pedestrian access to the fishing platform**
- **Erect barriers and signs to ensure that there is no public vehicle access from the subdivisions adjoining Springdale Beach.**
- **Ensure that no boats or dinghies are left on Springdale Beach.**

Inlet Drive Lookout Recreation Node



The car park at the lookout also provides access to the walk trail to Poison Point. The parking bays should be marked. Additional parking spaces should be marked along Inlet Crescent near the entrance to the track to Poison Point.

Recommendation:

- **2.5o) It is recommended that car parking at Inlet Drive Lookout be improved.**

Actions:

- **Delineate the parking bays at the Inlet Drive Lookout.**
- **Provide marked parking spaces along Inlet Crescent near the entrance to the track to Poison Point.**

Poison Point Recreation Nodes

These sites are currently reached by a walk track, which is steep and partly eroded. The track also provides vehicle access to an informal boat launching site. There is an unlicensed jetty, which is potentially unsafe, and pylons from another old jetty.

Poison Point is a beautiful place, with unspoilt vegetation and extensive views of the Inlet. However, the Poison Point Recreation Nodes are not currently accessible to the elderly and the infirm. Poison Point could become a favourite recreation destination for residents and visitors if extensive upgrades were developed including vehicle access, picnic facilities, and wheelchair friendly fishing platforms.

Poison Point could also link with Campbell Road by constructing a wheelchair accessible track or boardwalk from Campbell Road to Poison Point.

Recommendations:

- **2.5p) It is recommended that Poison Point be upgraded to a vehicular recreation destination.**
- **2.5q) It is recommended that a wheelchair accessible track be constructed from Campbell Road to Poison Point.**

Actions:

- **Apply for partnership funding to develop Poison Point as a recreation destination.**
- **Provide for 2-wheel drive vehicular access to Poison Point by re-sheeting the current access track and laying a bitumen top incorporating drainage within the bitumen shoulder on the northern edge with grids and drainage tubes beneath the road to transfer clean water to the southern slopes, ensuring that all works are undertaken to guarantee minimal tree removal and minimize disturbance to the adjacent vegetation.**
- **Provide for a car parking area (maximum 4 bays with 1 bay designated as disabled bay), suitably located so as to ensure minimal tree removal.**
- **Provide rest-point facilities (seating, picnic tables) in a suitable locations to provide for passive nature-based recreational experiences, with facilities suitable for use by the disabled where appropriate, ensuring minimal tree removal.**

- Consider in the future the possibility of providing an all weather nature appreciation trail, surfaced with dieback free mulched vegetation, providing safe pedestrian access for the physically able and elderly to deep water fishing spots at the point.
- Consider in the future upgrading of the all weather nature appreciation trail such that it is wheelchair accessible subject to identification of appropriate funding sources being identified, environmental and cultural heritage impact assessments being undertaken and the necessary statutory approvals, if required being obtained.
- Consider the provision of a facility that will enhance the environmental experience such as a suitable wheelchair friendly bird hide and fishing platform and a wheelchair accessible path from the access road and parking area to service deep water shore based fishing at Poison Point subject to identification of appropriate funding sources being identified, environmental and cultural heritage impact assessments being undertaken and the necessary statutory approvals, if required being obtained.
- Restrict boat launching to current active commercial fishermen for use only for their business, not for public boat launching.
- Liaise with the Department of Transport and licensee/user regarding the licensing and or removal of the jetty.
- Seek the vesting of the reserve adjacent to and south of Inlet Drive to combine with the Poison Point Recreation Reserve.
- Obtain funding to construct a wheelchair-accessible track from Campbell Road to Poison Point.
- Upgrade parking at Campbell Road.

2.5.1 Fishing and Boating

Boat Launching

There are a number of informal boat launching areas, some of which are degraded. These include Cherryup and Inlet Drive near Roberts Street. Should the need arise in the future for further formal boat launching sites then the order of preference for developing them is Crusoe Beach then the Yacht Club Reserve. The site visit on 16 September 2008 with DPI ruled out Lakeview Place and Springdale Beach as potential sites.

Recommendation:

2.5.1a) It is recommended that the Shire work with the relevant authorities to assess degraded informal boat launching areas and develop solutions to prevent further damage.

Action:

Assess degraded informal boat launching areas and develop solutions to prevent further damage.

Private Jetties

Under the Jetties Act 1926, all private jetties in Western Australia require a licence issued by the Chief Executive Officer in DPI. This is to ensure that the location of the jetty does not interfere with navigation and that the design, construction and maintenance of the jetty are such that it is safe to use. DPI will consult with other relevant authorities such as the Shire and DEC, and will generally issue a licence only with the agreement of these authorities. All licensed jetties are allocated a number. This jetty licence number must be displayed on the structure above the winter high-water level, so that it is visible from the shore or water. It should be of a contrasting colour to the jetty and have figures at least 75 mm high (See <http://www.dpi.wa.gov.au/imarine/19430.asp>).

The majority of the licensed jetties on the Inlet foreshore do not have the jetty licence number displayed as specified.

There are about 6 unlicensed jetties on the Inlet foreshore. Some of these jetties are in an unsafe condition, and some have associated clearing or other damage to the adjoining foreshore and its vegetation.

There is damage to the foreshore associated with some private jetties caused by launching boats in locations not designed for such activities. A licensed jetty does not entitle the licensee to launch a boat; it is a

tethering place. The practice of launching boats from the foreshore could result in the adverse impacts of acid sulfate soils in addition to the damage to the vegetation. The risk to public safety and foreshore integrity will continue unless action is taken to enforce the regulations.

Recommendations:

- **2.5.1b) It is recommended that all jetties on the foreshore be either licensed or made unusable and safe⁶.**
- **2.5.1c) It is recommended that all licensed jetties be clearly identified.**
- **2.5.1d) It is recommended that unauthorised clearing and damage to the foreshore associated with jetty use be repaired and not repeated.**

Actions:

- **Undertake a campaign to inform owners of unlicensed jetties that licences are required for all jetties, specifying a date for compliance.**
- **Make all jetties still unlicensed after the designated date unusable and safe.**
- **Remind all licensees of the requirement to display the jetty licence number and check compliance.**
- **Inform residents and owners of property adjacent to the foreshore of the regulations and procedures governing the installation of a private jetty.**
- **Monitor adherence to jetty licensing regulations.**
- **Inform all licensees of the designated public boat launching sites at the Denmark River mouth and Poddy Shot Bay.**
- **Monitor the condition of jetties and the adjoining foreshore.**
- **Repair and revegetate unauthorised clearing and damage to the foreshore associated with jetty use.**

Sheds

There are private sheds on the western foreshore; some are in bad condition and pose a risk to public safety. Construction of private structures on the foreshore is not permitted.

Recommendations:

- **2.5.1e) It is recommended that all safe, existing sheds be licensed and monitored by the Shire.**
- **2.5.1f) It is recommended that landowners and residents of properties adjoining the foreshore be made aware that no more private structures are permitted on the foreshore.**

Actions:

- **Undertake a campaign to inform owners of unsafe sheds on the foreshore that they must be removed by a designated date.**
- **Remove all unsafe sheds still in place after the designated date.**
- **Repair and revegetate unauthorised clearing and damage to the foreshore associated with removed private sheds.**
- **Develop and implement a licensing and monitoring process for safe, existing sheds on the foreshore.**
- **Inform landowners and residents of properties adjoining the foreshore that no more private structures are permitted on the foreshore.**

⁶ Jetties should be made unusable rather than removed in order to minimise disturbance. Disturbance could lead to the adverse impacts associated with ASS.

2.5.2 Tourism

The Shire's Tourism Policy has the following objectives:

- To recognise tourism as a social and economic force and as a major or potential major employer within the Shire of Denmark.
- To foster and create a community awareness of the benefits of tourism within the Shire of Denmark.
- To ensure that Council will guide and influence the development of tourism in the Shire of Denmark.
- To provide the basic facilities and infrastructure sufficient to encourage development.
- To ensure that facilities within the Shire are adequate to cater for visitors and residents.
- To ensure that the attributes of the natural environment within the Shire are managed sustainably so as to maintain and enhance the resource base on which the tourism industry relies.

The Shire does not yet have a Tourism Strategy; this should be a component of the overall Strategic Plan for Denmark currently in development. The Tourism Strategy should ensure that the balance between maintenance of the natural environment and tourism-related activities and development on and adjoining the Inlet foreshore is consistent with the policy objectives.

Recommendation:

2.5.2a) It is recommended that a Tourism Strategy covering the Inlet foreshore be developed and implemented.

Actions:

- **Develop and implement a Tourism Strategy.**
- **Ensure that the balance between maintenance of the natural environment and tourism-related activities and development on and adjoining the Inlet foreshore is consistent with the Tourism Policy objectives.**

Visitor Information

Information for visitors to the area about the facilities on the foreshore and interpretive information about the natural features is needed.

Recommendation:

2.5.2b) It is recommended that information regarding the recreational facilities and the natural features of the Foreshore Reserves be readily available to residents and visitors.

Actions:

- **Develop a brochure outlining the conservation value and importance of the Reserves and reasons for adhering to regulations and guidelines covering the use of the Reserves for display at the Shire Offices, Denmark Visitor Centre and the Denmark Environment Centre.**
- **In the brochure include information and map of recreational facilities available on the Reserves.**

2.5.3 Camping

One of the Foreshore Reserves managed by the Shire has Camping as its purpose: Reserve 20578 at Ocean Beach, extending from the caravan park to the bar.

When the Reserve was gazetted in 1930 this area was used for camping and there were supporting facilities in place. Since then commercial tourist accommodation, including camping, has been developed along

Ocean Beach Road. This Reserve no longer has facilities to support camping. It is now neither necessary nor appropriate that the Reserve be used for camping.

Recommendation:

It is recommended that the ability to camp on Reserve 20578 be removed.

Actions:

- **Change the purpose of Reserve 20578 from Camping to Recreation.**
- **Erect signs indicating that camping is not permitted on any Foreshore Reserve managed by the Shire.**

2.5.4 Signs

There are a number of different styles of sign in use. At sites where more than one sign is displayed these can confuse and detract from each other. There are instances where a sign is misleading, such as the sign showing water ski and personal water craft areas erected at the Denmark River mouth and Poddy Shot Bay boat launch sites.

The signs at the lookout on Ocean Beach are located so that they obscure the view of the Inlet and Mount Hallowell.



Signs at Denmark River mouth



Signs at Poddy Shot Bay



Signs at Ocean Beach lookout

Recommendations:

- **2.5.4a) It is recommended that signs be clear, unambiguous and safely positioned.**
- **2.5.4b) It is recommended that signs not detract from the aesthetic values of the foreshore.**

Actions:

- **Develop standards for the design, content and location of signs.**
- **Review and revise the content and positioning of all signs on Foreshore Reserves.**

2.6 FIRE MANAGEMENT

Fire risk to the Reserves and to residential areas surrounding the Reserves must be minimised and appropriate planning and fire management measures be put in place.

In a time of accelerating climate change, drying, and the risk of increased fire frequency and intensity, it is a matter of urgency to ensure that efficient and effective fire prevention measures are in place.

2.6.1 Fire Management

The Denmark Foreshore Fire Management Plan Wilson Inlet Foreshore Hay River – Mouth of Inlet was received by the Shire Council on 10 December 2002. This plan has had limited implementation. It was due for minor review in 2005 and a major review in 2010. A desktop review was carried out in the development of this Foreshore Reserves Management Plan.

Review Results

- The current Fire Management Plan covers the following points, which have been specified as essential by the Shire:

Assessment of fire hazard levels and biomass in both the Reserves and adjoining properties.

Fire Prevention Plan with medium to long-term mitigation strategies.

Fire Response Plan outlining predetermined fire suppression responses.

Strategic Fire Access Route System.

New or proposed developments.

Building Protection Zones.

Hazard Reduction Zones.

Current Water Supplies.

Current maps.

- The maps in the current Fire Management Plan do not clearly show fire access ways or water supply points.
- The Bibbulmun Track is referred to as a Heritage Trail.
- The format of the document is not easy to follow.
- Out of date terminology.
- The data needed for fuel management has not been collected and recorded.
- There are new, improved techniques for measuring fuel loading.

The version of the Fire Management Plan included in this document has been updated to address the out of date terminology and to include references to the Bibbulmun Track where relevant. The maps in the original document are not included as they were not available in a suitable format.

Recommendation:

- **2.6.1 It is recommended that the major review of the Fire Management Plan for the Foreshore Reserves be undertaken as soon as possible.**

Actions:

- **Determine the preferred model for a Fire Management Plan and ensure that it is used in the major review of the Fire Management Plan for the Foreshore Reserves.**
- **Obtain funding for a major review of the Fire Management Plan for the Foreshore Reserves.**
- **Engage suitably qualified personnel to carry out the major review of the Fire Management Plan**

for the Foreshore Reserves.

- Ensure funding is available to implement the revised Fire Management Plan.
- Implement the revised Fire Management Plan.

2.6.2 Public Awareness

There are varying levels of understanding and awareness of bushfire risk among the local community and visitors. This poses a threat to both the Reserves and surrounding properties. Public education is essential to reduce the likelihood of bush fire events.

Recommendation:

2.6.2 It is recommended that regular public education designed to reduce the likelihood of bush fire events be undertaken.

Action:

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 major access points.
- “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 by Denmark Community Fire Manager with assistance from Ocean Beach Bush Fire Brigade, Town Bush Fire Brigade and Denmark East Bush Fire Brigade.

2.6.3 Fire Access Ways

The current system of fire access ways is not adequate for effective fire control. Along sections of the western foreshore the terrain is not suitable for fire access ways on the Reserves.

Negotiation with landowners may be necessary to secure access through private properties to the foreshore.

Suggested access points through private property are:

- Rudgyard Beach
- Wildwood Estate fire track
- Springdale Beach subdivision fire track
- In the vicinity of 11 Inlet Drive
- In the vicinity of 27 Inlet Drive
- In the vicinity of 39 Inlet Drive

- The Waterfront Motel
- In the vicinity of 75 Inlet Drive
- In the vicinity of 5 Lunan Road
- In the vicinity of 145 Inlet Drive
- In the vicinity of 3 Inlet Crescent
- Loc 5434 on Inlet Drive
- The Cove
- the former Wilson Inlet Holiday Park
- Bonnie View Farm
- In the vicinity of 13 Little River Road
- In the vicinity of 1 Maraveen Place
- Karri Bay Estate
- In the vicinity of 19 Minsterly Road
- In the vicinity of 35 Minsterly Road
- In the vicinity of 91 Minsterly Road
- In the vicinity of 119 or 121 Minsterly Road
- In the vicinity of 133 Minsterly Road
- In the vicinity of Lot 3 Minsterly Road

As described in 2.3.3, there is some existing unauthorised clearing on Foreshore Reserves that may be useful as low fuel areas in the event of fire. These should be considered when determining the access points through private property.

Fire access ways exist at:

- Springdale Heights subdivision fire track, accessed from Lake View Place.
- The Heritage Trail, accessed through private property as described above and Rudgyard Place, Lake View Place, the Golf Course to Reserve 12232 and the Trotting Track.
- The Bibbulmun Track from Campbell Road to The Cove.

Regular maintenance of these fire access ways is essential to ensure their effectiveness, for example, removing fallen trees, pruning overhanging vegetation and erosion control.

Major works are also required to install additional fire access ways, for example from Rainbow Close southwards.

The bridges on the Heritage Trail east of Crusoe Beach Road are not suitable for heavy vehicles. These will be replaced with culverts.

At Lake View Place the barrier across the fire access way to the west had been damaged and rendered ineffective; a barrier should be installed across the fire access way to the east and also the track leading to the foreshore.



Damage to fire access track barrier at Lake View Place



Fire access way and track to foreshore at Lake View Place

Recommendations:

- **2.6.3a) It is recommended that the current system of fire access ways and access points be reviewed.**
- **2.6.3b) It is recommended that up-to-date maps be readily accessible to all stakeholders.**

Actions:

- **Initiate a review of the current system of fire access ways and access points and implement construction and maintenance programmes as required.**
- **Ensure that construction and maintenance of fire access ways keeps erosion, *Phytophthora* Dieback and invasive plants under control.**
- **Erect and maintain appropriate barriers across fire access ways.**
- **Negotiate with landowners where access to Foreshore Reserves through private property is required.**
- **Keep fire maps current and distributed to all stakeholders.**

PART 3: IMPLEMENTATION

3.1 MANAGEMENT PRIORITIES REVIEW

A review of the management priorities should be undertaken by the Shire 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 REPORTING OF ACHIEVEMENTS

Milestones achieved should be reported to the community in Shire communications, such as the Shire's feature in the Denmark Bulletin.

3.4 IMPLEMENTATION PLANS

Please Note: The Noongar community should be consulted and included in the development as well as the implementation of plans for areas identified as sites on the Department of Indigenous Affairs' Register of Aboriginal Sites and places of interest to Noongar people identified in the „Wilson Inlet Cultural Management Plan 2008". This can be done through consultation and collaboration with the Albany Aboriginal Corporation and the Albany Heritage Reference Group. Noongar field crews are available to participate in on-ground site restoration work and natural resource management projects.

3.4.1 Tenure and Purpose of Reserves

Recommendation	Action required	Responsibility	Priority	When
2.1a)	Ensure that regular communication regarding management activities on the foreshore is effective.	Shire, City of Albany and DEC	H	Ongoing
2.1a)	Ensure that planning steps for any foreshore management activity include co-ordination and discussion between agencies.	Shire, City of Albany and DEC	H	Ongoing
2.1b)	The Shire to seek management responsibility of the two areas of Unallocated Crown Land along the western side of the foreshore.	Shire	H	ASAP
2.1b)	The Shire to seek management responsibility for Reserve Number 12232 and Reserve Number 22248.	Shire	H	ASAP
2.1b)	The Shire to include the two areas of Unallocated Crown Land along the western side of the foreshore in this Management Plan.	Shire	H	ASAP
2.1b)	The Shire to include Reserve Number 12232 and 22248 in this Plan.	Shire	H	ASAP
2.1c)	The Shire and DEC to determine which is the most appropriate agency to manage the area of Unallocated Crown Land along the eastern foreshore, between Reserve Number 23579 and Rudgyard Beach, and formalise the decision.	Shire, DEC	H	ASAP

Management of Reserves

Recommendation	Action required	Responsibility	Priority	When
2.2a)	The Shire to maintain a working relationship with the Noongar Community and the Department of Indigenous Affairs to ensure that cultural heritage and environmental values are given due consideration in the development of plans.	Shire, Noongar Community, Department of Indigenous Affairs	H	ongoing
2.2b)	The Shire to develop a Biodiversity Management Plan.	Shire	H	ASAP
2.2c)	The Shire to develop a Reserve Management Strategic Plan.	Shire	H	ASAP

3.4.2 Conservation

Recommendation	Action required	Responsibility	Priority	When
2.3a)	Keep paths well-defined, marked and maintained to ensure that users of these facilities are encouraged to use them appropriately.	Shire	H	Ongoing
2.3a)	Install appropriate signage to indicate that domestic animals should be restricted from accessing the Conservation Zones.	Shire	H	ASAP
2.3a)	Establish procedures for assessing proposals for path development in a Conservation Zone so that they conform to the relevant management objective.	Shire	H	ASAP
2.3a)	Ensure that path construction and maintenance activities follow minimum disturbance guidelines.	Shire	H	ASAP
2.3b)	Monitor activities in Conservation Zones and ensure compliance with the relevant management objective.	Shire	H	Ongoing
2.3c)	Realign the Bibbulmun Track so that it follows the foreshore between Little River and Ridley Place.	DEC	L	2010
2.3d)	Realign the Bibbulmun Track below the former Wilson Inlet Holiday Park so that it is wholly on the Reserve.	DEC	H	ASAP
2.3.1a)	Obtain funding and carry out a survey of the flora on the Foreshore Reserves.	Shire, Friends Groups, Denmark Environment Centre	M	2009 and ongoing
2.3.1a)	Obtain funding and carry out a survey of the fauna on the Foreshore Reserves.	Shire, Friends Groups, Denmark Environment	M	2009 and ongoing

Recommendation	Action required	Responsibility	Priority	When
		Centre		
2.3.1a)	Obtain funding and carry out a survey of the fungi on the Foreshore Reserves.	Shire, Friends Groups, Denmark Environment Centre	M	2009 and ongoing
2.3.1b)	Ensure that flora, fauna and fungi surveys comply with licensing requirements under the Wildlife Conservation Act 1950 and the Animal Welfare Act 2002.	Shire	M	Ongoing
2.3.1b)	Set up ongoing monitoring programmes of the flora, fauna and fungi, including photo points where appropriate.	Shire, Friends Groups, Denmark Environment Centre	M	Ongoing
2.3.1c)	Obtain funding and carry out monitoring of the bird populations on the Foreshore Reserves.	Shire, Friends Groups, Denmark Environment Centre	M	Ongoing
2.3.2a)	Set up the terms of reference and coordinating structure for groups of Friends of areas of the foreshore.	Friends Groups, Shire	H	2008
2.3.2a)	Provide ongoing assistance and support to the Friends groups.	Shire	M	Ongoing
2.3.3a)	Develop and implement a planning policy to ensure that development adjoining the foreshore protects its integrity.	Shire	H	ASAP
2.3.3a)	Place conditions on all future development adjoining Foreshore Reserves consistent with the objectives of the Management Plan.	Shire	H	ASAP
2.3.3a)	Ensure that conditions placed on developments are satisfied.	Shire	H	ASAP
2.3.3a)	Clearly delineate foreshore areas to prevent intrusions from livestock and discourage unauthorised use.	Shire	H	ASAP
2.3.3a)	Ensure that paths and trails guide pedestrians through the foreshore so that damage is minimised.	Shire, DEC	H	ASAP
2.3.3b)	Undertake a program of public education regarding the values, uses and protection of foreshore vegetation.	Shire, Friends Groups	H	Ongoing
2.3.3b)	Issue foreshore clearing regulations and policies to owners of properties with a boundary in common with a Foreshore Reserve on receipt of rezoning	Shire	H	Ongoing

Recommendation	Action required	Responsibility	Priority	When
	applications, on receipt of subdivision applications, following transfer to new property owners and with the issue of a building licence.			
2.3.3b)	Issue clearing regulations under the Environmental Protection Act to owners of adjoining properties unless there is a subdivision approval with special clearing exemptions.	Shire	H	Ongoing
2.3.3b)	Enforce penalties for unauthorised clearing of native vegetation in the Foreshore Reserves.	Shire	H	Ongoing
2.3.3b)	Enforce penalties for dumping of garden waste in the Foreshore Reserves.	Shire	H	Ongoing
2.3.3c)	Conduct a survey of all areas of clearing on Foreshore Reserves to identify those suitable as low fuel areas for fire control and maintenance activities.	Shire, FESA	H	2009
2.3.3c)	Establish maintenance regimes for designated low fuel areas.	Shire, FESA	H	Ongoing
2.3.3c)	Rehabilitate those areas of unauthorised clearing not designated as low fuel areas.	Shire	M	Ongoing
2.3.3c)	Ensure that residents of properties adjoining Foreshore Reserves are aware that clearing is not permitted.	Shire	H	Ongoing
2.3.3d)	Ensure that the visual impact of any development on the view from the Inlet is included with applications for building consent.	Shire	H	Ongoing
2.3.3d)	Ensure that the designs, materials and colours of structures complement surrounding landscape elements.	Shire	H	Ongoing
2.3.3d)	Ensure that structures are sited away from major natural focal points such as headlands or ridgelines.	Shire	H	Ongoing
2.3.3e)	Promote membership of Friends groups to adjoining residents and landowners.	Shire, Friends Groups	H	Ongoing
2.3.3e)	Conduct invasive species information sessions for residents and landowners	Shire, Friends Groups	M	Ongoing
2.3.3e)	Conduct fire awareness training for residents and landowners.	Shire, FESA	H	Ongoing
2.3.3e)	Provide information for residents and landowners on appropriate use of public land.	Shire, Friends Groups	H	Ongoing
2.3.3e)	Monitor the Reserves' boundaries for unauthorised activities.	Shire, Friends Groups	H	Ongoing

Recommendation	Action required	Responsibility	Priority	When
2.3.3f)	Prevent public vehicle access to the foreshore from Lake View Place, while allowing pedestrian access.	Shire	H	2009
2.3.3f)	Prevent further erosion on the track to the foreshore from Lake View Place.	Shire	M	2009
2.3.3f)	Prevent vehicle access to the foreshore at Little River through private properties on Maraveen Place.	Shire	M	2009
2.3.4a)	A stormwater management policy should be prepared which includes: <ul style="list-style-type: none"> • Controls on discharge of water. • Maintenance of waterway vegetation. • Road drainage and upkeep of culverts. • Maintenance of access ways and trails to prevent erosion. • Careful design of access ways, walk trails, car parks and any other facility on the foreshore. 	Shire	M	2010
2.3.4b)	Prevent direct stormwater discharge into the Foreshore Reserves.	Shire	M	Ongoing
2.3.4b)	Locate nutrient stripping basins on land outside the foreshore.	Shire, land holders	H	Ongoing
2.3.5a)	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, DEC	M	2010
2.3.5a)	Ensure compliance by following up complaints.	Shire, DEC	H	Ongoing
2.3.5b)	Implement appropriate fox control measures in coordination with DEC activities on adjoining Reserves.	Shire, DEC	M	Ongoing
2.3.5b)	Implement appropriate feral cat control measures in coordination with DEC activities on adjoining Reserves.	Shire, DEC	M	Ongoing
2.3.5b)	Work with DEC on a rabbit baiting program where there is a specific biodiversity value at risk, otherwise investigate the use of traps for areas where rabbits are of concern.	Shire, DEC	M	Ongoing
2.3.6	Continue to follow the Shire of Denmark Policy No. 1 Dieback Management.	Shire, DEC	H	Ongoing
2.3.6	Implement the recommended actions from the <i>Phytophthora</i> Dieback study.	Shire, DEC	H	Ongoing
2.3.6	Obtain funding to map instances of	Shire, DEC	H	Ongoing

Recommendation	Action required	Responsibility	Priority	When
	<i>Phytophthora</i> Dieback along with <i>Phytophthora</i> Dieback-free protectable areas.			
2.3.6	Obtain funding to monitor the spread of <i>Phytophthora</i> Dieback on an ongoing basis.	Shire, DEC	M	2010
2.3.7	Develop and document a formal Weed Management Work Programme for the Reserves.	Shire, Friends Groups	M	2010
2.3.7	Include the Weed Management Work Programme in the Shire's Weed Strategy and Action Plan.	Shire, Friends Groups	M	2010
2.3.7	Secure funding to contract bush regenerators to continue with implementation of the weed control programme.	Shire, Friends Groups	H	2009
2.3.7	Advise adjacent residents of the problems caused by invasive species escaping from their gardens.	Shire, Friends Groups	H	Ongoing
2.3.7	Promote the use of non-invasive plants.	Shire, Friends Groups	H	Ongoing
2.3.7	Hold field trips and workshops to educate the public about the native flora, fungi and fauna and the identification and control of invasive species.	Shire, Friends Groups, Denmark Environment Centre	M	Ongoing
2.3.7	Secure funding for a collaborative weed-management project to be conducted by Denmark Weed Action Group and the Noongar Community to protect flora and cultural heritage values.	Shire, DWAG, Noongar Community	M	2010
2.3.8	Ensure that any development on a Foreshore Reserve is appropriate and essential.	Shire	H	Ongoing
2.3.8	Ensure that strategies and management techniques are employed to mitigate potential adverse effects of acid sulphate soils for any development on or adjacent to a Foreshore Reserve.	Shire, DEC	H	Ongoing
2.3.9	Determine priority areas for revegetation.	Shire	M	2010
2.3.9	Conduct a survey for details of species, numbers, site preparation and timing for revegetation.	Shire	M	2010
2.3.9	Develop and implement a Foreshore Reserves Revegetation Works Programme.	Shire, Friends Groups	M	2010
2.3.10	The Shire, guided by the Climate Change Advisory Committee, to identify relevant advice and initiate actions as necessary.	Shire	M	Ongoing

Recommendation	Action required	Responsibility	Priority	When
2.3.11a)	The Shire of Denmark liaise with relevant indigenous stakeholders to conduct consultative processes in regards indigenous heritage sites identified from the Wilson Inlet Community Cultural Management Plan Project pertaining to management of the Foreshore Reserves.	Shire	L	Ongoing
2.3.11b)	Develop and display interpretive information on the European history of Springdale Beach at the Heritage Trail Shelter.	Shire, Friends Groups	L	2010

3.4.3 Conservation and Passive Recreation

Recommendation	Action required	Responsibility	Priority	When
2.4a)	Keep paths, trails and access ways well-defined, marked and maintained to ensure that users of these facilities are encouraged to use them appropriately.	Shire, DEC	M	Ongoing
2.4a)	Keep shelters, picnic tables and benches well-maintained.	Shire	M	Ongoing
2.4a)	Install appropriate signage to indicate that domestic animals should be kept on a leash at all times.	Shire, DEC	M	2010
2.4a)	Establish procedures for assessing proposals for development in a Conservation and Passive Recreation Zone so that they conform to the relevant management objective.	Shire	M	2010
2.4a)	Ensure that construction and maintenance activities follow minimum disturbance guidelines.	Shire	H	Ongoing
2.4b)	Monitor activities in Conservation and Passive Recreation Zones and ensure compliance with the relevant management objective.	Shire, Friends Groups	M	Ongoing

3.4.4 Recreational Development

Recommendation	Action required	Responsibility	Priority	When
2.5a)	Keep paths, trails, access ways, jetties and boat ramps well-defined, marked and maintained.	Shire, DPI	M	Ongoing
2.5a)	Keep shelters, picnic tables and benches well maintained.	Shire, Friends Groups	M	Ongoing
2.5a)	Establish procedures for assessing proposals for development in a Recreational Development Zone so that they conform to the relevant management objective.	Shire	M	2010
2.5b)	Obtain funding to develop the following facilities on the foreshore at the Denmark River mouth: <ul style="list-style-type: none"> • Seating (wheelchair-accessible) • Shade structures • Car park modified to have a loop and marked boat-trailer parking • Landscaping using local species 	Shire, DPI	M	2010

Recommendation	Action required	Responsibility	Priority	When
2.5c)	Obtain funding to extend the path along the foreshore from the car park at the Denmark River mouth to provide a wheelchair-accessible walk trail as far as the Yacht Club Reserve.	Shire, Friends Groups	L	2015
2.5d)	Install a sump to the stormwater runoff from the new amenity block to strip nutrients from the water before it enters Denmark River.	Shire	M	2010
2.5e)	Provide picnic tables, seating, shaded areas and a barbeque at the Yacht Club Reserve.	Shire	M	2010
2.5e)	Delineate the parking areas at the Yacht Club Reserve.	Shire	M	2010
2.5e)	Ensure that facilities developed at the Yacht Club Reserve are wheelchair-accessible.	Shire	M	2010
2.5f)	Provide picnic tables, seating, shaded areas at the boat launching area at Poddy Shot Bay.	Shire	M	2010
2.5f)	Ensure that facilities developed at the boat launching area at Poddy Shot Bay are wheelchair accessible.	Shire	M	2010
2.5g)	Investigate the feasibility of making the Ocean Beach Dog Exercise Area an all-season facility.	Shire	L	2010
2.5g)	Inform residents of the outcome of the feasibility study.	Shire	L	2010
2.5h)	Provide picnic tables, seating and shaded areas at Prawn Rock Channel.	Shire	M	2010
2.5h)	Ensure that facilities developed at Prawn Rock Channel are wheelchair-accessible.	Shire	M	2010
2.5i)	Resolve the issues and complete the sealing of the path towards the Surf Club from Prawn Rock Channel as soon as possible.	Shire	H	2009
2.5j)	Maintain the track and the boat launching area at the Hay River mouth.	Shire	M	Ongoing
2.5j)	Rehabilitate damaged areas at the Hay River mouth and along the access track	Shire	M	Ongoing
2.5k)	When the need for an additional public boat launching facility is recognised, obtain funding to develop the Crusoe Beach Recreation Node.	Shire	L	When required
2.5k)	Ensure that development is restricted to the Crusoe Beach Recreation Node.	Shire	L	When required
2.5l)	Consider WIMAG's advice regarding	Shire	H	Ongoing

Recommendation	Action required	Responsibility	Priority	When
	Springdale Beach in the assessment of development proposals.			
2.5m)	<p>Consider the following low-impact recreational facilities for development at the Springdale Beach Recreation Node:</p> <ul style="list-style-type: none"> • Restoring the historic jetty, in keeping with its heritage aesthetic, as a fishing platform • Establishing wheelchair-accessible walk trails up to the adjacent subdivisions • Redeveloping the shelter and the surrounding area (with minimal clearing) to provide seats and picnic facilities and pedestrian access to the fishing platform 	Shire	H	2009
2.5m)	Erect barriers and signs to ensure that there is no public vehicle access from the subdivisions adjoining Springdale Beach.	Shire	H	2008
2.5m)	Ensure that no boats or dinghies are left on Springdale Beach	Shire	M	Ongoing
2.5n)	Ensure that development proposals do not adversely impact on heritage sites.	Shire, relevant authorities	H	Ongoing
2.5o)	Delineate the parking bays at the Inlet Drive Lookout.	Shire	M	2009
2.5o)	Provide marked parking spaces along Inlet Crescent near the entrance to the track to Poison Point.	Shire	L	2015
2.5p)	Apply for partnership funding to develop Poison Point as a recreation destination.	Shire	H	2012
2.5p)	Provide for 2-wheel drive vehicular access to Poison Point by re-sheeting the current access track and laying a bitumen top incorporating drainage within the bitumen shoulder on the northern edge with grids and drainage tubes beneath the road to transfer clean water to the southern slopes, ensuring that all works are undertaken to guarantee minimal tree removal and minimize disturbance to the adjacent vegetation.	Shire	H	2012
2.5p)	Provide for a car parking area (maximum 4 bays with 1 bay designated as disabled bay), suitably located so as to ensure minimal tree removal.	Shire	H	2012

Recommendation	Action required	Responsibility	Priority	When
2.5p)	Provide rest-point facilities (seating, picnic tables) in a suitable locations to provide for passive nature-based recreational experiences, with facilities suitable for use by the disabled where appropriate, ensuring minimal tree removal.	Shire	M-H	2012-2015
2.5p)	Consider in the future the possibility of providing an all weather nature appreciation trail, surfaced with dieback free mulched vegetation, providing safe pedestrian access for the physically able and elderly to deep water fishing spots at the point.	Shire	M	2015
2.5p)	Consider in the future upgrading of the all weather nature appreciation trail such that it is wheelchair accessible subject to identification of appropriate funding sources being identified, environmental and cultural heritage impact assessments being undertaken and the necessary statutory approvals, if required being obtained.	Shire	L	2015-2018
2.5p)	Consider the provision of a facility that will enhance the environmental experience such as a suitable wheelchair friendly bird hide and fishing platform and a wheelchair accessible path from the access road and parking area to service deep water shore based fishing at Poison Point subject to identification of appropriate funding sources being identified, environmental and cultural heritage impact assessments being undertaken and the necessary statutory approvals, if required being obtained.	Shire	L	2015 - 2018
2.5p)	Restrict boat launching to current active commercial fishermen for use only for their business, not for public boat launching.	Shire	M - H	2012
2.5p)	Liaise with the Department of Transport and licensee/user regarding the licensing and or removal of the jetty.	Shire	H	2012
2.5p)	Seek the vesting of the reserve adjacent to and south of Inlet Drive to combine with the Poison Point Recreation Reserve.	Shire	H	2011
2.5q)	Obtain funding to construct a wheelchair-accessible track from Campbell Road to Poison Point.	Shire	L	2015
2.5q)	Upgrade parking at Campbell Road.	Shire	L	2015

Recommendation	Action required	Responsibility	Priority	When
2.5.1a)	Assess degraded informal boat launching areas and develop solutions to prevent further damage.	Shire, relevant authorities	H	2009
2.5.1b)	Undertake a campaign to inform owners of unlicensed jetties that licences are required for all jetties, specifying a date for compliance.	Shire, DPI	M	2009
2.5.1b)	Make all jetties still unlicensed after the designated date unusable and safe.	Shire, DPI	M	2009
2.5.1c)	Remind all licensees of the requirement to display the jetty licence number.	Shire, DPI	M	2009
2.5.1b), 2.5.1a)	Inform residents and owners of property adjacent to the foreshore of the regulations and procedures governing the installation of a private jetty.	Shire, DPI	M	Ongoing
2.5.1b), 2.5.1c)	Monitor adherence to jetty licensing regulations.	DPI	M	Ongoing
2.5.1b), 2.5.1c)	Inform all licensees of the designated public boat launching sites at the Denmark River mouth and Poddy Shot Bay.	Shire	M	2010
2.5.1b), 2.5.1c), 2.5.1d)	Monitor the condition of jetties and the adjoining foreshore.	DPI, Shire	M	Ongoing
2.5.1d)	Repair and revegetate unauthorised clearing and damage to the foreshore associated with jetty use.	Shire, Property owners	H	ASAP and Ongoing
2.5.1e)	Undertake a campaign to inform owners of unsafe sheds on the foreshore that they must be removed by a designated date.	Shire	M	2010
2.5.1e)	Remove all unsafe sheds still in place after the designated date.	Shire	M	ASAP
2.5.1e)	Repair and revegetate unauthorised clearing and damage to the foreshore associated with removed private sheds.	Shire	M	2010
2.5.1e)	Develop and implement a licensing and monitoring process for safe, existing sheds on the foreshore.	Shire	M	ASAP
2.5.1f)	Inform landowners and residents of properties adjoining the foreshore that no more private structures are permitted on the foreshore.	Shire	M	Ongoing
2.5.2a)	Develop and implement a Tourism Strategy.	Shire	M	ASAP
2.5.2a)	Ensure that the balance between maintenance of the natural environment and tourism-related activities and development on and adjoining the Inlet foreshore is consistent with the Tourism Policy objectives.	Shire	H	Ongoing

2.5.2b)	Develop a brochure outlining the conservation value and importance of the Reserves and reasons for adhering to regulations and guidelines covering the use of the Reserves for display at the Shire Offices, Denmark Visitor Centre and the Denmark Environment Centre.	Shire, Friends Groups, Denmark Environment Centre	M	2009
2.5.2b)	In the brochure include information and map of recreational facilities available on the Reserves.	Shire, Friends Groups, Denmark Environment Centre	M	2009
2.5.3	Change the purpose of Reserve 20578 from Camping to Recreation.	Shire	L	2015
2.5.3	Erect signs indicating that camping is not permitted on any Foreshore Reserve managed by the Shire.	Shire	M	2010
2.5.4a)	Develop standards for the design, content and location of signs.	Shire	M	2010
2.5.4b)	Review and revise the content and positioning of all signs on Foreshore Reserves.	Shire	M	2010

3.4.5 Fire Management

Recommendation	Action required	Responsibility	Priority	When
2.6.1	Determine the preferred model for a Fire Management Plan and ensure that it is used in the major review of the Fire Management Plan for the Foreshore Reserves.	Shire	H	2009
2.6.1	Obtain funding for a major review of the Fire Management Plan for the Foreshore Reserves.	Shire	H	2009
2.6.1	Engage suitably qualified personnel to carry out the major review of the Fire Management Plan for the Foreshore Reserves.	Shire	H	2009
2.6.1	Ensure funding is available to implement the revised Fire Management Plan.	Shire	H	2009
2.6.1	Implement the revised Fire Management Plan.	Shire	H	2009

2.6.2	<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 major access points. • “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 by Denmark Community Fire Manager with assistance from Ocean Beach Bush Fire Brigade, Town Bush Fire Brigade and Denmark East Bush Fire Brigade. 	Shire	H	Ongoing
2.6.3a)	Initiate a review of the current system of fire access ways and access points and implement construction and maintenance programmes as required.	Shire	H	2009
2.6.3a)	Ensure that construction and maintenance of fire access ways keeps erosion, <i>Phytophthora</i> Dieback and invasive plants under control.	Shire	H	Ongoing
2.6.3a)	Erect and maintain appropriate barriers across fire access ways.	Shire	H	2009 and Ongoing
2.6.3a)	Negotiate with landowners where access to Foreshore Reserves through private property is required.	Shire	H	2009 and Ongoing
2.6.3b)	Keep fire maps current and distributed to all stakeholders.	Shire	H	Ongoing

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APPENDIX 1 – Foreshore Reserves Fauna Lists

Birds

1 Regan G., (1997) *A Vertebrate Fauna Survey of the Denmark Foreshore Wilson Inlet*, Source: *Draft Foreshore Management Plan Denmark to Hay Rivers 2001*

2 Hodgkin E.P. & Clark R., (1988) *Estuaries and Coastal Lagoons of South Western Australia. Wilson Inlet, Irwin Inlet, Parry Inlet, Estuaries of the Denmark Shire*. Environmental Protection Authority, Perth Western Australia, Estuarine Studies Series, Number 3
Source: *Denmark Foreshore Wilson Inlet Management Plan 1996*

3 Bondin A., (2008) *Birds as an indicator of biodiversity changes at Wilson Inlet foreshore reserves, Appendix 1*, Green Skills

4 Bondin A., (2008) *Birds as an indicator of biodiversity changes at Wilson Inlet foreshore reserves, Appendix 2*, Green Skills

	Scientific name	Common name	Reference			
			1	2	3	4
ANSERIFORMES						
Anatidae	<i>Biziura lobata</i>	Musk Duck	■	■	■	—
Anatidae	<i>Cygnus atratus</i>	Black Swan	■	■	■	—
Anatidae	<i>Tadorna tadornoides</i>	Australian Shelduck	■	■	■	—
Anatidae	<i>Chenonetta jubata</i>	Australian Wood Duck			■	—
Anatidae	<i>Anas gracilis (gibberifrons)</i>	Grey Teal	■	■	■	—
Anatidae	<i>Anas castanea</i>	Chestnut Teal				—
Anatidae	<i>Anas superciliosa</i>	Pacific Black Duck	■	■	■	—
Anatidae	<i>Aythya australis</i>	Hardhead				—
PODICIPEDIFORMES						
Podicipedidae	<i>Tachybaptus novaehollandiae</i>	Australasian Grebe			■	—
Podicipedidae	<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe			■	
COLUMBIFORMES						
Columbidae	<i>Phaps chalcoptera</i>	Common Bronzewing	■		■	—
Columbidae	<i>Phaps elegans</i>	Brush Bronzewing				—
PHALACROCORACIFORMES						
Anhingidae	<i>Anhinga novaehollandiae</i>	Australasian Darter				—
Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	Little Pied Cormorant	■	■	■	—
Phalacrocoracidae	<i>Phalacrocorax carbo</i>	Great Cormorant	■			—
Phalacrocoracidae	<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	■	■	—	
Phalacrocoracidae	<i>Phalacrocorax varius</i>	Pied Cormorant				—
CICONIIFORMES						
Pelecanidae	<i>Pelecanus conspicillatus</i>	Australian Pelican	■	■	■	—
Ardeidae	<i>Ardea modesta</i>	Eastern Great Egret			■	—
Ardeidae	<i>Egretta (Ardea) novaehollandiae</i>	White-faced Heron	■		■	—
Ardeidae	<i>Egretta alba</i>	Great Egret	—			
Ardeidae	<i>Egretta garzetta</i>	Little Egret			■	—
Ardeidae	<i>Nycticorax caledonicus</i>	Nankeen Night Heron				—
Threskiornithidae	<i>Platalea flavipes</i>	Yellow-billed Spoonbill			■	—
Threskiornithidae	<i>Threskiornis aethiopica</i>	Sacred Ibis	—			
Threskiornithidae	<i>Threskiornis molucca</i>	Australian White Ibis			■	—
Threskiornithidae	<i>Threskiornis spinicollis</i>	Straw-necked Ibis	■		■	—

	Scientific name	Common name	Reference			
			1	2	3	4
ACCIPITRIFORMES						
Accipitridae	<i>Pandion cristatus</i>	Eastern Osprey			■	—
Accipitridae	<i>Lophoictinia isura</i>	Square-tailed Kite				—
Accipitridae	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	■		■	—
Accipitridae	<i>Haliastur sphenurus</i>	Whistling Kite	■	■	■	—
Accipitridae	<i>Accipiter cirrhocephalus</i>	Collared Sparrowhawk				—
Accipitridae	<i>Accipiter fasciatus</i>	Brown Goshawk				—
Accipitridae	<i>Circus approximans</i>	Swamp Harrier				—
Accipitridae	<i>Aquila audax</i>	Wedge-tailed Eagle				—
FALCONIFORMES						
Falconidae	<i>Falco cenchroides</i>	Nankeen Kestrel	■	■		—
GRUIFORMES						
Rallidae	<i>Fulica atra</i>	Eurasian Coot	■	■	■	—
Rallidae	<i>Gallinula tenebrosa</i>	Dusky Moorhen	■			—
Rallidae	<i>Porphyrio porphyrio</i>	Purple Swamphen				—
CHARADRIIFORMES						
Haematopodidae	<i>Haematopus longirostris</i>	Australian Pied Oystercatcher		■	■	—
Haematopodidae	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	■	■		—
Recurvirostridae	<i>Himantopus himantopus</i>	Black-winged Stilt				—
Recurvirostridae	<i>Cladorhynchus leucocephalus</i>	Banded Stilt		■		—
Recurvirostridae	<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet				—
Charadriidae	<i>Pluvialis fulva</i>	Pacific Golden Plover				—
Charadriidae	<i>Pluvialis squatarola</i>	Grey Plover				—
Charadriidae	<i>Charadrius ruficapilus</i>	Red-capped Plover				—
Charadriidae	<i>Charadrius leschenaultia</i>	Greater Sand Plover				—
Charadriidae	<i>Thinomis rubricollis</i>	Hooded Plover				—
Charadriidae	<i>Erythronyx cinctus</i>	Red-kneed Dotterel				—
Scolopacidae	<i>Limosa lapponica</i>	Bar-tailed Godwit				—
Scolopacidae	<i>Actitis hypoleucos</i>	Common Sandpiper				—
Scolopacidae	<i>Tringa nebularia</i>	Common Greenshank				—
Scolopacidae	<i>Callidris tenuirostris</i>	Great Knot				■
Scolopacidae	<i>Callidris ruficollis</i>	Red-necked Stint				—
Scolopacidae	<i>Callidris acuminata</i>	Sharp-tailed Sandpiper				—
Scolopacidae	<i>Callidris ferruginea</i>	Curlew Sandpiper				■
Laridae	<i>Sternula nereis</i>	Fairy Tern				—
Laridae	<i>Hydroprogne caspia</i>	Caspian Tern			■	—
Laridae	<i>Chlidonias hybridus</i>	Whiskered Tern				■
Laridae	<i>Thalasseus bergii</i>	Crested Tern			■	—
Laridae	<i>Larus pacificus</i>	Pacific Gull			■	—
Laridae	<i>Chroicocephalus novaehollandiae</i>	Silver Gull	■	■	■	—

	Scientific name	Common name	Reference			
			1	2	3	4
PSITTACIFORMES						
Cacatuidae	<i>Calyptorhynchus latorstris</i>	Carnaby's Black-Cockatoo	■		■	—
Cacatuidae	<i>Calyptorhynchus baudinii</i>	Baudin's Black-Cockatoo	■			—
Cacatuidae	<i>Eolophus roseicapillus</i>	Galah				—
Psittacidae	<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet	■	■	■	—
Psittacidae	<i>Platycercus icterotis</i>	Western Rosella	■	■	■	—
Psittacidae	<i>Barnardius (Platycercus) zonarius</i>	Australian Ringneck	■	■	■	—
Psittacidae	<i>Purpureicephalus (Platycercus) spurius</i>	Red-capped Parrot	■	■	■	—
Psittacidae	<i>Neophema elegans</i>	Elegant Parrot				—
Psittacidae	<i>Neophema petrophila</i>	Rock Parrot				—
CUCULIFORMES						
Cuculidae	<i>Chalcites lucidus</i>	Shining Bronze Cuckoo	■			—
Cuculidae	<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo			■	—
STRIGIFORMES						
Strigidae	<i>Ninox novaeseelandiae</i>	Southern Boobook				—
CORACIIFORMES						
Halcyonidae	<i>Dacelo novaeguineae*</i>	Laughing Kookaburra	■		■	—
Halcyonidae	<i>Todiramphus sanctus</i>	Sacred Kingfisher	■		■	—
PASSERIFORMES						
Maluridae	<i>Malurus splendens</i>	Splendid Fairy-wren			■	—
Maluridae	<i>Malurus elegans</i>	Red-winged Fairy-wren			■	—
Maluridae	<i>Stipiturus malachurus</i>	Southern Emu-wren			■	—
Acanthizidae	<i>Sericornis frontalis</i>	White-browed Scrubwren			■	—
Acanthizidae	<i>Gerygone fusca</i>	Western Gerygone			■	—
Acanthizidae	<i>Acanthiza apicalis</i>	Inland Thornbill			■	—
Acanthizidae	<i>Acanthiza inornata</i>	Western Thornbill	■			—
Acanthizidae	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	■			—
Pardalotidae	<i>Pardalotus punctatus</i>	Spotted Pardalote			■	—
Pardalotidae	<i>Pardalotus striatus</i>	Striated Pardalote				—
Meliphagidae	<i>Acanthorhynchus superciliosus</i>	Western Spinebill			■	—
Meliphagidae	<i>Anthochaera lunulata</i>	Western Wattlebird				—
Meliphagidae	<i>Anthochaera carnunculata</i>	Red Wattlebird	■	■	■	—
Meliphagidae	<i>Lichmera indistincta</i>	Brown Honeyeater				—
Meliphagidae	<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	■	■	■	—
Meliphagidae	<i>Melithreptus lunatus</i>	White-naped Honeyeater			■	—
Neosittidae	<i>Daphoenositta chrysoptera</i>	Varied Sittella			■	—
Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	■		■	—
Pachycephalidae	<i>Pachycephala pectoralis</i>	Golden Whistler			■	—
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	■		■	—
Artamidae	<i>Artamus cyanopterus</i>	Dusky Woodswallow				—
Artamidae	<i>Cracticus tibicen</i>	Australian Magpie			■	—

	Scientific name	Common name	Reference			
			1	2	3	4
Artamidae	<i>Strepera versicolor</i>	Grey Currawong				—
Ripiduridae	<i>Rhipidura albiscapa</i>	Grey Fantail			■	—
Ripiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail			■	—
Corvidae	<i>Corvus coronoides</i>	Australian Raven	■		■	—
Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark	■		■	—
Petroicidae	<i>Eopsaltria georgiana</i>	White-breasted Robin			■	—
Megaluridae	<i>Megalurus gramineus</i>	Little Grassbird			■	—
Timaliidae	<i>Zosterops lateralis</i>	Silvereye			■	—
Hirundinidae	<i>Hirundo neoxena</i>	Welcome Swallow			■	—
Hirundinidae	<i>Petrochelidon nigricans</i>	Tree Martin	■			—
Estrildidae	<i>Stagonopleura oculata</i>	Red-eared Firetail	■		■	—
Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian Pipit	■	■		—

* Introduced species

Taxonomy based on Christidis L. & Boles W.E., (2008) *Systematics and Taxonomy of Australian Birds*. CSIRO Publishing, Melbourne
 New Atlas of Australian Birds database held by Birds Australia, Carlton, Victoria

Annual Summer Wader Count Data for Wilson Inlet

(Main count areas: Morley Beach complex and Lake Nenamup) Bold numbers indicate greater than 1% of world population

Source: Albany Bird Group, July 2008

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	1% level of world population
Australian Pied Oystercatcher	2			1		3	2			13	4	5	9	4		11
Sooty Oystercatcher						2										40
Black-winged Stilt	45	180	2	43	519	53	2	206	121	274	291	117	140	476	55	3000
Banded Stilt	700	219		62	767			316	187	1477	132	1095		159		2100
Red-necked Avocet	2000	1150	202	519	1253	59	66	375	360	400	767	781	160	44	12	1110
Pacific Golden Plover							8			28		14				1000
Grey Plover	1								4	4	2		1			1300
Red-capped Plover	150	1053	326	329	460	69	49	635	456	877	302	825	161	261		950
Lesser Sand Plover											1	1				1300
Greater Sand Plover				4	2				1							1000
Hooded Plover		1														60
Black-tailed Godwit						1			6							1600
Bar-tailed Godwit		2		6		2			2		2		2			1500
Godwit sp.											1					
Terek Sandpiper		1														500
Common Greenshank	15	216	7	31	275	87	33	117	133	112	52	166	142	267	5	550
Wood Sandpiper											1					1000
Ruddy Turnstone	2				1											1000
Red Knot												3				2200
Red-necked Stint	400	3402	2148	2406	2709	865	390	3663	1861	3478	407	1615	1303	3678	12	3200
Long-toed Stint										1						1000
Sharp-tailed Sandpiper	236	123	1	4	1059	5	3	26	4	33	10	109	24	28		1600
Curlew Sandpiper	355	389	732	371	552	262	73	9	2	270	67	32	29			1800
Unidentified waders									40							
Total count	3906	6736	3418	3776	7597	1408	626	5347	3177	6967	2039	4763	1662	4917	87	

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Mammals

1 Regan G., (1997) *A Vertebrate Fauna Survey of the Denmark Foreshore Wilson Inlet*, Source: *Draft Foreshore Management Plan Denmark to Hay Rivers* 2001

2 Hodgkin E. & Clark R., (1988) *Estuarine Studies Series No. 3, Wilson, Irwin and Parry Inlets*, Environmental Protection Authority, WA, Source: *Denmark Foreshore Wilson Inlet Management Plan* 1996

3 Smith T., *Birds, Reptiles, Frogs and Mammals of the Beveridge Road and Denmark River Bush Reserves*. Included as it is likely that these animals are present.

Scientific name	Common name	Reference		
		1	2	3
<i>Tachyglossus aculeatus</i>	Short Beaked Echidna			~
<i>Dasyurus geoffroii</i>	Western Quoll (Chuditch)			~
<i>Phascogale tapoatafa</i> #	Brush-Tailed Phascogale			
<i>Hydromys chrysogaster</i>	Water-Rat	~		
<i>Tarsipes rostratus</i>	Honey Possum	'	'	
<i>Cercartetus concinnus</i>	Pygmy Possum	~		
<i>Antechinus flavipes</i>	Mardo	'	'	~
<i>Smithopsis grisoventer</i>	Grey Bellied Dunnart			
<i>Isodon obesulus</i>	Quenda			
<i>Trichosurus vulpecula</i>	Brushtail Possum	~		
<i>Pseudocheirus occidentalis</i>	Ringtail Possum	~		
<i>Macropus fuliginosus</i>	Western Grey Kangaroo	~		
<i>Rattus fuscipes</i>	Bush Rat			
<i>Nyctinomops australis</i>	White Striped Mastiff Bat			~
<i>Chalinolobus gouldi</i>	Gould's Wattled Bat			~
<i>Chalinolobus morio</i>	Chocolate Wattled Bat			~
<i>Mus musculus</i> *	House Mouse	~		
<i>Rattus rattus</i> *	Black Rat	~		
<i>Oryctolagus cuniculus</i> *	Rabbit	~		
<i>Canis familiaris</i> *	Dog	~		
<i>Vulpes vulpes</i> *	Fox	~		
<i>Felis catus</i> *	Cat	~		
<i>Bos taurus</i> *	Cow	~		

* Introduced species

Relatively common in Denmark (source: Land for Wildlife)

Reptiles and Frogs

1 Regan G., (1997) *A Vertebrate Fauna Survey of the Denmark Foreshore Wilson Inlet*, Source: *Draft Foreshore Management Plan Denmark to Hay Rivers* 2001

2 Hodgkin E. & Clark R., (1988) *Estuarine Studies Series No. 3, Wilson, Irwin and Parry Inlets*, Environmental Protection Authority, WA, Source: *Denmark Foreshore Wilson Inlet Management Plan* 1996

3 Smith T., *Birds, Reptiles, Frogs and Mammals of the Beveridge Road and Denmark River Bush Reserve*. Included as it is likely that these animals are present.

Scientific name	Common name	1	2	3
<i>Chelodina oblonga</i>	Long Necked Turtle	—		
<i>Phyllodactylus marmoratus</i>	Marbled Gecko	~		
<i>Tiliqua rugosa</i>	Bobtail Lizard	—		
<i>Varanus rosenbergii</i>	Race-Horse Goanna	~		
<i>Egernia kingii</i>	King Skink	—		
<i>Egernia luctuosa</i>	Swamp Skink	~		
<i>Egernia napoleonis</i>	Napoleon's Skink	—		
<i>Ramphotphlops sp.</i>	Blind Snake	~		
<i>Pseudonaja affinis</i>	Dugite	█	█	
<i>Notechis scutatus occidentalis</i>	Tiger Snake			
	Skinks		█	
	Geckos			
<i>Limnodynastes dorsalis</i>	Pobblebonk Frog	~		
<i>Crinia georgiana</i>	Quacking Frog	█		—
<i>Litoria moorei</i>	Green Tree Frog	~		
<i>Heleioporus eyrei</i>	Moaning Frog		█	—
<i>Limnodynastes dorsalis</i>	Western Banjo Frog			~
<i>Geocrinis leai</i>	Lea's Frog	—		
<i>Litoria moorei</i>	Motorbike Frog			~
<i>Heleioporus psammophilus</i>	Sand Frog			—
<i>Litoria adelaidensis</i>	Slender Tree Frog			~
<i>Crinia subinsignifera</i>	South Coast Froglet			—
<i>Pseudophryne guentheri</i>	Gunther's Toadlet			~
<i>Metacrinia nichollsi</i>	Nicholl's Toadlet			—

Inlet Fish

Hodgkin E. & Clark R., (1988) *Estuarine Studies Series No. 3, Wilson, Irwin and Parry Inlets*, Environmental Protection Authority, WA,
Source: *Denmark Foreshore Wilson Inlet Management Plan 1996*

Some commercial species:

Scientific name	Common name
<i>Hyperlopus vittatus</i>	Sandy Sprat
<i>Cnidoglanis macrocephalis</i>	Cobbler
<i>Sillaginodes punctata</i>	King George Whiting
<i>Pomatomus saltator</i>	Tailer
<i>Pseudocaranx dentex</i>	Silver Trevally
<i>Arripis truttaceus</i>	Western Australian Salmon
<i>Acanthopagrus butcheri</i>	Black Bream
<i>Chrysophrys auratus</i>	Pink Snapper
<i>Phabdosargus sarpa</i>	Mulloway
<i>Aldritecheta forsteri</i>	Yelloweye Mullet
<i>Mugil cephalus</i>	Sea Mullet
<i>Scomber australasicus</i>	Blue Mackerel

APPENDIX 2 – Foreshore Reserves Flora Lists

Source: Western Australian Herbarium

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

It may not be a complete list of all of the flora found in the reserves, only that which has had vouchered specimens lodged at the Herbarium. Since the list of additional species provided by Mark Parre comprises only six species, the list from the Herbarium is likely to be comprehensive.

The Western Australian Herbarium conducts searches of its database using rectangles to define the areas required. To cover the Foreshore Reserves four rectangles were defined, using the following sets of coordinates:

34°57S 117°27E, 34°57S 117°24E, 34°59S 117°27E, 34°59S 117°24E

34°57S 117°24E, 34°57S 117°21E, 34°59S 117°24E, 34°59S 117°21E

34°58S 117°21E, 34°59S 117°21E, 34°58S 117°19E, 34°59S 117°19E

34°59S 117°19E, 34°59S 117°20E, 35°01S 117°19E, 35°01S 117°20E

The four lists received were amalgamated and used to produce the list in this appendix.

Note that ? denotes uncertainty.

Descriptions adapted from Florabase, asterisk denotes weed species, fl = flower, measurements are height then width if applicable

Class Psilotopsida – Fork Ferns – none recorded

Class Lycopsida – Fern Allies

Isoetaceae

? *Isoetes drummondii* A.Braun

Quillwort, 0.4-18cm brown scale leaves present winter wet

Dennstaedtiaceae

Histiopteris incisa (Thunb.) J.Sm.

0.5–4 m fern-like

Lindsaeaceae

Lindsaea linearis Sw.

Screw Fern, 7-50cm stipe blackish purple veins free

Schizaeaceae

Schizaea fistulosa Labill.

Narrow Comb Fern, grass-like fern 50-60cm fronds simple

Class Cycadopsida – Cycads - none recorded

Class Pinopsida – Conifers

Podocarpaceae

Podocarpus drouynianus F.Muell.

Emu Plum, conifer male and female plants edible fruit

Class Liliopsida – Monocotyledons

Anthericaceae

Johnsonia teretifolia Endl.

Hooded Lily, perennial grass-like 20-60cm fl pink, purple

Laxmannia jamesii Keighery P4

James' Paperlily, Tufted stilt-rooted per herb, 5-20cm fl red white

Thysanotus glaucifolius Brittan

Fringe Lily, dense tufting per herb to 15cm fl purple

Asparagaceae

Asparagus asparagoides (L.) Druce *

Bridal Creeper, tuberous perennial herb and climber 1–5m fl white
Perennial twining herb

Asparagus scandens Thunb. *

Boryaceae

Borya longiscapa Churchill P2

Dwarf domed perennial herb to 0.6m fl cream, white, yellow

Centrolepidaceae

Aphelia cyperoides R.Br.

Tufted annual grass-like or herb 0.02–0.11m fl green

Centrolepis alepyroides (Nees) Walp.

Tufted reddish annual herb 0.015–0.06m

Centrolepis aristata (R.Br.) Roem. & Schult.

Pointed Centrolepis, tufted annual herb 2-20cm

Centrolepis pilosa Hieron.

Tufted reddish annual herb 2.5-90cm

Centrolepis polygyna (R.Br.) Hieron.

Wiry Centrolepis, tufted reddish annual herb 1-7cm

Cyperaceae

Baumea juncea (R.Br.) Palla

Bare Twigrush, rhizomatous colonising per grass-like 0.2–1.2 m

Baumea preissii subsp. *laxa* ms

Rhizomatous, robust per grass-like 0.2–1.5m fl purple, brown, grey

Baumea preissii Nees subsp. *preissii* ms

Rhizomatous robust perennial sedge 0.4–2m fl purple, brown

Baumea rubiginosa (Spreng.) Boeck.

Rhizomatous, robust perennial grass-like to 4m x 2m fl brown,

- Chorizandra enodis* Nees
Cyathochaeta avenacea (R.Br.) Benth.
Cyperus congestus Vahl *
Cyperus sp.
Ficinia nodosa (Rottb.) Goetgh., Muasya & D.A.Simpson
Gymnoschoenus anceps (R.Br.) C.B.Clarke
Isolepis cernua var. *setiformis*
Isolepis cernua (Vahl) Roem. & Schult. var. *cernua*
Isolepis congrua Nees
Isolepis congrua x prolifera
Isolepis cyperoides R.Br.
Isolepis inundata R.Br.
Isolepis marginata (Thunb.) A.Dietr. *
Isolepis prolifera (Rottb.) R.Br. *
Isolepis sp.
Lepidosperma gracile R.Br.
Lepidosperma sp.
Lepidosperma tetraquetrum Nees
Mesomelaena tetragona (R.Br.) Benth.
Schoenus acuminatus R.Br.
Schoenus cruentus (Nees) Benth.
Schoenus maschalinus Roem. & Schult.
Schoenus nitens (R.Br.) Roem. & Schult.
Schoenus odontocarpus F.Muell.
Schoenus subbulbosus Benth.
Schoenus subfascicularis Kuek.
Schoenus subclaxus Kuk.
Tetraria capillaris (F.Muell.) J.M.Black
Tetraria octandra (Nees) Kuk.
Dasyopogonaceae
Dasyopogon bromeliifolius R.Br.
Kingia australis R.Br.
Lomandra brittanii T.S.Choo
Lomandra integra T.Macfarlane
Lomandra micrantha (Endl.) Ewart subsp. *micrantha*
Lomandra pauciflora (R.Br.) Ewart
Lomandra sonderi (F.Muell.) Ewart
Haemodoraceae
Anigozanthos flavidus DC.
Anigozanthos preissii Endl.
Iridaceae
Crocasmia x crocosmiiflora (Lemoine) N.E.Br. *
Ixia maculate L. *
Patersonia umbrosa Endl. var. *umbrosa*
Juncaceae
Juncus articulatus L. *
Juncus bufonius L. *
Juncus caespiticius E.Mey.
Juncus capitatus Weigel *
Juncus holoschoenus R.Br.
Juncus kraussii subsp. *Australiensis* (Buchenau) Snogerup
Juncus oxycarpus E.Mey. *
Juncus pallidus R.Br.
Juncus planifolius R.Br.
Juncus sp.
Juncus usitatus L.A.S.Johnson *
Juncaginaceae
Triglochin striata Ruiz & Pav.
Orchidaceae
Caladenia flava subsp. *sylvestris*
Caladenia latifolia R.Br.
Caladenia nana subsp. *unita* (W.Fitzg.) Hopper & A.P.Br.
Caladenia pectinata R.S.Rogers
Cryptostylis ovata R.Br.
Disa bracteata Sw. *
Diuris setacea R.Br.
Drakaea thynniphila A.S.George
Eriochilus dilatatus subsp. *multiflorus*
Lyperanthus serratus Lindl.
Microtis alba R.Br.
Microtis alba subsp. *nova* R.J. Bates
Microtis brownii Rchb.f.
- Black Bristlerush**, loose tufted per grass-like 0.18–1x1m
Rhizomatous, tufted perennial grass-like 0.4–1.6 x1m fl brown
Dense Flat Sedge, tufted colonial perennial grass-like 1m fl brown
-
Knotted Club Rush, erect dense tufting herb 1x.8m fl brown, crm
Tufted perennial grass-like herb (sedge) 0.2–1.5m fl brown
Tufted annual grass-like or herb (sedge) to 0.15m fl green, brown
Nodding Club Rush, erect dense tufting an or per grass-like 30cm
Slender tufted annual grass-like or herb 1-20cm fl green, brown
-
Tufted annual or perennial grass-like or herb (sedge) 3-50cm
Swamp Club Rush, tufted perennial grass-like 5-45cm fl brown,
Coarse Club Rush, tufted annual grass-like 2-32cm fl green, yel, brn
Budding Club Rush, tufted perennial grass-like 20-60cm fl grn, br
-
Slender Sword Sedge, tufted perennial grass-like 15-60cm fl brown
-
Rhizomatous robust tufted perennial grass-like 2–3x2.5m fl brown
Semaphore Sedge, tufted grass-like 30-80x50cm fl brown, black,
Tufted perennial grass-like 15-30(60)cm fl brown
Rhizomatous perennial 40-70cm fl brown, black
Spreading annual grass-like 5-10cm fl green, brown
Shiny Bog-rush, perennial grass-like 10-40cm fl brown
Tufted annual grass-like 2-15 cm fl brown
Tufted per grass-like 7-35cm, bulblike underground base fl brown
Tufted perennial grass-like 1.1cm fl brown,
Tufted perennial grass-like 20-90cm clumps to 0.3-0.9 m fl brown
Hair Sedge, tufted per grass-like 0.15–0.7(–1.5)x1 m fl brown
Rhizomatous, tufted perennial, grass-like 0.15–1.2m fl brown, black,
Pineapple Bush, tufted perennial, herb, 0.3–1(–1.5)m fl white,
Kingia, perennial tree-like monocot, 1–8m fl yellow, green, brown
Male and female plant dense clump herb 5-20x20cm fl purple, yellow
Rhizomatous dense clump herb 5-50cm fl white
Small-flower Mat-rush, m/f per herb 10-70x20cm fl grn, pur, brn
Rhizomatous, dense clump herb to 50x20cm fl yellow, cream
Rhizomatous, dense clump herb 20-50x30cm fl yellow, purple
Tall Kangaroo Paw, rhiz per, herb 0.5–3m fl yell, green, brown, red
Albany Catspaw, rhiz perennial herb 15-80cm fl yellow, orange, red
Montbretia, cormous broad-leaved herb 1.5 m fl orange, red
Yellow Ixia, cormous ann/per br-leaved herb 70cm fl white, yel, pink
Yellow Flags, rhiz tufted per herb 30-90cm fl blue, violet, yellow
Jointed Rush, rhizomatous perennial grass-like 20-70cm
Toad Rush, annual grass-like or herb 0.04–0.3m
Grassy Rush, rhizomatous perennial grass-like or herb 9-60cm
Capitate Rush, annual grass-like or herb 0.04–0.15m
Jointleaf Rush, rhizomatous perennial herb, 0.3–1m
Rhizomatous, colonial perennial herb 0.3–1.2m fl brown, red
Rhizomatous, tufted perennial herb to 0.4 m high fl brown, green
Pale Rush, rhizomatous robust perennial herb, 0.5–2m fl green
Broadleaf Rush, tufted perennial herb 0.5–0.75m
-
Common Rush, colonial perennial herb, 0.6–0.9m
Stoloniferous perennial herb to 0.5m fl green
Cowslip, tuberous perennial herb 0.05–0.3m fl yellow, white,
Pink Fairy Orchid, tuberous perennial herb 20–45cm fl pink, white
Pink Fan Orchid, loose clumping tuberous perennial to 40cm fl pink
King Spider Orchid, tuberous, per herb 35–70cm fl green, yellow
Slipper Orchid, tuberous perennial herb 25–70cm fl green, red
South African Orchid, tuberous per herb 20–40cm fl green, brown
Bristly Donkey Orchid, tuberous per herb 15–30cm fl yellow, brown
Tuberous perennial herb 25–40cm fl purple,
Bunny Orchid, tuberous perennial herb 25–40cm fl white, cream
Rattle Beak Orchid, tub per herb 25–50cm fl green, brown, yellow
White Mignonette Orchid, tub per herb 15–60cm fl grn, wh, cream
Not found on Florabase
Tuberous perennial herb 20–60cm fl yellow, green

Shire of Denmark

Wilson Inlet Foreshore Reserves Management Plan 2008

Microtis media subsp. *densiflora* (Benth.) R.J.Bates
Microtis media R.Br. subsp. *media*
Praecoxanthus aphyllus (Benth.) Hopper & A.P.Br.
Prasophyllum aff. parvifolium
Prasophyllum odoratissimum D.L.Jones
Prasophyllum regium R.S.Rogers
Philydraceae
Philydrella pygmaea (R.Br.) Caruel
Poaceae
Agrostis capillaris L. *
Agrostis stolonifera L. *
Aira cupaniana Guss. *
Aira praecox L. *
Amphibromus nervosus (Hook.f.) Baill.
Amphibromus sp.
Amphipogon amphipogonoides (Steud.) Vickery
Amphipogon debilis R.Br. Domin
Amphipogon laguroides R.Br. subsp. *laguroides*
Anthoxanthum odoratum L. *
Arrhenatherum (elatius) bulbosum (Willd.) C.Presl *
Austrodanthonia acerosa (Vickery) H.P.Linder
Austrodanthonia caespitosa (Gaudich.) H.P.Linder
Austrodanthonia pilosa (R.Br.) H.P.Linder
Austrodanthonia setacea (R.Br.) H.P.Linder
Austrostipa flavescens (Labill.) S.W.L.Jacobs & J.Everett
Austrostipa hemipogon (Benth.) S.W.L.Jacobs & J.Everett
Austrostipa mollis (R.Br.) S.W.L.Jacobs & J.Everett
Austrostipa semibarbata (R.Br.) S.W.L.Jacobs & J.Everett
Avena barbata Link *
Axonopus affinis Chase *
Briza maxima L. *
Briza minor L. *
Bromus catharticus Vahl *
Cynodon dactylon (L.) Pers. *
Cynosurus echinatus L. *
Dactylis glomerata L. *
Deyeuxia quadriseta Benth.
Digitaria sanguinalis (L.) Scop. *
Echinochloa crusgalli (L.) P.Beauv. *
Ehrharta calycina Sm. *
Ehrharta longiflora Sm. *
Elymus scaber (R.Br.) A.Love
Eragrostis brownii (Kunth) Wight
Eragrostis curvula (Schrud.) Nees *
Eragrostis sp.
Festuca arundinacea Schreb. *
Hemarthria uncinata R.Br.
Hemarthria uncinata R.Br. var. *uncinata*
Holcus lanatus L. *
Hordeum leporinum Link *
Lachnagrostis filiformis (Forst.) Trin.
Lolium multiflorum Lam. *
Lolium perenne L. *
Lolium rigidum Gaudin *
Melinis minutiflora P.Beauv. *
Microlaena stipoides (Labill.) R.Br.
Parapholis incurva (L.) C.E.Hubb. *
Paspalum dilatatum Poir. *
Paspalum vaginatum Sw. *
Pennisetum clandestinum Chiov. *
Poa poiformis (Labill.) Druce
Poa porphyroclados Nees
Poa sp.
Polypogon monspeliensis (L.) Desf. *
Setaria parviflora (gracilis) Kunth *
Sporobolus africanus (Poir)Robyns & Tournay (P.Beauv.)Engl. *
Sporobolus virginicus (L.) Kunth
Stenotaphrum secundatum (Walter) Kuntze *
Vulpia myuros forma myuros *
Vulpia myuros (L.) C.C.Gmel. *
Vulpia sp.
Restionaceae
Anarthria prolifera R.Br.

Tuberous perennial herb 20-50cm fl green
Tall Mignonette Orchid, tuberous per herb 10-60cm fl green
Tuberous, perennial herb 20-40cm fl white, cream
Autumn Leek Orchid, tuberous per herb 15-40cm fl green, white
Tuberous perennial, herb 0.15-0.4 m fl green, white
King Leek Orchid, tuberous per 0.5-2 m fl green, brown, purple
Butterfly Flowers, bulbaceous perennial herb 2-30cm fl yellow
Stoloniferous perennial grass-like or herb 20-50cm fl green
Creeping Bent, stoloniferous perennial grass-like 8-40cm fl green
Silvery Hairgrass, annual grass-like or herb 10-40cm fl green
Early Hairgrass, annual grass-like or herb to 15cm
Tufted perennial grass-like or herb 1.25m fl green
-
Rhizomatous tufted per grass-like 20-40cm fl grey, cream, purple
Tufted perennial, grass-like 25-30cm fl purple, green
Tufted, erect per grass-like to 55cm with long awns fl purple,
Sweet Vernal Grass, tufted per grass-like 10-80x40cm fl grn, purp
Onion Twitch
Tufted perennial, grass-like or herb, 0.6 m high fl purple, green
Tufted perennial, grass-like 3-90cm fl purple, green
Tufted, slender or robust perennial, grass-like 20-90cm
Perennial, grass-like or herb, 0.15-0.6 m fl purple, green
Tufted perennial grass-like or herb 0.2-1.2m fl green, yellow
Tufted perennial grass-like or herb 0.3-1m fl green, purple
Tufted perennial grass-like 0.15-0.6(-1)m fl green, purple
Tufted perennial grass-like (0.1-0.3-1.1m fl green, purple
Erect annual grass-like or herb, 0.3-1m fl green
Bearded Oat, erect annual grass-like 0.3-1m fl green
Blowfly Grass, tufted, glabrous an grass-like 20-60cm fl grn, purple
Shivery Grass, tufted glabrous annual grass-like 15-50cm fl green
Prairie Grass, tufted grass-like 0.3-1.2m fl green, brown
Couch, rhiz or stolon prost per grass 5-30cm fl green, purple,
Rough Dogstail, annual grass-like 0.1-0.4m fl green
Cocksfoot, tufted perennial grass-like or herb 1.4m fl purple
Reed Bentgrass, tufted per grass-like 0.15-1.5m fl purple
Crab Grass, decumbent tufted an grass 0.15-1m fl green, purple
Annual grass-like or herb 0.25-0.9m
Perennial Veldt Grass, clumping per grass 30-70cm fl grn, purp red
Annual Veldt Grass, clumping annual 20-60cm fl purple, green
Tufted perennial grass-like or herb 0.35-0.6m fl green
Brown's Lovegrass, clumping grass 10-60cm fl green, purple
African Lovegrass, dense clumping grass (often purple near base)
-
Tall Fescue, rhizomatous tufted per grass 0.5-1m fl green
Mat Grass, tufted perennial grass-like or herb 0.2-0.8m fl Green
Mat Grass, tufted perennial grass-like or herb 0.2-0.8m fl Green
Yorkshire Fog, tufted perennial, grass-like 30-70cm fl green, purple
Barley Grass, tufted annual grass-like 10-40cm fl green, cream
Erect caespitose stoloniferous annual grass-like to 1m fl green
Italian Ryegrass, short-lived per or annual grass 0.7-1.2m. fl green
Perennial Ryegrass, short-lived tufted bi/per grass 80-90cm fl green
Wimmera Ryegrass, erect or sprding an grass 0.3-1m fl green, yell
Molasses Grass, tufted perennial grass 0.3-1.2m
Weeping Grass, rhiz perennial grass 30-75cm fl green, purple
Coast Barbgrass, annual grass-like or herb 0.3m fl green
Rhizomatous tufted perennial grass 0.15-1.75m fl green, purple
Salt-water Couch, rhiz/stolon per grass 10-60cm fl green, purple
Kikuyu, rhizomatous stoloniferous perennial grass 7-15cm fl green
Coastal Poa, perennial grass 15-90cm fl green, yellow
Tufted perennial grass-like or herb 0.4-1m fl green, purple
-
Annual Beardgrass, erect tufted annual, grass-15-80cm fl green
Grass-like or herb 0.3-0.4 m fl green
Parramatta Grass, tufted per/an (long-lived) 10-50cm fl grn, purple
Marine Couch, rhiz/stolin tussocky perennial 10-50cm fl grn, purple
Buffalo Grass, stolon decumbent per 5-50cm fl green, purple
Not on Florabase
Rat's Tail Fescue, tufted annual 7-70cm fl green
-
M or female rhizom tufted tangled per herb (sedge-like) 25-60cm fl brn
-
M or female rhizom tufted robust per herb (sedge-like) 0.35-1.5m br, y
Rhizomatous perennial herb (sedge-like) 20-30cm fl White, yellow

Anarthria scabra R.Br.

Desmodium fasciculatum (R.Br.) B.G.Briggs & L.A.S.Johnson

Desmodium flexuosus (R.Br.) B.G.Briggs & L.A.S.Johnson
Empodisma gracillimum (F.Muell.) L.A.S.Johnson & D.F.Cutler
Hypolaena exsulca R.Br.
Hypolaena pubescens (R.Br.) Nees
Leptocarpus laxus (R.Br.) B.G.Briggs
Leptocarpus sp.
Leptocarpus tenax (Labill.) R.Br.
Lepyrodia hermaphrodita R.Br.
Lepyrodia muirii F.Muell.
Lepyrodia sp.
Lyginia barbata R.Br.
Lyginia imberbis R.Br.
Meeboldina denmarkica Suess.
Meeboldina roycei L.A.S.Johnson & B.G.Briggs ms
Meeboldina scariosa (R.Br.) B.G.Briggs & L.A.S.Johnson
Sporadanthus strictus (R.Br.) B.G.Briggs & L.A.S.Johnson
Taraxis grossa B.G.Briggs & L.A.S.Johnson
Xyridaceae
Xyris lanata R.Br.

Rhizomatous perennial herb (sedge-like) 0.2–1.5m
 Rhizom semi-climbing tufted tangled per herb (s-like) 0.2–1.2m fl brn
 M or f rhizomatous tussocky per herb 25–75cm fl brown, grey
 Rhizomatous perennial herb (sedge-like), 0.15–1m
 Large many-stemmed clumping (rush-like) 0.3–1.5 m fl red
 Rhizomatous perennial herb (rush-like), 0.4–1 m fl brown, red
Slender Twine Rush, rhizom per(rush-like) 0.4–1m fl brown, red
 Rhizomatous, slender, tufted perennial, herb (sedge-like) 5-20cm
 Rhizomatous perennial herb (sedge-like), 0.45–1m
 -
 Rhizomatous tufted perennial herb 0.2–1 m fl brown,
 Rhizom erect/flexuose clumping per grass-like or sedge 40-70 cm
 Rhizom tufted per herb 10-40x80cm grey-green appearance fl rd brn
 Rhizomatous perennial herb (rush-like) 0.3–1.5m fl brown
 Rhizomatous per herb (rush-like) 0.6–1.5(–2)m fl red, brown
 Rhizomatous robust perennial herb (sedge-like) 0.3–1m
 Rhizomatous robust straggling perennial herb 0.2–2.5m
 Tufted perennial herb 0.35–1 m fl yellow

Class Magnoliopsida – Dicotyledons

Aizoaceae

Tetragonia implexicoma (Miq.) Hook.f.

Amaranthaceae

Amaranthus sp.

Ptilotus aff. *gaudichaudii*

Apiaceae

Actinotus omnifertilis (F.Muell.) Benth.

Apium prostratum var. *filiforme*

Centella asiatica (L.) Urb.

Daucus carota L. *

Daucus glochidiatus (Labill.) Fisch., C.A.Mey. & Ave-Lall.

Foeniculum vulgare Mill. *

Xanthosia eichleri J.M.Hart & Henwood P3

Xanthosia rotundifolia DC.

Xanthosia sp.

Asteraceae

? *Senecio* sp.

? *Vellereophyton* sp.

Angianthus preissianus (Steetz) Benth.

Carduus pycnocephalus L. *

Centaurea cyanoides Berger *

Cirsium vulgare (Savi) Ten. *

Conyza sumatrensis (Retz.) E.Walker *

Coreopsis grandiflora Sweet *

Cotula australis (Spreng.) Hook.f.

Cotula coronopifolia L. *

Cotula turbinata 87 L. *

Helichrysum luteoalbum (L.) Rchb.

Hypochoeris glabra L. *

Ixiolaena viscosa Benth.

Leontodon taraxacoides (Will.) Merat subsp. *Taraxacoides* *

Senecio hispidulus A.Rich.

Senecio multicaulis A.Rich. subsp. *Multicaulis*

Siloxerus sp.

Sonchus oleraceus L. *

Vellereophyton dealbatum (Thunb.) Hilliard & B.L.Burt *

Xerochrysum bracteatum (Vent.) Tzvelev

Basellaceae

Anredera cordifolia (Ten.) Steenis *

Boraginaceae

Echium plantagineum L. *

Brassicaceae

Diplotaxis muralis (L.) DC. *

Lepidium bonariense L. *

Lepidium didymum L. *

Lepidium pseudotasmanicum Thell. P4

Lobularia maritima (L.) Desv. *

Caryophyllaceae

Corrigiola litoralis L. *

Polycarpon ? *tetraphyllum*

Polycarpon tetraphyllum (L.) L. *

Sagina apetala Ard. *

Bower Spinach, pros/scramb/climbing perennial 10-50cmx2 m fl yel

-
 Ascending/ erect annual herb, 0.1–0.4(–1) m fl yellow, green

Tufted erect or prostrate herb 3-50cm fl white

Prostrate/ascending bi/perennial herb 5-70cm fl white, pink

Creeping stoloniferous per herb 5-40cm fl pink, purple, red, white

Wild Carrot, erect biennial herb 0.3–1.5m fl white, purple

Australian Carrot, slender erect an herb 2-60cm fl pk pur rd wh y gn

Fennel, broad-leaved erect robust herb aniseed-scent up to 2.5m

Sub shrub 5-25cm leaves simple fl white, cream

Southern Cross, shrub 0.35–0.8 m fl white, cream

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-

-

Erect or prostrate annual herb 3-16cm fl yellow

Slender Thistle, erect prickly annual herb 0.2–1m fl purp, pink, red

Excluded name

Spear Thistle, spiny biennial herb 0.05–1.5(–3)m fl purple, red

Annual herb to 2m fl white, cream, yellow

American Tickseed, perennial or annual herb 20-60cm fl yellow

Common Cotula, slender diffusely branched herb 2-20cm fl yel wh

Waterbuttons, stoloniferous succulent herb to 0.3 m fl yellow

Funnel Weed, decumbent-ascending ann herb 5-40cm fl white, yellow

Jersey Cudweed, erect annual herb to 70cm fl cream yel ,wh, pink

Smooth Catsear, rosetted herb 8-50cm yellow flower heads 1.5cm

Sticky Ixiolaena, sticky annual or perennial herb 8-40cm fl white

Hairy Hawkbit, prostrate tuberous herb to 20cm fl yellow

Hispid Fireweed, shrub to 1(–1.5)m fl white, cream, yellow

Slender erect open to compact herb to 1m fl yellow, white

-

Common Sowthistle, erect annual herb to 1.5m fl yellow,

White Cudweed, short-lived herb 5-40cm fl white, cream, yellow

Soft shrub 0.3–1.5m fl white, yellow

Rampant climber with fleshy leaves fl white

Paterson's Curse, erect herb 0.1–0.6(–1)m fl blue, purp, pink, white

Wall Rocket, erect to ascending herb 8-60cm fl yellow

Peppercress, erect annual/biennial herb to 60cm fl white, green

Broad-leaved foetid herbs (with hairy stems and petioles) up to 0.3m

Erect annual or biennial herb 0.2–0.4(–1)m fl white, green

Sweet Allysum, ascending herb 5-40cm fl white, pink, purple

Strapwort, spreading herb 3-30cm fl green, white

-

Fourleaf Allseed, herb 20-50cm fl green, red, white

Annual Pearlwort, erect or ascending annual herb 2-40cm fl green

<i>Silene gallica</i> var. <i>quinquevulnera</i> *	Erect or ascending rather viscid herb 10-80cm fl white, pink
Casuarinaceae	
<i>Allocasuarina decussata</i> (Benth.) L.A.S.Johnson	Karri She-oak , tree or shrub (more rarely) to 15 m male & f flowers
<i>Allocasuarina humilis</i> (Otto & F.Dietr.) L.A.S.Johnson	Dwarf Sheoak , erect or spreading shr 0.2-2m fl red, orange, brown
Chenopodiaceae	
<i>Chenopodium album</i> L.	Fat Hen , erect annual herb, 0.2-1(-1.7)m fl green
<i>Chenopodium murale</i> L. *	Nettle-leaf Goosefoot , erect much-branched herb 0.2-1m fl green
<i>Chenopodium pumilio</i> R.Br.	Clammy Goosefoot , spreading aromatic herb 4-30cm fl green
Convolvulaceae	
<i>Ipomoea indica</i> (Burm.) Merr. *	Morning Glory , twining rampant herb or climber fl blue, purple
Crassulaceae	
<i>Crassula colorata</i> (Nees) Ostenf.	Dense Stonecrop , succulent herb 1-15cm fl green, yellow, red
<i>Crassula natans</i> var. <i>minus</i> *	Often aquatic annual herb fl white, pink
Dilleniaceae	
<i>Hibbertia cuneiformis</i> (Labill.) Sm.	Cutleaf Hibbertia , erect or sprawling shrub to 3m fl yellow
<i>Hibbertia furfuracea</i> (DC.) Benth.	Erect shrub, 0.5-2m fl yellow
<i>Hibbertia grossularifolia</i> (Salisb.) Salisb.	Prostrate shrub to 1.2 m wide fl yellow
<i>Hibbertia notibractea</i> J.R.Wheeler	Diffuse shrub 20-45cm fl. yellow
<i>Hibbertia perfoliata</i> Endl.	Weak, ascending or prostrate shrub to 40cm fl yellow
<i>Hibbertia pilosa</i> Steud.	Hairy Guinea Flower , often single-stemmed shrub 0.3-1.5m fl yel
<i>Hibbertia racemosa</i> (Endl.) Gilg	Stalked Guinea Flower , erect spreading shrub 10-75cm fl yellow
Droseraceae	
<i>Drosera erythrogone</i> N.G.Marchant & Lowrie	Tuberous, perennial herb or climber to 2m fl white
<i>Drosera myriantha</i> Planch.	Star Rainbow , tuberous twining per herb 15-30cm fl white, pink
<i>Drosera neesii</i> Lehm. subsp. <i>neesii</i>	Jewel Rainbow , tuberous twining herb 15-60cm fl yel, wh, pink, red
<i>Drosera pallida</i> Lindl.	Pale Rainbow , tuberous per herb or climber 0.3-1.8m fl white
<i>Drosera pulchella</i> Lehm.	Pretty Sundew , fibrous-rooted rosetted herb to 4cm fl pink, wh, orng
<i>Drosera stolonifera</i> Endl.	Leafy Sundew , tuberous herb stems arising from rosette fl white
Epacridaceae	
<i>Andersonia caerulea</i> R.Br.	Foxtails , erect or spreading shrub 0.05-m fl pink, blue, white
<i>Andersonia simplex</i> (Stschegl.) Druce	Spiked Andersonia , erect/ascending shrub 10-60cm fl pk bl pur red
<i>Andersonia virolens</i> Lemson ms P2	Rounded dwarf shrub 0.15-0.2m fl white
<i>Acrotriche cordata</i> (Labill.) R.Br.	Coast Ground Berry , low shrub 0.5-1x0.4-2m fl green, white
<i>Leucopogon australis</i> R.Br.	Spiked Beard-heath , erect shrub, 0.2-2 m fl white
<i>Leucopogon glabellus</i> R.Br.	Slender erect or straggly shrub, 0.1-1(-1.5) m fl white,
<i>Leucopogon parviflorus</i> (Andrews) Lindl.	Coast Beard-heath , erect dense shrub/tree 0.3-3(-5)m fl white
<i>Leucopogon pendulus</i>	Erect shrub, (0.1-)0.2-1.2(-1.5)m fl white
<i>Leucopogon propinquus</i> R.Br.	Erect ridgid shrub, 0.3-2m fl white
<i>Leucopogon revolutus</i> R.Br.	Compact or open-branched shrub 0.5-2(-4)m fl white
<i>Leucopogon richetii</i> var. <i>acutifolius</i>	Erect compact shrub to 1.2m fl white, pink
<i>Leucopogon verticillatus</i> R.Br.	Tassel Flower , erect bamboo-like shrub 0.8-4 m fl pink, red
<i>Lysinema ciliatum</i> forma <i>Denmark</i> (DH Perry s.n. 12/1961) PN	Erect shrub 30-60cm fl white, brown
<i>Lysinema ciliatum</i> R.Br.	Curry Flower , erect shrub 0.1-1.6m fl white, cream, pink, brown
<i>Lysinema conspicuum</i> R.Br.	Slender shrub 20-90cm fl white
<i>Monotoca</i> sp. <i>Walpole</i> (B.J. Lepschi & B.A. Fuhrer BJL 3666) PN	Description unavailable
<i>Monotoca tamariscina</i> F.Muell.	Erect or straggling shrub, 0.15-2.5m fl yellow, green, cream, white
<i>Sphenotoma capitata</i> (R.Br.) Lindl.	Slender erect shrub 0.1-1.2m fl white
<i>Sphenotoma gracilis</i> (R.Br.) Sweet	Swamp Paper-heath , slender lax or erect shrub to 1.5m fl white
<i>Sphenotoma parviflora</i> F.Muell. P3	Slender erect or straggling shrub 0.15-1m fl white
<i>Sphenotoma squarrosa</i> (R.Br.) G.Don	Slender erect shrub to 1.2(-2)m fl white
Euphorbiaceae	
<i>Amperea ericoides</i> A.Juss.	Low spreading many-branched perennial herb 10-40cm fl white
<i>Calycocephalus oligandrus</i> P.I.Forst.	Shrub or tree 1.5-5 m
<i>Ricinocarpos glaucus</i> Endl.	Wedding Bush , erect shrub (0.15-)0.3-2m fl white
Fumariaceae	
<i>Fumaria capreolata</i> L. *	White-flower Fumitory , climbing herb 0.1-1(-3)m fl white, red, brwn
<i>Fumaria muralis</i> W.D.J.Koch subsp. <i>muralis</i> *	Wall Fumitory , slender- robust herb or climber 0.05-1m fl pk, rd, pur
Goodeniaceae	
<i>Anthotium humile</i> R.Br.	Dwarf Anthotium , tufted herb 5-20cm fl cream, wh, pink, blu, purple
<i>Dampiera hederacea</i> R.Br.	Karri Dampiera , perennial herb 0.2-1(-2)m fl blue, white,
<i>Dampiera leptoclada</i> Benth.	Slender-shooted Dampiera , perennial herb 20-60cm fl blue
<i>Dampiera linearis</i> R.Br.	Common Dampiera , erect herb 15-60cm leaves entire/ lobed fl blue
<i>Dampiera pedunculata</i> Rajput & Carolin	Erect woody perennial herb 15-70cm fl blue
<i>Lechenaultia expansa</i> R.Br.	Prostrate to ascending shrub 15-60cm fl blue, purple, white
<i>Scaevola globulifera</i> Labill.	Spreading procumbent to ascending shrub 0.2-1.2m fl blue, white
<i>Scaevola microphylla</i> Benth.	Small-leaved Scaevola , perennial herb 10-50cm fl blue, purple
<i>Scaevola</i> sp.	
<i>Scaevola striata</i> R.Br.	Royal Robe , ascending to prostrate herb 3-30cm fl blue, purple
<i>Scaevola striata</i> R.Br. var. <i>striata</i>	Ascending to prostrate perennial herb 3-30cm fl blue, purple
<i>Selliera radicans</i> Cav. P2	Prostrate woody perennial herb
<i>Velleia macrophylla</i> (Lindl.) Benth.	Long-leaved Velleia , perennial herb 0.4-2m fl yellow
Haloragaceae	
<i>Gonocarpus benthamii</i> Orchard subsp. <i>benthamii</i> ms	Straggly or erect perennial herb/ shrub 0.1-0.6(-0.9)m fl red, green
Lamiaceae	
<i>Hemigenia humilis</i> Benth.	Slender, erect shrub, to 1.5 m fl blue, purple,

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Mentha pulegium L. *
Prunella vulgaris L. *
Stachys arvensis (L.) L. *
Lauraceae
Cassytha pomiformis Nees
Cassytha racemosa Nees
Cassytha racemosa Nees *forma racemosa*
Lentibulariaceae
Utricularia simplex R.Br.
Linaceae
Linum trigynum L. *
Lobeliaceae
Lobelia anceps formerly *alata* Labill.
Lobelia rhombifolia de Vriese
Loganiaceae
Logania campanulata R.Br.
Logania vaginalis (Labill.) F. Muell.
Lythraceae
Lythrum hyssopifolia L. *
Malvaceae
Malva linnaei M.F. Ray *
Modiola caroliniana (L.) G. Don ***Menyanthaceae**
Villarsia parnassiiifolia (Labill.) R.Br.
Villarsia submersa Aston P4
Mimosaceae
Acacia browniana H.L. Wendl. var. *browniana*
Acacia divergens Benth.
Acacia gilbertii Meisn.
Acacia hastulata Sm.
Acacia luteola Maslin
Acacia myrtifolia (Sm.) Willd.
Acacia pentadenia Lindl.
Acacia pulchella R.Br. var. *pulchella*
Acacia scalpelliformis Meisn.
Acacia urophylla Lindl.
Paraserianthes lophantha (Willd.) subsp. *lophantha*
Myoporaceae
Myoporum tetrandrum (Labill.) Domin
Myrtaceae
Actinodium cunninghamii Schauer
Agonis flexuosa var. *latifolia* Schauer
Agonis sp.
Agonis theiformis Schauer
Astartea arbuscula (*Baeckea*) 9b(Benth.) Rye P4
Astartea corniculata Schauer
Astartea loricifolia Schauer
Astartea scoparia Schauer
Astartea sp.
Astartea sp. *Long stalks* (D. Foreman 1490) PN
Baeckea blackettii F. Muell.
Beaufortia decussata R.Br.
Beaufortia sparsa R.Br.
Calothamnus lateralis Lindl.
Calothamnus schaueri Lehm.
Calytrix tetragona Labill.
Darwinia citriodora (Endl.) Benth.
Darwinia oederoides (Turcz.) Benth.
Darwinia vestita (Endl.) Benth.
Eucalyptus diversicolor F. Muell.
Eucalyptus marginata Sm. *Subsp. marginata*
Eucalyptus megacarpa F. Muell.
Eucalyptus patens Benth.
Eucalyptus staeri (Maiden) Kessell & C.A. Gardner
Homalospermum firmum Schauer
Hypocalymma cordifolium Schauer subsp. *cordifolium*

Hypocalymma scariosum Schauer
Hypocalymma strictum Schauer
Hypocalymma strictum Schauer subsp. *strictum*
Kunzea ericifolia (Sm.) Heynh. subsp. *ericifolia*
Kunzea recurva Schauer
Melaleuca microphylla Sm.
Melaleuca pauciflora Turcz.
Melaleuca preissiana Schauer
Melaleuca rhapsiophylla Schauer

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Pennyroyal, aromatic rhizomatous herb 15-70cm fl blue, purple, pink,
Self Heal, prostrate to ascending perennial, herb, to 0.4 m fl purple
Staggerweed, ascending annual herb 6-30cm fl pink, purple

Dodder Laurel, parasitic perennial herb&climber fl grn wh crm yell
Dodder Laurel, parasitic perennial herb&climber fl white green yell
Parasitic perennial herb&climber fl white green yellow

Bluecoats, affixed aquatic herb 1-4cm fl blue, purple

French Flax, erect slender annual herb 10-40cm fl yellow

Angled Lobelia, prostrate to ascending herb to 1.2m fl bl purp white
Tufted Lobelia, much-branched herb 5-30cm fl blue, purple

Bell-flowered Logania, erect slender herb 10-60cm fl white
White Spray, erect to weakly erect shrub to 2.5(4)m fl white

Lesser Loosestrife, decumbent/ascending herb 5-20(50)cm pink, purple

Annual or biennial herb 0.5-2m fl purple, blue, pink
Prostrate to ascending perennial herb fl yellow, red

Aquatic to semi-aquatic perennial herb, 0.1-1m fl yellow
Aquatic extremely slender perennial herb fl white

Shrub 0.2-2 m fl cream yellow
Diffuse open & slender spiny shrub 0.4-2.5 m fl yellow, cream
Erect slender or straggling shrub 0.3-1.5(-2.5) m fl white
Slender erect-spreading straggly v prickly shrub 0.3-2(-3)m cream yellow
Sprawling or erect shrub 0.2-1(-1.5) m fl yellow, cream
Glabrous bushy shrub 0.5-3 m fl cream, yellow
Karri Wattle, willowy shrub or tree (1-2)-5(-9)m fl yellow, cream
Prickly Moses, prickly shrub 0.3-3m fl yellow
Erect prickly shrub 0.5-2(-4)m fl yellow
Erect slender open shrub (0.6-1)-3(-5)m fl yellow, cream, white
Shrub or tree 1-10m leaves bipinnate fl yellow, green in racemes

Boobialla, shrub 0.5-3m fl white

Albany Daisy, slender shrub, 0.15-1m fl white, pink
Broader twisted leaves shrub or tree (small) to 4m fl white

Shrub (0.5-1)-2m fl white,
Spreading single-stemmed shrub to 25cm fl pink, white
Often drooping, diffuse shrub, to 3m fl white, pink,
Erect shrub to 1.5m fl white,
Shrub to 1.8m

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Shrub (0.4-1)-3m fl white
Gravel Bottlebrush, shrub 1-3m fl red
Swamp Bottlebrush, shrub 1-3m fl red, orange
Erect & slender shrub 0.4-1.5(-2.5)m fl red
Often prostrate spreading shrub 10-60cm fl red, brown
Common Fringe-myrtle, shrub 0.2-1.5 m fl white, pink
Lemon-scented Darwinia, erect-prostrate shrub 0.2-1.5(-3)m fl yellow green red
Low spreading or prostrate shrub 0.1-0.3m fl green, red, yellow
Pom-pom Darwinia, erect bushy shrub 0.2-1m fl white, red, pink
Karri Tree, 10-60(-90)m bark smooth fl white
Jarrah Tree, to 40m bark rough fibrous fl white, cream, pink
Bullich, mallee or tree 2-35m bark smooth fl white
Swan River Blackbutt, tree 3-25m bark rough furrowed fl white cream
Albany Blackbutt, mallee-tree 2-15m bark rough fissured fl white
Shrub or tree (0.3-1)-4(-8)m fl white, pink
Erect or decumbent shrub 0.2-2(-6)m fl white, pink

Shrub ca 50cm fl cream
Shrub 0.2-1.5m fl pink, white
Erect shrub 0.2-1m fl pink, white
Spearwood, erect shrub 1-4m fl yellow, cream, white
Erect or ascending shrub 0.3-2m fl pink, purple, red
Shrub 1.5-5m fl yellow, cream
Dense rounded shrub 0.5-1.5m fl white, cream
Moonah, shrub or tree 2-9m fl yellow, cream, white
Swamp Paperbark, tree or shrub 0.2-10m fl white, cream

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Melaleuca spathulata Schauer
Melaleuca viminea Lindl.
Pericalymma spongiocaula Cranfield
Taxandria fragrans J.R.Wheeler & N.G.Marchant
Taxandria juniperina (Schauer) J.R.Wheeler & N.G.Marchant
Taxandria linearifolia (DC.) J.R.Wheeler & N.G.Marchant
Taxandria parviceps (Schauer) J.R.Wheeler & N.G.Marchant
Olacaceae
Olax phyllanthi (Labill.) R.Br.
Onagraceae
Epilobium billardioreanum subsp.*intermedium* RavenEngelhom
Fuchsia magellanica Lam. *
Oenothera glazioviana Micheli *

Orobanchaceae
Orobanche minor Sm. *

Oxalidaceae
Oxalis corniculata L. *
Oxalis corymbosa DC. *
Oxalis exilis A.Cunn.
Oxalis incarnata L. *

Papilionaceae
Aotus intermedia Meisn.
Aotus passerinoides Meisn.
Bossiaea aquifolium subsp. *laidlawiana*
Bossiaea dentata (R.Br.) Benth.
Bossiaea linophylla R.Br.
Bossiaea praetermissa J.H.Ross
Bossiaea webbii F.Muell.
Callistachys lanceolata Vent.
Chorizema aciculare (DC.) C.A.Gardner subsp. *aciculare*
Chorizema reticulatum Meisn. P3
Chorizema retrorsum J.M.Taylor & Crisp
Chorizema rhombeum R.Br.
Daviesia flexuosa Benth.
Daviesia inflata Crisp
Dipogon lignosus (L.) Verdc. *
Euchilopsis linearis (Benth.) F.Muell.
Eutaxia parvifolia Benth.
Gastrolobium bilobum R.Br.
Gastrolobium brownii Meisn.
Gastrolobium coriaceum (Sm.) G.Chandler & Crisp
Gastrolobium cuneatum Henfr.
Gastrolobium minus (Crisp) G.Chandler & Crisp
Gastrolobium sericeum (Sm.) G.Chandler & Crisp
Gompholobium capitatum A.Cunn.
Gompholobium confertum (DC.) Crisp
Gompholobium knightianum Lindl.
Gompholobium polymorphum R.Br.
Gompholobium scabrum Sm.
Gompholobium venustum R.Br.
Gompholobium villosum (Meisn.) Crisp
Hovea chorizemifolia (Sweet) DC.
Hovea elliptica (Sm.) DC.
Jacksonia horrida DC.
Jacksonia spinosa (Labill.) R.Br.
Kennedia carinata (Benth.) Domin
Kennedia coccinea Vent.
Lathyrus tingitanus L. *
Latrobea brunonis (Benth.) Meisn.
Latrobea genistoides (Meisn.) Meisn.
Lotus angustissimus L. *
Lotus subbiflorus Lag. *
Lotus uliginosus Schkuhr *
Medicago arabica (L.) Huds. *

Medicago lupulina L. *
Medicago polymorpha L. *
Melilotus indicus (L.) All. *
Mirbelia ovata Meisn.
Ornithopus compressus L. *
Phyllota barbata Benth.
Psoralea pinnata *
Pultenaea barbata C.R.P.Andrews
Pultenaea reticulata (Sm.) Benth.
Robinia pseudoacacia L. *
Sphaerolobium drummondii Turcz.

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Erect shrub 0.2-2m fl pink, purple, red
Mohan, shrub or tree 0.6-5m fl white, cream
Erect shrub to 1.6m fl white, pink
Shrub to 2m
Wattie, tree or shrub 2-12m fl white
Swamp Peppermint, shrub 1-4m fl white
Shrub 1-4m fl white
Shrub 0.5-1.5m fl cream, white
Erect perennial, herb 10-70cm fl pink, white
Hardy Fuschia, shrub to 3m fl red and purple
Evening Primrose, short-lived herb 0.5-1.5m fl yellow
Lesser Broomrape, erect parasitic herb 10-45cm fl white, crm, pur
Yellow Wood Sorrel, creeping annual herb 2-20cm fl yellow
Pink Shamrock, bulbaceous perennial herb fl pink, purple
Lesser Yellow Sorrel, creeping annual herb fl yellow
Spreading perennial herb 10-20cm fl yellow
Erect shrub 0.45-2m fl yellow, red, brown
Erect slender shrub 0.4-1.8m fl yellow, brown, red
Shrub or tree 2-8m leaves 11-25 teeth fl orange, yellow, red, brown
Erect or straggly shrub 0.5-2m fl red, green, yellow, brown
Erect shrub (0.4-0.7-2.2m fl yellow, red,
Straggling tangled shrub 0.2-1m fl yellow, red, brown,
Water Bush, erect shrub, 0.5-2m fl yellow, red,
Wonnich, erect shrub or tree 1.5-7m fl orange, yellow
Erect or spreading shrub 0.15-0.5(-1)m fl pink, orange, yellow, red,
Showy Flame Pea, P3, erect, wiry shrub 0.1-0.5m fl pink, orange,
Trailing or erect to climbing shrub to 3m fl orange, red, yellow, pink
Prostrate, asc or twining shrub 10-50cm fl orange, pink, red, yellow,
Erect pungent shrub 0.4-1(-2)m fl yellow, orange, red, brown,
Erect spreading multi-stemmed shrub, 0.2-1.5m fl orange, red
Dolichos Pea, twining shrub or climber fl white, pink, purple
Swamp Pea, pros to asc slender shr 0.1-1.2m fl yellow, orange, red
Erect shrub to 1 m fl yellow, orange, red
Heart Leaf Poison, bushy erect shrub or tree to 4m fl yellow, orange
Tall bushy shrub to 3m fl yellow, red
Erect shrub to 2m fl orange
Erect shrub to 2m fl yellow, orange, red, pink
Prostrate trailing shrub to 0.2m fl red, yellow, white
Prostrate or weakly ascending shrub to 1m fl yellow, green
Slender erect or ascending shrub 0.2-1m fl yellow
Erect shrub 0.15-1(-1.2)m fl blue, purple
Slender erect shrub 10-50cm fl pink, purple
Bushy straggling or twining shrub 0.05-0.6(-1.2)m fl yell, orange, red
Painted Lady, erect- spreading shrub (0.2-0.4-2.3m fl pink, purple
Handsome Wedge-pea, slender/sprawling shr 10-90cm fl pk, bl, pur
Erect slender shrub 0.45-2m fl violet, purple, pink,
Holly-leaved Hovea, erect slender prickly shr 10-60cm fl blue, prple
Tree Hovea, slender erect shr/tree (0.4-0.6-3m blue, purple, white
Erect or spreading to prostrate shrub 0.1-2.5m fl yellow, orange, red
Spreading divaricately branched shrub, 0.3-2m fl yellow, orange, red
Prostrate shrub fl red, purple
Coral Vine, twining/trailing shrub/climber fl orange, pink, red, purple
Tangier Pea, twining herb or climber to 3m fl pink, purple
Erect spreading shrub 20-90cm fl yellow
Erect spreading shrub 0.3-1m fl yellow
Narrow-leaf Trefoil, slender diffuse herb 2-20cm fl yellow
Open sprawling annual herb to 70x30cm fl yellow, orange
Greater Lotus, erect or ascending perennial herb 10-50cm fl yellow
Spotted Medic, prostrate/spreading herb to 1.2m diameter fl yellow
Black Medic, procumbent or ascending (short-lived) herb fl yellow
Burr Medic, prostrate or ascending annual herb 4-20x 50cm fl yellow
Erect or sprawling annual or biennial, herb 10-50cm(-1)m fl yellow
Spreading or prostrate shrub 0.15-0.6m fl yellow, red, purple
Yellow Serradella, prostrate or decumbent herb to 10cm fl yellow
Erect shrub 0.2-1.5 m fl yellow, red, brown
Taylorina, erect slender shrub 1-4m fl purple, blue, white
Shrub 0.25-1m fl yellow, orange, red, brown
Erect shrub (0.2-0.5-2(-3)m fl yellow, orange, red, brown
Tree to 15m with spiny stems & branches fl white
Erect leafless shrub 0.15-0.6(-1) m fl red, yellow, orange

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Sphaerolobium medium R.Br.
Templetonia retusa (Vent.) R.Br.
Trifolium angustifolium L. var. *angustifolium* *
Trifolium arvense L. var. *arvense* *
Trifolium campestre Schreb. var. *campestre* *
Trifolium cernuum Brot. *
Trifolium dubium Sibth. *
Trifolium ligusticum Loisel. *
Trifolium striatum L. *
Trifolium subterraneum L. *
Trifolium tomentosum L. var. *tomentosum* *
Vicia hirsuta (L.) Gray *
Vicia sativa subsp. *nigra* (L.) Ehrh. *
Passifloraceae
Passiflora filamentosa Cav. *
Philydraceae
Philydrella pygmaea (R.Br.) Caruel
Phytolaccaceae
Phytolacca octandra L. *
Pittosporaceae
Billardiera coriacea Benth.
Billardiera drummondii (C.Morren) L.Cayzer & Crisp P4
Billardiera floribunda (Putt.) F.Muell.
Billardiera fusiformis Labill.
Billardiera laxiflora (Benth.) E.M.Benn.
Billardiera variifolia DC.
Lambertia uniflora R.Br.
Marianthus candidus Endl.
Marianthus coeruleopunctatus Klotzsch
Marianthus sylvaticus L.Cayzer & Crisp P3
Plantaginaceae
Plantago lanceolata L. *
Polygalaceae
Comesperma flavum DC.
Comesperma virgatum Labill.
Polygala virgata Thunb. *
Polygonaceae
Acetosella vulgaris Fourr. *
Persicaria hydropiper (L.) Spach
Polygonum aviculare L. *
Rumex conglomeratus Murray *
Rumex crispus L. *
Rumex frutescens Thouars *
Rumex pulcher L. subsp. *pulcher* *
Rumex x pseudopulcher Hausskn. *
Primulaceae
Samolus junceus R.Br.
Proteaceae
Adenanthos cuneatus Labill.
Adenanthos obovatus Labill.
Banksia aff. littoralis
Banksia quercifolia R.Br.
Banksia seminuda (A.S.George) Rye A.S. George
Banksia serra (R.Br.) A.R.Mast & K.R.Thiele P4
Conospermum caeruleum R.Br. subsp. *caeruleum*
Conospermum teretifolium R.Br.
Franklandia fucifolia R.Br.
Grevillea circisifolia Meisn.
Grevillea occidentalis R.Br.
Grevillea pulchella (R.Br.) Meisn. subsp. *pulchella*
Grevillea quercifolia R.Br.
Grevillea trifida (R.Br.) Meisn.

Hakea ceratophylla (Sm.) R.Br.
Hakea cucullata R.Br.
Hakea linearis R.Br.
Hakea oleifolia (Sm.) R.Br.
Hakea prostrata R.Br.
Persoonia longifolia R.Br.
Petrophile diversifolia R.Br.
Strangea stenocarpoides (Benth.) C.A.Gardner
Synaphea incurva A.S.George P1
Synaphea polymorpha R.Br.
Synaphea reticulata (Sm.) Druce
Ranunculaceae
Clematis pubescens Endl.

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Erect leafless shrub 10-60cm fl yellow, orange, red
Cockies Tongues, much-branched shr 0.3-4m fl red, white, yellow
 Erect or decumbent ann herb 0.1-0.7m fl pink, purple, white, green
Hare's Foot Clover, erect/spreading ann herb 50cm fl pk, wh, green
Hop Clover, prostrate asc or erect annual herb 3-20cm fl yellow, white
Drooping Flower Clover, decumbent /erect ann herb 2-10cm fl pink
Suckling Clover, prostrate or decumbent ann herb to 20cm fl yellow
Ligurian Clover, erect or decumbent annual herb 5-50cm fl pink
Knotted Clover, prostrate asc/erect ann herb to 60cm fl pink, white
Subterranean Clover, prostrate sprding herb to 35x40cm fl white, pink
Woolly Clover, prostrate/asc ann herb 2-35x40cm fl pink
Hairy Vetch, trailing/climbing ann herb 15-80cm fl white, blue, pink
 Prostrate twing/scramblg herb 0.2-1.1(-3)m fl bl, purple, pink, white

Twining perennial herb or climber to 5m fl white, blue

Butterfly Flowers, bulbaceous perennial herb 2-30cm fl yellow

Red Ink Plant, spreading/erect per herb/shrub 0.4-1.7m fl wh, pk, rd

Twining shrub or climber fl white, cream, yellow, purple

Slender climber fl blue, purple

White-flowered Billardiera, robust twining shrub or climber fl white

Australian Blue-bell, sturdy climber fl blue, white, pink

Delicate twining shrub or climber to 0.5m fl white, blue

Twining shrub or climber to 2.5m fl cream, yellow, blue, purple

Spreading straggly non-lignotuberous shrub to 3m fl red, orange

Twining shrub or climber to 5m dense fl white, cream

Twining shrub or climber fl blue

Slender climber fl blue, white

Ribwort Plantain, rosetted per herb 10-90cm fl green, yellow, brown

Erect perennial herb or shrub 0.3-1(-1.5)m fl cream, yellow

Milkwort, erect slender shrub, 0.3-1.6m fl pink, purple

Polygala, erect slender shrub 1.5-3 m fl purple

Sheep Sorrel, erect or ascending perennial herb 10-50cm fl red

Erect perennial herb 0.7-1.5m x 1.5m fl white, green

Wireweed, prostrate sprawling ann herb 2-10cm fl green, white, pink

Clustered Dock, erect perennial herb 0.3-1.5m fl white, green

Curled Dock, erect perennial herb, 0.2-1(-1.5)m fl green

Decumbent/ascending rhizomatous per herb to 40cm fl green, yellow

Fiddle Dock, perennial herb 0.2-0.6(-1)m fl green, red

Perennial herb Sandy soils

Erect/straggling almost leafless per herb 15cm-1.2m fl white, pink

Coastal Jugflower, erect/spreading lignotubrs shr 0.3-3(-5)m fl r, pk

Basket Flower, erect, lignotuberous shr 0.3-1.5(-2)m fl red, orange

Like Swamp Banksia, tree or shrub 1.5-12m fl yellow, orange

Oak-leaved Banksia, non-lignotubrs shr 0.6-3m fl yell, orange

River Banksia, non-lignotubrs shr/tree 1-25m fl yellow, orange, red

Serrate-leaved Dryandra, erect/slender shr 1-4(-7)m fl yel, crm, grn

Blue Brother, prostrate-straggly non-lign shrub, 0.15-1m fl blue, pink

Spider Smokebush, erect lignotuberous shr 0.6-2m fl white, cream

Janolin Bush, erect lignotuberous shrub 0.3-1.6m fl yellow

Varied-leaf Grevillea, prostrate shr 10-45cm x 0.5-2m fl wht, crm, yel

Spreading to erect shrub 0.4-1(-1.8)m fl pink, white, grey

Beautiful Grevillea, spreading shrub 0.2-1.5m fl white, cream

Oak-leaf Grevillea, straggly/sprawlg ligno shr 30-70cm fl pnk, rd, pur

Spreading spiny shru, 0.3-1.7m fl white, cream

Horned Leaf Hakea, erect-spreadg ligno shr 0.3-2m fl brown, red

Hood Leaved Hakea, slender few-branched, nl shr/tree, 1-4m fl pink

Shrub or tree 0.6-4m fl white, cream

Dungyn, erect shrub or tree 2-10m fl white

Harsh Hakea, erect/spreadg/prostrate non-ligno shr 1-3m fl wht, crm

Snottygobble, erect lignotuberous shrub or tree 1-5m fl yellow

Slender gen single-stem non-ligno shr 0.7-3m fl cream, white, pink

Slender erect/decumbent lignotuberous shr 0.2-1.2m fl green, yellow

Clumped spreading shrub fl yellow

Albany Synaphea, slender or rounded shrub 0.15-0.7m fl yellow

Spreading to prostrate shrub 10-45x80cm fl yellow

Common Clematis, strong m or f woody shrub/climb to 5m fl wt, crm

Rhamnaceae*Trymalium floribundum* subsp. *trifidum* Rye*Trymalium venustum* Rye**Rosaceae***Acaena novae-zelandiae* Kirk **Cotoneaster glaucophyllus* Franch. **Rosa canina* L. **Rubus anglocandicans* A. Newton **Sanguisorba minor* subsp. *muricata* ***Rubiaceae***Opercularia hispidula* Endl.*Opercularia volubilis* Benth.**Rutaceae***Boronia crenulata* Sm.*Boronia denticulata* Sm.*Boronia gracilipes* F. Muell.*Boronia heterophylla* F. Muell.*Boronia juncea* subsp. *micrantha**Boronia spathulata* Lindl.*Boronia stricta* Bartl.*Boronia virgata* Paul G. Wilson P3*Chorilaena quercifolia* Endl.*Crowea angustifolia* var. *platyphylla* (Benth.) Paul G. Wilson**Santalaceae***Choretum lateriflorum* R.Br.*Leptomeria ellytes* Lepshi*Leptomeria pauciflora* R.Br.**Scrophulariaceae***Verbascum virgatum* Stokes **Veronica arvensis* L. ***Solanaceae***Solanum ? americanum* **Solanum laciniatum* Aiton ***Sterculiaceae***Lasiopetalum floribundum* Benth.*Rulingia corylifolia* Graham*Thomasia heterophylla* E.M. Benn. & K. Shepherd ms*Thomasia pauciflora* Lindl.*Thomasia purpurea* (Aiton) Gay*Thomasia rhynchoarpa* Turcz.*Thomasia solanacea* (Sims) Gay P3**Stylidiaceae***Levenhookia pusilla* R.Br.*Stylidium adnatum* R.Br.*Stylidium amoenum* R.Br.*Stylidium caespitosum* R.Br.*Stylidium despectum* R.Br.*Stylidium guttatum* R.Br.*Stylidium inundatum* R.Br.*Stylidium laciniatum* C.A. Gardner*Stylidium luteum* R.Br.*Stylidium luteum* R.Br. subsp. *luteum**Stylidium nymphaeum* Wege ms*Stylidium piliferum* R.Br. (Mildbr.) Carlquist*Stylidium pritzelianum* Mildbr.*Stylidium repens* R.Br.*Stylidium rhynchoarpum* Sond.*Stylidium scandens* R.Br.*Stylidium sp. Mt Barker* (E.J. Croxford 1906) PN*Stylidium sp.* PN**Thymelaeaceae***Pimelea clavata* Labill.*Pimelea hispida* R.Br.*Pimelea imbricata* var. *piligera**Pimelea lanata* R.Br.*Pimelea longiflora* R.Br. subsp. *longiflora**Pimelea rosea* R.Br.*Pimelea rosea* R.Br. subsp. *rosea**Pimelea sylvestris* R.Br.*Pimelea tinctoria* Meisn.**Tremandraceae***Platytheca galioides* Steetz*Tetratheca affinis* Endl.*Tremandra stelligera* DC.**Valerianaceae**

Shrub or tree (occasionally) 0.8–9m fl white, cream, yellow, green

Erect shrub 1.5–4(–6)m fl white, cream

Trailing stoloniferous mat-forming perennial herb fl red, purple, green

Shrub to 3m leaves simple slightly glaucous flower clumps fruit red

Dog Rose, prickly shrub to 2.5m fl pink, white

Scrambling rampant sprawling shrub to 4m fl pink, white

Sheep's Burnett, erect or ascending perennial herb fl green**Hispid Stinkweed**, herb/shrub 0.15–1m fl grn, cream, yellow, purple

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Aniseed Boronia, shrub 0.25–1.2m fl pink, purple, red

Erect slender shrub (0.25–)0.5–2m fl red, pink

Karri Boronia, erect spindly shrub 0.3–1.2(–2)m fl pink**Kalgan Boronia**, erect slender shrub 1–3(–5)m fl red, pink

Erect, spindly shrub 0.45–2m fl pink

Boronia, erect slender shrub, 0.15–1m fl pink, red

Erect, slender shrub 0.6–2 m fl pink

Slender erect or sprawling shrub 0.3–2 m fl pink

Chorileana, shrub or tree 0.5–5m fl yellow, cream, white, green

Erect or spreading shrub 0.3–3.5m fl pink, white

Dwarf Sour Bush, weeping shrub 0.9–4.5m hemiparasitic fl wht, crm

Shrub 1–3 m fl green, orange, red, brown

Sparse-flowered Currant Bush, sh -5m fl yel, org, brn, crm, wt, grn**Twiggy Mullein**, stout erect biennial herb 0.3–3m fl yellow**Wall Speedwell**, erect or procumbent annual herb 10-30cm fl blue?**Glossy Nightshade**, erect/spreading herb/shr 0.45–2m fl white**Kangaroo Apple**, shrub 1–4m fl purple, blue**Free Flowering Lasiopetalum**, erect/sprdg 0.3–3m fl pk, bl, pr, wht**Hazel-leaved Rulingia**, shrub 0.25–2(–3)m fl cream, white

Erect or sprawling shrub 0.2–1.5m fl pink, purple, white

Few-flowered Thomasia, slend/erect/strag shr 0.2–1.5m fl pk, pr, wh

Erect slender shrub 0.3–1.2(–2)m fl pink, purple

Erect slender shrub (0.1–)0.3–1.2(–2)m fl pink, purple

Erect shrub 0.5–3 m fl blue, purple, pink

Midget Stylewort, annual (ephemeral) herb 1-10cm fl pink, white**Common Beaked Triggerplant**, erect per herb 5-30cm fl pink, white**Lovely Triggerplant**, rosetted herb 10-50cm fl white, blu, pur, violet**Fly-away Triggerplant**, rosetted per herb 6-40cm fl pink, white**Dwarf Triggerplant**, erect annual (ephemeral), herb 1.5-8cm fl pink**Dotted Triggerplant**, rosetted perennial herb 3-15cm fl white**Hundreds and Thousands**, erect eph herb 1.5-8cm fl white, pnk, vio**Tattered Triggerplant**, twining herb 0.75–3m fl white, purple**Yellow Triggerplant**, rosetted per herb 20-60cm fl yellow**Yellow Triggerplant**, rosetted per herb 20-60cm fl yellow

Scandent perennial, herb, 1.4–2.5m fl pink, purple

Common Butterfly Triggerplant, rosetted 10-50cm fl wht, crm, yell**Royal Triggerplant**, lax perennial, herb 5-40cm fl purple**Matted Triggerplant**, creeping to 10cm elevated on roots fl wht, pink**Black-beaked Triggerplant**, erect/sprng 10-50cm fl wt, crm, yel, pk**Climbing Triggerplant**, 4-85cm leaves in whorls fl white, pink, purple

Herb to 25cm fl cream

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Erect shrub (0.3–)1–4(–6)m fl white, cream, yellow

Bristly Pimelea, erect shrub 0.2–1.5m fl pink

Erect shrub (0.1–)0.2–0.8(–1)m fl white, cream, pink

Erect spindly shrub (0.5–)0.7–4m fl white, pink

Erect spindly shrub 0.3–1.3m fl white, cream

Rose Banjine, erect shrub 0.3–1m fl pink, red, purple

Shrub 0.3–1 m fl pink

Erect shrub 0.3–2m fl white, pink

Erect spindly shrub 0.5–1(–2 m fl yellow, green

Slender erect/stragglng shrub 0.2–0.6(–1.5)m fl blue, violet, purple

Erect open leafless shrub 0.1–0.7(–1)m fl pink, purple

Erect & spreading/sprawling shrub 0.1–1.5(–2)m fl pink, purple, blue

Shire of Denmark

Centranthus ruber (L.) DC.

Verbenaceae

Verbena bonariensis L. var. *bonariensis*

Wilson Inlet Foreshore Reserves Management Plan 2008

Red Valerian, perennial herb or shrub 0.3–1m fl pink, red, white

Erect annual or perennial herb to 1m fl blue, purple

The Fungi List was derived from data obtained from the West Australian Herbarium (June 2008) which incorporates a broader area encompassing land outside of the Wilson Inlet foreshore area and as such there are fungi species listed which do not occur within the Wilson Inlet Foreshore Reserves.

Fungi – Fewer common names exist for fungi, therefore they have not been included.

Agaricaceae

Agaricus ? xanthodermus
Agaricus silvaticus
Agaricus sp.
Agaricus sylvaticus
Agaricus xanthodermus
Lepiota leucothites

Lepiota sp.

Leucoagaricus naucinus
Macrolepiota rachodes
Melanophyllum echinatum
Leucocoprinus luteus

Amanitaceae

Amanita aff. Phalloides
Amanita ananiceps
Amanita austroviridis
Amanita cf. phalloides
Amanita sp.
Amanita umbrinella
Amanita xanthocephala
Limacella sp.

Ascomycota

Ascomycete sp.

Bankeraceae

Phellodon sp.

Boletaceae

Boletus sp.

Cantharellaceae

Cantharellus aff. Cinnabarinus var. australiensis
Cantharellus sp.

Clavariaceae

Clavulinopsis helvola

Clavicipitaceae

Claviceps purpurea
Cordyceps sp.

Coniophoraceae

Podoserpula pusio

Coprinaceae

Coprinus disseminatus.
Psathyrella candolleana
Psathyrella sp.

Coriolaceae

Daedalea gigantea

Corticaceae

Aleurodiscus sp.

Cortinariaceae

Cortinarius anomalus
Cortinarius basirubescens
Cortinarius calceolatus
Cortinarius phalaris
Cortinarius rotundisporus
Cortinarius sinapicolor
Cortinarius sp.
Cortinarius subarcheri
Cortinarius violaceus
Cortinarius volvaceus
Dermocybe sanguinea
Dermocybe splendida
Descolea maculata
Descolea sp.
Descomyces albus
Galerina autumnalis
Galerina sp.
Galerina unicolor

Hymenochaetaceae

Phellinus conchatus
Phellinus setulosus
Descomyces albus

Lentinaceae

Lentinus dactyloides

Lentinellaceae

Lentinellus hepatotrichus

Leotiaceae

? *Bulgaria sp.*

Discinella sp.

Lycoperdaceae

Vascellum pratense

Lycoperdon sp.

Meliolaceae

Meliola sp.

Mesophelliaceae

Castoreum cretaceum

Paxillaceae

Austropaxillus sp.
Paxillus infundibuliformis
Paxillus sp.

Pezizaceae

Peziza violacea

Peziza whitei

Pluteaceae

Pluteus sp.

Polyporaceae

Polyporus mylittae
Polyporus tumulosus

Ramariaceae

? *Ramaria sp.*

Rhizopogonaceae

Rhizopogon sp.

Russulaceae

Lactarius clarkeae

Lactarius eucalypti

Lactarius sp.

Russula "small white" (K. Syme 633/93)

Russula adusta

Russula clelandii

Russula clelandii

Russula nigricans

Russula persanguinea

Russula sp.

Russula viridis

Sclerodermataceae

Pisolithus albus

Pisolithus microcarpus

Strobilomycetaceae

Austroboletus occidentalis

Austroboletus sp.

Strophariaceae

Panaeolus campanulatus

Pholiota ? highlandensis

Pholiota highlandensis

Pholiota sp.

Tubaria rufofulva

Thelephoraceae

Hydnellum sp.

Sarcodon sp.

Thelephora terrestris

Tricholomataceae

? *Mycena sp.*

Shire of Denmark

Hebeloma sp.
Inocybe arenacolens
Inocybe cf. euferruginea
Inocybe euferruginea
Entolomataceae
Alboleptonia sericella
Entoloma cineria
Entoloma sp.
Leptonia sp.
Nolanea sp.
Geastraceae
Geastrum javanicum
Gloeocystidiellaceae
Gloeocystidiellum sp.
Hygrophoraceae
Hygrocybe sp.
Hygrocybe viscidibrunnea
Hygrophorus sp.

Water Mould

Peronosporaceae
Peronospora trifoliorum

Myxomycetes

Arcyriaceae
Arcyria cinerea
Ceratiomyxaceae
Ceratiomyxa fruticulosa

Algae

Acetabularia sp.
Batrachospermum sp.
Chaetomorpha sp.
Chara sp.
Gracilaria sp.
Nitella tasmanica A.Braun
Polysiphonia sp.
Sargassum sp.
Spyridia biannulata

Moss

Anthocerotaceae
Anthoceros cf. punctatus
Bartramiaceae
Breutelia affinis (Hook.) Mitt.
Fissidentaceae
Fissidens curvatus Hornsch.
Fissidens tenellus Hook.f. & Wilson

Briophytes / Liverworts

Acrobolbaceae
Goebelobryum unguiculatum
Aneuraceae
Riccardia bipinnatifida
Fossombroniaceae
Fossombronia sp.
Bryaceae
Gemmabryum chrysonuron (Muell.Hal.) J.R.Spence & H.P.Ramsay
Chaetophyllopsiaceae
Chaetophyllopsis whiteleggei

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Armillaria sp.
Collybia fusipes
Collybia sp.
Laccaria proxima
Laccaria sp.
Lepista sp.
Lichenomphalia chromacea (Cleland) Redhead et al.
Marasmius sp.
Mycena sp.
Mycena subgalericulata
Omphalina ericetorum
Tricholoma eucalypticum
Tricholoma sp.
Uredinales
Aecidium sp.
Uredo sp.
Xerocomaceae
Boletellus obscureroccineus
Boletellus sp.

Physaraceae
Leocarpus fragilis
Physarum cinereum

Ceramiaceae
Spyridia filamentosa (Wulfen) Harv.
Polyphysaceae
Acetabularia peniculus (Turner) Solms
Cystoseiraceae
Platythalia angustifolia Sond.

Frullaniaceae
Frullania probosciphora
Orthotrichaceae
Zygodon intermedius Bruch & Schimp.

Geocalycaceae
Chiloscyphus semiteres var. *semiteres*
Lejeuneaceae
Austrolejeunea occidentalis Pocs
Diplasiolejeunea plicatiloba (Hook.f. & Taylor) Grolle
Leucobryaceae
Leucobryum candidum (Brid. Ex P.Beauv.) Wilson
Pallaviciniaceae
Pallavicinia lyellii
Pottiaceae

Dicranaceae

Campylopus bicolor (Muell.Hal.) Wilson var. *bicolor*
Campylopus introflexus (Hedw.) Brid. *
Leucobryum subchlorophyllum Hampe

Dicranoloma

Dicranoloma diaphanoneuron (Hampe) Paris

Ditrichaceae

Pleuridium nervosum (Hook.) Mitt. Var. *nervosum*

Funariaceae

Entosthodon aff. *Apophysatus*

Barbula calycina Schwägr.

Didymodon torquatus (Taylor) Catches.

Syntrichia papillosa (Wilson) Jur.

Trichostomum eckelianum R.H.Zander

Sematophyllaceae

Sematophyllum homomallum (Hampe) Broth.

Splachnaceae

Tayloria octoblepharum (Hook.) Mitt.

Thuidiaceae

Thuidium sparsum (Hook.f. & Wilson) A.Jaeger

Lichens**Cladoniaceae**

Cladia aggregata (Sw.) Nyl.
Cladia sullivanii (Müll. Arg.) W. Martin
Cladonia cervicornis subsp. *Verticillata*
Cladonia floerkeana (Fr.) Flörke
Cladonia praetermissa A.W. Archer
Cladonia rigida (Hook.f. & Taylor) Hampe
Cladonia southlandica
Cladonia sp.
Thysanothecium scutellatum (Fr.) D.J. Galloway
 ? *Myelorrhiza* sp

Graphidaceae

Graphis sp

Parmeliaceae

Flavoparmelia diffractaica Elix & J. Johnst.
Flavoparmelia rutidota (Hook. F. & Taylor) Hale
Hypogymnia pulchrilobata (Bitter) Elix
Parmotrema ? *praesorediosum*

Pertusariaceae

Ochrolechia sp
Pachyella sp

Siphulaceae

Siphula sp

Usneaceae

Usnea inermis Motyka
Usnea rubicunda Stirt.
Usnea sp.

Mitosporic ^{trj} *Dpkk* sp**Mark Parre's list of additions to the Herbarium list****Class Liliopsida – Monocotyledons****Cyperaceae**

Lepidosperma effusum

Class Magnoliopsida – Dicotyledons**Casuarinaceae**

Allocasuarina fraseriana

Myrtaceae

Corymbia calophylla
Eucalyptus cornuta
Eucalyptus marginata
Melaleuca densa

Proteaceae

Banksia occidentalis

APPENDIX 3 – Environmental Weeds

Environmental Weeds found on Foreshore Reserves

Sources: Survey of Degradation & Rehabilitation Measures June 1996, Report of work done during April – July 2003 on Rehabilitation of the Wilson Inlet Foreshore by Denmark Weed Action Group Inc., Denmark Foreshore Wilson Inlet Management Plan May 1996, Wilson Inlet Foreshore Management Plan Denmark to Hay Rivers 2002

Common Name	Botanical Name	Source and/or Vector
African Love Grass	<i>Eragrostis curvula</i>	invaded from road verge
Agapanthus	<i>Agapanthus praecox</i>	garden escapee
Arum Lily	<i>Zantedeschia aethiopica</i>	birds
Asparagus Fern	<i>Asparagus scandens</i>	birds, garden refuse
Blackberry	<i>Rubus</i> spp.	garden refuse, birds, foxes
Blackberry Nightshade	<i>Solanum nigrum</i>	birds, garden refuse
Blackwood	<i>Acacia melanoxylon</i>	garden escapee
Bleeding Heart Tree	<i>Homalanthus novo-guineensis</i> (was <i>H. nutans</i> , <i>Omalanthus nutans</i>)	garden escapee
Blue Periwinkle	<i>Vinca major</i>	garden escapee
Bridal Creeper	<i>Asparagus asparagoides</i>	birds
Buffalo Grass	<i>Stenotaphrum secundatum</i>	garden escapee
Butterfly Bush	<i>Polygala myrtifolia</i>	garden refuse
Cape Weed	<i>Arctotheca calendula</i>	agricultural escapee
Cotoneaster	<i>Cotoneaster</i> spp.	birds, garden escapee
Cudweed	<i>Gnaphalium calviceps</i>	agricultural escapee
Dock	<i>Rumex</i> sp.	agricultural escapee
Dolichos Pea	<i>Dipogon lignosus</i>	garden refuse
Fishbone Fern	<i>Nephrolepis cordifolia</i>	garden escapee
Flatweed	<i>Hypochaeris glabra</i>	garden refuse
Fleabane	<i>Conyza</i> spp.	garden refuse
Flinders Range Wattle	<i>Acacia iteaphylla</i>	garden escapee
Geranium	<i>Erodium</i> sp.	garden escapee
Giant Reed	<i>Arundo donax</i>	garden escapee
Golden Wreath Wattle	<i>Acacia saligna</i>	escaped from plantings
Goosefoot Or Fat Hen	<i>Chenopodium</i> spp.	water
Honeysuckle	<i>Lonicera japonica</i>	garden escapee
Hop Bush	<i>Dodonaea purpurea</i>	garden escapee
Ink Weed	<i>Phytolacca octandra</i>	birds or garden refuse
Ivy	<i>Hedera helix</i>	garden escapee
Jasmine	<i>Jasminum officinale</i>	garden escapee
Kangaroo Apple	<i>Solanum laciniatum</i>	birds, garden escapee
Kikuyu	<i>Pennisetum clandestinum</i>	garden escapee
Lantana	<i>Lantana camara</i>	birds, garden escapee
Lightning Plant Or Canary Creeper	<i>Senecio angulatus</i> (was <i>S. tamoides</i>)	garden escapee
Lupins	<i>Lupinus cosentinii</i>	garden and agricultural escapee

Common Name	Botanical Name	Source and/or Vector
Madeira Vine	<i>Anredera cordifolia</i>	garden escapee
Morning Glory	<i>Ipomoea indica</i>	garden escapee
New Zealand Christmas Tree or Pohutukawa	<i>Metrosideros excelsa</i>	garden escapee
New Zealand Mirror Bush	<i>Coprosma repens</i>	garden escapee
Oxalis	<i>Oxalis</i> spp.	garden escapee
Pampas Grass	<i>Cortaderia selloana</i>	wind, garden escapee
Paspalum	<i>Paspalum dilatatum</i>	dumping, garden escapee
Pelargonium	<i>Pelargonium</i> sp.	garden escapee
Pine Tree	<i>Pinus</i> sp.	plantation escapee
Plantain	<i>Plantago</i> sp.	seed animals/walkers' socks
Queensland Silver Wattle	<i>Acacia podalyriifolia</i>	garden escapee
Radiata Pine	<i>Pinus radiata</i>	plantation escapee
Rats Tail Fescue	<i>Vulpia myuros</i>	road verges
Rats Tail Grass, Parramatta Grass	<i>Sporobolus africanus</i>	road verges
Rough Tree Fern	<i>Cyathea cooperi</i>	water, garden escapee
Satin Bush	<i>Podalyria sericea</i>	garden escapee
Spider Plant	<i>Chlorophytum tuberosum</i>	garden escapee
Sweet Pittosporum	<i>Pittosporum undulatum</i>	birds, garden escapee
Sydney Golden Wattle	<i>Acacia longifolia</i>	garden refuse and birds
Tagastase	<i>Chamaecytisus palmensis</i>	garden refuse
Taylorina	<i>Psoralea pinnata</i>	garden escapee
Umbrella Sedge	<i>Cyperus</i> spp.	water
Victorian Ti-Tree	<i>Leptospermum laevigatum</i>	garden refuse and birds
Water Couch	<i>Paspalum distichum</i>	water
Watsonia	<i>Watsonia</i> spp.	water, machinery movement
Wavy Gladiolus	<i>Gladiolus undulatus</i>	garden escapee
Wild Oat	<i>Avena fatua</i>	wind, garden refuse, horses
Yorkshire Fog	<i>Holcus lanatus</i>	soil dump and garden refuse

Declared Plants known to occur in the Shire of Denmark

Source: Department of Agriculture and Food WA

Common Name	Botanical Name
Arum Lily	<i>Zantedeschia aethiopica</i>
Blackberry	<i>Rubus</i> spp
Bridal Creeper	<i>Asparagus asparagoides</i>
Cape Tulip	<i>Morea flaccida</i> , <i>M. miniata</i>
Golden Dodder	<i>Cuscuta campestris</i>
Gorse	<i>Ulex europaeus</i>
Lantana	<i>Lantana camara</i>

Pest Plants known to occur in the Shire of Denmark

Source: Department of Agriculture and Food WA

Common Name	Botanical Name
African Love Grass	<i>Eragrostis curvula</i>
Angels Trumpet	<i>Datura saiveolens</i>
Castor Oil Tree	<i>Rinicus communis</i>
Victorian Ti-Tree	<i>Leptospermum laevigatum</i>
Cotoneaster	<i>Cotoneaster</i> spp.
Dolichos Pea	<i>Dipogon lignosus</i>
Doublegee	<i>Emex austrakis</i>
Fleabane	<i>Conyza</i> spp.
Ink Weed	<i>Phytolacca octandra</i>
Onehunga	<i>Soliva pterosperma</i>
Pampas Grass	<i>Cortaderia seioana</i>
Sweet Pittosporum	<i>Pittosporum undulatum</i>
Sydney Golden Wattle	<i>Acacia longifolia</i>
Taylorina	<i>Psoralea pinnata</i>
Tree of Heaven	<i>Ailanthus altissima</i>
Watsonia	<i>Watsonia</i> spp.

APPENDIX 4 – Recreational Facilities

Source: Denmark Foreshore Wilson Inlet Management Plan 1996, Wilson Inlet Foreshore Management Plan Denmark to Hay Rivers 2002, updated

Location	Reserve(s)	Current facilities
Crusoe Beach	23120	Informal car park on road reserve.
Rudgyard Beach	Unallocated Crown Land	The small boat launching area is part of the Rudgyard Beach development and requires access through private property. Gazetted water ski area is next to this foreshore area.
Springdale Beach	43923 and Road Reserve 14132	Heritage Trail Shelter 3, 2.4 km from start of trail at Denmark River, heritage benches constructed in 1934, picnic area, beach and interpretive heritage information.
Eastern section of the Heritage Trail	24452, 41815, 43923, Road Reserve 14132 to South Coast Highway	Walking/cycling trail extending 12 km east from heritage bridge at the Denmark River mouth to the Hay River. There is a series of shelters and seats along the trail between Denmark River mouth and Rudgyard Beach, constructed through a community project in the 1980s. The distance to each shelter is signposted at start of trail at Denmark River. Shelter 1 – 1 km, Shelter 2 – 1.4 km, Shelter 3 – 2.4 km, Shelter 4 – 3.4 km.
Denmark River mouth	14376	Car park, boat launching ramps and jetty, yacht set up area, fish cleaning area, walk trail, public toilets.
Yacht Club Reserve	36714	Small public recreation area, public toilets and car parking overlooking Inlet.
Roberts Street Recreation Node	Unallocated Crown Land	Parking for less than 5 cars, access to the foreshore via informal path.
Inlet Drive Lookout	12344	Parking for less than 5 cars at lookout, walk trail to Poison Point.
Poison Point	12344	Walk trail.
Campbell Road Recreation Node	34742	Parking for less than 5 cars at the bottom of Campbell Road, on the edge of the Foreshore Reserve.
Bibbulmun Track	34742, 26480	Walk track from Campbell Road to Ridley Place, then from Maraveen Place to Rainbow Close (Little River Walk Track).
Rainbow Close Recreation Node	26480	Parking for less than 5 cars.
Poddy Shot Bay Recreation Area	25347	Boat launching ramp, jetty, fish cleaning area, public toilets.
Ocean Beach Dog Exercise Area	24596	Limited facilities – parking for up to ten cars, access to dog exercise area. Flooded when Inlet level is high. Cycle/walk path from Little River Road to Ocean Beach Surf Club crosses the access tracks.
Prawn Rock Channel Recreation Area	24596, 20578	Walk trails, swimming areas, small car parks, picnic shelters. Flooded when Inlet level is high. Cycle/walk path from Little River Road to Ocean Beach Surf Club crosses the car park.

APPENDIX 5 – Fire Management Plan

The version of the Fire Management Plan included in this document has been updated to address the out of date terminology and to include references to the Bibbulmun Track where relevant. The maps in the original document are not included as they were not available in a suitable format.

DENMARK FORESHORE
FIRE MANAGEMENT PLAN

WILSON INLET FORESHORE
HAY RIVER – MOUTH OF INLET

IN THE

SHIRE OF DENMARK

Version 1.1
2 September 2008

Denmark Foreshore Fire Management Plan

Version 1

Prepared for Shire of Denmark and the Wilson Inlet Management Advisory Committee, by FirePlan WA in October 2002

DISCLAIMER

The information contained in this report is based on sources believed to be reliable. FirePlan WA gives no warranty that the said sources are correct, and accepts no responsibility for any resultant errors contained herein and any damage or loss, howsoever caused, suffered by any individual or corporation.

The findings and opinions in this report are based on research undertaken by FirePlan WA as independent consultants and do not purport to be those of the Shire of Denmark or the Wilson Inlet Management Authority.

Version 1.1

This version has been prepared as part of the Wilson Inlet Foreshore Reserves Management Plan 2008.

It contains minor updates to the original document:

- 1) to distinguish between the Denmark – Nornalup Heritage Rail Trail and the Bibbulmun Track between Campbell Road and “The Cove”
- 2) to update the names of government agencies where appropriate
- 3) to change references to „fire break notice/order“ to „Fire Regulations Notice“
- 4) to remove references to the Denmark Fire Prevention Committee
- 5) to change Wilson Inlet Management Authority to Wilson Inlet Management Advisory Group
- 6) to add references to the Wilson Inlet Foreshore Management Plan Denmark to Hay Rivers (2002) and the Wilson Inlet Foreshore Reserves Management Plan 2008
- 7) to change the Agricultural High School to Denmark College of Agriculture

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1.0 EXECUTIVE SUMMARY

The Denmark Foreshore Management Plan (DFMP) was prepared for the Shire of Denmark and the Wilson Inlet Management Authority in 1996.

The Denmark Foreshore Management Plan identified: - "Fire is a significant concern for residents with properties close to densely vegetated areas along the Denmark Foreshore, and for the authorities responsible for the management of this vegetation" Also the DFMP identified the need for - "A fire hazard reduction plan for the Denmark foreshore should be prepared and implemented by the Denmark Shire Council".

The Denmark Foreshore Fire Management Plan will provide a useful tool to protect the ecological values of the Wilson Inlet foreshore vegetation while at the same time being consistent with community fire protection standards outlined in the Denmark Fire Prevention Report.

1.1 Summary of Recommendations.

Firebreaks.

1. All existing firebreaks and heritage trails to be maintained as firebreaks to allow access for management, fire suppression operations and to act as boundaries for hazard reduction burning. It is essential that heritage trails be upgraded to the above standard to allow safe access for fire fighting vehicles. If heritage trails are not upgraded then earth- moving equipment will need to be used to construct firebreaks at the line of fire suppression to ensure safety of fire fighters and equipment and to contain the fire. It is not desirable to use earth-moving equipment to construct more firebreaks and such equipment should be used as a last resort.
2. The Denmark – Nornalup Heritage Rail Trail (Heritage Trail) and the Bibbulmun Track between Campbell Road and "The Cove" to be maintained to the same specifications as for Fire Service Access.
3. In the Hay River to Denmark River area firebreaks are to be installed along fence lines adjoining private property, preferably in areas that are cleared or partially cleared already and not within the narrow foreshore reserve.
4. All adjoining private property owners/occupiers should comply with the Shire of Denmark Fire Regulations Notice. Alternatively, individual fuel reduction plans should be prepared and approved by the shire.

Protection of Residential Values

5. Boundaries of the reserve and private property be clearly delineated by permanent markers.
6. Foreshore management objectives, strategies and works programs be clearly identified and provided to adjoining private owners/occupiers.
7. Clearing restrictions and access to the inlet water by adjoining owners/occupiers be clearly defined and be made known to the property owners. Where necessary regeneration/replanting of the foreshore is to be carried out at the owner/occupiers expense to Shire requirements.
8. All adjoining owners/occupiers be required by the Shire to prepare an individual Fuel Reduction Plan as described in the Denmark Fire Prevention Plan.
9. Hazard reduction be carried out jointly (by owners and the Shire) in specific areas on private property and the Foreshore Reserve. For example between the Bibbulmun Track and Payne Road, Weedon Hill. In these areas it may be necessary to have the houses protected by building protection zones prior to hazard reduction being carried out.
10. A concerted effort of visitation and liaison be conducted as a matter of priority to the owners/occupiers of land adjoining the foreshore reserve in the Springdale, Weedon Hill, Harington Break and Motel Point areas. This is to make them aware of the overall fire risk, and show them how to prepare a fuel reduction plan.

Hazard Reduction

11. Research be conducted to verify the effectiveness of selective hand clearing. This would be achieved by measuring fuel weights before and after hand clearing using both on and off- site removal. This would quantify any reduction in fuel loading, change in fuel structure leading to a reduction in fire intensity and whether the action provided the same protection from fire as would hazard reduction by burning.
12. No hazard reduction burning be carried out between the heritage trail and the waters edge. Regeneration burning may be carried out.
13. No hazard reduction burning take place where a road is the foreshore boundary.
14. All planned hazard reduction burning be part of the annual Works Program endorsed by Bush Fire Advisory Committee and approved by Council.
15. All planned hazard reduction burning on foreshore Reserves, have a prescription prepared in accordance with the Fire and Emergency Services Authority of Western Australia (FESA) Learning Manual 3.17 Prescribed Burning 1.
16. Only persons trained in Prescribed Burning 1. be allowed to write prescriptions (FESA Learning Manual 3.17).
17. A process be established to handle any complaints or objections to planned hazard reduction burning as determined in the Denmark Fire Prevention Plan.
18. All brigades conducting planned hazard reduction burning be trained in application of a burning prescription and lighting techniques for various fuel types.

19. All prescriptions for planned hazard reduction burning use the FESA/Department of Environment and Conservation (DEC) Prescription forms and pre-burn check list.
20. The hazard reduction program for Weedon Hill and Springdale as shown on Maps 1 and 2 be implemented.
21. Fire history, fuel loads, vegetation types, location size, month/year of fires and strategic firebreaks be stored in the Shire of Denmark Geographic Information System.

Post Fire Management

22. Limit access to fire scar areas
23. Explore the possibility of rabbit and predator control following significant fires in foreshore reserves. The need for community consultation in decision making and for advertisement of control operations should also be addressed.
24. Post fire weed control, dieback and flora and fauna rehabilitation programs be established and implemented when necessary.
25. Develop joint research programs with DEC, Denmark Environment Centre, Shire and the Wilson Inlet Management Advisory Group to monitor the effects of fire on fuel quantities, flora and fauna and gather information that can be used to enhance fire management programs to assist in achieving overall management objectives.

Access to Foreshore Reserves

26. Signage be erected at major entrances to foreshore reserves indicating the purpose of the reserve, its conservation values and reporting authority.
27. Signage be erected at minor entrances advising conservation area where access is for management purposes only.
28. That signage restricting access to dieback free areas be erected.

Poddy Point

29. The small areas of tea tree/melaleuca vegetation types as at Poddy Point not be burned for hazard reduction.
30. Any introduced grass areas on Foreshore reserve be mowed or slashed to achieve hazard reduction, and be regenerated back to native vegetation.
31. Burning of jarrah/marri vegetation types for the protection of property and buildings be done in accordance with burning regimes outlined in Section 7.3, Diagrams 2 & 3.

2.0 INTRODUCTION

A Foreshore Management Plan was prepared for the Wilson Inlet foreshore from the Denmark River to the Inlet's sandbar in 1996. The Denmark Foreshore Management Plan (DFMP) was prepared by the Shire of Denmark and the Wilson Inlet Management Authority. The Wilson Inlet Management Authority had community representation that had been established to oversee the implementation of the Management Plan.

The Denmark Foreshore Management Plan identified: - "Fire is a significant concern for residents with properties close to densely vegetated areas along the Denmark Foreshore, and for the authorities responsible for the management of this vegetation" Also the DFMP identified the need for: - "A fire hazard reduction plan for the Denmark foreshore should be prepared and implemented by the Denmark Shire Council" In the DFMP the following objective was stated: - "To ensure the provision of adequate and appropriate fire management planning and controls without adversely affecting the conservation, recreational and aesthetic values of the Denmark Foreshore". (Denmark Foreshore Management Plan pages 17 & 18).

The Wilson Inlet Foreshore Management Plan Denmark to Hay Rivers was prepared in 2002 to complete the management plans for the whole Inlet foreshore in the Shire of Denmark. The Wilson Inlet Foreshore Reserves Management Plan 2008 is amalgamating and updating both previous plans.

This Fire Management Plan will link with ongoing implementation of the Denmark Foreshore Management Plans and will become part of the Shire of Denmark Fire Prevention Plan.

The Fire Management Plan will provide a useful tool to protect the ecological values of the Wilson Inlet foreshore vegetation. The scope of the Fire Management Plan is to extend from the mouth of the Hay River to the Inlet sandbar, that is, the area of the Wilson Inlet foreshore within the Shire of Denmark boundary.

The consultant was provided with a brief (See Appendix 1) which detailed the objectives, outcomes, general methodology, and project management. During the course of implementing the brief, consultation was carried out with local conservation groups, fire service officers, Council staff, Bush Fire Service, Albany and DEC, Walpole. Fuel sampling of the major vegetation types was conducted, analysed, mapped and fuel reduction programs developed.

The Denmark Fire Prevention Plan was developed concurrently with this plan (with a separate brief), allowing the outcomes of both plans to complement each other. The implementation of the Denmark Foreshore Fire Management Plan will comply with the general procedures contained within that plan as well as Wilson Inlet Management Advisory Group protocols.

3.0 OBJECTIVES

- To develop a Denmark Foreshore Fire Management Strategy (DFFMS).
- To ensure the provision of adequate and appropriate fire management planning and controls without adversely affecting the conservation, recreational and aesthetic values of the Denmark Foreshore.
- To ensure that the DFFMS is consistent with the Shire of Denmark's Fire Prevention Plan (DFPP).

3.1 OUTCOMES

- Survey the vegetation of the inlet foreshore and immediately adjacent lands to determine fuel loads (standing and ground) from Wilson Inlet bar to Hay River. An impact assessment on rare and endangered flora is also required.
- Mapping of fuel loads and production of colour map showing hazard ratings.
- Analysis and summary of fuel load data and map information.
- Identification of areas with high/medium/low etc hazard rating (from analysis of fuel load data) incorporating ignition sources and locations.
- Produce a draft and final report, including recommendations for fire management of Denmark Foreshore from the sandbar to Hay River.

4.0 ENVIRONMENTAL VALUES

The Denmark Foreshore Management Plan objective is “To manage the foreshore so that it remains essentially as it is, the scarce and beautiful surround to the inlet, while continuing to provide for a range of recreational demands.” To help achieve this management objective the area has been zoned to show planning purposes for sections of the Denmark Foreshore. These are:-

1. Conservation

Purpose: To conserve the ecological, historical and landscape values of the Denmark Foreshore.

2. Conservation/Passive Recreation

Purpose: To ensure the conservation and ecological, historical and landscape values of the Denmark Foreshore, while providing for certain compatible passive recreational activities.

3. Recreational Development

Purpose: To manage recreational development on the Denmark Foreshore in a manner that minimises the impact on other values and in a manner that is compatible with the long term maintenance of the entire foreshore management.

These zones are delineated in the DFMP and it is not intended to redefine these areas as part of this plan.

The flora and fauna including Rare and Declared flora and fauna have been well documented in the Denmark Foreshore Management Plan.

This fire management plan takes into account the overall Denmark Foreshore Management Plan objectives, zoning activities and management guidelines, the Rare and Declared flora and fauna (detailed in the Denmark Foreshore Management Plan 1996).

5.0 RESPONSIBILITIES FOR LAND MANAGERS AND FIRE SERVICES

5.1 Land Owner and Manager – Shire of Denmark

Most of the foreshore area is vested in the Shire of Denmark, DEC or is Unallocated Crown Land. As the owner (manager) of the land the Shire is responsible for the fire protection of its foreshore reserves. It is also the Shire's responsibility to ensure that a response from the fire services will take place when advised of any fire occurring within the foreshore area.

5.2 Denmark Fire and Rescue Service

The Denmark Volunteer Fire and Rescue Service (Fire and Emergency Services Authority), acts as the Hazard Management Authority for fires in both urban and bushland areas within the Denmark Gazetted Fire District. Areas of the foreshore fall within the Gazetted District. (See Map 1 & 2 for Brigade boundaries.) The Fire and Rescue Services will co-ordinate additional resources from Bush Fire Brigades, DEC and the Denmark Shire to fight larger fires within their area.

5.3 Department of Environment and Conservation

DEC is responsible for fire protection on their land and will implement a fire management plan, respond to fires and assist with fire fighting on neighbouring land.

Reserve 23120 near Crusoe Beach is a DEC Nature Reserve. DEC is also responsible for fire management of areas of Unallocated Crown Land. Fire management for these areas should be integrated with this plan and the Denmark Fire Prevention Plan. DEC on a neighbour to neighbour basis will provide support, advice and some resources (to areas adjoining the Nature Reserve) in the implementation of this Fire Management Strategy.

5.4 Volunteer Bush Fire Brigades

The Shire of Denmark is responsible for the registered Bush Fire Brigades within its area. The Ocean Beach Brigade and East Denmark Brigade respond to fires in areas outside the Fire Rescue Service Gazetted Fire District and DEC reserves. However, they will respond in these areas as requested.

The Ocean Beach and East Denmark Brigades can call upon other Bush Fire Brigades to assist in fire fighting or planned burning as and when required.

In addition they have access to Council owned or hired equipment such as graders, front end loaders and dozers to assist in fire fighting operations.

5.5 Local Government – Shire of Denmark

Under the Bush Fire Act Local Government is responsible for the prevention, management and suppression of bush fire within the municipality. In a recent damages case the Court made the following ruling: “Apart from Common Law it is possible to argue that a Statutory body has a duty to perform its statutory functions and that if it does not do so or if it does perform its functions but in a negligent manner, then any person harmed as a result of that action (or inaction) should be able to sue to recover damages for their loss.” (Michael G Burn: Emergency Law. Council of Shire of Sutherland v Heyman (1985); Pyrenees Shire v Day 1998)

At present the Shire of Denmark issues a Fire Regulations Notice to all owners/occupiers of private land within the Shire requiring them to carry out minimum fire protection requirements. The Shire currently has limited resources for community awareness programs. Such programs aim to change community attitudes and apathy towards fire protection recommendations, as well as help enforce the Fire Regulations Notice. The Denmark Fire Prevention Report will be used to improve fire management throughout the entire Shire. The Denmark Foreshore Fire Management Plan will help to address fire management issues for the Shire and private property owners adjoining the foreshore reserve.

These fire management issues detailed in the Denmark Fire Prevention Report are:-

- Town Planning and rural subdivision standards.
- Fire Prevention of State and Local Government Land.
- Fire Prevention Planning within Tourism facilities.
- Fire Prevention of Special accommodation and Health Care Facilities.
- Fire Prevention in Agricultural Land.
- Role of Denmark Fire Prevention Plan Advisory Committee.
- The need for a Fire Prevention Officer to be employed by the Shire of Denmark.
- The development of Fire Service equipment strategy.
- Training of volunteer Fire Fighters.
- Promotion of Community Safe Havens.
- Community Public Awareness programs.
- Geographic Information Systems.
- Hazard Reduction.
- Council Policies on Fire Protection.

6.0 BUSH FIRE RISKS

6.1 Fire History

A recorded fire history of the foreshore area was not available at the time this fire management plan was compiled. Information was obtained via personal communications (together) with Fire and Rescue Service and the Bush Fire Brigades, Captain and Chief Bush Fire Control Officer, respectively.

It was reported that a fire started in the Springdale area in about 1975 and burned under an easterly then a north easterly wind. It burned along the foreshore past the golf course and trotting track, jumped the Denmark River and was controlled in or near Weedon Hill.

About 1990, a fire occurred south of the trotting track and south of the Heritage Trail in the Beaufortia/Melaleuca flats area. When fuel sampling was undertaken in the area for the preparation of this plan, tea tree regrowth was about two-thirds the height of the dead tea tree vegetation, indicating that the melaleuca vegetation has not reached maturity.

An inspection of Department of Land Information aerial photography could not confirm the 1975 or 1990 fires.

Another fire about 4ha in size occurred in the DEC Nature Reserve near Crusoe Beach in 1995-96 (confirmed by satellite photography).

A fire was deliberately lit near the Hay River bridge in March 2000 that burned about 1ha under a strong south easterly wind. Smoke across the road caused concern to traffic on the South Coast Highway.

With the continuing development in the Springdale, Weedon Hill and Harington Break areas and an increase in tourist numbers adding pressure to recreational areas along the foreshore, the potential for fire ignition by humans will continue to increase. (See Fire Causes, Denmark Fire Prevention Plan page 17.)

6.2 Values at Risk from Bush Fires

The values at risk from fires within the foreshore area, whether starting in foreshore reserves or entering foreshore reserves are:-

- People in special rural subdivisions adjoining urban areas, caravan parks, farming areas and recreational facilities.
- Property values and livelihoods associated with farmland, pine plantations, houses, caravans, chalets and recreational infrastructure.
- Historical values of the disused railway bridge across the Denmark River and the main Denmark bridge on South Coast Highway.

- Degradation/destruction of environmental, ecological and aesthetic values including Rare and Declared flora and fauna and the DEC Nature Reserve.
- Loss of farm pasture and stock.

If the heritage listed railway bridge across the Denmark River was completely burnt it may not be rebuilt and would be lost forever. Along the old railway line, now the Heritage Trail, there are numerous wooden culverts which would be at risk from any fires in the area.

As all trails in the foreshore reserves are used regularly by visitors to the area the risks are greater in the summer months.

6.3 Fire Risk Assessment

The term “fire risk” can be defined as the process, events or activities that increase the likelihood of fire occurring.

In the Denmark Fire Prevention Plan the following Risk Assessment criteria were used to determine Bush Fire risk. The area was broadly classified into three classes, High, Moderate and Low, using factors of population, fuels, topography the level and implementation of fire prevention in the subdivision.

Classes are:

High vulnerability: denser population (number of lots in subdivision and size of lots 4000 sq. metres to 5 ha), heavy bush fuels, steep topography and adjoining fuels or land use.

Moderate vulnerability: less dense population (number of lots in subdivision), grass fuels (previously cleared farms) or low quality forest or heath fuels and flatter topography.

Low vulnerability: generally farming areas which may have remnant vegetation with heavy fuels.

Using these classifications the foreshore reserves are considered to have the following risk classification.

Hay River to DEC Nature Reserve	Moderate.
Rudgyard Caravan Park to Denmark River	High.
Denmark River to Poddy Point	High.
Poddy Point to Mouth of Wilson Inlet	Moderate.

The above classifications are consistent with the Denmark Fire Prevention Plan.

6.4 Fuel Quantities

A fuel quantity survey was conducted using the methodologies and tables contained in the Fire and Emergency Services Authority "Prescribed Burning 1" and DEC's, "Forest Fire Behaviour Tables for Western Australia", briefly described in Appendix 1.

This is considered the best method to determine fuel quantities in Jarrah/Marri and Karri fuel types.

In areas such as Beaufortia swamps/flats, where there is very little leaf and fuel loading is mainly scrub fuels, fuel quantity is not a critical factor in influencing fire behaviour.

Fuels loads could not be quantified, for example from Motel Point to Poison Point and areas in front of Star Rocks and Little River Road because:-

- Some areas have introduced grasses.
- Tree, vegetation and grasses and are cut to improve views of the inlet.
- Dumping of garden refuse, lawn clippings and other material.
- Fuels not consistent and large enough to obtain a reliable sample.
- Soils in some of these areas are moist nearly all year round. Other areas are affected by the water level in Wilson Inlet.

It is worth noting that although these fuels were not measurable using the above sampling method, the fuels are hazardous. Being grass fuels the ease of ignition and the rate of spread may be greater than experienced in forest fuel types. (Grass fuels are more aerated, of finer composition, dry out quicker and fire behaviour is more affected by a minor change in wind speed.)

From the southern end of Poddy Point to the mouth of Wilson Inlet is a Melaleuca flat. Some is quite healthy while in other areas the Melaleuca has died off due to inundation by saltwater. Ocean Beach Road isolates this area so it is considered to be low risk. Any fire should be extinguished immediately to prevent further environmental damage. A regeneration and replanting program is being undertaken where dead Melaleuca occurs.

Table 1. Fuel Quantities See Map 1 for location of sample lines.

Fuel Sample No.	Vegetation Type	Fuel Quantity Tonnes/ha	Flats Veg Height
1	Beaufortia Flat		1.5m
2	Melaleuca/paperbark	62	
3	Jarrah/Marri Sheoak	38	
4	Jarrah/Marri 4yo	20	
5	Karri (small pocket)	67	
6	Melaleuca/Peppermint (spot sample)	64	
7	Marri, Peppermint	51	
8	Beaufortia flats		1.2m
9	Beaufortia flats		1.5m
10	Jarrah, Marri	11	
11	Marri, Peppermint Paperbark	43	
12	Marri, Peppermint	85	
13	Jarrah, Peppermint	58	
14	0 -		
15	Karri	80	
16	Peppermint, Karri	72	
17	Karri, Peppermint Bracken	73	
18	Buffalo Grass, Paperbark, Bull Rushes Black berries		1.5m
19	Marri, Peppermint	49	
20	Marri/jarrah, Black hay	43	
21	Karri, Karri Wattle	87	
22	Karri, Karri Wattle, Peppermint	70	
23	Melaleuca (modified fuels) spot sample	62	
24	Jarrah, Marri, Sheoak	42	
25	Jarrah, Marri	40	
26	Marri, Jarrah	35	
27	Jarrah, Marri, Bull Banksia	42	
28	Beaufortia flat odd paperbark 10yo	11/6	2.1m
29	Beaufortia flat		0.9m

7.0 FIRE MANAGEMENT STRATEGIES

7.1 Fire Breaks

The safety of people must be paramount at all times. Access roads and firebreaks must be safe to drive down, with adequate clearance from vegetation (can cause physical damage to equipment), adequate areas to turn around a vehicle and adequate width and visibility so that vehicles can pass during operations. A fire fighter was killed at the Fitzgerald National Park in the early 1990s due to lack of visibility and access width.

The Heritage Trail and the Bibbulmun Track between Campbell Road and “The Cove” in their current states could not be safely used as firebreaks for hazard reduction burning or fire fighting operations.

Firebreaks provide access for fire fighting operations as well as a location to burn back from, in an effort to contain fire. When carrying out hazard reduction burning, firebreaks provide a clear line from which to work and to contain the burning operation.

When firebreaks are installed prior to fire fighting operations the most appropriate alignment, taking into account flora, dieback and engineering standards can be considered. This is unlikely to occur during fire fighting, as the main objective is to control the fire.

Reserves need to be large enough so that firebreaks can be constructed along the boundary of the reserve adjoining private property. In the Hay River to Denmark River area as subdivision development occurs, land should be seceded to the reserve to allow this to happen.

Recommendations:

1. All existing firebreaks, the Heritage Trail and the Bibbulmun Track between Campbell Road and “The Cove” to be maintained as firebreaks to allow access for management, fire suppression operations and to act as boundaries for hazard reduction burning.
2. The Heritage Trail and the Bibbulmun Track between Campbell Road and “The Cove” to be maintained to the same specifications as for Fire Service Access as per Table 2 below.

Table 2. Minimum Standards for Fire Service Access “Planning for Bush Fire Protection” P 26-33.

Minimum Width cleared	6m
Trafficable surface all weather	6m
Vertical clearance	Unlimited
Dead end	Not permitted
Turn around areas	Every 500m
Passing areas	Every 200m
Access to road network	1000m
Maximum grades	1 in 7 (14.4%)
Maximum grade permissible <50m	1 in 4 (25%)
Maximum average grade	1 in 5 (20%)
Maximum crossfall	1 in 33 (3%)
Curves minimum inner radius	12m

3. In the Hay River to Denmark River area firebreaks are to be installed along fence lines adjoining private property, preferably in areas that are cleared or partially cleared already and not within the narrow foreshore reserve. At the time of fuel sampling it appeared that some fence lines might have been erected inside the foreshore reserve.
4. All adjoining private property owners/occupiers should comply with the Shire of Denmark Fire Regulations Notice. Alternatively, individual fuel reduction plans should be prepared and approved by the shire.
5. Foreshore reserves should be of an adequate size to cater for firebreaks along their boundaries, in a manner that does not lead to the clearing of vegetation on steep slopes or in close proximity to the river and its fringing vegetation.
6. It is essential that the Heritage Trail and the Bibbulmun Track between Campbell Road and “The Cove” be upgraded to the above standard to allow safe access for fire fighting vehicles. If these trails are not upgraded then earth-moving equipment will need to be used to construct firebreaks at the line of fire suppression to ensure safety of fire fighters and equipment and to contain the fire. It is not desirable to use earth-moving equipment to construct more firebreaks and such equipment should be used as a last resort.

7.2 Protection of Residential Values

Co-operative management of the foreshore reserve and adjoining private property should be established. Currently, many owners/occupiers of private property are modifying foreshore vegetation and adding to fuel loads by: -

- Allowing introduced grasses to invade.
- Clearing trees and understorey vegetation to allow views of the inlet then dumping garden refuse, lawn clippings and other material.

- This practice needs to be controlled and managed for the benefit of the foreshore reserve. **Pro-active management of the foreshore reserve by the Shire and the Wilson Inlet Management Advisory Group is essential to control further degradation of the reserve and an increase in fire hazards and risk to the reserve and private property.**

Recommendations:

7. Boundaries of the reserve and private property be clearly delineated by permanent markers.
8. Foreshore management objectives, strategies and works programs be clearly identified and provided to adjoining private owners/occupiers.
9. Clearing restrictions and access to the inlet water by adjoining owners/occupiers be clearly defined and be made known to the property owners. Where necessary regeneration/replanting of the foreshore is to be carried out at the owner/occupiers expense to Shire requirements.
10. All adjoining owners/occupiers be required by the Shire to prepare an individual Fuel Reduction Plan as described in the Denmark Fire Prevention Plan. (Attached draft standard, Appendix 1).
11. Hazard reduction be carried out jointly (by owners and the Shire) in specific areas on private property and the Foreshore Reserve. For example between the Bibbulmun Track and Payne Road, Weedon Hill. In these areas it may be necessary to have the houses protected by building protection zones prior to hazard reduction being carried out.
12. A concerted effort of visitation and liaison be conducted as a matter of priority to the owners/occupiers of land adjoining the foreshore reserve in the Springdale, Weedon Hill, Harington Break and Motel Point areas. This is to make them aware of the overall fire risk, and also to show them how to prepare a fuel reduction plan.

7.3 Hazard Reduction

“Three main factors - burning debris, radiant heat and direct flame contact - can affect buildings. The vast majority of houses damaged in Australian bushfires have been affected by burning debris. All have started as small, unattended fires that over time fully engulf a building” (Planning With Fire FESA 1999 p5). Limiting the community’s vulnerability to fire risk can be achieved by limiting the fuel quantity and fuel proximity around communities and buildings.

7.3.1 Methods of Hazard Reduction

The priorities for hazard reduction must be:

- Protection of life
- Protection of property
- Protection of the environment.

Methods available to reduce fuel loading in grass areas include:

- Grazing
- Herbicides
- Mowing or Slashing
- Pruning
- Raking
- Making hay

Methods available to reduce fuel loading in remnant bushland include:

- Weed control, using hand clearing or selective herbicides
- Selective hand clearing of weeds and dead material and removal
- Planned burning

7.3.2 Weed Control

Weeds are a major consideration in determining the fire regime for an area, and implementation of a weed reduction program is a critical part of fire management in areas such as foreshore reserves.

Weeds may increase fire intensity to a level that prevents direct attack fire fighting methods, causing a more extensive area to be burned and damage to the native vegetation structure.

Many weeds, especially herbs and grasses, are able to invade following fire, before native vegetation has time to establish. Dumping of rubbish, garden refuse and remnant vegetation adjoining farm pastures are also sources of herbs and weeds. Many grasses and weeds dry off in summer and provide a greater quantity of aerated fine fuel, which will carry fire easily. After the fire, the grasses return in even greater abundance, thus making the fire problem even worse. Examples of these grasses would be wild oats and veldt grass.

In areas of wild oats, exclusion from fire and allowing natural vegetation to regenerate over the area will over time reduce grass fuel. It is essential that other methods of hazard reduction than fire be used in grass fuels.

Because fire access tracks are highly disturbed areas, they are often the first areas where weeds gain a foothold due to lack of competition from other plants, extra water runoff and water infiltration to bare soil. Disturbances in bush land, such as access tracks other than those pre-planned, should be kept to a minimum.

Comprehensive information on weed reduction programs may be found in Safstrom, (1999), and how to target individual species of weed is detailed in Dixon & Keighery (1995), (Davies 1999 P10).

7.3.3 Selective Hand Clearing

Selective hand clearing in small areas of bushland can be effective if the vegetation is removed off site. If not removed the same amount of fuel (fuel loading) is

Shire of Denmark Wilson Inlet Foreshore Reserves Management Plan 2008
available for burning. Changing the fuel structure or arrangement will reduce fire behaviour under mild weather conditions but it is doubtful if it will have any effect under severe weather conditions.

Recommendation:

13. Research be conducted to verify the effectiveness of selective hand clearing. This would be achieved by measuring fuel weights before and after hand clearing using both on and off- site removal. This would quantify any reduction in fuel loading, change in fuel structure leading to a reduction in fire intensity and whether the action provided the same protection from fire as would hazard reduction by burning.

7.3.4 Planned Burning

Planned burning can be used to achieve a wide range of management objectives including:

- Protection of life, property and assets.
- Reduction in fire behaviour and fire intensity to assist in wildfire control.
- Protection of environmental and cultural assets.
- Management of habitat and food for fauna
- Management and regeneration of flora.
- Regeneration of certain tree species (FESA, 2000 p9)

Planned burning should not be carried out until:

- A detailed assessment of the fire hazard has been conducted.
- An assessment of the options for hazard reduction has been evaluated. Refer to Section 7.3.1 for details.
- The effectiveness of the planned burning has been evaluated.
- Recognition of environmental values has been considered.
- A clear objective for burning has been established.
- The fire regime for the area has been clearly established including:
 - Frequency of fire.
 - Time of year in which fires are to occur.
 - Intensity of Fire.
 - Distribution of burnt and unburnt areas within the burn area (% burnt) (Davies. S. 1999 P11).

7.3.5 Examples of Objectives for Planned burning

Sample objectives could include:

Jarrah & Karri Types

- To provide a reduced fuel zone as fire protection for adjacent private or community values.
- To maintain biodiversity by providing for the regeneration of all understorey species.

Swamp/Flats Types

- To provide a reduced fuel zone as fire protection for adjacent private or community values.
- To maintain biodiversity by providing for the regeneration of all understorey species.
- To reduce fuels without burning peat communities.

Coastal Heath and Woodland Types

- To provide a reduced fuel zone as fire protection to adjacent private or community values.
- To reduce litter and grass fuels under *Agonis flexuosa* woodland without scorching /killing the trees and creating coppice.
- To maintain biodiversity by providing for the regeneration of all understorey species.
- To preserve and protect endangered flora and fauna.

The above objectives were taken from DEC's operational Fuel Reduction Burning guidelines and could be used or modified for use in planned burning of land covered by the Denmark Foreshore Management Strategy. To achieve these burn objectives various burning standards and techniques must be used by trained and experienced personnel. DEC and FESA will assist in training and guiding personnel to achieve the desired objective.

7.3.6 Fire Regimes

"Many native plants are able to survive or recover from fire by resprouting, (e.g. 70-75% of 300 jarrah forest understorey species) either from epicormic buds buried beneath protective bark, apical buds or subterranean organs" (Burrows, and Friend 1998. p415). Other plants are dependent on seed stored in seedpods or in the soil.

"Time to first flowering after fire (juvenile period) is an important parameter for determining the minimum fire interval to ensure the persistence of obligate seed species, especially those which depend on seed stored in the canopy for regeneration. The juvenile period however does not necessarily indicate sufficient time to set seed and replenishment of seed banks. It has been reported that a

conservative fire free period of about twice the juvenile period was necessary to replenish seed banks” (Burrows, and Friend 1998 p415).

Table 4. Definition of fire frequency for various jarrah forest habitats based on the juvenile period of the slowest maturing understorey plant species. (longest juvenile period =LJP). The fire frequency ratio (FFR) = fire interval (FI): LJP. (Burrows, and Friend 1998 p416)

Habitat type	Longest juvenile period (LJP) (yrs)	Sustainable fire interval (2×LJP) (yrs)	FFR <2 High fire frequency (yrs)	FFR 2–4 Moderate fire frequency (yrs)	FFR 4–6 Low fire frequency (yrs)	FFR >6 Very low fire frequency (yrs)
High rainfall (>900 mm) upland jarrah forest	3	6	<6	6–12	12–18	>18
Low rainfall (<900 mm) upland jarrah forest	4	8	<8	8–16	16–24	>24
High rainfall (>900 mm) riparian jarrah forest	6	12	<12	12–24	24–36	>36

“Fauna and flora in southwest Australian ecosystems display a variety of physical and behavioural adaptations, which enable them to persist in this fire prone environment. However based on the fire history of the most fire-sensitive taxa, they are not immune to any fire regime. Fire frequency and scale, or patchiness (which is linked to intensity and season), are the most critical factors to consider when planning fire regimes to conserve biodiversity. These factors are also vital for managing fuel loads and for reducing the threat of wildfires” (Burrows, Friend 1998 p419).

“While low intensity, patchy spring fires are recommended for fuel reduction and for maintaining biodiversity, it is recommended to vary the season and interval between planned fires” (Burrows, and Friend. 1998 p420).

Example of a Burning Regime in high rainfall Jarrah Forest

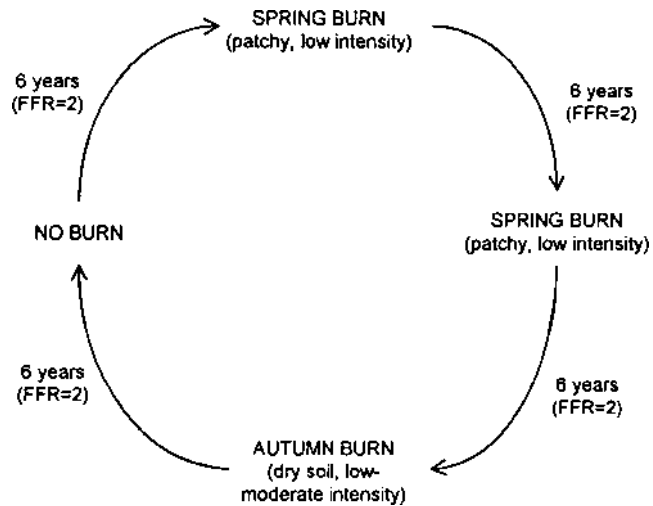


Diagram 2. A fire regime for intermediate and high rainfall jarrah forest based on biological indicators and which incorporates seasonal and temporal variation to achieve conservation and wildfire protection benefits. FFR = fire frequency ratio. (Burrows, and Friend 1998 p420). This Fire regime could be suitable for application in the upland areas of the foreshore reserves in the Hay River to Denmark River area.

NB. Each burn should be assessed on merits as described in Sect. 7.3.1-7.3.6

Example of Burning Regime in Karri Forest

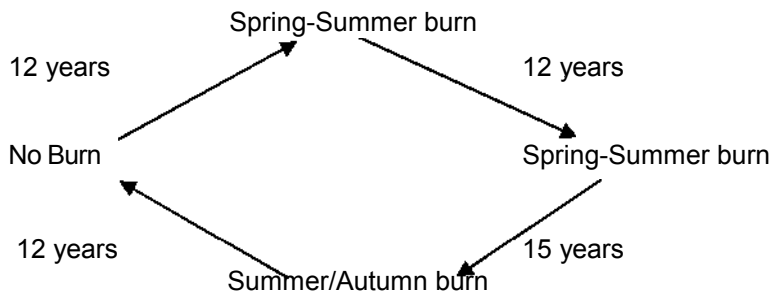


Diagram 3. A fire regime for Karri Forest based on biological indicators and which incorporates seasonal and temporal variation to achieve conservation and wildfire protection benefits. (Compiled from information contained in Burrows and Friend 1998).

NB. Each burn should be assessed on its merits as described in Sect.7.3.1-7.3.6.

7.3.7 Fuel Management

Table 1 is a summary of the fuel quantities which range from 11 tonnes / ha in Jarrah/Marri types to 80tonnes /ha in Karri types. Areas of mixed fuels containing grasses etc (discussed in Sect 6.4) were not measured. Foreshore reserves adjoining housing or rural zone subdivision pose a risk to those values (discussed in Sect.6.2). Similarly reserves are at risk from the adjoining land. The Foreshore Risk Assessment contained in Section 6.3 identified that the majority of the reserve is high risk.

In many places the foreshore reserves are very narrow and to construct firebreaks would cause more damage (by removal of vegetation) to the reserve than would be achieved in protection by conducting a hazard reduction burn. Some areas that have a bitumen road as the reserve boundary (Inlet Drive near the caravan park), contain high levels of fuel but do not pose an immediate threat to values outside the reserve. However, fire would need to be extinguished quickly in these areas to reduce the possibility of spotting into other areas.

In the Weedon Hill area, (high risk) no firebreak exists on the reserve or private property boundary and, due to topography, it is unlikely that one could be constructed. No trail exists in the reserve that could be used as a management boundary and fire access road. In the area between the Bibbulmun Track and the waterline the fuel quantity is varied as vegetation changes closer to the water. This area is most important for species diversity, fauna habitat, bird refuge and nesting sites. The area between the Bibbulmun Track and the houses is the area of most concern for protection.

The priority in this area must be to get private property owners/occupiers to protect their house firstly by establishing a building protection zone (30 metre low fuel zone), then a joint approach to a hazard reduction burn between the heritage trail and the building protection zones. The burning regime for this area, being Karri, would be as per Diagram 3. In years 1 and 2 of this plan efforts should be concentrated on establishing building protection zones and individual fuel management plans on private properties (See Sect. 6.4) and a hazard reduction burn carried out in the 3rd year.

A hazard reduction burn would also need to be conducted on the adjoining Springdale subdivision (the Heritage Trail) and the strategic firebreak located on the boundary of the subdivision. Again, a co-operative burn would be desirable. Building protection zones would need to be established around buildings on properties adjoining the foreshore reserve, prior to the burning being carried out. The burning regime for this area (Jarrah/Marri vegetation type) could be as per Diagram 2.

As further subdivisions are established in the Springdale – golf course area, hazard reduction burns will need to be conducted to provide reduced fuel zones. In the area adjoining Denmark College of Agriculture land (south of South Coast Highway) burning is to be carried out between the access road to the disused gravel pits and private property.

In accordance with the recommendations contained in the Denmark Fire Prevention Plan all hazard reduction burning is to be conducted in a responsible and managed way. Fire Brigades carrying out burning must do so in accordance with a burning prescription prepared by a qualified person.

It is proposed that the Denmark Fire Prevention Committee coordinates all proposed hazard reduction burning to ensure those programs of various agencies and private property managers complement each other.

In the grassed areas weed control would be most important to control introduced species through various weed control methods (section 7.3.2). The most important fire management strategy in these areas is the education of adjoining owners/occupiers to reduce fuels on their land, the establishment of building protection zones, preparation of individual fuel management plans on private property and understanding Reserve Management programs. This will minimize the need for hazard reduction to be carried out on the foreshore reserves.

It is essential that all hazard reduction burns be documented to improve statistical knowledge of foreshore reserves. This would also apply to any other fires that occur. The Shire of Denmark Geographic Information System is ideal to store this and other fire management data.

Recommendations

14. No hazard reduction burning be carried out between the heritage trail and the waters edge. Regeneration burning may be carried out.
15. No hazard reduction burning take place where a road is the foreshore boundary.
16. All planned hazard reduction burning be part of the annual Works Program prepared by the Denmark Fire Prevention Advisory Committee, endorsed by Bush Fire Advisory Committee and approved by Council.
17. All planned hazard reduction burning on foreshore reserves have a prescription prepared in accordance with the FESA Learning Manual 3.17 Prescribed Burning 1.
18. Only persons trained in Prescribed Burning 1. be allowed to write prescriptions (FESA Learning Manual 3.17).
19. A process be established to handle any complaints or objections to planned hazard reduction burning as determined in the Denmark Fire Prevention Plan.
20. All brigades conducting planned hazard reduction burning be trained in application of a burning prescription and lighting techniques for various fuel types.
21. All prescriptions for planned hazard reduction burning use the FESA/DEC Prescription forms and preburn check list.
22. The hazard reduction program for Weedon Hill and Springdale as shown on Map 1 be implemented.

23. Fire history, fuel loads, vegetation types, location size, month/year of fires and strategic firebreaks be stored in the Shire of Denmark Geographic Information System.

7.4 Public Education

As discussed in Section 7.2 of this plan proactive management of the Foreshore Reserve, involving adjoining land owners in management of the reserve and co-operative joint hazard reduction programs (Section 7.3) are essential. The public education programs outlined in the Denmark Fire Prevention Plan (below) are relevant to private property owners and occupiers adjoining foreshore.

- A public information package be developed, using existing written resources of the Shire of Denmark, FESA and DEC.
- Individual fuel reduction plans be promoted by Shire, Wilson Inlet Management Authority, Environment Centre, DEC and FESA as the preferred method of addressing fuel reduction by owners and occupiers of special rural and small holdings. (Appendix 1)
- A schools based public education program be conducted by the Shire, FESA, Brigades, Wilson Inlet Management Advisory Group and the Denmark Environment Centre to educate children about bush fire dangers, environmental values of the foreshore reserve and the need to prepare a home emergency and fuel reduction plan.
- Community Fire Guard or similar community fire prevention activity be sponsored by the Shire and FESA to advise owners/occupiers about fire dangers and how to address problems on their property. Advise residents about information on foreshore management objectives, strategies and works programs.
- The foreshore reserve is to be managed for the benefit of the community and it is essential that the community is involved in decision making processes for the management of the reserves. It is recommended that a "Friends of the Foreshore" group be formed, made up of predominantly adjoining landowners, and that they are represented on the Wilson Inlet Management Advisory Group.

7.5 Fire Suppression Strategies

It is inevitable that fires will occur in the foreshore reserves. In the past 10 years most of the fires that have occurred have been small, less than 1ha in area (senior ranger pers. comm). When a fire is detected a quick response from brigades is essential. Good access to the fire will allow fire fighting crews to arrive quicker. Quick response and fast access allows fire fighters to attack a fire while it is small.

Fire fighters being aware of the Foreshore Reserve Management Plan and Fire Management Plan is essential to ensure that they can attempt to achieve reserve objectives and outcomes, without causing unnecessary damage to flora and fauna.

Meetings between reserve managers and fire brigades for them to understand the reserve management plans is essential. It is not adequate just to send a copy and expect the fire brigades to understand their role in reserve management. The Wilson Inlet Management Advisory Group should initiate this information session.

Priorities for Fire Suppression

1. Protection of Life
2. Protection of property including houses, townsites, farm buildings, tourist facilities and livestock.
3. Protection of environmental values, forests and reserves

Fire Reporting

- When a fire is detected in the foreshore reserve ring "000" or the Shire of Denmark during working hours with the following information:-
 - Location of the fire
 - Size or area of the fire.
 - Type of vegetation it is burning in e.g. grass, Karri bush, Jarrah bush, heathland etc.
 - Values at risk e.g. house, farmland, tourist facilities, caravan park, environmental etc.
 - Number of people in attendance.
- The Shire of Denmark is to notify the Wilson Inlet Management Advisory Group of any fire occurrences.

Suppression Criteria

- Limit the size of the fire by early extinguishment.
- Use existing firebreaks to contain the fire.
- As a last option construct firebreaks to contain the fire to the smallest possible area.
- All earthmoving machinery used in the foreshore reserve must comply with DEC's dieback hygiene standards.
- Populations of rare and declared flora are not to be effected or disturbed in any way by the construction of firebreaks.
- Wilson Inlet Management Advisory Group is to provide advice on populations of rare and declared flora to the Incident Controller and other information that may be relevant, e.g. access roads and firebreaks, important habitat sites and other environmental considerations.
- Water with no additives may be used in aerial water bombers.

7.6 Post Fire Management

It is important to manage any foreshore reserve areas affected by fire to ensure that the area is allowed to recover with little or no disturbance.

Recommendations

24. Limit access to fire scar areas
25. Explore the possibility of rabbit and predator control following significant fires in foreshore reserves. The need for community consultation in decision making and for advertisement of control operations should also be addressed.
26. Post fire weed control, dieback and flora and fauna rehabilitation programs be established and implemented when necessary.
27. Develop joint research programs with DEC, Environment Centre, Shire and the Wilson Inlet Management Advisory Group to monitor the effects of fire on fuel quantities, flora and fauna and gather information that can be used to enhance fire management programs to assist in achieving overall management objectives.

Access to Foreshore Reserves

There is a need to control access into the foreshore reserves. At present there is limited signage advising the public about access. Trail bikes and 4wd vehicles are of particular concern. The Shire's rangers carry out limited policing of the reserves due to other work commitments.

Recommendations

28. Signage be erected at major entrances to the foreshore reserves indicating the purpose of the Reserve, its conservation values and reporting authority. Possible wording is suggested in Diagram 4.
29. Signage be erected at minor entrances advising conservation area where access is for management purposes only. Possible wording is suggested in Diagram 5.
30. Signage be erected to restrict access to dieback free areas.

DENMARK FORESHORE RESERVES

This bushland is very special, a haven for wildlife and for community enjoyment.

It is a small reserve, one of the few remaining examples of the natural vegetation types associated with Wilson Inlet.

It containsspecies of native plants and provides the homes for bird species, different native mammals,species of reptiles anddifferent frogs.

This foreshore reserve may be used for walking on the designated tracks, walking dogs on a leash and nature observation.

PLEASE TAKE CARE OF THIS VERY SPECIAL RESERVE

Shire of Denmark

Phone.....ranger services

Phone to report fires

DIAGRAM 4

DENMARK FORESHORE RESERVES

**CONSERVATION AREA
MANAGEMENT ACCESS ONLY**

PLEASE TAKE CARE

DIAGRAM 5

8.0 PODDY POINT

A burn in the Poddy Point area was conducted on 17 December 1998. The aim of the burn was to reduce fuels adjacent to private property and houses. Burning was conducted in Jarrah/Marri and Tea tree/Melaleuca fuels. The vegetation in the Jarrah/Marri area has started to regenerate.

In the tea tree area regeneration has been slow, with only some seedling regeneration, and dead tea tree still standing. There is a possibility of grass intrusion.

Recommendations

31. The small areas of Tea tree/Melaleuca vegetation types as at Poddy Point not be burnt for hazard reduction.
32. Any introduced grass areas on Foreshore reserve be mowed or slashed to achieve hazard reduction, and be regenerated back to natural vegetation.
33. Burning of Jarrah/Marri vegetation types for the protection of property and buildings be done in accordance with burning regimes outlined in Section 7.3, Diagrams 2 & 3.

9.0 REVIEW

This fire management plan is designed to guide management of fire in Wilson Inlet foreshore reserves over the next ten years, with a review in five years. Minor annual reviews should be undertaken in May each year taking into account any unplanned fire and the adjustment of burning regimes as necessary.

Minor Review Winter 2005.

Major Review 2010.

10.0 References

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- Davies Sue. *Guidelines for Fire Management Planning for Urban Bushland 1999*. Fire and Emergency Services Authority, Publication.
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- FESA & CALM joint publication April 2000. *Prescribed Burning Learning Manual 3.17*.
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- Sneeuwjagt R. J. and Peet G.B. *Forest Fire Behaviour Tables for Western Australia 1985 amended*. Department of Conservation and Land Management. Western Australia.
- Fire and Emergency Services Authority 2000. *Planning for Fire Draft Discussion Document*. Fire and Emergency Services Authority.

Appendix 1 - A. Fuel Quantity Survey Methodology

The summary below was taken from FESA's Prescribed Burning 1 Learning Manual.

The means of gathering fuel measurements in the field is called a *sample line*.

A fuel sample line is a 100 metre line within an area that contains 10 sampling points, each 10 metres apart.

At each of the sample points, measurements are taken of litter depth, trash height, trash density, identify scrub structural type, scrub height, scrub density and the percentage of dead foliage.

This information is recorded on a Fuel Assessment sheet (Appendix 1.B) and averaged to achieve a figure for the total weight of litter, trash and scrub. Tables are used to convert field measurements into fuel quantities.

A sample line is conducted for each distinct variation in vegetation and fuel age.

An average fuel quantity for each vegetation type is then determined.

Definitions

- Fuel** Any material such as grass, leaf litter, and live vegetation which can be ignited and sustain a fire. Fuel is measured in tonnes per hectare.
- Fuel Load** The oven dry weight of fuel per unit area commonly expressed as tonnes per hectare.
- Fuel Type** An association of fuel characteristics such as species, form, size and arrangement that will cause a predictable rate of spread or difficulty of suppression under specified weather conditions.
- Litter** The top layer of the forest floor composed of loose debris of dead sticks, branches, twigs, and recently fallen leaves or needles, little altered by decomposition.
- Scrub** Vegetation such as heath, wiregrass and shrubs, which grows either as an understorey or by itself in the absence of a tree canopy.
- Trash** The component of ground fuel above the leaf litter layer made up of dead twigs, branches and scrub debris of at least 10mm thickness.

Appendix 1 - B

**Bush Fires Board of Western Australia
FUEL ASSESSMENT RECORD**

BURN NO. _____ SAMPLE LINE _____ DATE _____

FOREST/VEG TYPE _____ TREE SIZE CLASS _____ (m & HEIGHTS)

DOM. SCRUB TYPE _____ (m)

TOPOGRAPHY _____ ACCEPT. SCORCH HT _____ (m)
(slopes, aspect, ridges, gullies)

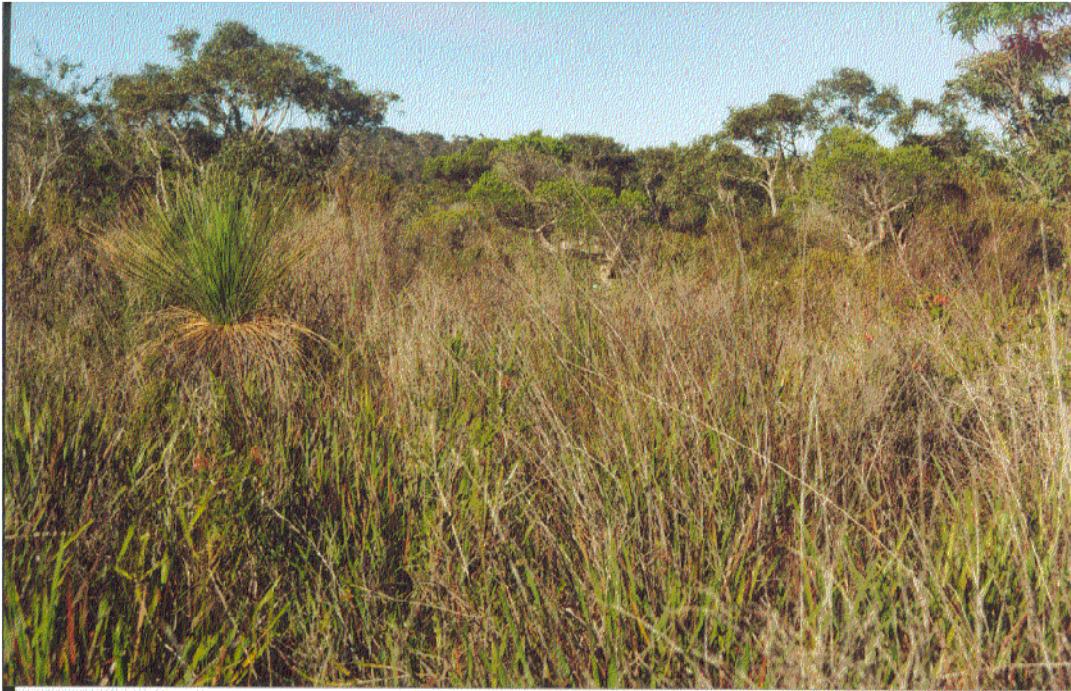
SUGGESTED BURN SEASON _____ REC. WIND RATIO _____

SAMPLE NO.	LITTER DEPTH (mm)	TRASH HEIGHT (m)	TRASH DENSITY	SCR STRUCT TYPE	SCRUB DENSITY	SCRUB AVG HEIGHT (m)	FOLIAGE DEAD %
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
TOTALS	mm	m				m	
AVERAGES	mm	m				m	%
TOTAL	7.2.1	7.3.1				7.4.1 col.1	
WEIGHTSt/ha +t/ha	+		t/ha =t/ha
AVAILABLE WEIGHTS	AFF=..... TOTAL WT X AFF =t/ha		AVAIL TRASH TABLE 7.3.1t/ha		AVAIL SCRUB 7.4.1, Col 3 or 2t/ha X * FLAMMABILITY FACTOR 7.4.2 +t/ha * F/F NORMALLY 1.0 FOR PRESCRIBED BURNING		
AVAILABLE FUEL WEIGHT = AVAIL. LITTER + AVAIL TRASH + AVAIL SCRUB =t/ha							

REMARKS: (Indicate factors to consider in determining prescription & burn strategy)

OFFICER COMPILING _____ OFFICER CHECKING _____

Appendix 2 Photographs showing different fuel types



Melaleuca wetland near the Hay River



Melaleuca wetland near the Trotting track



Trash and scrub fuels in Jarrah/Marri forest types





Overgrown Heritage trail and Karri fuels Weedon Hill



Housing adjoining Weedon Hill foreshore reserve



Paperbark (Melaleuca) wetland adjoining Wilson Inlet



A part of the foreshore reserve mown to provide access and views to adjoining residential areas



Degraded Melaleuca wetland opposite Ocean Beach Caravan Park

APPENDIX 6 – Public Submissions to the Draft Management Plan

Summary

The Draft Management Plan was made available to the general public and other selected reviewers for comment. We are grateful for all of the submissions; they have broadened the debate and helped with focus. The many changes to the draft from the project team have not been included in the summary.

The following points in the Draft Management Plan received written comments, which are reproduced below, along with our response. Some minor parts that are not related to the actual text have not been included.

For convenience, a table of points and respondents precedes the actual comments and the project team's response to each comment.

Abbreviations in alphabetical order

DEC	Department of Environment and Conservation
LWPPG	LWP Property Group
SCLG	South Coast Landscape Guardians Incorporated
SBD	Springdale Beach Development
WIRG	Wilson Inlet Restoration Group

Original Name of Section	Respondent	Respondent	Respondent	Respondent
1.1	SCLG			
1.3.1	Case Koning	SCLG	DEC	
1.3.2	DEC			
1.4.1	Case Koning			
1.4.2	Case Koning			
1.4.3	Case Koning			
1.4.5	Gerald Hughes	DEC		
1.4.9	Case Koning	DEC		
1.5.1	W Miller	H Miller		
1.5.3	Case Koning	Gerald Hughes		
1.5.4	Case Koning			
1.5.5	Case Koning	Gerald Hughes	DEC	
1.5.7	DEC			
1.5.9	Case Koning	DEC		
2.1	Case Koning	DEC		
2.2	Case Koning	SCLG	DEC	
2.2.1	DEC			
2.2.2	W Miller	H Miller		
2.2.3	SCLG	DEC		
2.2.4	DEC			
2.2.5	Gerald Hughes	DEC		

Original Name of Section	Respondent	Respondent	Respondent	Respondent
2.2.6	DEC			
2.2.8	Case Koning	DEC		
2.3	Case Koning	Gerald Hughes	SBD	DEC
2.4.1	Case Koning	Gerald Hughes		
2.5	W Miller	H Miller		
2.5.3	Gerald Hughes			
3.2	Gerald Hughes			
Camping	W Miller	H Miller		
Denmark River mouth	WIRG			
Dog Exercise Area	WIRG			
Facilities available	Gerald Hughes			
Foreshore Tenure	Brad Kneebone			
Fox baiting	W Miller	H Miller		
Hay River Boat Launch	Brad Kneebone			
Inlet Breach	WIRG			
Inlet fish	Gerald Hughes			
Lack of facilities	WIRG			
Landscape Protection	WIRG			
Map at Tourist Centre	Gerald Hughes			
Poddy Shot	WIRG	WIRG		
Poison Point	WIRG	WIRG		
Prawn Rock Channel	WIRG			
Recreational Fishing	WIRG			
Reporting back to community	Gerald Hughes			
Reserve 20578	Gerald Hughes			
Reserve 25379	Brad Kneebone			
Safe mooring to east	Gerald Hughes			
Shelters on Heritage Trail	W Miller	H Miller		
Springdale Beach	LWPG	W Miller	SBD	H Miller
Physical environment	SCLG			

Submissions

Adam Browne LWP Property Group

- Springdale Beach

We have engaged an environmental consultant to provide formal response, but briefly in reference to the draft WIFMP, section 2.3 which states:

“WIMAG has provided specific planning advice regarding Springdale Beach in the minutes of the meeting on 25 June 2008:

“In reference to providing advice concerning the future management of Springdale Beach WIMAG provides the following recommendations:

- *No boat launching facilities*
- *No jetty*

Recommendations:

- WIMAG's advice regarding Springdale Beach be adopted.

Actions:

- Adopt WIMAG's advice regarding Springdale Beach.”

What environmental backing is there to support the above recommendation as the report does not identify any environmental issues?

Given that within the Springdale Beach development there is a tourist zone required by council adjacent to the Wilson Inlet foreshore this area seems an ideal and logical option for consideration of future marine facilities.

Further given that there may be a recommendation come from DPI's rationalisation of Marine structures in the Wilson Inlet that highlights a requirement for more facilities to meet growing demand which will need to be constructed somewhere we believe Springdale Beach to be a logical spot. A real opportunity then exists to couple this requirement to a location that people are coming to already, having both tourist and permanent population creating a real place of destination!

This would also limit the potential degradation of other areas of the Wilson Inlet foreshore by focusing the movement of people to one key area.

Until we can provide formal response and full environmental assessment can be undertaken we believe stronger consideration should be given to input by others and Springdale Beach should not be excluded as an active recreation area.

Response: The recommendation and action have been modified to say that WIMAG's recommendations be considered.

Environmental issues regarding Springdale Beach have been expanded on in the document.

A tourist zone can be for passive recreation in unspoilt area.

DPI was consulted regarding marine facilities and this site was not recommended for this type of development.

Springdale Beach has been identified as a passive recreation area with a small development node at the eastern end which is suitable for picnic and fishing facilities.

Brad Kneebone

- Foreshore Tenure

Section 2.1 covers Tenure status and I refer to the particular UCL comprising the foreshore between the western end of Reserve 23579 and westwards to the southern projection of Sea Change Close.

Firstly, all UCL around the Inlet foreshore should be vested as reserve as UCL is too vulnerable on its own, eg for inclusion in development proposals, secondly anything less than a status of a formal reserve sends out the wrong message to adjoining landowners and other users as to its importance.

The foreshore to the west of Reserve 23579 is of significance to waterbirds and shorebirds being adjacent to the Hay River mouth and Morley Beach areas which have the greatest concentrations over the whole Inlet. The latter areas are the subject of regular shorebird and waterbird surveys and we have recently added Rudgyard and Crusoe beaches to our regular survey areas.

I would urge that at least this stretch of UCL be added to the list of those recommended for upgrade to reserve status. If the Shire has a management problem with this it could perhaps be considered as an "unmanaged" reserve by DPI until the Shire has more confidence in taking on management.

- Reserve 23579

although this has been recommended by DEC Walpole for upgrading to "Conservation ", actioning could take some years given the number of referrals to be made including that for native title.

In the short term there is quite urgent foreshore rehabilitation to be undertaken at the Hay River mouth and adjacent to the last part of the track into this reserve.

As mentioned before, WIMAG supported this work in a proposal to the Shire.

There is therefore a case for the Shire to take on low key de-facto management until DEC fully actions the current recommendation. Otherwise the area will continue to deteriorate and that does not make sense.

- Hay River Boat Launching Facility

The other recommendation by WIMAG was to remove the unofficial boat launching at the mouth of the Hay River to the bridge area at the Highway. I previously supplied documentation on this.

This should be included under section 2.3 as another WIMAG recommendation.

Response - Noted, see sections 2.1 and 2.5 recommendations.

Case Koning

- 1.3.1

Suggest that the informal access to the Hay River mouth is closed to the public during wet season to stop degradation. A boom across the track at the main road is proposed.

In general, access to various sites needs to be maintained.

Response – see 2.5 recommendations.

- 1.4.1 Climate

Although climate change is important, it is suggested that the key finding by the CSIRO are limited to the conclusions that are applicable to the SW of WA. The rest, although of interest, are irrelevant to our area.

Response – noted.

- 1.4.2

This is an excellent summary. It should open the public's eye to the recent origin of the Inlet and in addition the recent climate changes that led to the creation of the Inlet and of course other inlets along our coast during the Holocene.

Response – see 2.5 recommendations.

- 1.4.3

This section in my mind is somewhat misleading. The geology of the area is described in the previous section consists mainly of granites, sandstone (Aeolian) and laterites. Only the granite has minerals that will break down into clays ie feldspar and mica, only the latter as the mineral biotite contains iron. The clays (phyllo-silicates) are the lighter fraction in the transport cycle and settle within the deeper portion of the Inlet. Here with carbon, derived from plant debris, produces anoxic conditions that during consolidation which

releases oxygen. The iron ion can and will take up available sulphur to nucleate as pyrite and depending on the iron/sulphur availability can grow with time. When at a later stage the sediment is exposed to the air does the pyrite oxidize to an iron sulphate or limonite, with latter setting sulphuric acid free. Obviously the amount of acid set free is dependant on the amount of pyrite within the system and the duration of the oxidising period.

Similarly the breakdown of the granite into clays along the fringes of the inlet can only form potential acid sulphate soils within swamp areas, which to my knowledge of the inlet are minor in areal extent. Hence the amount of potential sulphuric acid (dilute) will be minimal. There is not doubt that is some if not all (of) the acid is transported to the Inlet that dilution thereof in the vast amount of water available cannot have an effect on the overall biology of the Inlet.

It is suggested that the source rocks do not contain „heavy metals“ hence won't be in the system.

The section suggest that acid soils in the Inlet fringe area is a problem, this is probably an over statement in my mind, and is suggestive of unnecessary scaremongering.

Response – section has been expanded.

- 1 . 4 . 9

The lack of migratory birds during the summer high water levels when the bar was not opened in 2007 is worrying. Did Green Skills/Denmark Shire foresee this event? Was this possibility discussed at a WIMAG meeting at which both parties have representation? Obviously the bar opening or lack thereof has implications on a healthy migratory birds population.

Response – beyond the scope of this document.

- 1 . 5 . 3 WIRG submission delivered to you on 8/8/2008 is still considered applicable for the foreshore development. *Response – See WIRG submission below.*

- 1 . 5 . 4

Tourism is, in part, the bread and butter of Denmark of which the Inlet is a major contributor. It is for this reason that additional facilities are sought for the enjoyment of all.

Unfortunately boat tour trips are no longer available as the operator considered the Denmark River mouth unsafe for his craft in 2006/7.

Response – noted.

- 1.5.5 Recreational fishing boat launching areas.

The Hay River launching site has potential for degradation as is also the parking area. An upgrade of this facility could be considered.

PWC and other boats could be restricted to a maximum speed whilst travelling to their designated area or fishing spot.

Response – see 2.5 recommendations

- 1.5.9 Vegetation Surveys.

Are there any official quadrats that are monitored from the Denmark River mouth to the Bar? If not, it should be done as it is an effective method to measure changes.

Response – There are no official quadrats, however we recommend a vegetation survey be undertaken. The priorities of the vegetation survey will determine the methodology used.

- 2.1

It is suggested that regular information should be disseminated to the Denmark public on the findings/achievements that are obtained on a monthly basis.

Response – Noted.

~ 2.2 ACTIONS

The proposal to develop interpretive information etc etc for display at the Denmark Visitor Centre and Denmark Environment Centre is in my mind very negative. It should also show the facilities that are available. That is what the public is mainly interested in. Both should be incorporated on a single map and must be available for distribution.

Response – Noted.

~ 2.2.8 Acid sulphate soils.

The statement regarding the impacts of ASS with WA is too broad based, it is suggested (that its) relevance to our area be considered.

I agree that ASS areas should not be disturbed, however extended dry periods may acerbate the problem.

The evidence of ASS at Ocean Beach and Springdale Beach, please advise the location for my personal interest.

Response Noted.

~ 2.3

Dog walking at Ocean Beach Exercise Area refers only that vicious dogs should be muzzled or on a leash at all times. It is suggested that they should not be there at all.

Response Noted – compliance issue.

~ 2.4.1 Actions:

This is currently a barren and most unattractive site. It is suggested that some landscaping is done prior to the proposed development.

Response Noted.

General

No camping is allowed in R20678. There are no designated camping sites available, it can create a health problem, certainly a fire risk, and degradation will occur. Ensure that this „facility“ is not on any plan to be submitted to the Tourist/Environment Centres.

Response – Noted.

Gerald Hughes

1. An excellent suggestion is a map showing the foreshore development available at the Tourist Centre. We also suggest „Facilities available to residents and visitors“ be added to this information (under Actions).

Response – Noted.

2. No mention is made (of) reporting back to the community on a regular basis showing results of yearly planning.

Response – See 3.1 and 3.2.

3. Reserve No. 20578, south of Ocean Beach Caravan Park is a designated camping area. Tourists will view this as an ideal location. We should not be in favour of this as there are no cleared areas, no ablutions and is a potential fire hazard. Should not be on the map and (the purpose) should be changed to Conservation or something else.

Response – Noted.

4. VEGETATION 1.4.5

There is no attached map.

Response – See final document.

5. RECREATIONAL FACILITIES 1.5.3. Appendix 4

Poison Point. Current facilities only has walk trail, where is this?

Response – See Map.

Should also include vehicle access, parking, boat launching.

Response – See recommendation 2.5.

6. FISHING AND BOATING 1.5.5 Inlet Drive Is this Poisson Point?

Response – Near Roberts Street. Recreational fishing Poisson Point needs upgrade of access and parking track currently used.

Response – See recommendation 2.5.

HAY RIVER - Designated boat launching site Albany side needs upgrade to minimize degradation.

Response – Out of scope of this plan.

PERSONAL WATERCRAFT - Who has control of these crafts? What is the speed limit, launch site to gazetted area? What is maximum speed of large craft? Should maximum speed be 20 knots?

Response – See DPI website.

7. INTRODUCED ANIMALS 2.2.5

Implement fox, feral cat and rabbit trapping.

Response – Noted.

8. CONSERVATION AND PASSIVE RECREATION FOR POISSON POINT 2.3 It

is very important that this should include recreational fishing, professional fishing, boat launching.

Response – See 2.5 recommendation.

OCEAN BEACH DOG EXERCISE AREA 2.4

Dog walking on a leash at all times. No signage – add to recommendations.

Response – Noted.

9. FISHING AND BOATING 2.4.1

Reduction of jetties along the western shoreline is a reduction in boating safety. Wilson Inlet is regularly used by boating residents and visitors, mainly through the summer months.

Under the influence of strong east south east wind changing to south west in the afternoon, water becomes very rough. For varied reasons, boats break down, are blown towards the western shore. Much of which is rough, hard to access. Jetties offer safeguard for people to land without damaging themselves or boats.

We accept reviewing jetties is right concept, providing retaining those structures, rather than rendering them unusable is a priority. As these structures are built at no cost to authorities, we consider the licensing fee of \$150 is excessive.

Response – Noted.

TOURISM INDUSTRY 2.4.1

Bus parking

Rivermouth Caravan Park, Inlet Drive should be signposted.

Response – Out of scope of this plan.

CAMPING 2.4.1

Where are these locations. Should this be listed in this section.

Response – Noted.

YACHT CLUB RESERVE 2.4.1

Upgrade at this unattractive site is questionable. Suggest major surface levelling, landscaping and planting with native grasses.

Response – See recommendation 2.5.

FISHING AND BOATING 2.4.1

There is no other proposed amenity development for the Public Report besides Section 2.4.1 this has major shortcomings.

Response – See 2.5.

10. FIRE MANAGEMENT 2.5.3 Clarification of access

through private properties, priority before summer.

Response – Noted.

11. PART 3 IMPLEMENTATION 3.2

MANAGEMENT PLAN REVIEW

Plan to be reviewed every five years, showing amenities, subdivisions, current development.

Response – Noted.

12. INLET FISH

Add to some commercial species:

Flathead, Silver Bream, Gardies, Trumpeter, Leather Jackets. Flounder

Response – Noted.

13. OTHER NOTES FROM PUBLIC SESSION

No safe mooring east of Denmark River, a jetty like that at Springdale is needed.

Plan boat launching facilities to cater for demand in peak period.

Response – See 2.5 recommendation.

John Xanthis Vice President Wilson Inlet Restoration Group

- Poison Point. This area is one of the most picturesque spots on the inlet, currently it has a sign saying processional fishermen only, we would like this to be pulled down as it is not their area. Poison Point should be recognized as a tourism development node with access road, car park, wheelchair access boardwalk and viewing and fishing platform; BBQ, huts and seating.

Response – See 2.5 recommendation.

- The current breaching of Wilson Inlet on the western side to be retained no more than 100m from the western limestone cliffs to support the amenity of Prawn Rock Channel and the health of Wilson Inlet.

Response – Out of scope.

- The launching jetty at Poddy Shot boat ramp to be made into dual access as it was originally designed and the river mouth boat ramp to be made functional for varied water levels with ladders for elderly people as it was originally designed. Both boat ramps were designed by Matt (Shire Engineer at the time) and I through WIMAG. This is a problem with the implementation of plans going through WIMAG and on to the Shire with the turn over of staff and their lack of experience and knowledge of what has gone on before. The outcome is flawed by the time it is implemented. I have suggested to the former and the current CEO they need a local foreshore manager to liaise and work with the management groups and the Shire and on the ground works say two days a week to get an acceptable outcome.

Response – Noted.

- The area next to Ocean Beach Caravan Park, that is designated as a dog exercise area, the access road and car park area to be filled with sand from Prawn Rock Channel to the height of the walk/cycleway to accommodate rising water levels and make the dog exercise area more accessible during these times.

Response – Noted.

- From the Ocean Beach Lookout car park a walk trail is needed adjacent to the cliffs heading south to a gap in the cliffs approximately 100m and a tyre stair access to the bar area for walkers, surfers, fishermen and dog exercise. This will alleviate pressure on the surf club access and provide a safe access to the beach instead of having to scale the cliff face as they do now.

Response – Out of scope.

- To respect the original 1995 landscape protection guidelines in the last Foreshore Management Plan, which clearly states not to put large structures on headlands and ridge lines. As our coastal landscape is a non renewable resource. Adding to these guidelines, no windfarms in the view shed from Wilson Inlet to the mouth of Wilson Inlet.

Response – Out of scope.

Case Koning Secretary Wilson Inlet Restoration Group

Submission WIFMP

PREAMBLE

There is a lack of facilities available to the general Denmark public and tourists alike on the Wilson Inlet Foreshore Reserves.

The following benches are available for Inlet viewing, 1 in front of the Riverview Caravan Park, 1 at Inlet Drive and 4 at Prawn Rock Channel (not much of a view here).

There are 2 official boat launching and fish cleaning facilities available, one at the Denmark River mouth, the other at Poddy Shot. Both have parking facilities available. Professional fishermen also uses other facilities, ie Crusoe Beach, Poison Point and a few other places (undoubtedly unofficial). Access to these later facilities, due to lack of maintenance, has been degraded.

A foreshore walkway is in place from Campbell Road to Rainbow Close and a walkway/bicycle track has been recently constructed from Greenbury Place to the Surf Club.

A fishing platform is in place at Prawn Rock Channel, which is used only when the snapper are running (just prior to the bar breaching).

There are neither table or barbeque facilities available along the whole Foreshore Reserve. There are very few deep water recreational fishing areas for the elderly and the disabled.

Response – Noted – see 2.5 recommendations.

INTRODUCTION

There are a few anomalies within the Denmark Foreshore, Wilson Inlet Management Plan 1996 that need to be addressed.

ZONING TABLE:- Recreational Development Zone should include recreational fishing access.

- Poison Point, a designated Recreational area (No T12344), is demarcated on Plan 4.2 as a Conservation/Passive Recreational Zone (CPRZ), yet it has marked boat access areas (and used mainly by professional fishers). Additional criteria for this zone should include recreational fishing access (used as such).

Response – Noted – see 2.5 recommendations.

SUBMISSION

1 POISON POINT RECREATIONAL AREA T12344

This area is probably the only area for the recreational angler to access deep water in order to wet a line in this known successful fishing spot. There is currently no suitable access for the elderly or disabled. The elderly/disabled should have the same access rights and recreational availability to the Inlet via the foreshore reserves as the general public.

The following proposal is submitted, in part, to provide opportunities for both passive and active recreation and will, in addition, include facilities that will enhance the enjoyment of this area for all members of the public ie it is a combined facilities proposal. It will also contribute to the region's tourism industry.

- It is proposed that a safe recreational fishing facility be made available to the elderly/disabled; it will have wheelchair access to a proposed shoreline boardwalk which will incorporate a few T shaped jetties.
- Suitable walk trails/boardwalks to be constructed to access designated picnic areas (close to the foreshore) which can be enhanced with suitable benches and tables.
- Access to part of the area is available but needs to be upgraded; similarly a small parking area is available and also needs to be upgraded.
- Suitable toilet facilities need to be installed.
- As this is reputed to be a successful fishing spot, it will be necessary to construct a small fish cleaning facility at a suitable location.
- It is suggested that this proposal is to be managed by the Denmark Shire, who have the expertise in obtaining funds to complete this. They will also ensure that the relevant authorities are contacted and permission be obtained to complete the proposal. In addition they will ensure that compliance and high standards are maintained to all structures and minimize degradation to the environment within the proposal.
- The proposal is broad based, no plans are therefore submitted. It is suggested a more detailed plan can be submitted at a later stage when there is agreement in principle. It is to be noted that WIRG has obtained significant support with regard to increasing facilities for the elderly/disabled especially to the proposed amenities at Poison Point.
- Copies of the support letters can be obtained by request.
- The existing sign „Professional Fishermen Only“ at the entrance to the Recreational Area should be removed and replaced with appropriate signage.

A proposed activity/facility and timetable was attached.

Response – Noted – see 2.5 recommendations.

2. DENMARK RIVERMOUTH RECREATIONAL NODE

Facilities at this location include:- boat launching jetty, boat mooring, fish cleaning amenity and parking.

- It is proposed that lighting be made available for those that arrive at dusk and thus can clean their catch with safety.
- It is suggested that picnic facilities are installed comprising of benches and tables so that the general public can enjoy this part of the Inlet, especially the bird life that frequent this area.
- It is suggested that boats should not be parked on a semi-permanent basis on the grass verge along the Denmark River, (currently a professional fishing boat is at this location). It creates a negative visual impact of the area. Boats when not in use should be moved or taken home.

Response – Noted – see 2.5 recommendations.

3. PODDYSHOT DEVELOPMENT NODE

Facilities here include:- boat launching jetty, fish cleaning amenity, parking and toilets. This area is frequented by tourists who circle the area and depart: people lunch at this location but do not get out of their car.

- It is proposed that a bench is installed, so that some members of the public can in comfort eat their lunch or at least observe the birdlife in this area.

Response – Noted – see 2.5 recommendations.

4. PRAWN ROCK CHANNEL DEVELOPMENT NODE

Facilities here include:- 4 benches, parking, fishing platform, swimming and paddling, an overpass bridge and pontoon across the channel giving access to the island and Ocean Beach.

- It is proposed that additional amenities should include tables and barbeque facilities.
- Young families cross the channel by pontoon so that their youngsters can swim or paddle in the shallow water during summer providing the water is clean.
- It is proposed that benches are made available in this area so that parents, grandparents have some comfort when supervising the children.
- The area is prone to flooding and it may be required to raise the ground level and replanting with native grasses is envisaged.

Response – Noted – see 2.5 recommendations.

W Miller

2.5 Fire protection

- That controlled burns be maintained by recommendation of Denmark Fire Authorities in conjunction with the Shire. This should also be discussed with adjacent landowners.

Response – Noted.

Springdale Jetty

- The Springdale Jetty was a large part of early Denmark history. The jetty should be restored to its former size with access through to it via the new subdivision (pine tree entrance). The jetty should have provision for recreational boating use and use by walkers and people hand fishing.

Response – Noted – see 2.5 recommendations.

2.2.2 Preservation of Heritage

- Recommendation. Remove buffer zone extension to a minimum of 50 metres above the high water mark from plan.
- If a burial site is proven to be found at Poddyshot, it should be marked and signposted.

Response – Noted.

2.2.3 Adjoining Development

- I recommend to remove the point. Actions:- siting structures away from natural focal points such as headlands or ridgeline. The landowner and Shire should decide where they build.

Response – Noted.

Camping

- Camping should be banned within the foreshore

Response – Noted.

Shelters along Heritage Trail

- All the shelters and seating along the trail are in a dangerous condition. They should all be repaired and restored.

Response – Noted.

1.5.1 Aboriginal History

I take exception to the Noongar community being called „cultural custodians“ or „Traditional Owners“. They are not the owners of the Wilson Inlet any more than you or I. We the community share in the ownership. I would like to see the emphasis on the Aboriginal ownership removed from the Management Plan, Yes they do have a history in the area but so do many other people.

Response – Noted.

Fox Baiting

~ Fox baiting should be introduced in reserves twice a year to restore fauna numbers.

Response – Noted.

H Miller

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Response – Noted.

Fox Baiting

- Fox baiting should be introduced in reserves twice a year to restore fauna numbers.

Response – Noted.

Jim Karakatsanakis Project Manager Springdale Beach Denmark Development

2.3 Conservation and Passive Recreation

Relating to the management of the foreshore area adjacent to the Springdale Beach subdivision.

The draft management plan states that Wilson Inlet Management Advisory Group (WIMAG) has provided the following specific planning advice regarding Springdale Beach in the minutes of the meeting on 25 June 2008:

“In reference to providing advice concerning the future management of Springdale Beach WIMAG provides the following recommendations:

- *No boat launching facilities*
- *No jetty*

Recommendations:

WIMAG’s advice regarding Springdale Beach be adopted.

Actions:

Adopt WIMAG’s advice regarding Springdale Beach.

Response – The recommendation and action have been modified to say that WIMAG’s recommendations be considered.

LWP has engaged Coffey Environments Albany to discuss strategic options and assess the environmental challenges involved with placing marine infrastructure, namely boat launching and or jetty facilities at Springdale Beach. Given that within the Springdale Beach development there is a tourist zone required by council adjacent to the Wilson Inlet foreshore this area seems an ideal and logical option for consideration of future marine facilities. The close proximity to the town centre of Denmark and the lack of other easily accessible facilities add weight to the idea.

Further given that there may be a recommendation come from DPI’s rationalization of Marine structures in the Wilson Inlet that highlights a requirement for more facilities to meet growing demand which will need to be constructed somewhere along the northern shores of the inlet, we believe Springdale Beach to be a logical spot.

Response – DPI was consulted regarding marine facilities and this site was not recommended for this type of development.

A real opportunity then exists to couple this requirement to a location that people are coming to already, having both tourist and permanent population creating a real place of destination!

This would also limit the potential degradation of other areas of the Wilson Inlet foreshore by focusing the movement of people to one key area.

The environmental challenges faced by placing these facilities at Springdale Beach are not unique to this site and would be faced wherever they were to be built.

Until WIMAG’s specific environmental and or planning concerns are raised and we have had the opportunity to address them and full environmental assessment can be undertaken we believe stronger consideration should be given to input by others and Springdale Beach should not be categorically excluded as an active recreation area.

Response – Springdale Beach has been identified as a passive recreation area with a small development node at the eastern end which is suitable for picnic and fishing facilities.

Peter Mortimer, Chairman, South Coast Landscape Guardians Incorporated

1.1 Purpose of the Management Plan

A key aspect of this Plan is to protect the unique ecological, [landscape](#) and heritage values of the Foreshore reserves.

Reason for addition: the term ecological does not necessarily include the visual landscape as has been noted in Part 1.2.2 Conservation and Passive Recreation where reference is made to the ... ecological, historical and landscape values of the Foreshore Reserves,...

Response – Noted.

LOCATION AND TENURE

It is strongly recommended that within this part, [A-Class Reserve No. 24913](#) be added to the foreshore reserves listed here.

Reasons for addition: this 554 hectare A-Class Public Reserve No. 24913 abuts part of the Wilson Inlet (in its lower reaches near the bar/opening to the ocean) but also, the reserve is largely comprised of a naturally-vegetated, highly prominent and elevated landscape (the top of Wilson Head it reaches 110 metres above sea level) which forms a very substantial part of the view-shed from many parts but particularly the lower reaches of the Wilson Inlet. More importantly, near the boundary between this A-Class Reserve 24913 and Reserve 20578 there is known to be a significant Aboriginal heritage site known as the „Katelaysia Rock Shelter“. One of the many references to this site can be found in a paper by Dortch, Dortch and Reynolds titled „*Test Excavation at the Oyster Harbour Stone Fish Traps, King George Sound, Western Australia*“ (- see WEB reference below). It is a very significant site because radiocarbon dates for fish and molluscan remains found here *provide the earliest known age of estuarine fishing in either the Southern or Indian Oceans. This information would also be well worth including in part 1.5.1 Aboriginal History.*

(WEB reference: <http://www.library.uq.edu.au/ojs/index.php/aa/article/view/20060623843/82>)

Response – Noted.

PHYSICAL ENVIRONMENT

It is suggested that another section titled [Landscape](#) be added as a sub-section of this part.

Reasons for addition: the visual landscape of the Wilson Inlet and adjoining environs is very much a part of the *Physical Environment*. Although section 1.4.2 *Landforms, Geology and Soils* makes reference to the physical geology, there is no reference to such things as the largely unobstructed (particularly coastal) horizons which are close to and clearly visible from a substantial part of the Inlet and its foreshore reserves, nor is there reference to the way in which the landscape changes substantially around the perimeter of the Inlet. For example, the stark contrast between the largely flat landscape to the north-east and east of the Inlet, as opposed to the substantially-elevated nature of the landscape from Wilson Head eastwards towards part of the Nullaki Peninsula could be detailed herein. Such a detailed description of the quality of the landscape as it currently stands (in many places it remains largely in its natural state in terms of flora and topography) is recommended such that later in the Plan, reference can be made to the importance of protecting such landscapes.

Response – Noted.

2.2 CONSERVATION

Those areas of the Foreshore Reserves designated as Conservation Zones are to be managed to maintain and enhance habitat for flora, fungi, and to protect cultural heritage sites [and natural landscape values](#). They are suitable for the following recreation activities only:

Walking

Bird Watching

Photography

[Painting \(eg: of landscapes\)](#)

Reasons for additions: since these areas have been designated as requiring extra conservation/protection, it would seem imperative that their natural landscape value(s) also be given similar standing and hence protection. Additionally, since it is pointed out that these areas have significant *environmental quality*, it would be prudent to include Painting (eg: of landscapes) as a suitable recreational activity.

Response – Noted

Because of the visual prominence and natural landscape value of Wilson Head, it is strongly recommended that the above-mentioned A-Class Reserve No.24913 (within which Wilson Head lies) be classified as, at best as a *Conservation Zone* of the Foreshore Reserves and at worst, it is recommended that it be classified as a *Conservation – Passive Recreation Zone*. (This would also necessitate inclusion of this Reserve in 2.3 CONSERVATION AND PASSIVE RECREATION.)

The Western Australian Planning Commission's September 2005 Report to Planning Minister Alannah MacTiernan (relating to a proposed rezoning of part of this A-Class Reserve), highlighted the significance of this (Wilson Head) landscape when it stated in its conclusion: "The elevation of the subject land, combined with its low heath vegetation and visibility from popular public recreation areas and lookout points, result in it being a visually significant and sensitive landscape." This same report went on to reinforce this point by stating: "Having regard to topography, the extent and type of vegetation, natural features, land use patterns, built form character and community values, there is evidence to suggest that approval to rezone the land would detrimentally affect the landscape qualities and environmental values of the area."

Further weight is added to the already well-justified argument to protect/conservate this A-Class Public Reserve along with numerous other Wilson Inlet Foreshore Reserves (which can be considered „coastal“), by the references in the Shire of Denmark's „Coastal Management Plan - August 2003“. Page 7 of this report describes the Denmark coast as "...unique in southern Australia and increasingly being recognised as an invaluable asset – not only as a corridor for the protection of plants and movement of animals, but as a protective buffer between human development and the coastal and marine environments".

This same 2003 plan states that "...there appears to be very strong support for minimal development of Shire coastal locations in Denmark ... over 60% of those surveyed wanted either no further development or low level development with recreational facilities and no buildings. Of those who supported some development, over 80% of people wanted public rather than private development of facilities. Most strikingly, 99% of those surveyed were opposed to anything more than single storey developments in coastal locations."

The report goes on to state that its „Overall Management Objective for the Ocean Beach Reserve“ is to "Manage the Ocean Beach reserve (No. 24913) ... for recreation, ensuring activities do not detract from the reserve's natural values".

Response – Out of scope of this Plan.

2.2.3 Adjoining Development

Land next to Wilson Inlet has great value for potential development, particularly residential subdivision. However, subdivision Development on any scale has visual and environmental impacts on the foreshore and the Inlet, through:...

Reason for changes: since land development or the construction of facilities on any scale has the potential to cause visual and environmental impacts, it is suggested that the scope of recommended protection of the foreshore reserves be broadened such that it doesn't refer to only residential subdivisions.

Response – Noted.

Although the WIFRMP makes reference to the type of structures or development which may be acceptable within the view-shed of Wilson Inlet (2nd set of **Recommendation / Action** text boxes, page 24 of draft Plan), it is highly recommended that relevant parts of the "Wilson Inlet Management Authority (WIMA now WIMAG) Denmark Foreshore, Wilson Inlet Management Plan" – September 2002 be considered for inclusion in this new Wilson Inlet Foreshore Reserves Management Plan (and be added to the Bibliography). Particularly relevant here are the sections of the 2002 WIMA report which state: "Alterations to the landscape should be subtle remaining subordinate to natural elements ... Where structures are required they should complement natural landscape elements; ... away from major natural focal points (such as headlands or ridgelines) ... The visual impact of any development on the view from the Inlet itself should be considered ... The

protection of the landscape value of this area is important and structures within and adjacent to the foreshore need to have minimal visual impact ...”.

Response – Noted.

Finally, again with reference to the coastal development (and hence coastal reserves) the „Southern Shores 2001 – 2021, A Strategy to Guide Coastal and Marine Planning and Management in the South Coast Region of WA“ (South Coast Management Group, September 2001)“ is relevant to any development which adjoins the coastal reaches of Wilson Inlet and its Foreshore Reserves . This report outlines best practice coastal and marine planning and management guidelines for south coast Shire Councils including Denmark. Excerpts from these guidelines include prohibiting the development of visually prominent structures on the coast which may adversely impact the coastal view-shed; new public structures should be designed and sited in an ecologically, culturally, and aesthetically considerate manner; areas of high visual sensitivity should be identified and zoned for their protection; the design of buildings and structures on the coast should be encouraged to be sympathetic to natural landscape features and skylines; any development on the coast should be undertaken with regard to potential impact upon visual qualities of the natural landscape.

Response – Noted.

Peter Keppel Regional Manager – Warren Region Department of Environment and Conservation

- Section 1.3 Location and Tenure

On p7 Reserve 23120 is formally known as Rudyard Beach Nature Reserve, not Crusoe Beach

Response – Noted.

- Reserve 23120 is vested in the Conservation Commission, not the National Parks and Nature Conservation Authority;

Response – Noted.

- Section 1.3.2 History of the Reserves

On p9 under fire history there is a reference to a 4ha fire in 1995/96 in the Nature Reserve near Crusoe Beach – there is no record in the DEC fuel age corporate data of this fire. What is the source of the information?

Response – clearly shown on satellite photos.

1998/99 – 176ha burnt on Plantagenet Loc 6720, the adjacent road reserve and part of Crown Reserve 23759 (DEC Corporate Fuel Age Data)

Response – Noted.

- Section 1.4.5 Vegetation

The threatened flora list on p 12 is inconsistent with DEC records; for example DEC has no records of *Andersonia virolens*, *Borya longiscarpa*, *Sphenotoma parviflora*, *Thomasia solanacea* or *Microtis pulchella* occurring within the foreshore reserves; however DEC does have a record of *Andersonia* sp. Mitchell River, *Sphenotoma parviflorum*, *Thomacia quercifolia*, *Banksia serra* and *Anthocercis sylvicola* occurring within the foreshore reserves, which are not listed in the plan. It is important that the information contained in the plan is referenced and the date of the reference document/ data set noted.

Response – Noted, this is in part due to the coordinates provided, which also cover adjacent reserves. References have been included and this section has been changed. It underlines the importance of and need for proper flora surveys.

- Section 1.4.9 Fauna

A number of statements need to be referenced. For example, 2nd Paragraph “Wilson Inlet has been identified as one of 125 internationally important sites for migratory shorebirds in Australia” – this statement should have a reference following it.

Response – Noted, figure quoted was from a draft, it has now been revised and the reference included.

Paragraph 3 – “A bird survey was commissioned for this report mid 2008. It found that the diversity of resident birds in the foreshore reserves appears to have remained unchanged within this decade” – how can a single survey determine a 10 year pattern? It is clear from the appendices that the 2008 survey is one of many over the 10 year period and that the trend has been determined from a number of years’ worth of data. This does not come through in the text.

Response – Noted, wording changed.

- “109 species of birds have been recorded within the past 9 years” (ref?)

Response – Noted.

- “It was noted in the (2008) survey that changes in the water levels of the inlet have had a huge impact on populations of migratory birds” Can you clarify which changes and how they have impacted?

Response – Noted.

- Reference to the Carnaby’s and Baudins Cockatoos (p14) as declared threatened fauna – The Forest Red-tailed black cockatoo (*Calyptorhynchus banksii naso*) is now also listed and has been recorded in the general area.

Response – Noted.

- P14 Paragraph 2 – “the report noted that recreational use of the foreshore areas can lead to unnecessary disturbance of waterbirds” – there is no reference to which report is being cited, just “The report”. It would be useful to clarify how recreational use is disturbing the birds; it is inferred that domestic animals are the main issue, in the recommendation following, but this is not stated.

Response – Noted.

- P14 Paragraph 6 – “There is much to be done, for example it has recently been found that there are many more species of small mammals (in the reserves?) than was previously recognized. How was this discovered? Through anecdotal observation or surveys etc?”

Response – Noted.

- P14 Paragraph 8 – “the reserves play an even more significant role in times of upheaval such as fire” – this would be better represented as “times of disturbance and habitat alteration, for example that associated with wildfire”;

Response – Noted.

- P14 Paragraph 8 (last sentence) – “Wilson Inlet foreshore invertebrates have not been well studied and there is no doubt that there is much to learn about them” – suggest replace this with “Wilson Inlet foreshore invertebrates have not been well studied, but it is likely that given the mesic nature of parts of the habitat that these areas are potentially important as refugia”.

Response – Noted and included.

- P14 Paragraph 9 – is this the only recommendation for protection of fauna habitat? What about development of an appropriate fire management regime, completion of biological surveys to determine the potential importance of the reserves, management of recreational activities such as boat access etc

Response – Noted and included.

- Section 1.5.5 Fishing and Boating

It is our understanding that the informal boat ramp in reserve 23759, south of the South Coast Hwy, is a concern to members of the Wilson Inlet Advisory Group as a result of the potential impacts on migratory bird habitat and shoreline vegetation? If this is the case, it has not been mentioned at all in relation to boat ramps and no recommendations have been put forward regarding its management.

Response – Noted and included.

- Section 1.5.7 Waste Water

P18 Paragraph 2 – “Older properties surrounding the inlet not on town sewerage leach nutrients through the foreshore reserves into the inlet. This is affecting plant growth on the foreshore and inlet” – how/

where is this information documented and should this plan be making a recommendation in relation to how the issue can be addressed to reduce long-term effects on the inlet and foreshore?

Response – Noted.

- Section 1.5.9 Research – for all of the sections under this heading, where is the data being stored (i.e. which department/ group is the custodian and how is it available for trend analysis)?

Groundwater monitoring and urban sewerage – reference to groundwater samples being collected on a monthly basis between June 2006 and Feb (2007?) to determine the potential impact on the inlet from upslope residential areas. Does the data suggest that there is an issue? Is this intended to be an ongoing monitoring project, given the increase in development around the inlet? 8 months of data is a good baseline, but doesn't necessarily provide any management guidance.

Response – Noted.

Phytophthora Dieback – what is the objective of the risk assessment project and the intended outcome? The section is very brief.

Response – See 1.4.8 and 2.3.6.

Foreshore rehabilitation plan – Who is the custodian of the rehabilitation plan, where are the priority areas for rehabilitation and how much has been accomplished to date?

Response – Noted.

Vegetation surveys – Did the quadrats target a certain vegetation type within the reserves? What is the definition of “condition” in this context (i.e. what was measured?) What is the intended use of the data? Trend analysis?

Response – Noted.

Section 2.1 Actions #2 – what planning process is being referred to?

Response – Noted.

Section 2.2 Conservation

- P20 Paragraph 4 – reference to “designated Conservation Zones” – It is unclear in the text what is meant by the zone terminology. It would be useful to have a link made here to the appendices, which delineate these areas.

Response – Noted, see maps.

- P21 Recommendations – “ensure that any path developed in a Conservation Zone conforms to the management goal” – which management goal is being referred to? 1.2.1, 1.2.2, 1.2.3 or all 3?

Response – Noted.

- Section 2.2.1 Preservation of the Ecology

P21 paragraph 2 – “the exact composition of the ecology of the reserves must be known” – this is a huge ask in terms of quantifying all biotic and abiotic factors contributing to the ecology, the interactive processes and ecosystem functions that are critical in maintaining the ecosystems within the reserves. It would be more achievable to establish indicator groups for targeted monitoring.

Response – Noted.

Actions – ensure that flora/ fauna and fungi surveys comply with licencing requirements under the Wildlife Conservation Act 1950 and the Animal Welfare Act 2002.

Response – Noted.

P22 Paragraph 6 “the survey found that the diversity of resident birds in the Foreshore Reserves in winter months appeared to remain unchanged within the decade” – there is no indication that there is any comparative data in the text. The only reference to survey is in relation to the July 2008 survey. There is good data listed in the appendices which reveal that there have been previous surveys and that comparative data is available, but this is not clear in this section.

Response – Noted.

P22 Paragraph 7 – “anecdotal evidence that some species are declining in numbers”; There may be lower numbers of birds using the foreshore and inlet habitats but the birds listed are capable of moving significant distances if the habitat is not suitable, so an inference that the *species* is declining could be misleading. The inference should be that the habitat appears less suitable and so usage of the area is reduced.

Response – Noted.

Recommendation – “it is recommended that monitoring of bird populations on the foreshore reserves be conducted” – all birds? Key habitat users (eg waders) or endemic species would be good indicators of the ongoing suitability of the reserves. Or select key reserves or specific habitats within the reserves for monitoring. What would be monitored? Species diversity or relative abundances? A broad list of species associated with all of the reserves doesn’t provide any indication of the potential contributing factors if declining trends are detected. It would be useful to establish an outcome to ensure that monitoring is effective and a clear outcome will make it easier for attracting funding as well.

Response – Noted.

- Section 2.2.3 Adjoining development

Increasing water runoff – this statement should represent altered hydrology through increased runoff or water extraction pressures

Response – Noted.

Increasing pedestrian (and vehicular) traffic through the foreshore vegetation

Response – Noted.

P23 Action box 2 “issue foreshore clearing regulations and policies to owners of properties with a boundary in common with a foreshore reserve on receipt of rezoning applications” – the clearing regulations under the EPAct should be issued unless there is a subdivision approval with special clearing exemptions.

Response – Noted.

P24 “Clearing along boundaries, particularly lopping trees” – Clearing for fence lines or vehicular tracks are exempt under the Regulations for clearing native vegetation, Environmental Protection Act 1986, as long as the area is not within an environmentally sensitive area (ESA) and the total clearing under any of the exemptions does not exceed 1ha in any financial year.

Response – Noted.

- ~ Section 2.2.4 Waste Water

“Unmanaged stormwater causes erosion to access ways, trails and other infrastructure”. Movement of nutrients and mobilization of minerals should also be mentioned.

Response – Noted.

- ~ Section 2.2.5 Introduced animals

- The reference to “introduced predatory” animals – this is contradicted by the reference to rabbits and domestic animals in the recommendations. Suggest that the section heading should be introduced and domestic animals and that predatory is not used as a quantifier.

Response – Noted.

- Actions – reference to designated areas. Are there designated domesticated animal areas within the foreshore reserves? If yes, these should be included in the preamble for section 2.2.5

Response – Noted.

- “Implement a rabbit trapping program in coordination with DEC” – DEC undertake rabbit *baiting* (not trapping) only where there is a specific biodiversity value at risk.

Response – Noted.

- Section 2.2.6 Phytophthora Dieback

- 1st Paragraph – is there any documentation of the “original forest composition”

- P27 Second dot point – reference to Quadrat C with no explanation of what this refers to. It comes across in the text as an important area, could this be clarified with a brief summary of the area.

Response – Noted.

- P27 Second dot point – There is currently no known link between Phytophthora spread and mild prescribed burning; where large older Banksias persist they often require fire to stimulate seed release and germination. A cool mosaic burn in this area would be desirable to maintain part of the population unburnt and allow part of it to burn. If implemented properly there is a high possibility of ensuring adult Banksias are not killed by the fire and the result would be the establishment a multiple aged Banksia stand (I.e seed producing adults as well as young establishing plants), which provides the populations with resilience to future disturbance in the habitat. In the complete absence of fire, the Banksias may senesce and stop producing seed, which makes stand replacement in the event of a wildfire impossible.

Response – Noted.

- P27 “Installation of project dieback signage at entry to priority reserves to inform users of how to reduce risk of spread” – how will priority reserves be determined? Field interpretation?? The broadscale mapping for the area shows the majority of the areas as low certainty infested.

- P27 “Immediate treatment of susceptible species within and around quadrat C to stabilize disease movement” Again – what is quadrat C? Need to identify the Pc fronts and areas that are protectable or have escaped the disease. There is no point treating all susceptible species in an area that is completely infected unless there is some evidence of “disease escape”, a threatened species or community that isn’t represented anywhere else or some long-term prognosis for the area as a result of drainage or other disease risk factors.

~ P28 “Wilson inlet heritage trail to be surveyed in wet weather conditions to ID areas of muddy and wet pothole areas” – this contradicts the recommendations on P27 that the areas be accessed under dry soil conditions!

- P28 “wet areas need to be surfaced with limestone or potholes filled” – potential alteration of hydrology/ drainage patterns and soil alkalinity issues will need to be considered.

Response – Not appropriate to edit a quote from another report.

- Recommendation “prevent further spread of dieback” – It is not practical to aspire to preventing further spread given that the disease spreads autonomously. We *can* prevent further *assisted* spread.

Response – Noted.

- Actions “obtain funding to map instances of dieback” – for long-term management/ conservation of disease free areas, it is important to find the dieback free protectable areas.

Response – Noted.

- Section 2.2.8 Acid Sulfate Soils

P29 Paragraph 4 – “Recreational Development Zones” – again there is no link to the delineation of these areas. Need to refer to relevant appendix

Modified surface and ground water flow patterns and draw down cones associated with water extraction should also consider potential ASS issues.

Development adjacent to the foreshore could have just as much impact on the foreshore quality as development on the foreshore itself.

Response – Noted.

Section 2.3 Conservation and Passive Recreation

P31 and 32 – dog walking is not an activity that is consistent with the Rudgyard Beach Nature Reserve

Response – Noted.

MAPS



Location maps of Wilson Inlet

N

A

16 October 2008





