



Shire of Busselton

**Management
Plan**

Quindalup Reserve No 46

May 2004

Shire of Busselton

MANAGEMENT PLAN Quindalup Reserve No 46

**Prepared by
Brian T Clay
Toby Inlet Catchment Group Inc.**

**for
The Shire of Busselton
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**Adopted by the Shire of Busselton
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I Introduction

1.1. Aim of the Plan

The aim of the management plan is to produce a working plan, as a guide for the protection of the Reserve, so that conservation values can be improved. These values will be achieved by providing baseline assessment of flora and vegetation, fauna and habitats, weed control, and feral animal control, the impact of predators, fire prevention and control measures, soil erosion and rehabilitation techniques. Recreational strategies must also be addressed so that impact by use does not threaten conservation values.

The Management Plan seeks to identify management issues, supported by objectives and recommendations to address issues. The recommendations outlined in the Management Plan are considered necessary to ensure conservation values of the Reserve are addressed. The Reserve is vested in the Shire of Busselton, which is the Authority responsible for control and management of the Reserve. The Shire of Busselton intends to implement the Management Plan in partnership with local community groups.

1.2 Management Objective

The high conservation values of the Reserve, together with its important passive recreational values, suggest that the most appropriate purpose for the Reserve, should be 'Conservation and Recreation', as the objectives of this Management Plan is to ensure these values are maintained.

1.3. General Description

Reserve 46 is located on Geographe Bay Road, Quindalup, approximately 4 kilometres east of Dunsborough, Figure 1. The reserve is bounded by residential development to the east and west, the Indian Ocean to the north and Toby Inlet to the south. It is located on a narrow fore dune between Toby Inlet and the coast. The vegetation is mainly peppermint (*Agonis flexuosa* var *flexuosa*) woodland / forest with a diverse understorey. Along Toby Inlet there is a 2 –3 m strip of dense *Juncus kraussi* and *Isolepis nodosa*. Adjacent to the beach is dune vegetation.

Reserve 46 is 13.26 hectares of which approximately 1.25 hectares has already been cleared. The total length is only some 550 m with a width of some 250 m. The Reserve is divided into two sections by Geographe Bay Rd. The reserve contains a boat launching facility, parking on both the north and south sides of Geographe Bay Road and a dual purpose walk trail from the west to the Sea Rescue site. The Sea Rescue site situated on the north side of Geographe Bay Road, accommodates the headquarters for the local sea rescue Building. See maps pages 5-6.

2 Site Description

2.1 History

The tramline that went from Henry Yelverton's timber mills (established in the 1850s) to the Quindalup Jetty, traversed Reserve 46 from south to north on the eastern section of the Reserve. The timber mills were located inland to the south of the reserve. A bridge over Toby Inlet connected the mills to the jetty. Should any evidence of these works / structures remain, they should be noted for preservation.

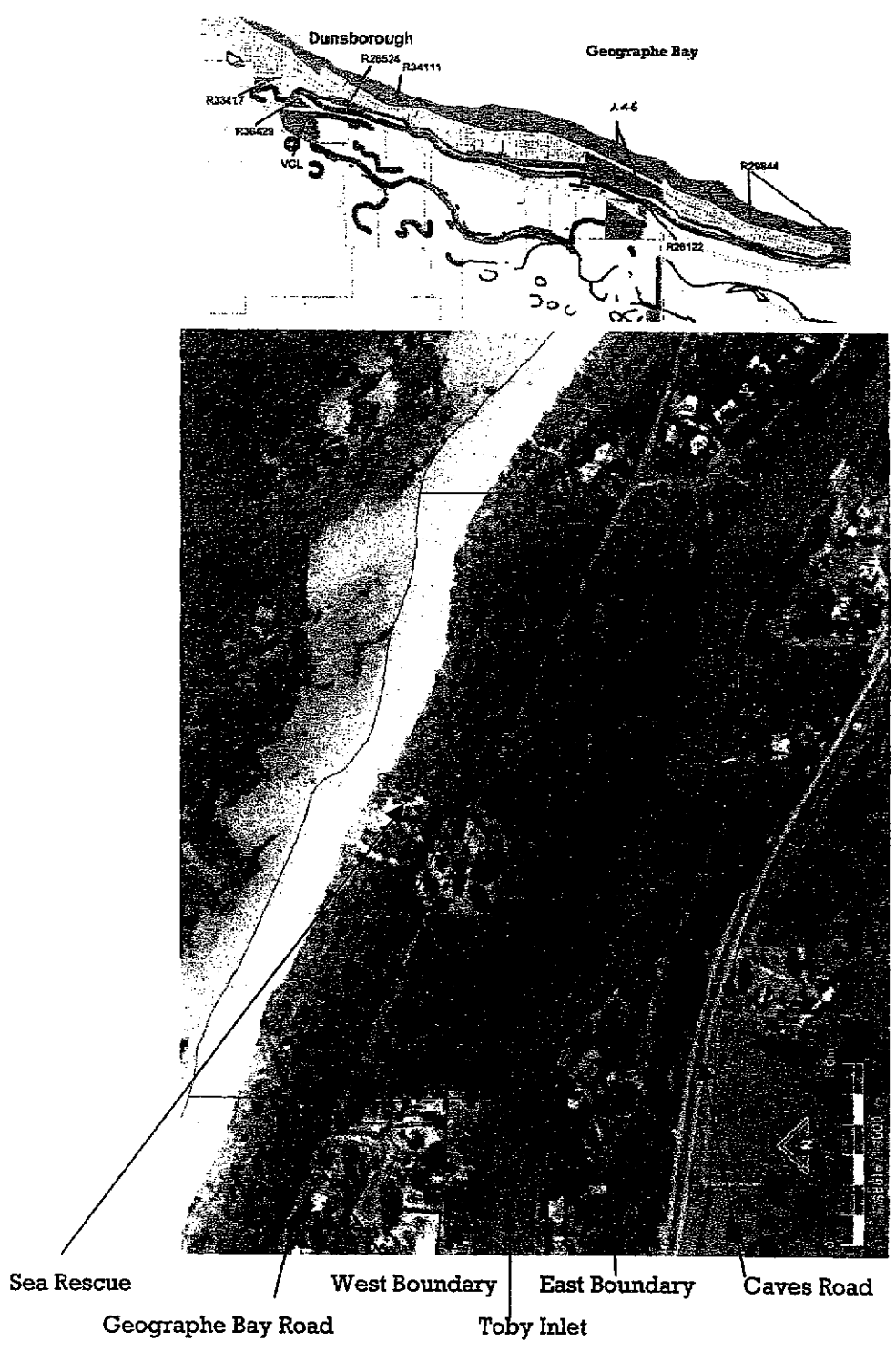
In recent years a portion of the reserve has been utilised to establish a boat launching facility. The facility was originally a gravel ramp but was replaced in 1986 by the existing concrete structure. Parking associated with the boat ramp is within the reserve on the north and south sides of Geographe Bay Road. Recent development of the Naturaliste Volunteer Sea Rescue Headquarters has incorporated public toilets and an upgrade for vehicle access to the boat ramp. In addition funds were allocated by the Shire of Busselton to construct a finger jetty to assist with launching and recovery of the sea rescue boat. The reserve has also been identified as the possible site for the development of a boating facility.

The use of the reserve for a boat launching facility has resulted in approximately 1.25 hectares having been cleared for the boat ramp, parking, and the Sea Rescue building.

Aboriginal heritage of this site lacks documentation although there is a long history of Aboriginal occupation in the South West of Australia. Records indicate occupation for some 40,000 to 50,000 years (Merrilees, 1973). Preliminary searches of the Register of Aboriginal Sites indicate that several Aboriginal sites are located within the Toby Inlet Catchment. Without further investigation it is difficult to determine whether these sites are located in Reserve 46. Major development is not anticipated so there would be no impact on any sites of significance.

An attempt has been made to identify sites by contacting the local Aboriginal Groups. Further dialog is required. It is the desire of the community to foster a working relationship with the Local Aboriginal Community.

Figure 1. A Class Reserve A 46



Map of Reserve 46

Fig 1. Regional Location of Reserve 46

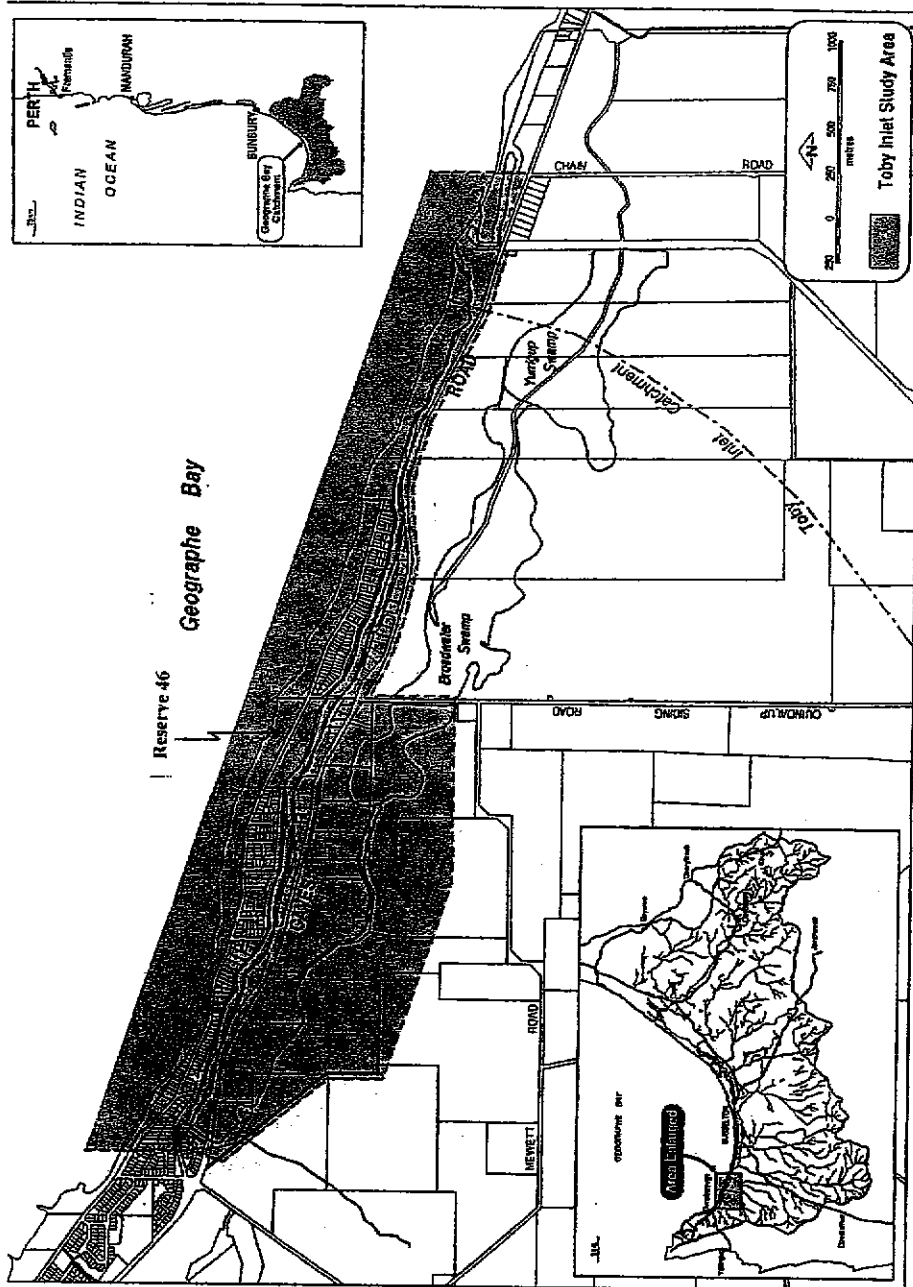


Figure 2: Toby Inlet and Associated Wetlands Study Area Locality Map

2.2 Landform and soils

The reserve is located between the coast and Toby Inlet on a fairly narrow fore-dune. This area is within the Quindalup Coast land system (Tille & Lantzke, 1990). The Quindalup Coast has formed on recent holocene, aeolian marine and estuarine deposits, and is commonly less than a few metres above sea level. The section of reserve adjoining the beach is part of a very low fore-dune system of calcareous sand. Behind this is a series of low, very gently inclined beach ridges and flats. These consist of calcareous sands with some accumulation of organic matter on the surface.

2.3 Hydrology

Little is known of the hydrology of the area. Due to the sandy nature of the soils, a large proportion of rainfall is contained within the Reserve and no significant drainage lines are apparent.

2.4 Vegetation Communities

Arthur Weston (Weston, 1997) has identified four vegetation communities within the reserve. They are:

- Beach and dune vegetation incorporating belts of *Ammophila arenaria* and *Spinifex hirsutus* grassland and *Acacia cochlearis* open heath between high tide line and *Agonis flexuosa* var *flexuosa* forest, possibly with enclaves of *Poa ?porphyroclados* tussock grassland.
- *Agonis flexuosa* var *flexuosa* low forest to low woodland (<8m tall).
- *Agonis flexuosa* var *flexuosa* forest (dense and >10m tall).
- Estuarine fringing vegetation, mainly *Juncus kraussii* – *Isolepis nodosa* closed sedge-land.

Weston has identified *Agonis flexuosa* var *flexuosa* forest and *Poa ?porphyroclados* as significant vegetation communities in this area as they appear to be poorly represented along the Geographe Bay coast. On a local scale the vegetation of the reserve is very important, as it represents one of the few larger areas of relatively undisturbed *Agonis flexuosa* var *flexuosa* remaining in the vicinity of Toby Inlet.

The majority of the vegetation surrounding the Inlet has been cleared for residential use and most of the remnants that remain are only narrow strips. The vegetation in the reserve is generally in good condition, particularly the closed sedge-land along the Inlet and the peppermint forest in the north-west section of the reserve where disturbance has been minimal.

2.5 Flora

Approximately 140 plant species have been recorded for the Toby Inlet area. This includes 87 native species and 51 exotic species, mainly environmental weeds. Appendix 1 contains a list of flora identified at the reserve.

Most of the environmental weeds in the reserve are herbaceous plants, many of which are annuals that are relatively small and inconspicuous even when they are growing and in flower. Problem weeds include Bridal Creeper (*Asparagus asparagines*), Arum Lily (*Zantedeschia aethiopica*), Rose Pelargonium (*Pelargonium capitatum*) and various exotic grasses.

2.6 Fauna

A terrestrial fauna study undertaken in 1997 (Hart, Simpson & Associates Pty Ltd, 1997) indicated that two native mammals have been seen or identified by signs such as tracks in the reserve. They are the Southern Brown Bandicoot (*Isooden obesulus*) and the Western Ringtail Possum (*Pseudocheirus peregrinus occidentalis*).

The Western Ringtail Possum is widespread but rare over much of the forested southwest and coastal regions. The Possum was once common from Perth to Albany, and is now restricted to certain areas.

A list of mammals, frogs, reptiles, snakes, and birds is included in Appendix 2 and 3.

Feral animals present include rabbits living in the reserve, with cats and foxes probably hunting in the reserve at certain times.

The Reserve, is one of the few larger areas of relatively undisturbed native vegetation remaining around Toby Inlet, and is undoubtedly important for native fauna.

The Reserve is the only remaining important Eco system between Toby Inlet to the South, and the Ocean to the North. The result of this unique system is that there is a connection between the Toby Inlet estuarine birds, in saline and fresh water habitats, and the Ocean birds to the north.

The bird species list attached does not recognize the ocean bird species. However work done by Ross Paton does indicate a rich and diverse sea bird population in Geographe Bay. Unfortunately a lot of the species recorded are transient.

It has been noted that due to the destruction of vegetation, song birds have suffered from loss of habitat. Reserve 46 is therefore a perfect habitat, with its thick under-storey, for a lot of the songbirds. It is important to note that a Buff Banded Rail and Banded Stilts have recently been recorded. Appendix 3.

2.7 Landscape and Recreational Values

The visual qualities of the reserve are excellent as it is well vegetated, provides a pleasant view of Toby Inlet and the sea. There are existing recreational values such as a boat ramp, finger jetty, a walk trail to Dunsborough to the West and access to the beach for swimming fishing, and walking.

2.8 Land tenure

The Reserve is currently vested in the Shire of Busselton as an A-Class reserve for 'Camping and Recreation'. The reserve is designated for vegetation protection under the Dunsborough Structure Plan (DPUD, 1990). Due to the value of the reserve as a conservation area, it is suggested that the Shire of Busselton apply for the purpose of the Reserve to be changed to 'Conservation and Recreation'.

3 Management Physical Resource

Priority 1=Urgent. Priority 2=Needs to be addressed. Priority 3=Not urgent and ongoing

Note: Due to the many variables such as funding, climate and the availability of volunteers, each priority and time line cannot be stipulated.

As Quindalup 'A Class' Reserve 46 is vested in the Shire of Busselton, Management is therefore the responsibility of the Shire. It is suggested that the Toby Inlet Catchment Group and the Committee for the Preservation of the Quindalup strip assist with implementing management recommendations.

3.1. Climate and Weather

The area experiences a Mediterranean climate with warm to hot summers and mild wet winters. Mean annual rainfall of 821.7mm. at Busselton and a mean annual rainfall at Cape

Naturaliste of 824.7mm. (Bureau of Meteorology, 1903 – 1993) suggest that the lower flood plains experience a similar rainfall pattern. However the mean average rainfall on the ridge from 1991 to 1998 of 976mm. suggests that the mean average rainfall on the ridge is greater than the low country (Clay – 1991-1998).

Issue

- i. Severe weather patterns, and / or a return to a wet cycle will exacerbate the problems of flooding.

Objective

- i. To understand the hydrology of the area and instigate necessary control measures. If required.

Action

- i. Re-vegetate the banks of Toby Inlet, if required, with deep rooted endemic plants to assist in stabilizing the banks as well as providing a nutrient stripping function to water entering the Inlet. Priority 1

3.2 Coastal Erosion

Due to recreation pressures, there is an urgent need to determine the effects of boat ramps, tourist vehicle parking bays, vehicular and pedestrian access to the beach, and the consequent impacts on coastal sand dunes, local vegetation and fauna.

Due to the impact on the remnant vegetation it is suggested that there is an urgent need to define parking bays, beach access and walk trails before any further degradation occurs. This vegetation community of *Agonis flexuosa* var *flexuosa* (Peppermint) needs to be retained due to its worth as old growth remnant vegetation.

Environmental Constraints as referred to in the 'Recommendations for Coastal Reserves, Building Setbacks and Development Controls', Department of Planning (1992), with assistance of the Shire of Busselton state that:

'Where a shoreline is shown to be eroding in the long term, then a greater buffer width is required where it is demonstrated that there are shoreline fluctuations'.

State Coastal Planning Policy No. 2.6. Western Australian Planning Commission (WAPC) states that: 'the broad objectives of the policy are to protect, conserve and enhance coastal values and ensure that the location of development takes into account coastal processes'. Development must also take into account the policy's general guide of a total setback of 100 metres from the horizontal setback datum (HSD) defined in the policy.

It is noted that Section 5.10 sub section 5.10.5 of the Recommendation for Coastal Policy, states that: 'A Class Reserve 46 is located along a shoreline that is subject to erosion', and the suggested use should be low key. Appendix 4.

Issue

- i. Human impact on the environment has degraded the primary dunes and local vegetation.

Objective

- i. Ensure that there is no further degradation of the coastal Environment.

Action

- i. Funding is needed to complete a survey on drainage, impact on vegetation communities, to compliment existing data. Priority 1
- ii. Funding is needed to assess the problems and complete a Management Plan for soil erosion, sand dune reclamation, vehicle and pedestrian access to the beach, parking demarcation. Priority 1
- iii. Implement actions of the Management Plan. Priority 1
- iv. Ensure local guide lines for use of and access to the beach by professional fishermen are in place. Priority 2
- v. Due to high conservation values ensure coastal protection guidelines are adhered to. Priority 1
- vi. Ensure community input. Priority 1

4. Management of Biological Resources

4.1. Vegetation and Flora

4.1.1. Vegetation Communities

The remnant upper level vegetation is predominantly *Agonis flexuosa var flexuosa* with *Melaleuca raphiophylla* growing close to Toby Inlet. A fairly diverse understorey of plant species such as *Lagineria huegelli*, *Olearia axillaris*, *Rhagodia baccata*, *Hibbertia cuneiformis*, *Leucopogon parviflorus*, *Conostylis aculeata*, *Acacia littorea*, *Caladenia sp.* support the need for conserving these remnants.

4.1.2. Flora

Approximately 140 species of vascular plants were recorded in the Toby Inlet area. No species of Declared Rare Flora or Priority Flora were recorded. Within the area two species of significance were recorded and they were *Veronica distans* and *Exocarpus odoratus*. Not necessarily of significance, but *Anthocercis littorea* was also recorded.

Issue

Conservation of remnant *Agonis flexuosa var flexuosa* and its associated plant community.

Objectives

Due to the high conservation values:

- i. Protect the diversity of plant and animal species, and animal habitats.
- ii. Ensure adequate protection from wildfires.
- iii. Ensure adequate weed control.

Action

- | | | |
|-------|------------------------------------------|------------|
| i. | Funding for surveys | Priority 1 |
| i. | Vegetation and flora surveys | Priority 2 |
| iii. | Map plant communities and invasive weeds | Priority 2 |
| iv. | Map animal habitats | Priority 2 |
| vi. | Restrict vehicle and pedestrian activity | Priority 2 |
| vii. | Control invasive weeds | Priority 1 |
| viii. | Fire prevention | Priority 1 |

4.2. Fauna

4.2.1. Mammals, Reptiles, Amphibians, Birds

Within the study area of the Toby Inlet and Associated Wetlands, Hart 1997, recorded three native mammal species and three introduced mammals, thirteen reptile species and two frog species.

Two of the native mammals, *Pseudocheirus occidentalis* (Western Ringtail Possum) and *Isodon obesulus* (Southern Brown Bandicoot) have been declared under Schedule 1 of the Wildlife Act as "Rare or likely to become extinct" and have special legal protection. It is therefore imperative to retain these remnant vegetation zones to ensure habitats for these endangered animals. Further work on the habitat requirements of the Possum and the Bandicoot are suggested to ensure the protection and survival, of these animals, into the future.

Western Ringtail Possum (*Pseudocheirus occidentalis*) is widespread over much of the forested South-West and was once common from Perth to Albany, it is now found only in certain areas, such as Busselton. It is known to survive in disturbed areas and could become common locally in certain circumstances. It has declined since European settlement and the introduction of the fox.

Southern Brown Bandicoot (*Isoodon obesulus*). The Bandicoot range was widespread in the South West until European settlement reduced its range dramatically. It is thought to be restricted to the wetter parts of the South West, which affords greater protection from the fox in the denser vegetated areas. It is likely to persist as long as it is afforded protection from predation.

Of the possible species that may occur in the Reserve, there are four native mammals and five introduced mammals, twenty four reptile species and eight frog species. The Water-rat, (*Hydromys chrysogaster*) is one animal in the area that is of conservation status. A resident of the Quindalup strip, recently observed a water rat near Toby Inlet.

The limited fauna that has been recorded or expected to occur in the reserve is the result of a limited habitat, rather than the condition of the habitat.

Issue

- i. Due to its value in a regional and local context and its conservation status, there is a need to conserve remnant vegetation and habitats for rare species of fauna such as the Western Ringtail Possum and the Southern Brown Bandicoot.

Objective

- i. Ensure vegetation communities and habitats are protected.
- ii. Establish records of animal species and their habitats.
- iii. Ensure rare fauna are protected.

Action

- | | | |
|------|----------------------------------------------------------------------------------------------------------|------------|
| i. | Collate all records of fauna and habitats to a data base. | Priority 1 |
| ii. | Fauna surveys to determine numbers and habitats
Western Ringtail Possum and Southern Brown Bandicoot. | Priority 1 |
| iii. | Control invasive weeds (section 4.1.2. Action 3) | Priority 1 |
| iv. | Protect habitats | Priority 1 |

5. Management Protection

5.1 Rehabilitation of Degraded Areas

As the area is relatively flat, erosion is not a major problem, except for the primary sand dune. This area has been impacted upon by constant misuse and needs to be defined.

There are concerns for the survival of the vegetation surrounding the car park with further degradation around the edges of the parking area. During summer the boat ramp and car park are used extensively. It is this pressure on the surrounding vegetation that is of concern.

So that possible suggested future areas for parking be restricted, current parking boundaries of existing car parks must be defined. Due to the conservation status of the reserve, further car parks need to be restricted.

The track running in a southeast direction from the car park to Champion Way needs to be closed and rehabilitated with local native plants. This track has been used for access for fire fighting purposes and is also used extensively by campers. The track is considered to be in the wrong place for fighting fires, and could be extremely dangerous if used for this purpose. Weed infestation along the track and especially where it meets Champion Way needs addressing. On-going use of this track by vehicles is leading to further degradation. The *Juncus kraussii* - *Isolepis nodosa* community, on Toby Inlet, has been impacted upon as a result of boat launching.

Issue

- i. Erosion of dunes and impact by people, wind erosion and weed infestation.

Objective

- i. Restore degraded areas where possible with native vegetation and ensure further degradation does not occur.

Action

- | | |
|--------------------------------------------------------------------------------------------------------|------------|
| i. Identify and delineate the boundaries of the car park to ensure further degradation does not occur. | Priority 1 |
| ii. Identify and delineate access to the beach | Priority 1 |
| iii. Rehabilitate and stabilise dunes with local native plants | Priority 1 |
| iv. Rehabilitate degraded vegetation with local native plants. | Priority 2 |
| v. Restore track to Champion way with local native plants | Priority 2 |

5.2 Weed and feral animal control

Weeds such as Bridal Creeper (*Asparagus asparagines*), Arum Lily (*Zantedeschia aethiopica*), Rose Pelargonium (*Pelargonium capitatum*), Buddleia (*Buddleia sp.*) and various exotic grasses are currently a problem throughout the reserve. Other weeds in the reserve should be monitored and control measures undertaken as required.

In September 1999, the leaf hopper, *Zygina sp.*, that attacks the Bridal Creeper, was released in the reserve. The hopper appears to have survived and it is therefore pertinent that there is a need to restrict the use of herbicides, and a plan formulated, so that the leaf hopper is not accidentally sprayed. Bridal Creeper Rust fungus (*Puccinia*) was first spread in the Cape Naturaliste region in October, 2001, and has proved very successful in Reserve 46.

Rabbits are present in the reserve and control measures need to be taken. Bait stations, using Pindone, were effective, as reported by Animal Pest Management Services. The August report suggests that this baiting program achieved a reduction in rabbit numbers of between 25 and 40 %. It was also recommended that rabbit warrens be fumigated at the end of winter, as this would greatly enhance the effectiveness of Pindone bait stations. Fumigation has not been carried out in the Reserve. As 1080 is not allowed in an urban situation, Pindone stations are considered the acceptable method of rabbit control in urban areas. Pindone bait stations are considered safe, and therefore an effective, but expensive, means of reducing rabbit numbers.

Foxes have been sighted in the reserve, and control, at some stage will be needed. As the 'The Reserve' still remains an important habitat for the Western Ring-tail Possum and Southern Brown Bandicoot, reptiles, amphibians and birds, it is important to reduce predation to a minimum. Weeds, pests and feral animals will impact on these eco systems.

Issue

- i. Plant communities and habitats degraded by weeds and rabbits. Rare and other fauna predated upon by foxes and cats.

Objective

- i. Increase community awareness of the value of plants and animals in the Reserve, and ensure, by management, that weeds and feral animals are minimised.

Action

- i. Inform the public by news letters on the values of:
native animals and plants, habitats and communities. Priority 1
- ii. Complete an appraisal of the impacts of weed infestation
and or feral animals Priority 1
- iii. Apply for funding for projects from appropriate sources Priority 1
- iv. Conduct appropriate baiting programs for rabbit control Priority 2
- v. Conduct a weed control program Priority 2
- vi. Conduct a fox control program Priority 2

5.3. Fire Control and Prevention

Fire, as a management tool, is very complex, and hard to determine best practices. Unfortunately fire management is required to reduce fuel loading, in some cases, for safety reasons. As an occasional fire is a natural part of the Australian environment, it can therefore be used to assist regeneration programs. However, frequent burning will result in the invasion of weeds, to the exclusion of the native vegetation. Controlled fires, on the whole, are very difficult to manage in such small areas.

The fire history of Reserve 46 is not known, and there appears to be no records of any fires in recent years.

Controlled burning should only be carried out, as a last resort, if there is a fuel hazard problem, or for the creation of buffer zones. The area is too small to carry out large fuel reduction programs, and it is recommended that small cool patch burns could be used during the cooler months of the year.

In consultation with the Shire FMO it was decided that there was a need to put in fire access tracks on the east and west boundaries so as to create a buffer zone of some 20 to 30 metres along these boundaries. Reduction of fuel in these zones to be instigated by whatever means is deemed appropriate.

Discussions held with the Shire FMO, consideration was given to the closure and rehabilitation of the track leading from the car park, that leads in a southeast direction to Champion Way. This track does not comply with fire control concepts.

A fire control and prevention plan for the Reserve needs to be developed, with the Shire FMO, as a separate document to the Management Plan. Should the Reserve contain any Declared Rare Flora within an intended burn area, the Department of Conservation and Land Management must be consulted.

Issue

- i. Wild fires entering the Reserve

Objective

- i. Prevent uncontrolled fires from entering the Reserve and if necessary, the use of fire as a management tool.

Action

- | | | |
|------|-------------------------------------------------------------------------------------------------------------------------------|------------|
| i. | Complete fire access tracks along the East boundary and West boundary of the Reserve with minimal clearing. | Priority 1 |
| ii. | Reduce fuel loading to 20 to 30m on the East boundary and West boundaries under the direction of the Shire of Busselton. FMO. | Priority 1 |
| iii. | Determine fuel loading for the remaining vegetation. | Priority 2 |
| iv. | Consider further dual use fire access and walk trails where it is deemed appropriate and or necessary.. | Priority 3 |
| iv. | Progress a fire plan after completion of surveys with the FMO and or CALM | Priority 3 |

6 Management – Recreation

6.1 Access and Facilities

Define dual walk trails / access tracks with information signage to restrict access to various vegetation communities and the spread of weeds. Access paths along selected pathways to bird hides on Toby Inlet could also be a useful dual use recreation and fire management tool.

As Reserve 46 is important to the local community for recreational access, then any anticipated works that seeks to limit or increase reserve access needs to be undertaken with extensive community consultation. All proposed recreational tracks must also consider the purpose of the Reserve as 'Conservation and Recreation'.

A restricted car park policy with a defined existing car parks policy needs to be put in place, to ensure that vehicles do not impact and or damage the vegetation. It is recommended that pine rails and posts be used as markers.

Defined access to the beach is required where appropriate to ensure that the vegetation on the dunes is not damaged. These areas need to be assessed and appropriate action taken.

There is an urgent need for the Shire of Busselton to address the uncontrolled trailer / car parking, so as to reduce further impact on the sand dunes and or vegetation. A detailed survey is required as part of a design plan to address the control of access, vegetation and dune protection, road safety and traffic management. The plan should address all existing uses, to ensure management accommodates and balances 'Conservation and Recreation'.

Issue

- i. Access to passive recreation such as boating, swimming, walking and fishing.

Objective

- i. Facilitate access to current walk tracks, boat ramp, swimming, and fishing areas where possible, to enjoy passive recreation.

Action

- I. Apply for funding from appropriate sources to evaluate and define existing car parks with appropriate fencing. Priority 1
- ii. Define walk trails/access trails to beach Priority 2
- iii. Put in place Information signage Priority 3
- v. Ensure there is a balance between Conservation and Recreation. Priority 1

6.2. Water-Based Activities

The area is used mainly for water based activities and so there is a need to ensure these activities are compatible with the conservation values of the Reserve.

The Shire of Busselton has recognized the possibility for the construction of another jetty on the coastal portion of Reserve to add to the recreational value of the Quindalup foreshore.

Before any such projects can be considered, and due the purpose of the Reserve as 'Conservation and Recreation', the following must be examined and considered:

'Recommendations for Coastal Reserves, Building Setback and Development Controls by the Department of Planning (July 1992) with the assistance of the Shire of Busselton'.

There is a need to combine management with the input and the needs of the community, so as to ensure that passive recreation is managed, in such a way, that there is minimal impact on a unstable beach. It is anticipated that the existing beach could be eroded away leaving a shoreline with only trees (Recommendations for Coastal Reserves. Section 5.10.5. Station 10.8 to Station 10.12).

The recreational values of boating, fishing, swimming are currently catered for, and under the classification of an 'A Class Reserve' will prevent any major development occurring without the appropriate approvals (See section 9.4.1.).

Issue

Ensure all activities are compatible with the purpose and conservation values of the reserve.

Objective

Due to a moving coast line in this region, all recreational activities should be of a passive nature.

Action

- i. Evaluate the opportunities and environmental constraints on on any form of construction. Priority 1
- ii. Ensure all environmental issues are addressed Priority 1
- iii. Ensure all passive recreation is sustained Priority 1

7. Community Relations

7.1. Education and information

With newsletters and brochures, the local community needs to be well informed on all aspects of management and the benefits of good management on the well being of the whole of the environment.

7.2. Community Liaison and Involvement

It is important to liaise with the local community, and obtain their input on management plans and to assist with management. Local community groups should be approached and encouraged to participate in all aspects of management.

Ensure the community is aware that pets, such as dogs, will only be allowed in the Reserve on a leash with their owner.

Ensure that the public is aware that rubbish must be handled in the appropriate way.

Issue

Ensure the Community is aware of the values of the Reserve, and that pets and rubbish can harm the flora / fauna habitat.

Objective

- i. Encourage community involvement with management and ensure that management is in accordance with recommendations within the management plan.

Action

- i. Relay information to the community via news letters. Priority 2
- ii. Shire to enforce a ruling on pets Priority 2
- iii. Shire to ensure rubbish is collected Priority 2

8 Research and Monitoring

Initial research has already commenced on flora and fauna. Further surveys and research need to be seen as ongoing projects, so that management progress with the optimum information available.

Issue

Base line data that will ensure the efficient management of this environment.

Objective

- i. Ensure all the necessary data is available for management.

Action

- i. Collate all available data. Priority 3

9. Management Plan

The Shire of Busselton needs to put in place a management plan so that recommendations of the plan can be put in place. As the Shire retains responsibility and control, the Shire needs to address the level of assistance required from local communities and the degree of involvement, which will be acceptable to local communities. Partnerships have been suggested as a means to management.

9.1. Priorities

Priorities have been addressed, and a suggested priority number assigned to each phase of a project by nominating the urgency to any particular project. These nominations will vary during the time frame set, and therefore should be flexible.

9.2. Funding

Funding for general works by The Shire of Busselton.

Funding for surveys, walk trails, fencing and the like will be sourced from various funding bodies.

9.3. Evaluation and Review

An initial review stage set at five years to assess how well the objectives outlined here, have been addressed. At this stage management can be modified to address deficiencies or altered objectives.

9.4. Strategic Land Use Considerations

Reserve 46 is classified as an 'A Class Reserve' vested in the Shire of Busselton with a required purpose of 'Conservation and Recreation'.

This Management Plan does not envisage any further development on Reserve 46, outside the existing parking area, boat ramp, and Sea Rescue building.

The primary intent of the Management Plan is the preservation of all the Environmental Values, and any future development should be limited to walk trails and the like, that will compliment that intent.

If any further development, other than what this Management Plan provides for, is to be considered by Council, then a new Management plan is required. Any such new Management Plan will need to have extensive community consultation, environmental assessment with a referral to the Environmental Protection Authority under Part 1V of the Environmental Protection Act, 1986. There could possibly be a need to change the purpose of R 46 Reserve as well.

Note 1

At the time of preparation of the Management Plan for Reserve 46, the Council and the Minister for the Environment and Heritage are considering an application for a 10 metre x 12 metre boat shed on the western side of the access road to the existing boat ramp. In considering any proposal for a boat storage shed and or extensions to the existing Sea Rescue building, the relevant authorities must consider the following:

- i. impact on the foreshore and dunal areas, vegetation and flora, fauna and fauna habitats.*
- ii. size and location of development, short and long term purpose of structure*
- iii. impact of providing any servicing and infrastructure such as electricity, water, and effluent treatment.*
- iv. short and long term access requirements to the site from Geographer Bay Road.*
- v. short and long term parking needs and additional traffic through the area as a result of the proposal.*
- vi. consideration to alternative sites.*
- vii. guidelines and general measures for developments abutting the coast set out in the State Coastal Planning Policy No. 2.6. Western Australian Planning Commission (WAPC), Heritage Act, Aboriginal Heritage Act, and recommendations of the Management Plan for Reserve 46.*

After the determination of appeals by the Minister, should the requisite approvals be given by the Busselton Shire Council, and the Environmental Protection Authority, then the boat shed will be noted in the Management Plan for Reserve 46. This reference for a 10 metre x 12 metre boat shed west of the access road should not be construed as support for the shed, but rather acknowledges the continuing statutory process.

The Author does not accept that 'note 1' should be part of the Management Plan. The Author suggests that 'note 1' should be under separate cover.

The acceptable guidelines set down in the 'Strategic Land Use Considerations', Section 9.4, of the Management Plan, are the guidelines that now must be followed.

10. References

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Appendix 1. Flora Species list for Reserve 46

Family / Species	Weed *	Common name
Family: Aizoaceae		
<i>Carpobrotus ?virescens</i>		pigface
Family: Apiaceae		
<i>Erngium subdecumbens</i>		Blue Devil
(=E. rostratum var. subdec.)		
<i>Trachymene pilosa</i>		Native Parsnip
Family: Araceae		
<i>Zantedeschia aethiopica</i> *		Arum Lily
Family: Asparagaceae		
<i>Asparagus asparagines</i> *		Bridal Creeper
Family: Asphodelaceae		
<i>Trachandra divaricata</i> *		
Family: Asteraceae		
<i>Hypochaeris glabra</i> *		Flat Weed, Cat's Ear
<i>Laginifera huegellii</i>		
<i>Olearia axillaris</i> *		Coastal Daisy-bush
<i>Podotheca angustifolia</i>		Sticky Longheads
Family: Chenopodiaceae		
<i>Rhagodia baccata</i>		Seaberry Saltbush
<i>Sarcocornia quinqueflora</i>		Beaded Samphire
Family: Cyperaceae		
<i>Isolepis nodosa</i>		Knotted Club-rush
<i>Lepidosperma gladiatum</i>		Coast Sword-sedge
Family: Dasypogonaceae		
<i>Acanthocarpus preissii</i>		Prickle Lily

Family: Dilleniaceae		
	<i>Hibbertia cuneiformis</i>	Cut-leaf Hibbertia
Family: Epacridaceae		
	<i>Conostephium</i> sp.	Pearl-flower Bush
	<i>Leucopogon parviflorus</i>	Coast Beard-heath
Family: Euphorbiaceae		
	<i>Phyllanthus calycinus</i>	False Boronia
Family: Geraniaceae		
	<i>Geranium molle</i> *	Cranesbill
	<i>Pelargonium capitatum</i> *	Rose Pelargonium
Family: Haemodoraceae		
	<i>Conostylis aculeata</i>	Prickly Cotton-head
Family: Juncaceae		
	<i>Juncus kraussii</i>	Shore rush
	<i>Luzula meridionalis</i>	Field Wood-rush
Family: Lauraceae		
	<i>Cassytha racemosa</i>	Dodder-laurel
	<i>Cassytha</i> sp.	Dodder-laurel
Family: Mimosaceae		
	<i>Acacia littorea</i>	
Family: Myoporaceae		
	<i>Myoporum parviflorum</i>	
Family: Myrtaceae		
	<i>Agonis flexuosa</i>	Peppermint
	<i>Melaleuca raphiophylla</i>	
Family: Orchidaceae		

Caladenia latifolia	Pink Fairies
Cryptostylis ovata	Slipper Orchid
Cyrtostylis ?huegillii,	Midge, Mosquito Orchid
Leporella fimbriata	Fringed Hare Orchid
Pterostylis media	Common Mignonette Orchid
Subsp. Media	
Family: Oxalidaceae	
Oxalis sp. *	
Family: Papilionaceae	
Hardenbergia comptoniana	Native Wisteria
Kennedia prostrata	Running Postman
Family: Phormiaceae	
Dianella revoluta	Flax Lily
Family: Poaceae	
Briza minor *	Shivery Grass
Eragrostis curvula *	African Lovegrass
Hordeum leporinum *	Barley Grass
Piptatherum miliaceum *	Rice Millet
Spinifex hirsutus	Hairy Spinifex
Family: Polygalaceae	
Comesperma virgatum	Slender Milkwort
Family: Polygonaceae	
Muehlenbeckia adpressa	Climbing Lignum
Family: Primulaceae	
Anagallis arvensis	Pimpernel
Family: Ranunculaceae	
Clematis linearifolia	Old Man's Beard
Family: Rhamnaceae	

Spyridium globulosum

Family: Santalaceae

Leptomeria pauciflora

Family: Solanaceae

Anthocercis littorea

Yellow Tailflower

Family: Stylidiaceae

Stylidium adnatum

Pink Trigger

Family: Thymelaeaceae

Pimelea argentea

Family: Urticaceae

Parietaria debilis

Pellitory

Family: Xanthorrhoeaceae

Xanthorrhoea pressii

Balga, Grass Tree

Appendix 2. Fauna Species List - A46 reserve

FAUNA		Recorded	May Occur
FROGS			
Leptodactylidae			
Crinia georgiana			x
Heleioporus eyrei			x
Limnodynastes dorsalis			x
Pseudophryne guentheri			x
Ranidella glauerti			x
Ranidella insignifera		x	
Hylidae			
Litoria adelaidensis		x	
L. moorei			x
REPTILES			
Chelidae	Side-necked Turtles		
Chelodina oblonga	Western Swamp Turtle		x
Gekkonidae	Geckos	x	
Phyllodactylus marmoratus			
Pygopodidae	Legless Lizards		
Aprasia repens		x	
Pygopus lepidopodus		x	
Agamidae	Dragon Lizards		
Pogona m. minor			x
Scincidae	Skinks		
Bassiana trilineata			x
Cryptoblepharus plagiocephalus		x	

<i>Egernia kingii</i>		x	
<i>E. napoleonis</i>		x	
<i>Glaphyromorphus australis</i>		x	
<i>Hemiergus peronii</i>		x	
<i>Lerista distinguenda</i>		x	
<i>Menetia greyii</i>		x	
<i>Morethia lineoocellata</i>		x	
<i>Tiliqua r. rugosa</i>			x
Varanidae	Monitors		
<i>Varanus gouldii</i>			x
<i>V. rosenbergi</i>		x	
Typhlopidae	Blind Snakes		
<i>Ramphotyphlops australis</i>			x
Elapidae	Elapid Snakes		
<i>Drysdalia coronata</i>			x
<i>Echiopsis curta</i>		x	
<i>Notechis scutatus occidentalis</i>		x	
<i>Pseudonaja affinis affinis</i>		x	
<i>Rhinoplocephalus gouldii</i>			x
<i>R. nigriceps</i>			x
MAMMALS			
Pseudocheiridae			
<i>Pseudocheirus occidentalis</i>	Western Ringtail Possum	x	
Peramelidae			
<i>Isooden obesulus</i>	Southern Brown Bandicoot	x	
Macropodidae			
<i>Macropus fuliginosus</i>	Western Grey Kangaroo	x	

Muridae			
Mus musculus	House mouse	x	Introduced
Rattus rattus	Black Rat		x Introduced
Hydromys chrysogaster	Water Rat		x
Canidae			
Vulpes vulpes	Fox	x	Introduced
Felidae			
Felis catus	Feral cat		x Introduced
Leporidae			
Oryctolagus cuniculus	Rabbit	x	Introduced

**Appendix 3. Birds of Toby Inlet and the Associated Wetlands
(Dunsborough - Western Australia)**

by Brian and Pauline Clay

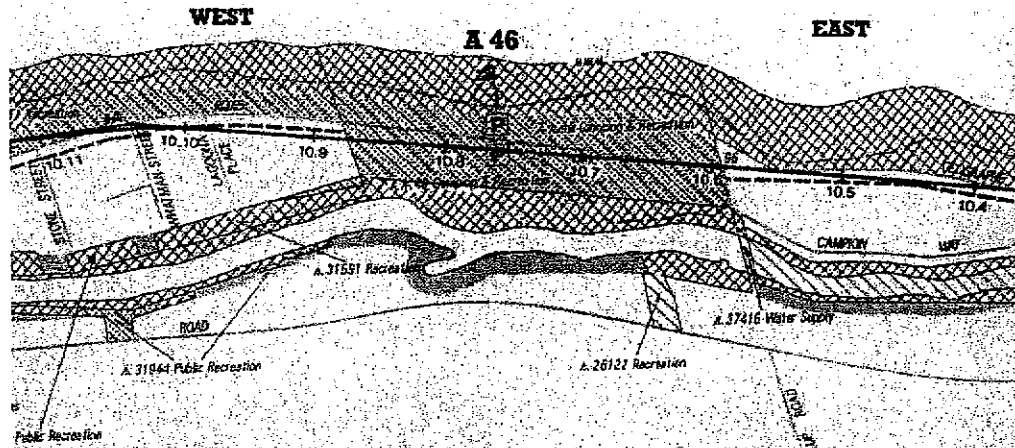
1996

Nomeclature is based on the "Atlas of Australian Birds" by R. A. O. U.

Hoary-Headed Grebe	<i>Poliiocephalus poliocephalus</i>
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>
Australian Pelican	<i>Pelecanus conspicillatus</i>
Darter	<i>Anhinga melanogaster</i>
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>
Little Pied Cormorant	<i>Phalacrocarax melanoleucos</i>
White Faced Heron	<i>Ardea novaehollandiae</i>
Great Egret	<i>Egretta alba</i>
Sacred Ibis	<i>Threskiornis aethiopica</i>
Straw-Necked Ibis	<i>Threskiornis spinicollis</i>
Yellow-Billed Spoonbill	<i>Platalea flavipes</i>
Black Swan	<i>Cygnus atratus</i>
Australian Shelduck	<i>Tadorna tadornoides</i>
Pacific Black Duck	<i>Anas superciliosa</i>
Grey Teal	<i>Anas gibberifrons</i>
Maned Duck	<i>Chenonetta jubata</i>
Musk Duck	<i>Biziura lobata</i>
Osprey	<i>Pandion haliaetus</i>
Black-Shouldered Kite	<i>Elanus notatus</i>
Whistling Kite	<i>Haliastur sphenurus</i>
Brown Goshawk	<i>Accipter fasciatus</i>
Australian Kestrel	<i>Falco cenchroides</i>
Eurasian Coot	<i>Fulica atra</i>
Purple Swamphen	<i>Porphyrio porphyrio</i>
Hooded Plover	<i>Charadrius rubricollis</i>
Black-Fronted Plover	<i>Charadrius melanops</i>
Greenshank	<i>Tringa nebularia</i>
Silver Gull	<i>Larus novaehollandiae</i>
Caspian Tern	<i>Hydropgne caspia</i>
Crested Tern	<i>Sterna bergii</i>
Fairy Tern	<i>Sterna nereis</i>

Laughing Turtle-Dove	<i>Sreptopelia senegalensis</i>
Common Bronzewing	<i>Phaps chalcoptera</i>
Red-Tailed Black-Cockatoo	<i>Calyptorhynchus magnificus</i>
White-Tailed Black Cockatoo	<i>Calyptorhynchus baudinii</i>
Red-Capped Parrot	<i>Purpureicephalus spurius</i>
Western Rosella	<i>Platycercus icterotis</i>
Port Lincoln Ringneck	<i>Barnardius semitorquatus</i>
Tawny Frogmouth	<i>Podargus strigoides</i>
Laughing Kookaburra	<i>Dacelo novaeguineae</i>
Sacred Kingfisher	<i>Halcyon sancta</i>
Rainbow Bee-Eater	<i>Merops ornatus</i>
Welcome Swallow	<i>Hirundo neoxena</i>
Tree Martin	<i>Cecropis nigricans</i>
Richard's Pipit	<i>Anthus novaeseelandiae</i>
Black-Faced Cuckoo-Shrike	<i>Coracina novaehollandiae</i>
Scarlet Robin	<i>Petroica multicolor</i>
Rufous Whistler	<i>Pachycephala rufiventris</i>
Grey Fantail	<i>Rhipidura fuliginosa</i>
Willie Wagtail	<i>Rhipidura leucophrys</i>
Splendid Fairy-Wren	<i>Malurus splendens</i>
Western Gerygone	<i>Gerygone fusca</i>
Western Thornbill	<i>Acanthiza inorta</i>
Yellow-Rumped Thornbill	<i>Acanthiza chrysorrhoa</i>
Varied Sitella	<i>Daphoenositta chrysoptera</i>
Red Wattle Bird	<i>Anthochaera carunculata</i>
Brown Honeyeater	<i>Lichmera indistincta</i>
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>
Western Spinebill	<i>Acanthorhynchus supercilliosus</i>
Silvereye	<i>Zosterops lateralis</i>
Australian Magpie-Lark	<i>Grallina cyanoleuca</i>
Dusky Woodswallow	<i>Artamus cyanopterus</i>
Grey Butcherbird	<i>Cracticus torquatus</i>
Australian Magpie	<i>Gymnorhina tibicen</i>
Australian Raven	<i>Corvus coronoides</i>

FIG 2



Recommendations for Coastal Reserves, Building Setbacks and Development Controls- Dept. Planning July 1982

5.10 Section 10 Quindalup.

5.10.1 Climax vegetation made up of peppermints and discontinuous primary sand dunes indicate that the shoreline has experienced prolonged but periodic recession.

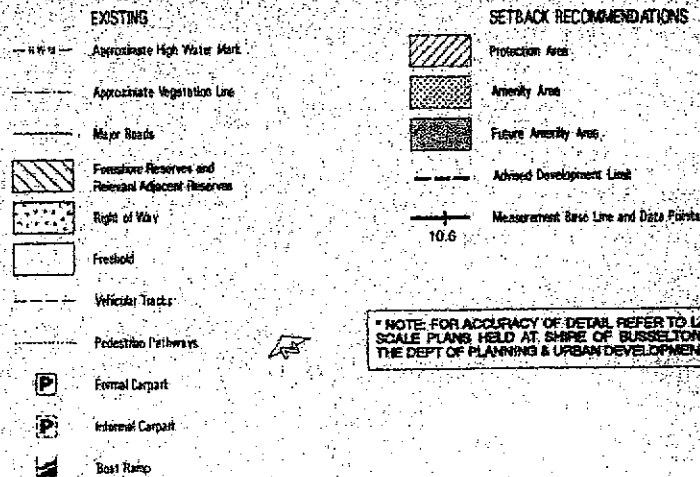
5.10.3 As is common with these forms of migratory giant cusps, the eastern flank (east of Sea Rescue) is accreting while the western flank is eroding (west of Sea Rescue).

5.10.4 Between 1941 and 1985 the sector from station 10 to 10.8 has experienced accretion rates on an average of 1.4 m per year. From 1975 to 1985 was stable.

5.10.5 Station 10.8 to 10.12 had a period of accretion from 1941 to 1975, followed by a recession of shore line in 1985 at the rate of 0.8 m per year.

5.10.6 From station 10.12 to the end of this section 10, the shoreline retreated between 1941 and 1985 at an average rate of -0.3 m per year

NOTE: Due to sample size in the 1941 - 1985 there is a possible need to do an in depth study of sand movement



* NOTE: FOR ACCURACY OF DETAIL REFER TO LARGE SCALE PLANS HELD AT SHIRE OF BUSSELTON AND THE DEPT OF PLANNING & URBAN DEVELOPMENT

