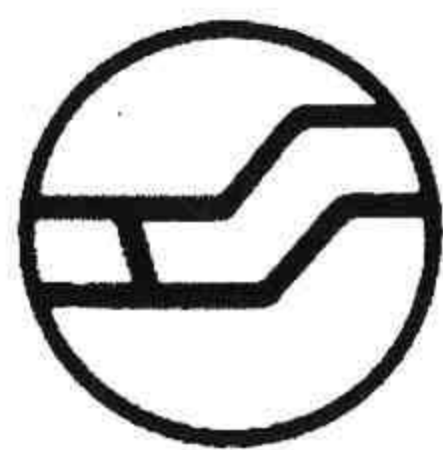
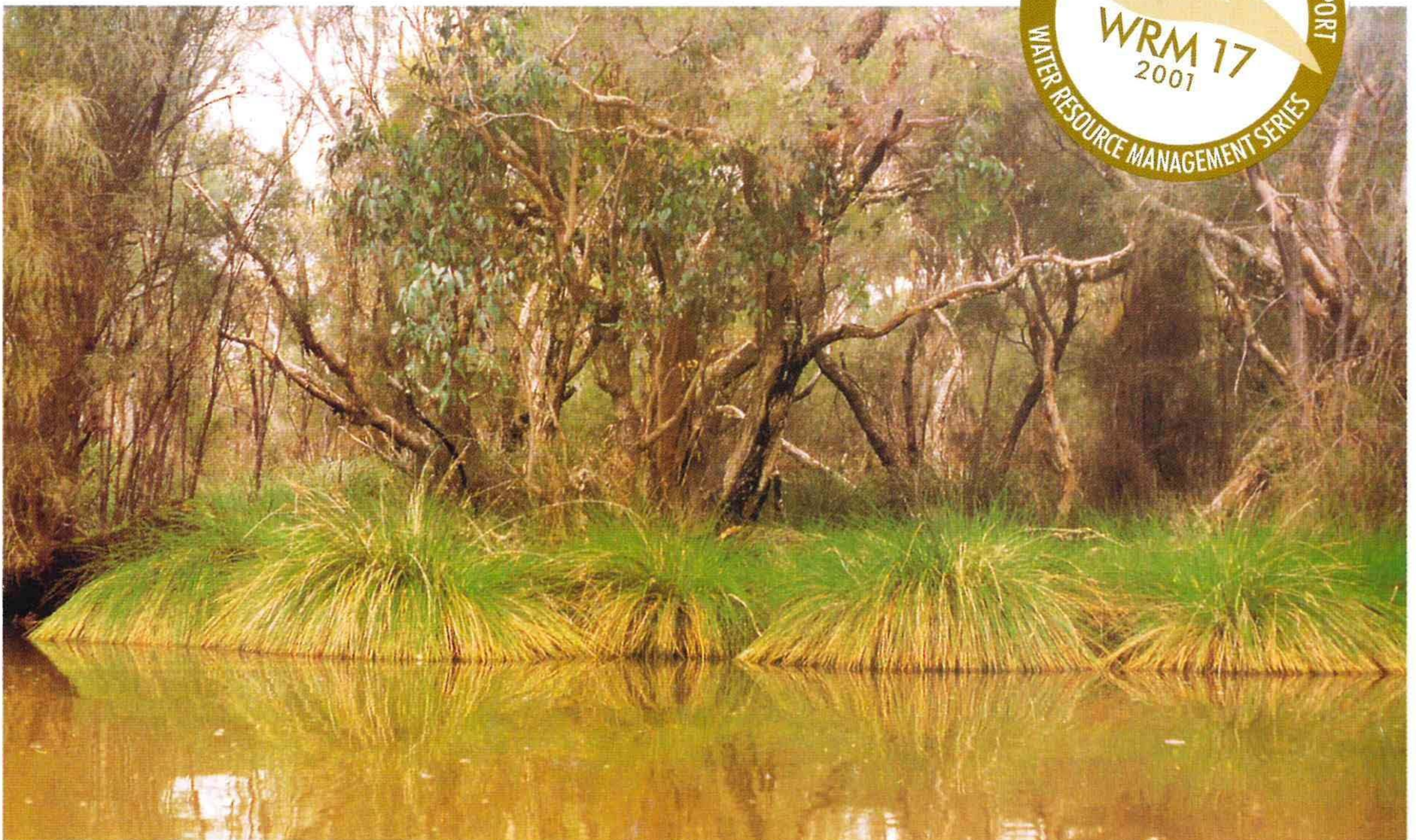




LESCHENAULT INLET MANAGEMENT AUTHORITY

COLLIE RIVER ISLANDS MANAGEMENT GUIDELINES



DEPARTMENT OF CONSERVATION
AND LAND MANAGEMENT



SHIRE OF HARVEY



CITY OF BUNBURY



SHIRE OF DARDANUP



WATER AND RIVERS
COMMISSION

LESCHENAULT INLET MANAGEMENT AUTHORITY
COLLIE RIVER ISLANDS MANAGEMENT GUIDELINES

Report to the
Leschenault Inlet Management Authority,
City of Bunbury, Shire of Harvey,
Shire of Dardanup and the
Department of Conservation and
Land Management

WATER AND RIVERS COMMISSION
WATER RESOURCE MANAGEMENT SERIES
REPORT NO WRM 17
APRIL 2001



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The members of the working group assisted with preparation of the recommendations.

Prepared by *E Wright, C Derrington and L Barrett* of the Water and Rivers Commission.

Dr Michael Walker assisted with the collection and identification of vegetation samples and with the survey of the three islands.

Maps and plans prepared by *Brett Harrison*.

Reference Details

The recommended reference for this publication is: Water and Rivers Commission 2001, *Collie River Islands Management Guidelines*. Water and Rivers Commission, Water Resource Management Report WRM 17.

We welcome your feedback

A publication feedback form is enclosed with this publication and can be found online at <http://www.wrc.wa.gov.au/public/feedback>

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Cover photograph: Fringing vegetation on Snake Island [Taken by C. Derrington 1994]



Foreword

The waterways and foreshores of the Leschenault Estuary and associated rivers combine to form a singular significant conservation resource providing a recreation focus for the Bunbury region.

The Collie River Islands, that is, Bar Island, Alexander Island and Snake Island, contain some of the least used and most isolated river foreshore in the region. With access only by boat, few people have visited the Islands and generally there is little understanding within the community of the conservation and ecosystem values of the Islands.

The Islands provide a refuge for waterbirds, both local and migratory. River foreshores close to the Estuary are under intense pressure for development and recreational use, and safe breeding and roosting areas for waterbirds around the Estuary are decreasing.

The purpose of these management guidelines is to identify the environmental values of the Islands, and integrate these with the recreational and amenity needs of the community to maintain and enhance their conservation values.

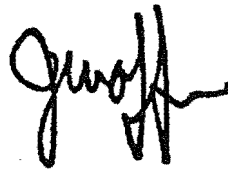
These management guidelines have been prepared by a working group involving the local community. The guidelines are designed to promote a better understanding of the area and to provide a basis for agreement between all the parties involved on how the area is to be used and managed.

It is the aim of the guidelines to develop the recreational and conservation opportunities of the Islands, and to protect fringing vegetation, and riverbank and foreshore stability. In order to achieve these objectives a series of recommendations have been developed. It is intended that these recommendations be implemented over a five year period, and to involve the community as much as possible in actively managing the area.

The management guidelines have been finalised following the preparation and publication of draft guidelines which were released in December 1995 and open for public comment for a period of approximately six weeks. This document has been completed taking these submissions into account.



Mr Bob Chandler
Regional Manager
Department of CALM



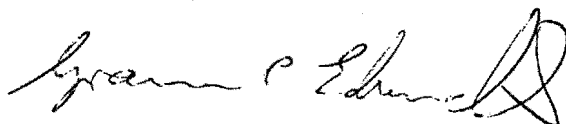
Cr Jim Offer
Shire President
Shire of Harvey



Cr John Castrilli
Mayor
City of Bunbury



Cr Michael Bennett
Shire President
Shire of Dardanup



Mr Graeme Edwards
Chairman
Leschenault Inlet Management Authority



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1. Introduction

The Collie River lies in the south east region of the Leschenault catchment, where it extends beyond the township of Collie (60 km east of Bunbury), to its mouth at the Leschenault Estuary (Figure 1). There are three islands in the lower reaches of the Collie River (Figure 2). The first, Bar Island, is located in the mouth of the river in the Leschenault Estuary. The second, Alexander Island, is located approximately 1 km upstream from Bar Island and the third, Snake Island lies approximately 4.5 km upstream from the river mouth. These three islands differ in terms of exposure and influence from both the Collie River and Leschenault Estuary, thus explaining the differences in vegetation distribution and composition.

The Islands provide a refuge for both local and migratory waterbirds. River foreshores close to the Estuary are under intense pressure for development and recreational use, while safe breeding and roosting areas for waterbirds around the Estuary are decreasing. Occasional camping on Alexander and Bar Islands has led to the accumulation of rubbish and the lighting of fires, resulting in damaged vegetation.

It is important to protect and manage these Islands as they provide an opportunity to conserve foreshore vegetation and animal populations which have had minor human disturbances in comparison to the adjacent foreshore areas.



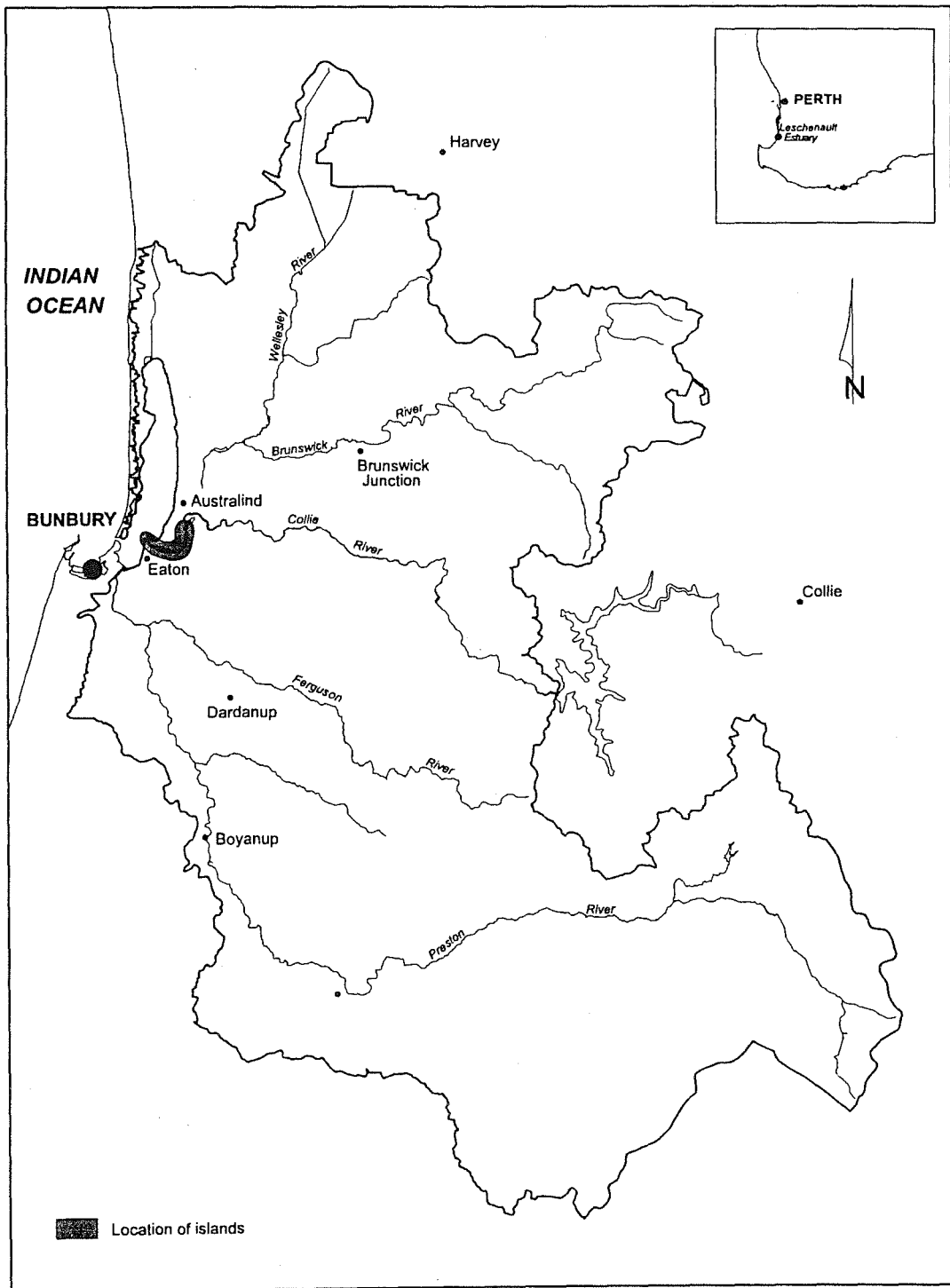


Figure 1: Leschenault catchment



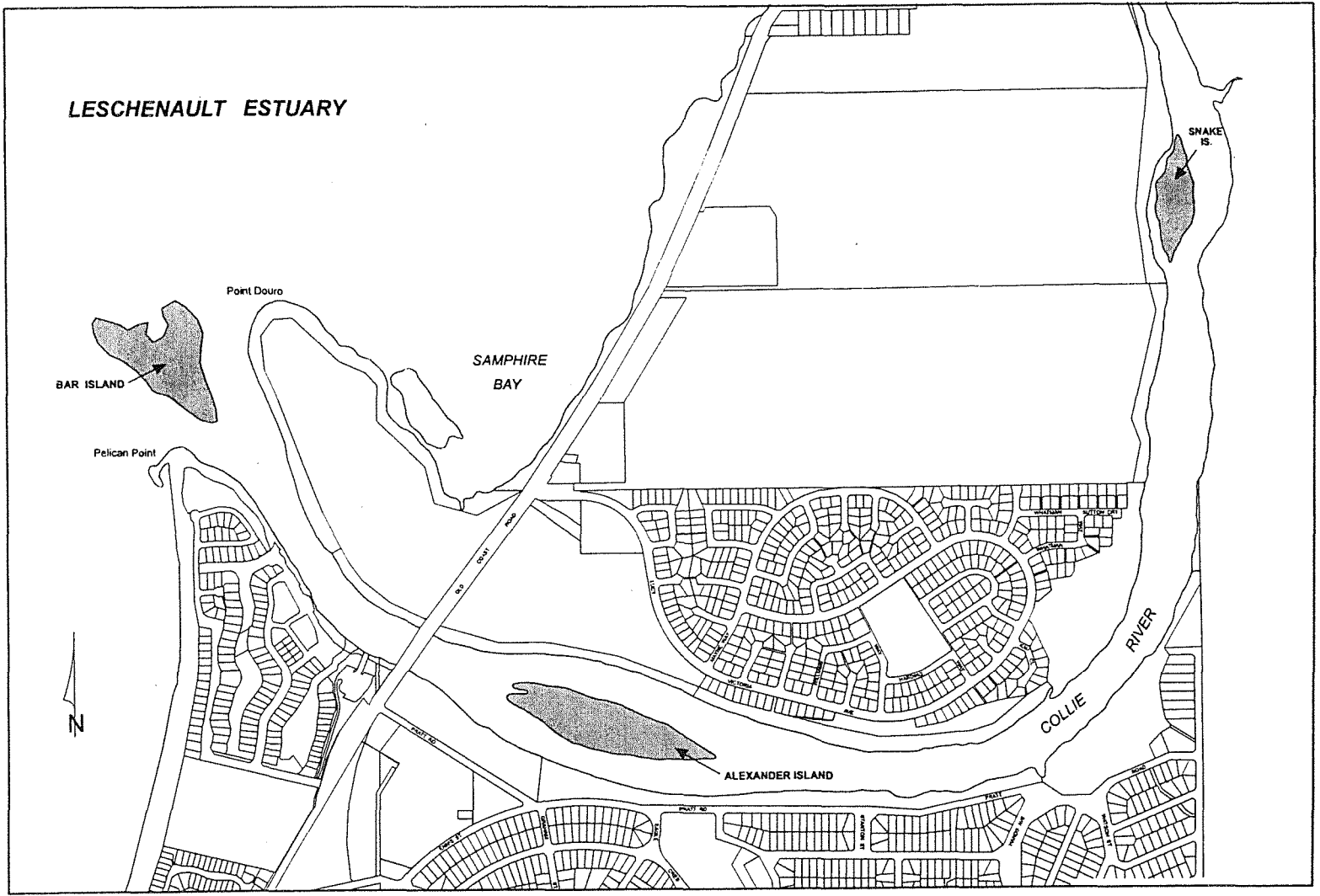


Figure 2: Bar, Alexander and Snake Island

2. Development of the plan

A working group was formed in March 1995 to prepare management guidelines for the Collie River Islands. The management guidelines were prepared as a draft document to present background information and recommendations for management and use of the islands and were released for public comment in December 1995. In the light of public comments received the final management guidelines have been prepared and will be implemented in coming years.

2.1 Working group members

The Working Group comprised eight members drawn from the local community, the City of Bunbury, the Shire of Harvey, the Shire of Dardanup and the Leschenault Inlet Management Authority (LIMA). The owners of Alexander Island, Greycote Pty Ltd were invited to be a part of the Working Group but declined.

Mr Eric Wright, Chairman

Mr Adam Czernowski, Community Representative

Mr Kevin Carnall, Community Representative

Mrs Margaret Radge, Community Representative

Mr Kevin Ryan, Shire of Dardanup

Mr Tim Hunter, City of Bunbury

Mr Morgan Smith, Shire of Harvey

Mrs Maidee Smith, Leschenault Inlet Management
Authority

2.2 Relevant reports

The following studies and reports have been considered in the preparation of this management plan. Some of these studies influence how the area is to be managed and readers are referred to these reports for further information.

- Leschenault Estuary, Collie River, Preston River Regional Flood Study (George 1981);
- System 6 Report (Department of Conservation and Environment 1983);
- Clifton Park Foreshore Reserve Management Plan (Waterways Commission 1989);
- Leschenault Waterways Management Programme (Waterways Commission 1992);

- Collie and Brunswick Rivers Foreshore Study (Woodcock 1993);
- Fringing Vegetation of the Lower Collie and Brunswick Rivers 1992 (Pen 1992);
- Lot 131 Clifton Park Management Plan (Wright 1993); and
- Eaton Foreshore Draft Management Plan (Wright *et al.* 1995).

2.3 Public consultation

The draft management guidelines were released for public comment during December 1995. A public meeting was held to provide initial explanation of the guidelines and provide guidance on the content of the document and how to make submission. Staff of the Water and Rivers Commission were present at this meeting to explain the draft recommendations, and to listen to additional comments and points of view from the community. This document has been prepared in the light of these submissions.

2.4 Schedule of tasks

- Form Working Group
- Draft Plan completed
- Refer Plan to local government authorities for ratification
- Release Plan for public comment
- Finalise Plan from public input
- Plan Completed
- Release Final Plan and Commence Implementation
- Review Plan



3. Terms of reference

The following terms of reference for the working group were prepared by the working group after discussion at its first meeting.

3.1 Aim

To identify issues relating to the use and management of the Collie River Islands, and to prepare recommendations for the development and maintenance of the area to protect the foreshore and river environment.

3.2 Objectives

3.2.1 Recreation

Define appropriate levels of use on the Islands.

3.2.2 Conservation

Protect and improve the indigenous flora and fauna on the Islands within the river system in order to maintain their conservation values.

3.2.3 Landscape protection

Protect the island foreshores from erosion.
Provide a mechanism for rehabilitating river bank and island vegetation.

3.2.4. General

Develop a suitable management structure for the Islands which is acceptable to landowners, local government, state agencies and the local community.

Recognise the importance of the area for the passage of floodwaters.

Ensure conservation of vegetation through the control of fire, eradication and control of introduced weeds.

Ensure mosquito breeding levels conform with local government and Health Department guidelines for the area.

Provide public education and information on the environmental and recreational value of the Islands.

Involve the public with the ongoing management of the Islands where appropriate in order to protect them from vandalism.

Address issues of public safety.

3.3 Study area

The study area was defined as the land area to the low water mark of the three Collie River islands, Bar Island, Alexander Island and Snake Island (see Figure 2).



4. Definition of the study area

4.1 Bar Island

4.1.1 Vegetation

A number of comprehensive vegetation surveys of the Leschenault catchment have been undertaken by Pen (1992, 1993, 1994). Pen describes six major categories of fringing vegetation:

- (1) Salt marsh;
- (2) Fringing vegetation;
- (3) Estuarine vegetation;
- (4) Freshwater (riverine) fringing forest and sandy rise vegetation;
- (5) Sandy rise vegetation; and
- (6) Other plant communities and vegetation types.

These categories were adhered to in this investigation.

Bar Island is comprised of four major vegetation communities: salt-marsh vegetation; fringing estuarine forest vegetation; sandy rise vegetation and other plant communities. Figure 3 illustrates the distribution of vegetation on Bar Island, while Appendix A lists the plant species found on Bar Island.

Salt - marsh vegetation

An extensive salt marsh occurs at the northern end of Bar Island adjoining the shore and its sand bar and is influenced tidally by several drainage channels. This area has apparently increased over the last 30 years due to the colonisation of bare sand by salt marsh species. The salt marsh community is dominated by the seablight *Suaeda australis*, the beaded samphire *Sarcocornia quinqueflora*, couch grasses and various other salt shrubs and heaths. From Pen's (1992) vegetation categories the area is classified as *Sarcocornia quinqueflora* salt marsh complex and *Sporobolus virginicus* grassland.

Sandy-rise vegetation

Pen's (1992) vegetation categories classify this area as *Jacksonia furcellata* open-closed forest. This sandy rise community consists of a grassland/sedge understorey adjacent to the salt marsh and is made up of many plants. It is dominated by *Sporobolus virginicus*, *Juncus kraussii*, couch grasses and sedges, as well as the samphire *Sarcocornia quinqueflora*.

This community lies under the open-closed forest of *Jacksonia furcellata* which forms an extensive area dominating most of the middle portion of the Island. In sections the *Jacksonia* is dense making access difficult. *Hakea prostrata* is the only other commonly occurring tree that mixes in with *J. furcellata*. A number of drainage channels weave through this community and their banks are dominated by *Juncus kraussii*.

Fringing estuarine forest vegetation

Pen's (1992) vegetation categories divide this area into two separate vegetation classes. The first is *Melaleuca viminea* low open-closed forest which dominates the southern end of Bar Island. The second class is *Casuarina obesa* low open-closed forest which dominates the shoreward fringe of the island (see Figure 3 for illustrated vegetation distributions). Several large *Casuarina* trees have fallen over and are still living at the water's edge. It is not known whether this is a natural occurrence or is the result of erosion caused by the wash of power boats. Other plants which occur in abundance throughout both classes are: pigface (*Carpabrotus edulis*); geranium (*Geranium molle*); cutleaf Hibbertia (*Hibbertia cuneiformes*); couch grasses; *Juncus kraussii*; *Eucalyptus rudis* (planted seedlings); and a mixture of herbs, weeds and sedges.

Stands of the introduced pampas grass *Cortaderia selloana**¹ have been observed on Bar Island in the *Melaleuca viminea* low open-closed forest.

¹*denotes introduced species





Photograph 1: Aerial view of Bar Island



Photograph 2: Bar Island - erosion due to powerboat wash can result in the destabilisation of river banks

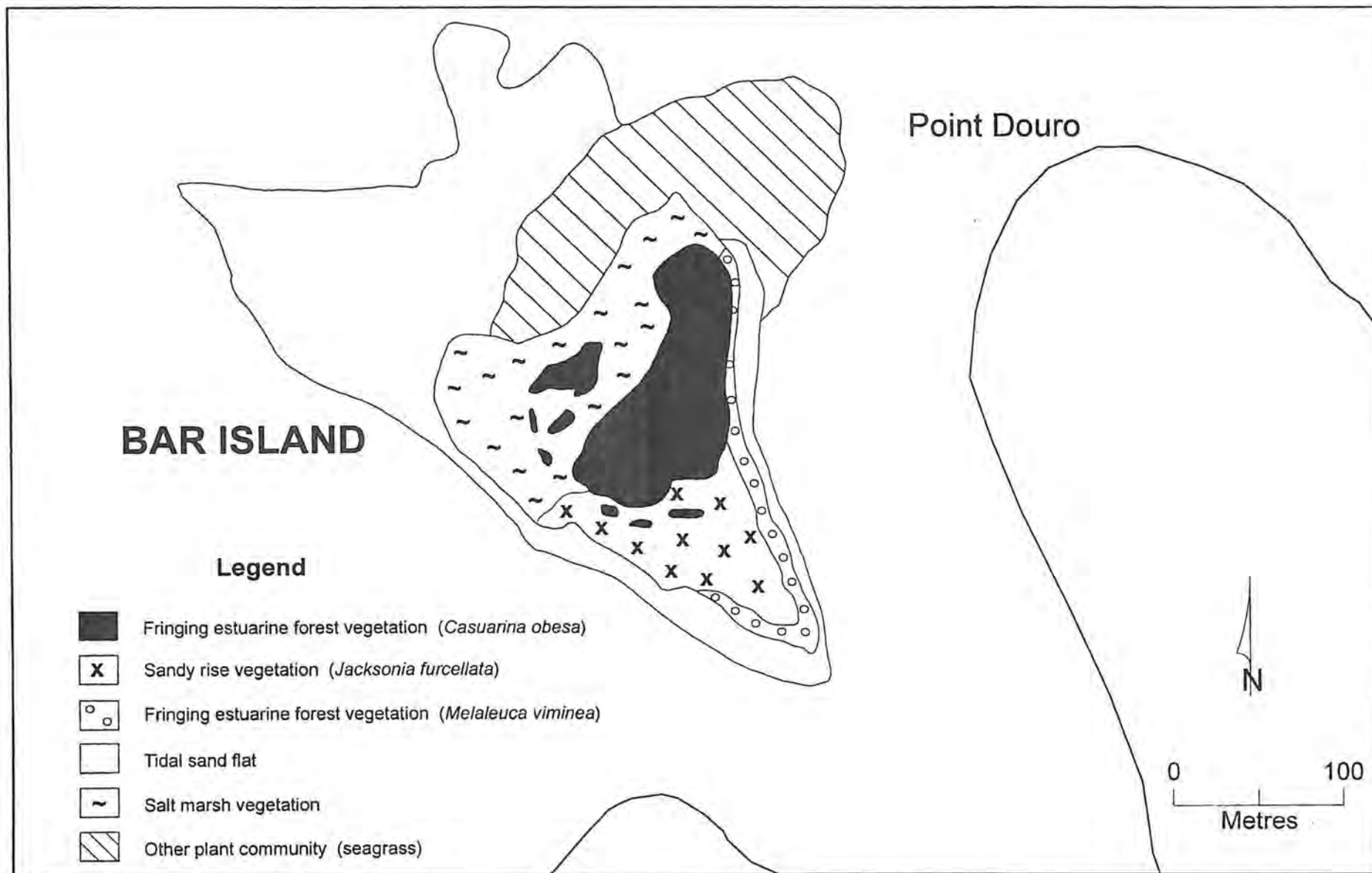


Figure 3: Bar Island vegetation

Other plant communities

The tidal sand flats located on the northern section of Bar Island contain a sparse coverage of sea grass (*Heterozostera tasmanica*) and green algae.

4.1.2 Fauna

Bar Island is a good habitat for seabirds. Rabbits are evident on Bar Island and an eradication program should be established. There is little evidence of other vertebrate life, however the invertebrate population was observed.

Avian

Bar Island is a haven for sea birds, wading birds and migratory birds. The following species have been observed on the Island:

Great cormorant	<i>Phalacrocorax carbo</i>
Pied cormorant	<i>Phalacrocorax varius</i>
Banded stilt	<i>Cladorhynchus leucocephalus</i>
Black duck	<i>Anas superciliosa</i>
Australian pelican	<i>Pelecanus conspicillatus</i>
Pied oyster catcher	<i>Haematopus longirostris</i>
Australian shell duck	<i>Tadorna tadornoides</i>
Silver gull	<i>Larus novaehollandiae</i>
Great egret	<i>Egretta alba</i>
White faced heron	<i>Ardea novaehollandiae</i>

Unidentified terns have also been seen on the Island. The remains of a hatched egg was found adjacent to an area frequented by a pair of pied oyster catchers. It is surmised that this pair have bred successfully on the island and may have been protecting their young. Ospreys have been observed roosting on Bar Island and hunting and feeding on adjacent foreshores.

The birds listed above feed on a combination of invertebrates, fish and frogs all of which are likely to be abundant on and around the island.

Mammals

It is likely that predators, possibly domestic or feral cats and/or foxes. have been hunting on the Island and

are responsible for bird remains seen on the Island. An eradication program should be established if the presence of these animals is confirmed.

4.1.3 Hydrology and drainage

Figure 4 details the drainage on Bar Island. The major features are a number of man-made channels that allow for intertidal flows and drainage within the salt marsh areas which were dug by the Shire of Harvey to drain pools of water as a means of controlling mosquito breeding.

The island is relatively flat, containing very slight sandy rises within the *Jacksonia* community. The sand flat at the northern end of the Island is exposed during low tides offering feeding opportunities for birds, and also possible access for predatory mammals which are able to swim short distances.

4.1.4 Visual qualities

Bar Island provides an undeveloped and vegetated backdrop to Collie River and Leschenault Estuary. The Island is used infrequently by the general public for recreation because access is by boat only, however fishermen use the Island regularly.

The Island and surrounding area hold an attraction for bird watchers as wading and migratory birds use the tidal sand flats for feeding.

To the north lies Point Douro, as yet undeveloped with a 30 metre foreshore reserve along the River and Estuary edge. The reserve is lined with casuarinas, melaleucas and eucalypts providing shady areas. Point Douro at present has no amenities for recreation. Pelican Point lies south of Bar Island and has a similar foreshore to that of Point Douro. The area has been developed and has a boat ramp, housing, canals, toilets and picnic facilities. This area is frequently used and provides a number of attractions. Pelican Point has a large sand bar extending into the Estuary that attracts a large number of wading and migratory birds. Additionally, the area provides access to the foreshore and the surrounding vegetation.



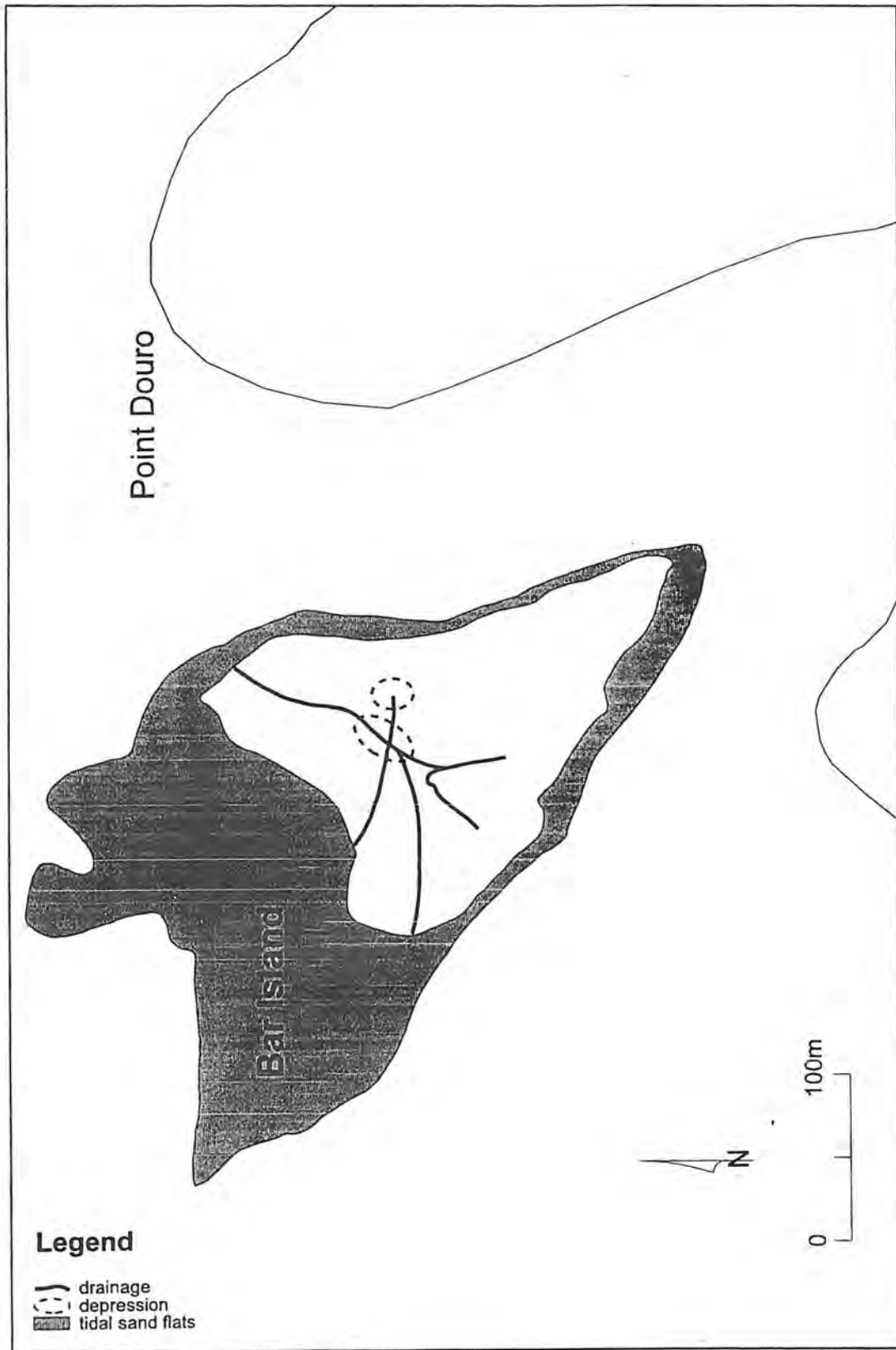


Figure 4: Bar Island drainage and hydrology





Photograph 3: Pampas grass *Cortaderia selloana* should be removed from the islands



Photograph 4: Channels have been dug through samphire marsh on Bar Island to control mosquito breeding



4.2 Alexander Island

4.2.1 Vegetation

Alexander Island is characterised by two of Pen's (1993) vegetation communities, that is, salt-marsh vegetation and estuarine fringing forest vegetation. These vegetation communities are presented in Figure 5 and a list of plant species is found in Appendix 1. A fire swept Alexander Island in January 1994 and, due to this disturbance, vegetation distribution and patterns are likely to change in the future.

Salt-marsh vegetation

According to Pen (1993), this area is classified as *Juncus kraussii* closed sedgeland and is located at the western end of the island. Underneath this rush are pools of stagnant water which contain filamentous green algae.

Estuarine fringing forest vegetation

Pen (1993) categorises this area with two classes, the first is *Casuarina obesa* open-closed forest. This

vegetation class occurs as a stand of *C. obesa* with a patchy understorey of *J. kraussii* which encircles the island in a thin band. This area was burnt by fire in January 1994 and as a result the stand is either dead or dormant. If this area does not regenerate, the vegetation pattern in the area will change.

Pen's second vegetation class for this area is *Casuarina obesa* - *Melaleuca raphiophylla* - *Eucalyptus rudis* low open forest. This low open forest consists of the above three species, blackboy *Xanthorrhoea preissii*, small herbs, mosses, grasses and weed species, and open ground. Fire damage is extensive within this vegetation community, however many of the *M. raphiophylla* and *E. rudis* are regenerating from stumps. The introduced bugle lily *Watsonia bulbifera* is present in a few patches and is likely to spread due to the reduced competition created by the fire. It therefore has the potential to dominate the understorey in the future. The number of weed species in this area is due to the fire, however they are likely to be reduced to a few hardy species as competition for light, moisture and nutrients begins.



Photograph 5: Aerial view of Alexander Island



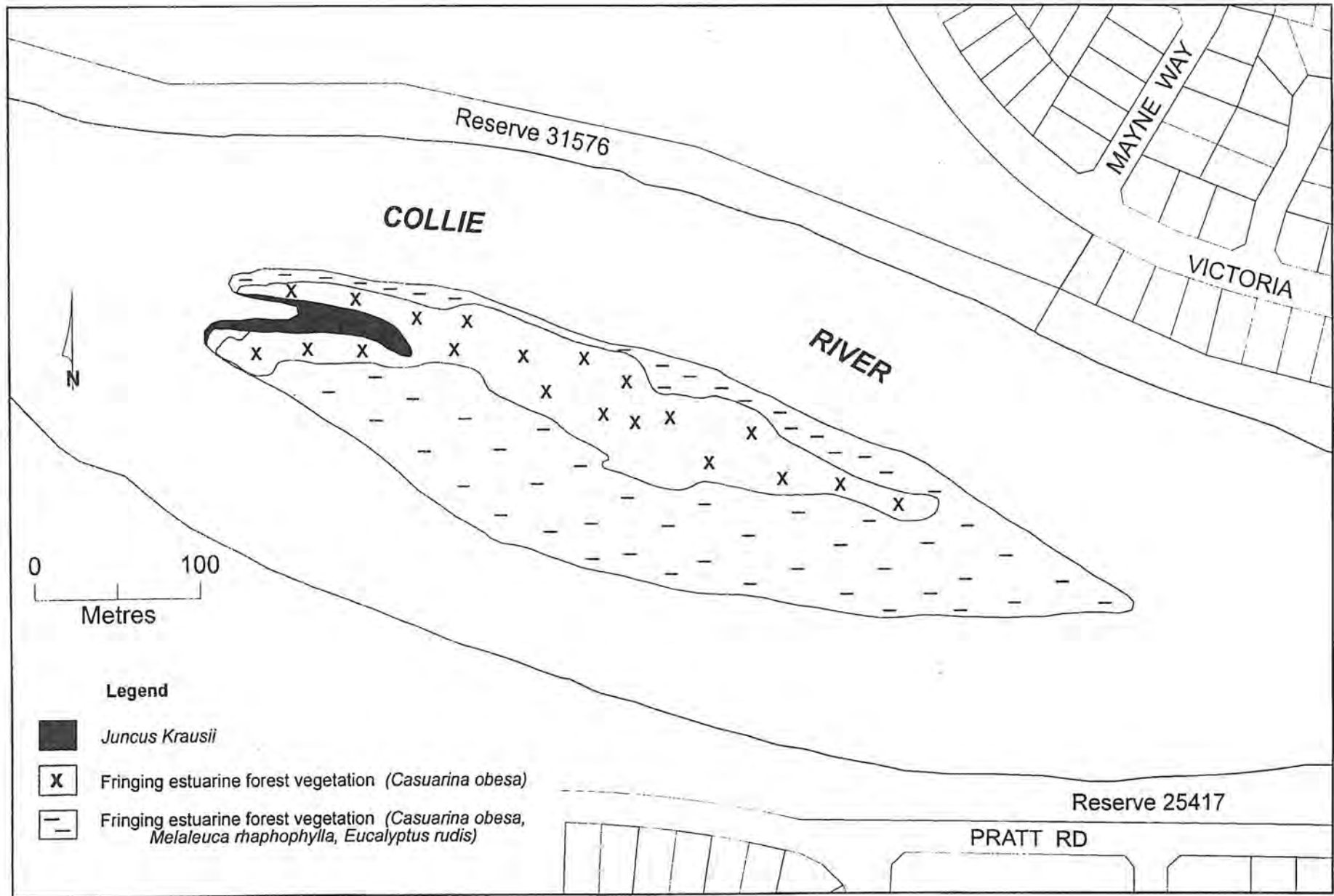


Figure 5: Alexander Island vegetation

4.2.2 Fauna

Some signs of small animal activity such as holes and scrapings were noted during site inspections. These are presumably from rabbits. An ants' nest was also observed.

4.2.3 Avian

Two black duck (*Anas superciliosa*) nests containing 8 and 9 eggs respectively were observed amongst the shore rush. Cormorants roost in the trees on Alexander Island and fly out to the Estuary early in the morning and return late in the afternoon. Birds seen feeding on the eastern tip of the island include:

Australian pelican	<i>Pelecanus conspicillatus</i>
Yellow Spoonbill	<i>Platelea flavipes</i>
White Faced Heron	<i>Ardea novaehollandiae</i>
Great Egret	<i>Egretta alba</i>
Black Duck	<i>Anas superciliosa</i>
Great cormorant	<i>Phalacrocorax carbo</i>
Pied cormorant	<i>Phalacrocorax varius</i>

4.2.4 Hydrology and drainage

Figure 6 shows the drainage pattern and elevation of Alexander Island. There are three levels of drainage which correlate with the vegetation distribution. At the western tip of the Island an area is inundated with tidal

estuarine water and is covered with *J. kraussii*. Beyond this region coinciding with the *C. obesa* stand is an area that is periodically inundated with water during winter. The rest of the Island is above waterlogging and tidal influence and it would appear that most run off drains into the *C. obesa* low-open forest and the *J. kraussii* wetland at the western tip of the island.

4.2.5 Visual qualities

Alexander Island is lined with shady trees and provides attractive views from across the river. The Island is carpeted with attractive wild flowers and aesthetically pleasing low-open forest and is a haven for the avian community.

To the north of Alexander Island is the Clifton Park foreshore reserve, lined with shady casuarinas, melaleucas and eucalypts. The walk along the foreshore provides a distinctive and attractive variation to the open parkland on the southern bank of the Collie River.

The Eaton foreshore reserve lies on the southern banks of the Collie River and south of Alexander Island. The river is lined with shady trees and there are groups of shade trees throughout the well maintained and reticulated grassed areas which are attractive to picnickers.



Photograph 6: Vegetation on Alexander Island forms a dense cover for birdlife



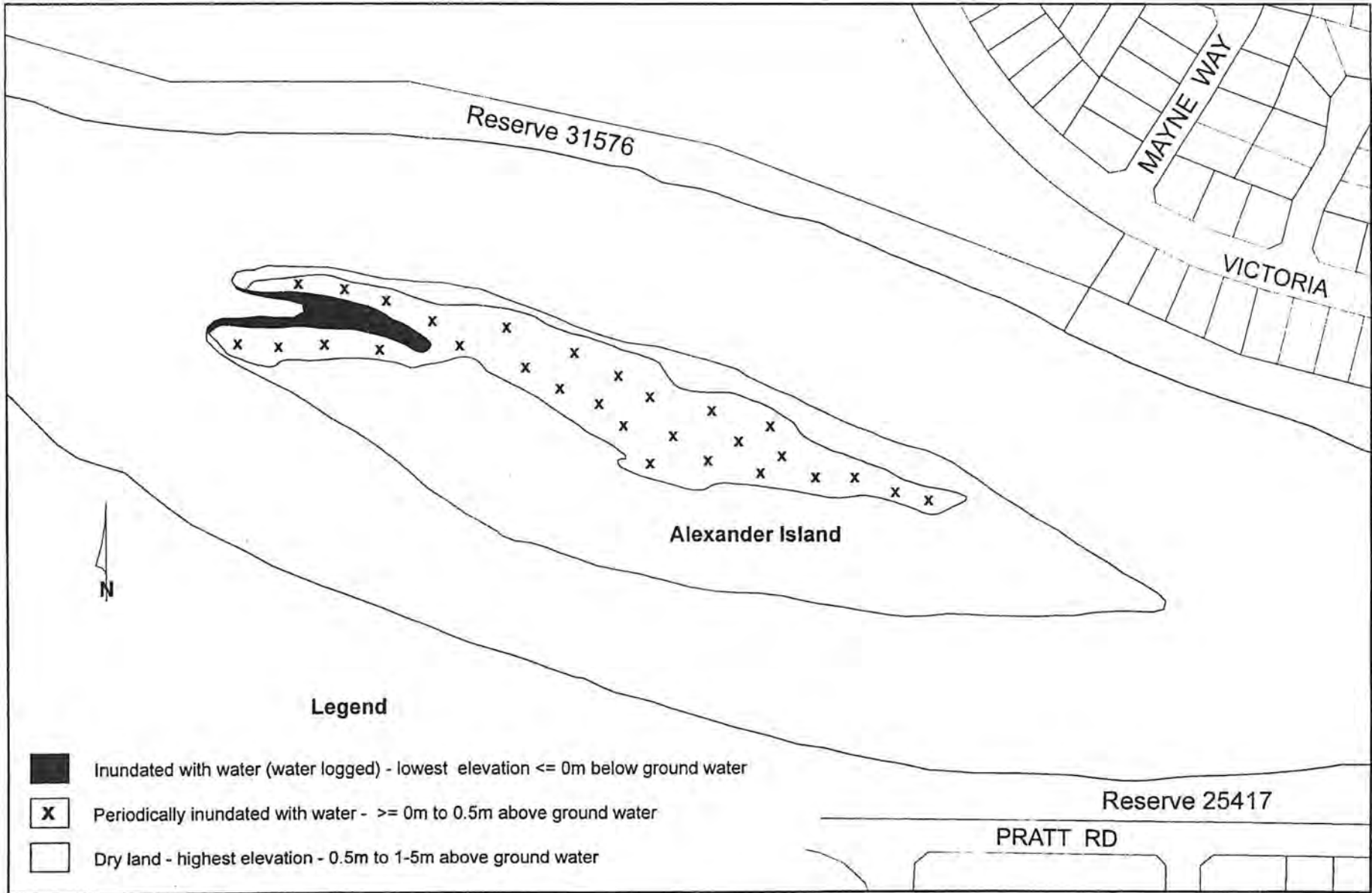


Figure 6: Alexander Island drainage and hydrology

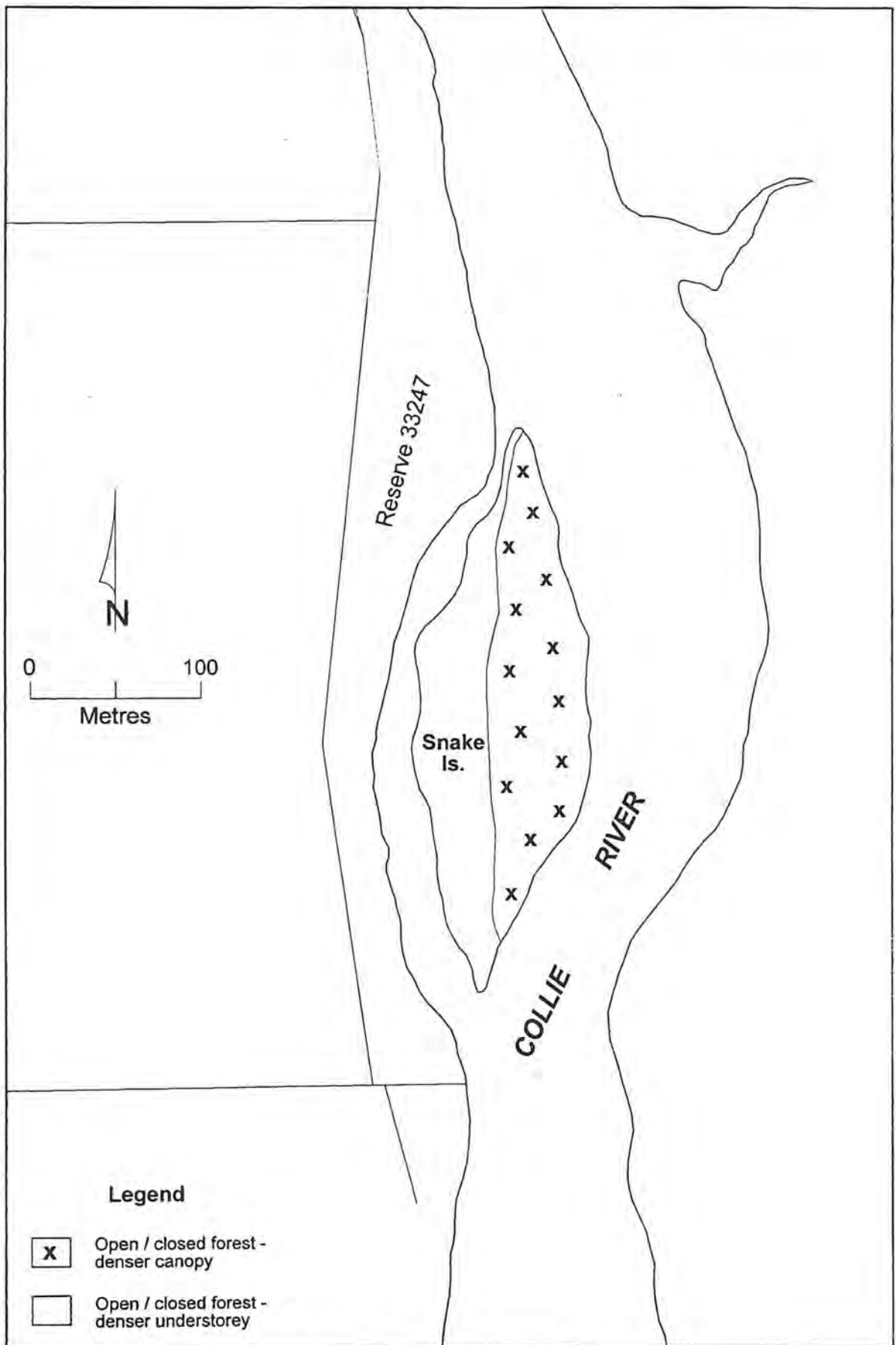


Figure 7: Snake Island vegetation



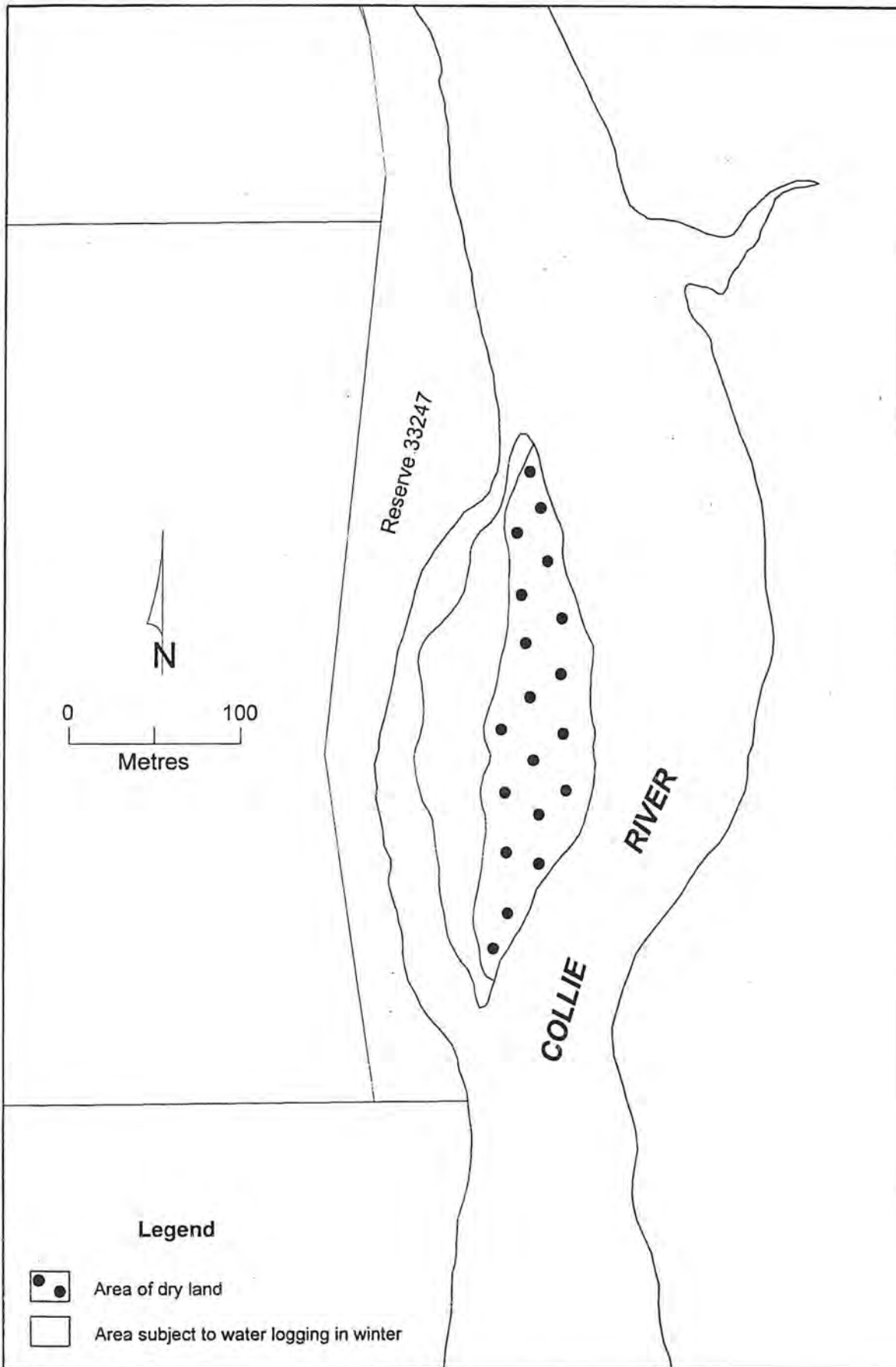


Figure 8: Snake Island drainage and hydrology



4.3 Snake Island

4.3.1 Vegetation

Snake Island is described by Pen (1993) as a low open-closed forest of *Casuarina obesa*, *Melaleuca raphiophylla* and *Eucalyptus rudis*. *Acacia saligna* and *Agonis flexuosa* occur intermittently within this forest and a dense understorey of the shore rush *Juncus kraussii* is interspersed with the introduced bugle lily *Watsonia bulbifera** and the common saw sedge *Lepidasperma longitudinale*. The drier eastern side of the Island has a denser canopy while the understorey is denser on the western side, which is subject to water logging. Figure 7 shows the areas of different density. Appendix 1 contains a list of common plant species found on the Island.

4.3.2 Fauna

The island is infested with mosquitoes particularly in winter. Evidence of invertebrates such as ants and spiders were common. Rabbit warrens were also common as were scrapings and potential habitat trees for mammals and birds.

4.3.3 Avian

Birds sighted on the island include:

Black duck	<i>Anas superciliosa</i>
Australian pelicans	<i>Pelecanus conspicillatus</i>
Great Egret	<i>Egretta alba</i>
Ringnecked Parrot	<i>Platycercus zonarius</i>

Willy Wagtail	<i>Rhipidura leucophrys</i>
Pied Cormorant	<i>Phalacrocrax varius</i>

4.3.4 Hydrology and drainage

The western section of the Island has a high water table and, when inspected, was wet and spongy underfoot supporting a large mosquito population. This water logging was only apparent in the wet season but remained moist in summer. Figure 8 shows the area susceptible to waterlogging. There are no drainage channels on the Island.

4.3.5 Visual qualities

Snake Island is undeveloped and is covered by lush vegetation. There are no amenities on the Island and it is rarely used for recreation. The island is attractive as it is thickly vegetated and mostly undisturbed and provides a haven for numerous species of birds.

To the west of the Island lies the Clifton Park foreshore reserve, lined with shady clusters of casuarinas, melaleucas and eucalypts. This foreshore provides an attractive walking track, allowing users to walk in a semi-forested area. Colourful wild flowers are scattered throughout the foreshore attracting people, birds and other local fauna.

Farmland lies to the east of Snake Island, and the foreshore is lined with shady trees which provide roosting sites for birds. This area could be upgraded by planting additional trees and sedges along the rivers edge.



Photograph 7: Aerial view of Snake Island



5. Land development and use

5.1 Land tenure and ownership

Bar Island forms Reserve 13531. The reserve is set aside for camping and picnic ground. Although the Island is located within the boundaries of the Shire of Harvey, it is vested with the City of Bunbury. This situation arose a number of years ago when the local authority boundaries were amended but the vesting of Bar Island was inadvertently overlooked.

Both LIMA and the Shire of Harvey have requested that the vesting of the Island be changed. The City of Bunbury is opposed to this and would prefer the local authority boundaries be amended so that the Island is then located within the City's boundaries.

Alexander Island, part Leschenault Location 23, is under the private ownership of Greycote Pty Ltd.

Snake Island, along with an area of foreshore on the north bank of the Collie River forms Reserve 33247. The Reserve is currently unvested.

5.2 Land zoning

Under the Shire of Harvey's current District Planning Scheme Number 1, the zoning of Bar, Alexander and Snake Islands is "Reserve for Recreation".

5.3 Patterns of human use

Bar Island is regularly used during the summer months by fishermen who clean their catch on the island. It is used infrequently by campers.

Alexander Island is not used on a regular basis although there is evidence of camping and other human activity. It is possible that the fire which swept the island in January 1994 was the result of an abandoned campfire. Snake Island is rarely used.

Human activity on any of the islands can have serious consequences as evidenced by the fire on Alexander Island. Such activity must therefore be carefully managed to avoid similar occurrences in the future.



6. Management issues

The following issues have been identified by the working group for the management of the Collie River islands.

- protection of wildlife habitats;
- ownership and management of Alexander Island;
- resolution of management responsibility for Bar Island between City of Bunbury and Shire of Harvey;
- rubbish on the Islands;
- erection of signs;
- provision and control of public access;
- control of introduced weeds, including introduced grasses and exotic plants;
- control of mosquito populations;
- erosion control;
- protection and fire control;
- management of speeding boats;
- provision of public facilities;
- public education and information;
- control of vandalism;
- protection for vegetation;
- suitable management structure for the three islands; and
- limiting impacts from recreational remote camping.

6.1 Bar Island

The vegetation on Bar Island is in good condition and represents relatively undegraded values for wildlife habitat and ecosystem function. It had, on inspection, a minimum amount of litter including some jetsam on the shoreline. There is evidence that the salt marsh community is increasing with time, as salt marsh plants are encroaching on the growing sand bar. The growth

of the sand bar and the salt marsh community is worthy of monitoring, as it probably represents a measure of siltation of both the Collie River and the Leschenault Estuary.

The reasons for fallen casuarinas along the shoreline of Bar Island should be investigated. If it is due to power boat wash, management measures may be required.

Pampas grass (*Cortaderia selloana**) on the island should be removed to prevent its spread.

The possible existence of cats and foxes on the island should be investigated with a view to eradicating them from the island.

Recreation facilities should be minimised to limit disturbance to bird and animal life. A bird hide would be a useful facility to allow people to view the birdlife unnoticed and would provide a specific location from which to do so, thereby minimising impacts on bird habitat areas.

Bar Island lies within the Shire boundary for the Shire of Harvey, and through an oversight, is currently vested with the City of Bunbury. This situation has led to confusion over management responsibilities, and should be resolved.

6.2 Alexander Island

Alexander Island is in a generally good condition. Most of the fire damaged vegetation is now regenerating, however rehabilitation may be required in the *C. obesa* stand. Measures to prevent further fires are also required to protect both vegetation and fauna.

Several recent camp sites were evident on the Island and litter including broken glass, cans, plastic, bricks and other building materials was distributed over most of the island. This was made more obvious after the fire. A cleanup day should be organised to remove the rubbish.



The ecological and wildlife values of Alexander Island could be improved in a number of ways including:

- Removal of the litter and building materials;
- Discouraging camping; and
- Removal and/or monitoring of weed species.

Regular monitoring of the vegetation on Alexander Island over time should be undertaken, as it provides a unique opportunity to observe the regeneration process and plant succession.

Mosquito control has yet to be implemented on Alexander Island. Small channels could be dug within the areas which are suitable for mosquito breeding to assist in reducing the mosquito population.

Alexander Island is owned in Fee Simple by a private company. The island lies entirely within the floodway of the Collie River, and has significant wildlife and landscape amenity values. Development options for the owners would be limited, difficult to achieve given the location in the middle of the river and unlikely to

be supported by the overall community and decision making authorities. The most appropriate outcome for Alexander Island is for the State Government to acquire the island and establish it as a conservation reserve.

6.3 Snake Island

Rubbish on Snake Island was minimal but its removal is still required. Although there was evidence of human activity, disturbance is minimal. This island, with its lush forest, is suitable for conservation purposes.

Pampas grass, *Watsonia* and other common weeds occur on the island and should be removed immediately, before they have the opportunity to spread.

Mosquito control practices must be implemented on Snake Island. Fog spraying is not recommended due to its adverse effects on the island's fauna. Small channels could be dug through the western side of the island to drain pools of water although it should be noted that this method may change the current vegetation pattern and reduce the amount of sedge understorey.



7. Recommendations for management

The following recommendations for management have been prepared by the Working Group after consideration of previously discussed issues. Agencies listed in brackets after each recommendation have agreed to be the lead agency(s) in carrying out the recommendations.

7.1 Land use and management

- R1 Request the State Government to arrange for Alexander Island to be acquired by the State for use as a conservation reserve. [LIMA]
- R2 Place responsibility for management of all three islands with the Water and Rivers Commission. [LIMA]
- R3 Establish a joint management committee to oversee the ongoing management of the islands. Membership of this committee to include the City of Bunbury, Shires of Harvey and Dardanup, and local community groups. [LIMA]
- R4 Shire of Harvey to change the zoning of Alexander and Snake Islands to “Conservation and Recreation” to better reflect the proposed use of the Islands. [Shire of Harvey]
- R5 Promote the ethos that the principle management aim for the islands is for conservation of their environmental and landscape values. Recreational access to the islands will be discouraged, except for the eastern end of Bar Island where recreational access will be allowed, but not promoted. [LIMA, CALM, Shire of Harvey, Shire of Dardanup and City of Bunbury]
- R6 Change the zoning of Bar Island from “Picnic and Camping” to “Conservation and Foreshore Management” which is a more appropriate purpose to conserve the wildlife on the Island, while still allowing limited public use. [City of Bunbury]

R7 Encourage the management committee to include in its charter the conservation of wildlife and landscape values of the islands. [LIMA, CALM, City of Bunbury, Shire of Harvey and Shire of Dardanup]

R8 Involve the general community in the provision of resources for recommended works and in seeking sponsorship and grant funding to assist with the works program and general maintenance in conjunction with the Water and Rivers Commission. [LIMA]

7.2 Environmental

R9 Ensure public use of the islands is minimised by promoting the management structure and objectives within the local community, and strategic placement of signage. [LIMA]

R10 Establish understorey and tree plantings of indigenous species on Bar Island and Alexander Island. Establish plantings of Swamp Sheoak along the shoreline of Bar Island where older trees have fallen into the water. [LIMA]

R11 Maintain drainage on Bar Island samphire areas, to reduce mosquito breeding using methods in accordance with the Mosquito Control Strategy and to the satisfaction of the Local Authorities (Chester and Klemm 1990). [Shire of Harvey]

R12 Control weed species by spraying or physical removal as appropriate. [LIMA]

R13 Remove rubbish from the islands. [LIMA, City of Bunbury and Shire of Harvey]

R14 Carry out further investigations to establish whether control measures for cats, rabbits and foxes are required. [CALM]



7.3 Recreational

- R15 Limit public access to a small area on the eastern end of Bar Island, as shown on the Management Plan. Encourage day use only. Camping and lighting of fires will not be permitted. Discourage recreational access to Alexander Island and Snake Island. [LIMA, City of Bunbury and Shire of Harvey]
- R16 Construct fencing on Bar Island as shown on the Management Plan, to protect the western side of the island from people access. [LIMA]

7.4 Other

7.4.1 People access

- R17 Limit access to Bar Island to the western area as shown on the Management Plan. [LIMA]
- R18 Discourage public access to Alexander Island and Snake Island. [LIMA]

7.4.2 Fire control

- R19 Control grasses and other weeds by slashing and mowing grassed areas. [LIMA]
- R20 Monitor fire hazard within the vegetation communities in conjunction with the fire brigade over the first three years to determine whether a fuel reduction strategy should be developed. An annual inspection of the Islands to be made in conjunction with the fire brigade to determine the fire hazard. [City of Bunbury, Shire of Harvey and LIMA]
- R21 Prohibit lighting of fires and barbeques on the Islands except in designated barbecue areas on Bar Island. [LIMA]
- R22 Develop a joint fire response strategy between the Leschenault Inlet Management Authority and the Eaton/Australind Volunteer Bushfire Brigade. [LIMA]



8. Review of public consultation

Comments and suggestions received during the public consultation period have been reviewed by Staff of Water and Rivers Commission. The summary is outlined below.

The Collie River Islands Draft Management Guidelines were released in December 1995 for a public submission period of approximately three months.

During this time four written submissions were received, a summary of which follows.

In general, the responses were positive and supportive with a few suggestions being made for the improvement of the plan and possible future work.

Several submissions suggested the survey of the Islands to assess the fauna present and the development and implementation of appropriate management and eradication strategies.

One submission suggested that while measures are discussed for the prevention of fire on the Islands there is no mention of an appropriate strategy to control fires once they have broken out.

Public submissions were received by:

Don and Rose Wass, Eaton

George Mardon, Australind

Tony Brandis, CALM Bunbury

Brad Brooksby, City of Bunbury



9. Implementation

9.1 Funding and management responsibilities

Management responsibility for the three Collie River islands currently lies with a number of different bodies. Bar Island is currently vested with the City of Bunbury. Alexander Island is under private ownership and Snake Island is part of an unvested reserve.

The Working Group consider that to ensure appropriate and management of the Collie River Islands, all three should be vested with the Water and Rivers Commission for management by the Leschenault Inlet Management Authority. A community based management committee should be established to oversee the ongoing management of the islands.

It has been recognised however, that funding for general works and maintenance by government departments is decreasing and that significant community input will be required in order to implement all the recommendations.

The community can assist with construction and maintenance through direct sponsorship - provision of equipment, materials or labour; and by seeking State and Federal Government grants for community based programs or environmental programs. Individuals within the community are welcome to approach the Water and Rivers Commission with suggestions on how they may assist.

9.2 Implementation schedule

The recommendations developed in the final management plan will be implemented over a five year period, subject to sufficient funding and resources being available from managing authorities or the community.

Stage 1

- Request the State Government acquire Alexander Island for use as a conservation reserve.
 - Vest Bar, Alexander and Snake Islands with the Water and Rivers Commission for management by the Leschenault Inlet Management Authority. The vesting purpose for Bar Island be changed from "Picnic and Camping" to "Conservation and Recreation".
 - Establish a joint management committee to oversee the ongoing management of the Islands. Membership of this committee should include representatives from the City of Bunbury, the Shire of Harvey, the Shire of Dardanup and local community groups.
- The management committee should be encouraged to include in its charter the protection and enhancement of wildlife and landscape values for the islands.
- The assistance of the general community should be enlisted in the provision of resources for recommended works and in seeking sponsorship and grant funding to assist with the works program and general maintenance in conjunction with the Water and Rivers Commission.
- Promote the ethos that the principle management aim for the islands is for conservation of environmental and landscape values.
 - Restrict recreational access to the eastern end of Bar Island. Access to Alexander and Snake Islands will be discouraged. Promote the management structure and objectives contained in this management plan within the local community. Undertake the strategic placement of signs at boat launching ramps and on the islands to ensure access to the Islands is according to the recommendations. Access to Bar Island will be for day use only. Camping and lighting of fires will be prohibited.
 - Maintain drainage of samphire areas on Bar Island to reduce mosquito breeding. [on going]
 - Spray weeds in specific locations on the islands with appropriate herbicides to allow regeneration of native species. [on going]



-
- Liaise with Eaton/Australind Bushfire Brigade regarding a joint fire response strategy.
 - Inspect islands in conjunction with the fire brigade to determine fire hazard and whether a fuel reduction strategy is required. [on going]
 - Plant indigenous understorey and tree species on Bar and Alexander Islands.

Stage 2

- Remove rubbish from islands.
- Remove weeds which have established on Bar Island and Alexander Island.
- Construct barrier fencing and picnic area on Bar Island, as shown on Figure 9, to protect the western side of the Island from the impacts of public use.

- Determine whether cat, rabbit and fox control measures are required on the islands and implement control strategy if required.
- Plant indigenous understorey and tree species on Bar and Alexander Islands.

Stage 3

- Construct walk trail and bird hide on Bar Island as shown on Figure 9.
- Plant indigenous understorey and tree species on Bar and Alexander Islands.



10. Review of management plan

The management plan is to be reviewed and revised after five years. This process will include further public consultation and review of existing recommendations and implementation progress.

Figures 9, 10 and 11 illustrate the current management recommendations of Bar, Alexander and Snake Islands respectively.



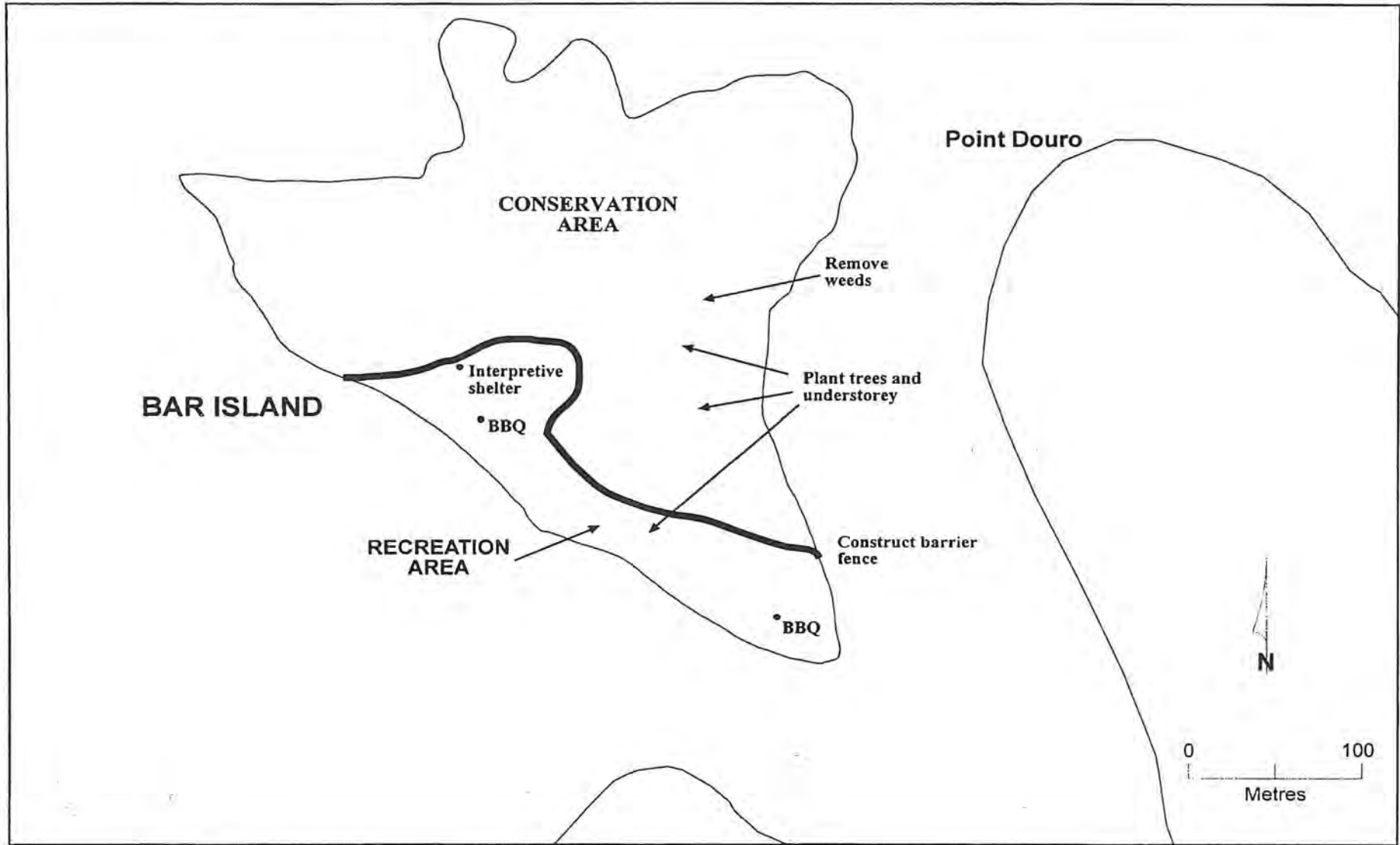


Figure 9: Bar Island management plan

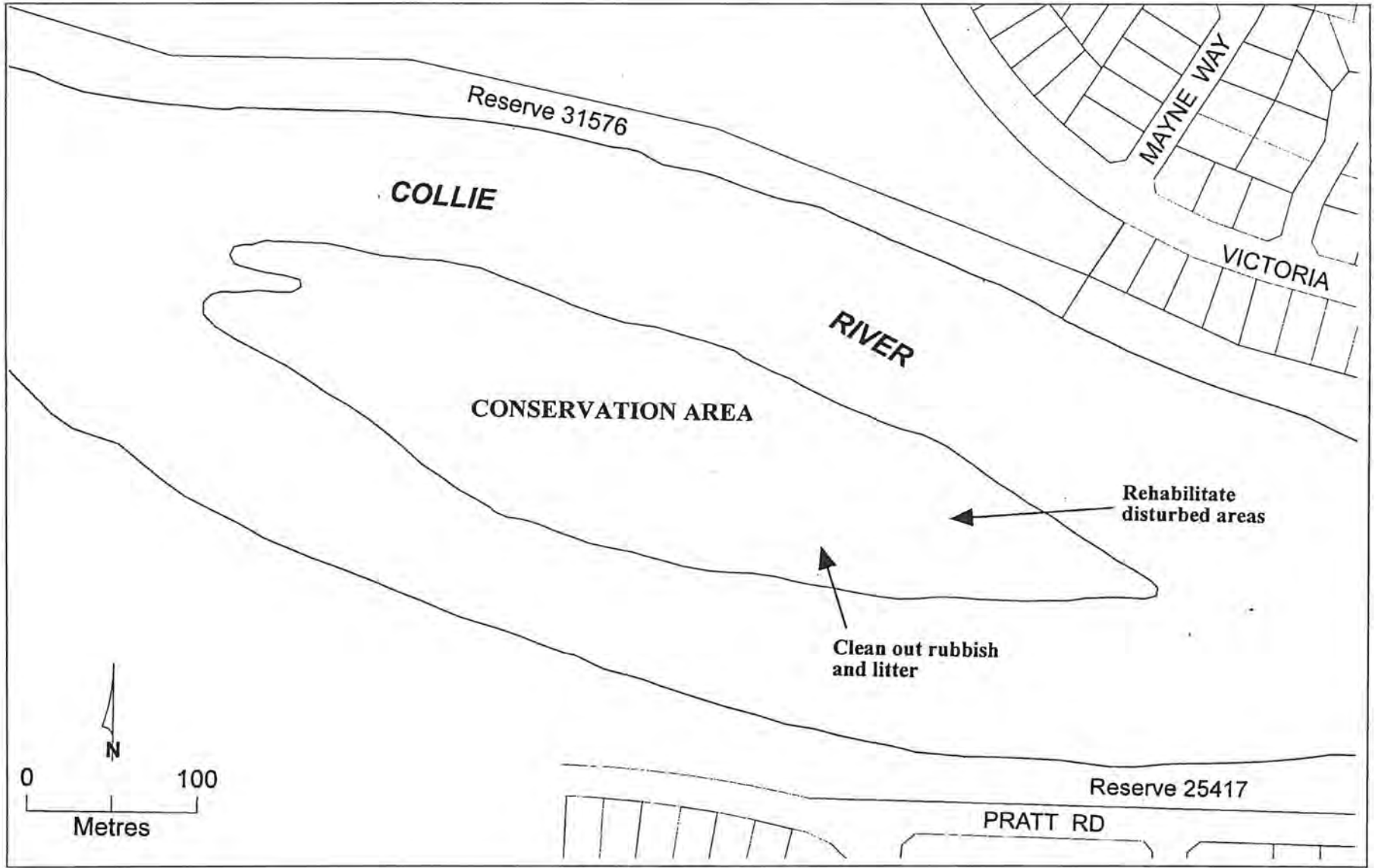


Figure 10: Alexander Island management plan

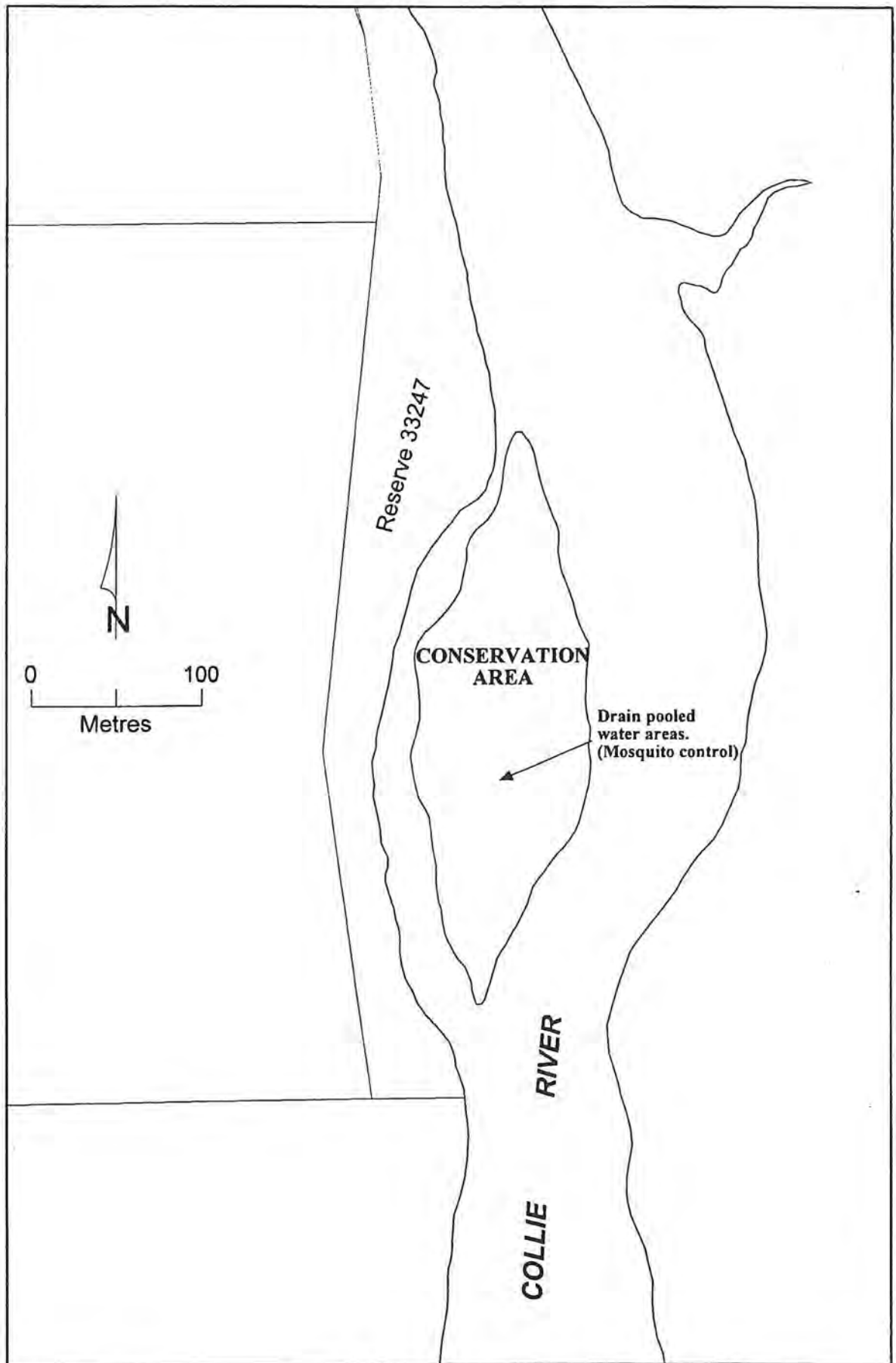


Figure 11: Snake Island management plan



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Appendix

Plant Species List

Bar Island

Family	Species	Common Name
Aizoaceae	<i>Carpobrotus edulis</i>	pigface
	<i>Tetragonia decumbens</i>	
Asphodelaceae	<i>Trachyandra divaricata</i>	
Asteraceae	<i>Hypochaeris glabra*</i>	smooth catsear
	<i>Senecio</i> sp*	
	<i>Ursina anthemoides*</i>	
Casuarinaceae	<i>Casuarina obesa</i>	swamp sheoak
Chenopodiaceae	<i>Rhagodia baccata</i>	
	<i>Sarcocornia quinqueflora</i>	samphire
	<i>Suaeda australis</i>	seablite
Cyperaceae	<i>Bolbschoenus caldwellii</i>	marsh club rush
	<i>Schoenus subfasciflora</i>	
Dilleniaceae	<i>Hibbertia cuneiformis</i>	cutleaf hibbertia
Frankeniaceae	<i>Frankenia pauciflora</i>	seaheath
Geraniaceae	<i>Pelargonium capitatum</i>	rose pelargonium
Iridaceae	<i>Patersonia occidentalis</i>	purple flag
Juncaceae	<i>Juncus kraussii</i>	shore rush
Juncaginaceae	<i>Triglochin striata</i>	streaked arrowgrass
Myrtaceae	<i>Eucalyptus rudis</i>	flooded gum
	<i>Melaleuca rhapsiophylla</i>	swamp paperbark
	<i>Melaleuca viminera</i>	paperbark
Myoporaceae	<i>Myoporum</i> sp	
Oxalidaceae	<i>Oxalis pers-caprae</i>	soursob
Papilionaceae	<i>Jacksonia furcellata</i>	grey stinkwood
	<i>Trifolium campestra*</i>	hop clover
	<i>Viminaria juncea</i>	golden spray
Poaceae	<i>Briza maxima*</i>	blow fly grass
	<i>Cortaderia selloana*</i>	pampus grass
	<i>Cynodon dactylon</i>	couch
	<i>Lolium rigidum*</i>	
	<i>Lolium</i> sp*	
	<i>Sporobolus virginicus</i>	saltwater couch
Primulaceae	<i>Samolus repens</i>	creeping brookweed
Proteaceae	<i>Hakea prostrata</i>	harsh hakea
Santalaceae	<i>Exocarpus</i> sp	
Zosteraceae	<i>Heterozostera tasmanica</i>	seagrass



Appendix

Plant Species List (cont.)

Alexander Island

Family	Species	Common Name
Anthericaceae	<i>Tricoryne elatior</i>	yellow autumn lilly
Apiaceae	<i>Daucus glochidatus</i>	native carrot
Aponogetonaceae	<i>Aponogeton</i> sp	
Asteraceae	<i>Conyza</i> sp*	
	<i>Sonchus oleraceus</i> *	common sowthistle
Casuarinaceae	<i>Casuarina obesa</i>	swamp sheoak
Crassulaceae	<i>Crassula natans</i>	
Cyperaceae	<i>Gahnia trifida</i>	saw sedge
	<i>Isolepis</i> sp	
	<i>Lepidosperma gladiatum</i>	coast sword sedge
	<i>Lepidosperma longitundinale</i>	common sword sedge
Geraniaceae	<i>Geranium</i> sp	
Iridaceae	<i>Watsonia bulbillifera</i> *	watsonia
Juncaceae	<i>Juncus kraussii</i>	shore rush
Menyanthaceae	<i>Villarsia</i> sp	
Mimosaceae	<i>Acacia</i> sp	
Myrtaceae	<i>Eucalyptus rudis</i>	flooded gum
	<i>Melaleuca raphiophylla</i>	swamp paperbark
Oxalidaceae	<i>Oxalis pers-caprae</i>	soursob
Papilionaceae	<i>Lotus</i> sp*	
Poaceae	<i>Briza maxima</i> *	blow fly grass
	<i>Briza minor</i> *	lesser quaking grass
	<i>Lagurus ovatus</i> *	hare's tail grass

Snake Island

Family	Species	Common Name
Casuarinaceae	<i>Casuarina obesa</i>	swamp sheoak
Cyperaceae	<i>Lepidosperma longitundinale</i>	common sword sedge
Iridaceae	<i>Watsonia bulbillifera</i> *	watsonia
Juncaceae	<i>Juncus kraussii</i>	shore rush
Mimosaceae	<i>Acacia saligna</i>	golden wreath wattle
Myrtaceae	<i>Agonis flexuosa</i>	peppermint
	<i>Eucalyptus rudis</i>	flooded gum
	<i>Melaleuca raphiophylla</i>	swamp paperbark
Poaceae	<i>Briza maxima</i> *	blow fly grass
	<i>Cortaderia selloana</i> *	pampas grass

* Denotes introduced species





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