Swan Estuary Marine Park and Adjacent Nature Reserves

Draft Management Plan 1996

Department of Conservation and Land Management

National Parks and Nature Conservation Authority

SWAN ESTUARY MARINE PARK AND ADJACENT NATURE RESERVES DRAFT MANAGEMENT PLAN

1996

Planning Team
Chris Portlock (CALM, Plan Coordinator)
Laurie Poole (Fisheries)
John Brooker (Dept of Transport, Maritime Div)
Peter Dans (CALM)
Lyndon Mutter (CALM)
John Edwards (CALM)
Paul Brown (CALM)
Rob Hutchison (Swan River Trust)
Local Government Representatives
Jenny Easton (Melville)
Wally Darch (Subiaco)
Jim Elliot (Nedlands)
Brett Carter (South Perth)

Department of Conservation and Land Management
for the
National Parks and Nature Conservation Authority
Perth, Western Australia

SUBMISSIONS ON THE DRAFT PLAN

This is an opportunity to provide information, express your opinion, suggest alternatives and have a say on how we are proposing to manage this reserve system over the next 10 years.

If you prefer not to write your own submission you could make a joint submission with others. To ensure your submission is as effective as possible:

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

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

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

All submissions will be summarised according to the topics discussed. The Draft Management Plan will then be reviewed in the light of submissions, according to established criteria (see below). A summary of the submissions will be published along with the Final Management Plan, including an indication of how the plan was amended or not in response to the submissions.

1. The Draft Management Plan *may* be amended if a submission:
   (a) provides additional resource information of direct relevance to management;
   (b) provides additional information on affected user groups of direct relevance to management;
   (c) indicates a change in (or clarifies) Government legislation, management commitment or management policy;
   (d) proposes strategies that would better achieve management goals and objectives; or
   (e) indicates omissions, inaccuracies or a lack of clarity.
2. The Draft Management Plan *may not* be amended if a submission:
   (a) clearly supports the draft proposals;
   (b) offers a neutral statement or no change is sought;
   (c) addresses issues beyond the scope of the plan;
   (d) makes points which are already in the plan or were considered during plan preparation;
   (e) is one amongst several widely divergent viewpoints received on the topic and the recommendation of the draft plan is still considered the best option;
   (f) contributes options which are not possible (generally due to some aspect of existing legislation, or Government policy).

Submissions are welcome for two months after the date of release. Written submissions should be sent to:

Attention: Plan Coordinator
Swan Estuary M P and Adjacent Nature Reserves Mgm Plan
Executive Director
Department of Conservation and Land Management
P.O. Box 104 COMO WA 6152

For enquiries please phone (09)334 0406

PREFACE

Marine Parks and Nature Reserves are reserves subject to the Conservation and Land Management Act, vested in the National Parks and Nature Conservation Authority (NPNCA) and managed on behalf of the NPNCA by the Department of Conservation and Land Management (CALM).

The NPNCA is responsible for preparing management plans for all waters and lands that are vested in it. Plans are prepared by CALM and released as drafts for public comment. After consideration of public comment the NPNCA submits the plan to the Minister for the Environment for approval. In the case of a management plan for a marine park, the plan is first submitted to the Minister for Fisheries with respect to fishing, and the Minister for Mines with respect to petroleum exploration and production activities.

The Planning Team was established to prepare the management plan for the Swan Estuary Marine Park and adjacent Nature Reserves. It comprises representatives from CALM, the Fisheries Department, Department of Transport, Swan River Trust and local government.

Any name included on maps or within the text does not necessarily imply approval of the name by the relevant nomenclature authority.

ACKNOWLEDGMENTS

This management plan was prepared for the NPNCA by the Swan Estuary Reserves Planning Team under the direction and guidelines of CALM's Planning Branch. Editing was done by Richard Grant. The Planning Team would like to acknowledge Greg Pobar, Dr Bill Andrew, Jim Lilburne, Gary Hartnet, Greg Davis, Meg Sheen, Tony Shaw and Penny Shelbourne for their contributions in earlier Planning Team meetings and Fiona Crowe, Kerrie Naughton, Frank Prokop, Phil Mosel from the Fisheries Department and Hugh Chevis and Simon Hancocks from CALM for their advice on management policies and legislation. The Planning Team would like to thank Fisheries Research, Waterways Commision Officers and CALM's specialist branches for their comments on early drafts of this management plan. Thanks also to all those individuals and groups who exchanged information with us at Planning Team meeting or who contributed submissions during the preparation of this draft.

CONTENTS

Page

PREFACE ... ii
ACKNOWLEDGMENTS ... ii

INTRODUCTION
1. Overview ... 1
2. Values ... 1
3. Community Involvement in the Draft Plan ... 1

PRINCIPAL MANAGEMENT DIRECTIONS
4. Policies and Goals ... 3
5. Tenure and Boundaries ... 3
6. Zoning ... 4
7. Interagency Responsibilities and Integrated Operations ... 7

CONSERVATION
8. Conservation Overview ... 8
9. Geology, Geomorphology and Soils ... 8
10. Flora, Fauna and Habitat ... 8
11. Waders and other Waterbirds ... 10
12. Estuarine Processes and Water Quality ... 11
13. Cultural History ... 12
14. Landscapes and Seascapes ... 13
15. Rehabilitation ... 13
16. Non-Local Plants, Weeds, and Disease ... 14
17. Pets and Feral Animals ... 15
18. Fire ... 16

RECREATION
19. Recreation Overview ... 17
20. Line Fishing ... 17
21. Collecting ... 17
22. Prawning and Crabbing ... 17
23. Spearfishing ... 18
24. Boating and Surface Water Sports ... 18
25. Wildlife Observation and Interaction ... 19
26. Day-Use, Access and Nature Walks ... 19
27. Organised Events ... 20

COMMUNITY RELATIONS
28. Information, Promotion and Interpretation ... 21
29. Education ... 21
30. Community Involvement ... 22

Page

COMMERCIAL AND OTHER USES

31. Commercial Overview ... 23
32. Commercial Fishing ... 23
33. Commercial Concessions ... 23
34 Water Transport Services ... 24
35. Structures, Facilities and Developments ... 24

INTERACTION WITH NEARBY LANDS AND WATERS

36. Private Property ... 26
37. Government Lands and Waters ... 26

RESEARCH AND MONITORING

38. Overview ... 27
39. Nature Conservation ... 27
40. Social Research ... 27

PLAN IMPLEMENTATION

41. Staffing and Management ... 29
42. Funding ... 29
43. Plan Monitoring and Review ... 29
44. Priority Implementation ... 29

TABLES

Table 1 Issue Survey Results ... 2
Table 2 Permitted Uses in Marine Park Zones and in Nature Reserves 6
Table 3 Management Priorities ... 31

Following Page

MAPS

Map 1 Location ... 1
Map 2 Tenure. ... 3
Map 3 Zoning ... 4
Map 4 Habitat ... 9
Map 5 Alfred Cove Nature Reserve: Day Use and Access ... 19

REFERENCES ... 37

APPENDIX A Marine Park Zoning ... 39

INTRODUCTION

1. OVERVIEW

The "Swan Estuary Marine Park" is comprised of estuarine lands and waters within the Swan River at Alfred Cove, Milyu and Pelican Point (Map 1). The Marine Park and the three land areas adjacent to the Marine Park are vested in the NPNCA and managed by CALM.

The EPA System Six Report, endorsed by the State Government in 1983, recommended that these three areas be reserved as they provide important feeding habitats for transequatorial migratory wading birds protected by agreements Australia has with Japan and China. Waders and waterbirds move between Alfred Cove, Pelican Point and Milyu on a daily basis. The sand flats, mud flats and beaches at these three locations provide the only remaining significant feeding and lofting areas (areas for resting mainly during periods of high tide) in the Swan Estuary (System 6 Report, 1983). The Park and adjacent reserves also provide habitat for a diverse assemblage of aquatic and terrestrial flora and fauna (See Section 10).

The high conservation value and diversity of the Marine Park has educational and interpretive value, particularly as it is located within the Perth metropolitan area.

Passive and active recreational activities in the Park cater for the local community as well as national and international visitors. Pressure in the Park is increasing and the need to protect important wader and waterbird habitats is becoming more important.

Limited commercial and recreational fishing will continue in the Park and be regulated under the Fish Resources Management Act and managed in consultation with the Fisheries Department. Management will be for the multiple purposes of conservation, recreation, education, scientific study and commercial and recreational fishing. Given the Marine Park's location and future projected recreational and nature-based tourism demands for the City of Perth, management should emphasise the Park's conservation and education values.

2. VALUES

Conservation Values

- Important feeding habitats for internationally protected, transequatorial migratory wading birds.
- Rich and diverse estuarine and terrestrial communities and habitats.
- Feeding, resting and breeding habitat for fauna, such as fish species and waterbirds.
- Relatively undisturbed native vegetation and geomorphology.
- Visual landscape values.
- Benthic fauna and seagrass beds that contribute to energy flows, primary production, species diversity and river floor stabilisation.

Recreational Values

- An aquatic and terrestrial environment that offers recreational activities, including bird watching, sightseeing, artistic pursuits, windsurfing and boating.
- An estuarine habitat that supports a resource for recreational fishing.
- Hire and instruction for aquatic sports.

Commercial Values

- An estuarine habitat that supports commercial net fishing.
- Commercial tour opportunities based on wildlife observation and natural and cultural history.

Educational and Historical Values

- School groups, tertiary institutions and outdoor organisations use the reserve system for educational purposes, such as intertidal biology and waterbird studies and history studies of the Swan River region.
- Display and interpretation opportunities at each of the three locations for cultural and natural history.

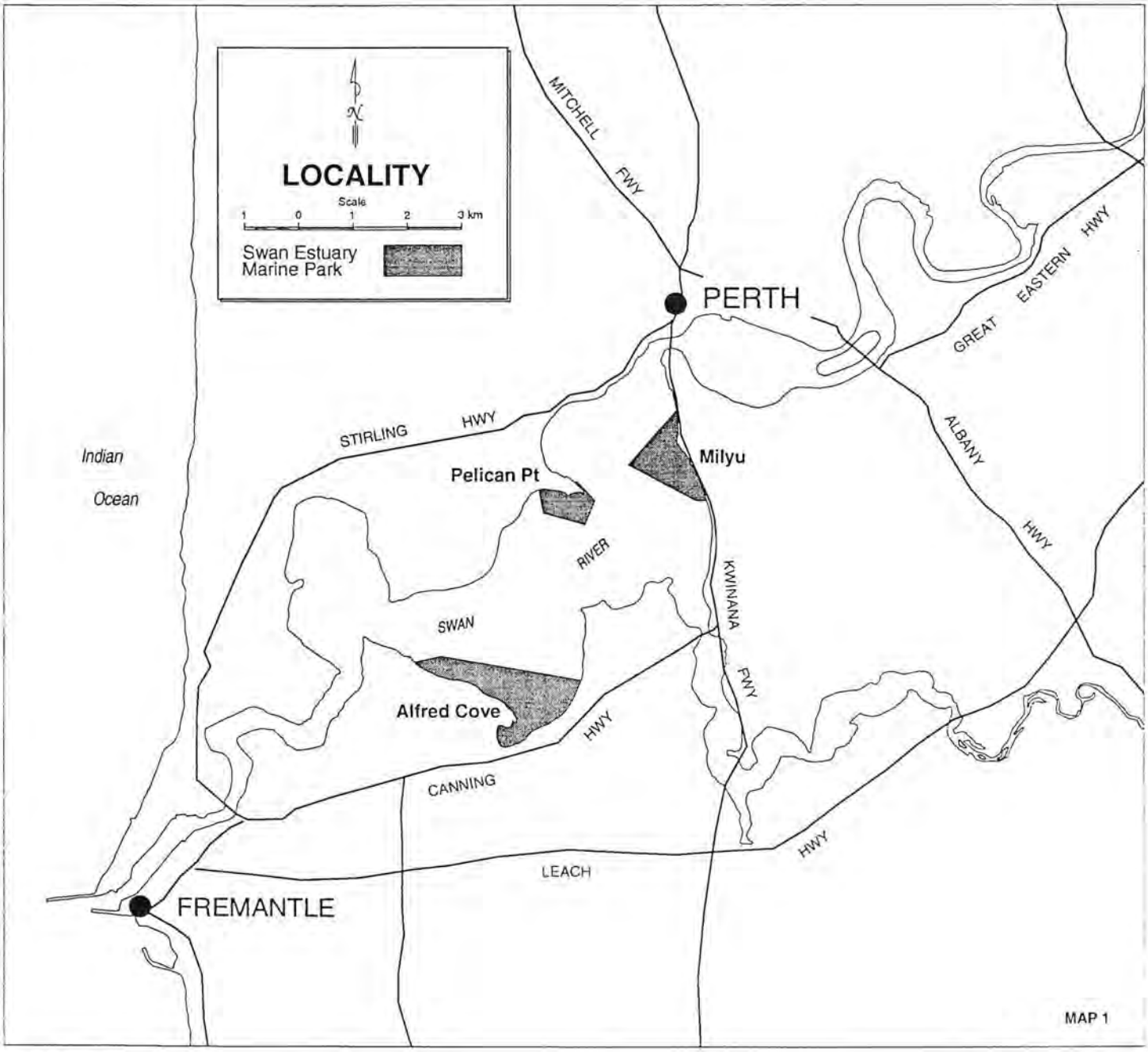
Research Values

- Internationally important waterbird populations that are close to the city.
- Three relatively healthy ecosystems that serve as important reference areas for broader studies in the Swan and Canning River system.
- The diversity of terrestrial and estuarine habitats and the use of these areas by birds and juvenile fish make the reserve system well suited to continued research by tertiary institutions, government agencies, volunteer organisations and individuals.

3. COMMUNITY INVOLVEMENT IN THE DRAFT PLAN

Community Input

- Public submissions were invited through State and local newspapers during the Draft Plan's preparation.
- A Survey in the Spring of 1993 identified the main issues, public perceptions and public expectations of Park management (Table 1).


LOCALITY
Scale
1 0 1 2 3 km
Swan Estuary Marine Park
MITCHELL FWY
PERTH
GREAT EASTERN HWY
STIRLING HWY
Indian Ocean
Pelican Pt
Milyu
ALBANY HWY
RIVER
SWAN
KWINANA FWY
Alfred Cove
HWY
CANNING
HWY
LEACH
FREMANTLE
MAP 1

- Interested individuals and groups discussed their concerns with the Planning Team.
- Local, State and Commonwealth government officers were consulted.
- Written submissions as well as issue surveys were received from a number of groups and individuals before the Draft Plan was prepared.
- Submissions received in response to the published notice of intent to create the marine park were considered during the Draft Plan's preparation.

All respondents who addressed issues related to dogs and cats, jet skiing and prawning felt that these activities should be excluded from the reserve system. The majority in other categories indicated that they would like to see more signs and public education, boating and moorings restricted and drainage rationalised. Views on commercial fishing and wind surfing in the Park were divided on allowing these activities to continue, allowing them in specific areas, or excluding them altogether.

Table 1 ISSUE SURVEY RESULTS

Issue	No. of Responses on the Topic
Commercial Fishing	12
Jet Skiing	10
Cats and Dogs	10
Boating	10
Windsurfing	6
Drainage	6
Prawning	5
Information and Education	5
Other	9

PRINCIPAL MANAGEMENT DIRECTIONS

4. POLICIES AND GOALS

This Draft Management Plan is based on current NPNCA, CALM and Fisheries Department policies derived principally from the Conservation and Land Management Act 1984, the Wildlife Conservation Act 1950 and the Fish Resources Management Act 1994.

The management goals for this reserve system cover the major management issues and form the basis for the structure of this management plan with objectives in each of the sections of the plan.

MANAGEMENT GOALS

Conservation
Conserve biological, physical, cultural and scenic values.

Recreation
Facilitate public enjoyment of natural and cultural values in a manner compatible with conservation of the environment and in a manner that minimises conflict between users.

Community Relations
Promote awareness, appreciation and understanding of natural and cultural values and facilitate liaison with the community.

Commercial and Other Uses
Manage commercial and other uses in a manner that minimises impact on other values.

Interaction with Nearby Lands and Waters
Promote cooperation and minimise conflicts in matters associated with use of nearby lands and waters.

Research and Monitoring
Seek a better understanding of the natural and cultural environment and the impacts of visitor use and management activities.

Plan Implementation
Develop and prepare the Plan in such a way that it will be easily and effectively implemented.

5. TENURE AND BOUNDARIES

The objectives are to:

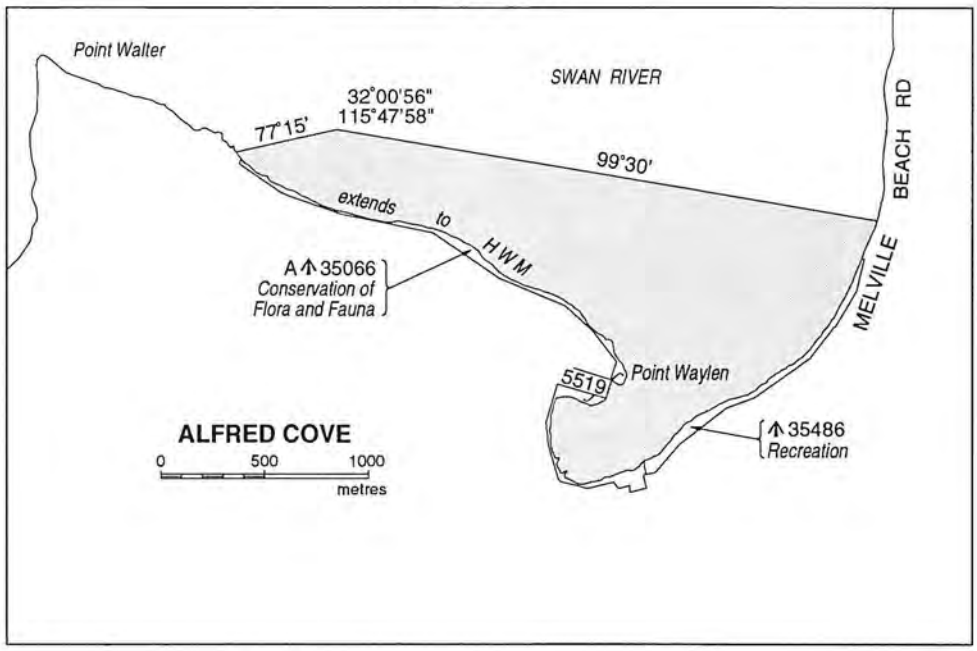
- **Ensure that the gazetted purpose, vesting and tenure of the Park, adjacent CALM reserves and its surroundings protect the reserve system's values.**
- **Incorporate appropriate lands and water within the reserve system where possible.**

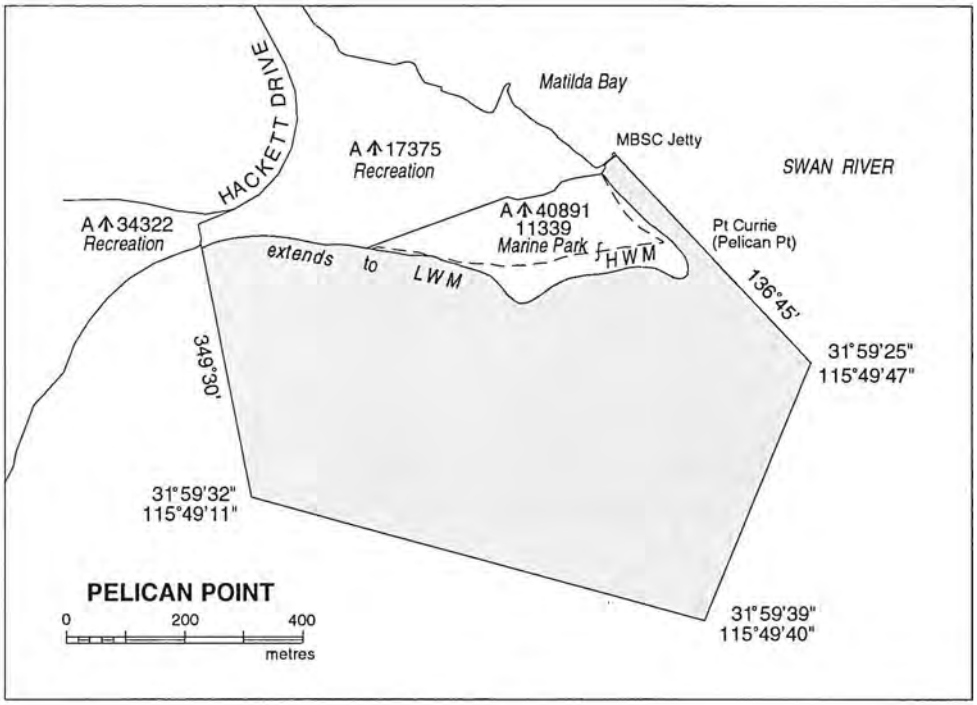
The Swan Estuary Marine Park was reserved on 25 May 1990, as Class "A" Marine Reserve No 4, and is vested in the NPNCA and managed by CALM. The Marine Park is in three sections off the foreshores at South Perth, Alfred Cove and Pelican Point and comprises an area of 340 hectares (Map 2). The three adjacent CALM-managed reserves Alfred Cove (Reserve 35066), Milyu (Reserve 33803) and Pelican Point (Reserve 40891), are all 'A' Class reserves with respective areas of 8.7, 4.4 and 5.5 hectares. The total area covered by this Plan, including the Marine Park, is 358.6 hectares (Map 1).

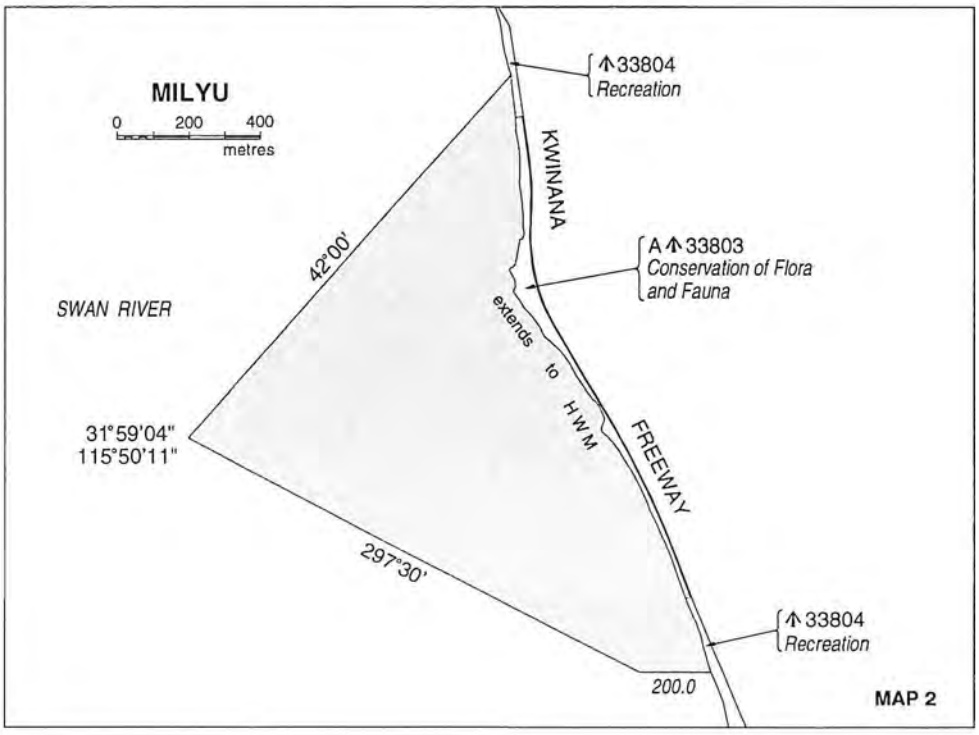
These three areas were identified as important feeding grounds for protected migratory waterbirds and local resident species in the early 1970s by the Department of Fisheries and Wildlife. The areas complement each other, depending on tides and weather and are the only three remaining significant wading bird habitats on the Swan River identified in the System Six Report (DCE, 1983).

A marine park is reserved to conserve the marine or freshwater aquatic or terrestrial flora and fauna and their habitats. It also provides for a range of compatible recreational and commercial uses. A nature reserve is established to conserve flora and fauna as well as the area's landscape, and to preserve the area's archaeological, historical and scientific features.

Important conservation areas adjacent to this 'A' class reserve should, whereever possible, be added to the reserve system or managed in a manner compatible with this system. Adjacent locations to be investigated as additions to Alfred Cove Nature Reserve are: Reserve 35486 (City of Melville), part of the Burke Drive Road Reserve (City of Melville) and Swan Location 5519 as a reserve for conservation and other purposes. (Map 2). Swan Location 5519, currently used for communication purposes, includes a transmission tower and associated facilities, and would be reserved under section 5g of the CALM Act (as a 5g reserve) to include communication purposes as well as flora


Point Walter
SWAN RIVER
32°00'56"
115°47'58"
77°15'
99°30'
BEACH RD
extends to HWM
A 35066
Conservation of Flora and Fauna
MELVILLE
5519
Point Waylen
ALFRED COVE
35486
Recreation
0 500 1000
metres


HACKETT DRIVE
Matilda Bay
A 17375
Recreation
MBSC Jetty
SWAN RIVER
A 34322
Recreation
A 40891
11339
Marine Park
Pt Currie
(Pelican Pt)
extends to LWM
HWM
136°45'
349°30'
31°59'25"
115°49'47"
31°59'32"
115°49'11"
PELICAN POINT
31°59'39"
115°49'40"
0 200 400
metres


MILYU
0 200 400
metres
33804
Recreation
KWINANA
42°00'
A 33803
Conservation of Flora and Fauna
SWAN RIVER
extends to HWM
FREEWAY
31°59'04"
115°50'11"
297°30'
33804
Recreation
200.0
MAP 2

and fauna conservation. In Alfred Cove consideration should be given to amending the nature reserve boundary to exclude areas of grass and include adjacent areas of native vegetation. Consideration should also be given to restoring areas with native vegetation within the Nature Reserve that have been cleared, filled or grasssed. The nature reserve boundary should be redefined by a fence just inside the dual use path for as much of the boundary as possible (See Section 26).

The Marine Park and adjacent nature reserves will be managed as one unit and the proposed zoning scheme will cover the marine area. Alfred Cove and Milyu are nature reserves to high water mark and Pelican Point previously a 'C' Class nature reserve, has presently got a purpose of marine park to the low water mark. All vegetated land within this reserve system will be 'A' Class nature reserves because of flora and fauna conservation values. The intertidal areas adjacent to the land reserves are important feeding grounds for protected migratory waterbirds and local resident species.

Pelican Point to high water mark should become an 'A' Class nature reserve for flora and fauna conservation in keeping with its flora and fauna conservation values. The land-based nature reserves should then be extended to include low lying vegetation such as samphire flats, important for waders and waterbirds. Other Swan estuarine intertidal areas important for waterbirds with high conservation and recreation value both adjacent to the Marine Park and adjacent to other important foreshore conservation areas should be considered as future possible areas for addition to the reserve system.

RECOMMENDATIONS:

1. **Identify areas of low lying vegetation such as samphire flats important for waders and waterbirds in the Marine Park, and extend the three land-based reserves from high water mark to include these areas (H).**

2. **Investigate other areas important for waders and waterbirds of high conservation and recreation value as future possible additions to the Swan Estuary Marine Park, particularly those adjacent to the Marine Park or adjacent to important foreshore conservation areas (M).**

3. **Change the tenure and purpose of the Pelican Point Reserve down to the vegetation line, to nature reserve (H).**

4. **Investigate adding to the reserve system at Alfred Cove, Reserve 35486 and a portion of the Burke Drive Road Reserve as Nature Reserve and Swan Location 5519 as a 5g Reserve. Remove all infrastructure in Swan Location 5519 surplus to management requirements (M).**

5. **Consider amending the Alfred Cove Nature Reserve boundaries between areas of grass and native vegetation to better reflect local and State Government management responsibilities (M).**

6. ZONING

The objective is to develop and implement a management zoning system that will protect the reserve system's conservation values and provide for compatible recreation and commercial uses.

While some recreational and commercial uses can be permitted in a marine park, it is necessary to ensure conservation values of the Swan Estuary Marine Park are maintained and also to ensure varying uses don't conflict with one another. Recreational uses appear to have the greatest potential to impact on the environment and cause conflict between users in this reserve system.

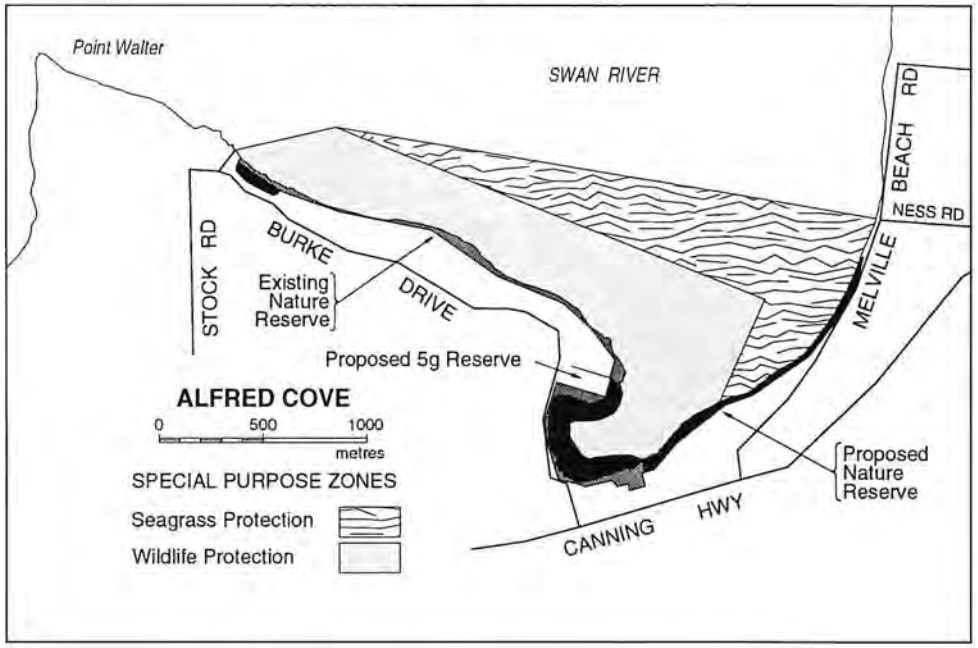
Management zoning schemes are designed to meet the needs of all Park users in an equitable way, providing for the widest possible range of activities compatible with conservation values. Activities are defined and regulated within each zone. Equity of use is determined through evaluating socio-economic values against conservation requirements.

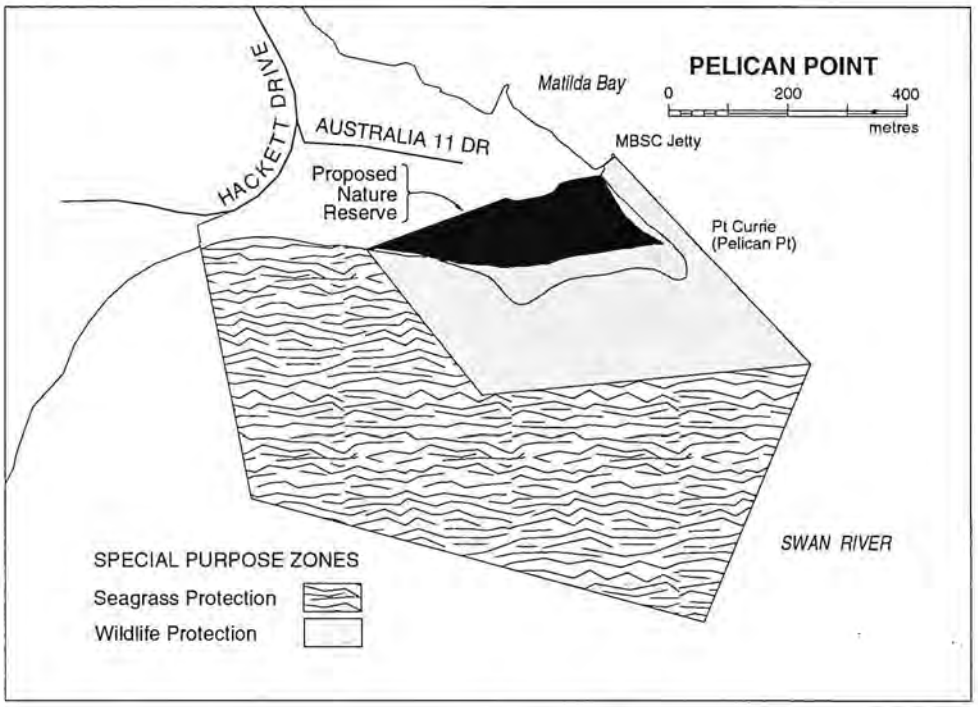
The proposed zoning scheme has been developed after widespread consultation. Zones within marine parks (see Appendix A) are established under the CALM Act as classified areas, while regulations may apply to each zone under the CALM Act or under other Acts such as the Wildlife Conservation Act and Fish Resources Management Act. The following two special purpose zones are proposed and can be seen on Map 3. Table 2 shows the permitted uses in each zone.

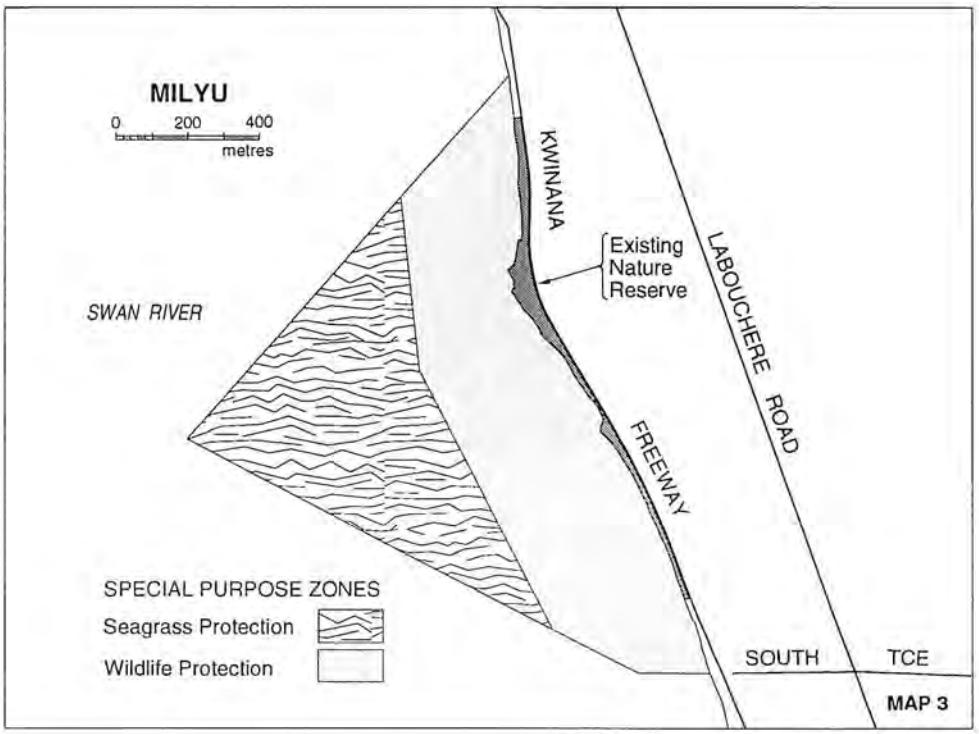
Special Purpose (Seagrass Protection) Zone

The seagrass protection zone provides for commercial and recreational uses consistent with the need to conserve seagrass beds (See Table 2). Conservation implies fishing within the sustainable limits of natural resources. The majority of the seagrass protection zone is within an 8 knot speed limit area under the Navigable Waters Regulations due to the shallow depth of less than 3 metres of these estuarine waters. Signposting, community education and

ZONING


Point Walter
SWAN RIVER
BEACH RD
NESS RD
STOCK RD
BURKE
DRIVE
Existing Nature Reserve
MELVILLE
Proposed 5g Reserve
ALFRED COVE
0 500 1000
metres
SPECIAL PURPOSE ZONES
Seagrass Protection
Wildlife Protection
Proposed Nature Reserve
CANNING HWY


HACKETT DRIVE
AUSTRALIA 11 DR
Matilda Bay
PELICAN POINT
0 200 400
metres
MBSC Jetty
Proposed Nature Reserve
Pt Currie (Pelican Pt)
SWAN RIVER
SPECIAL PURPOSE ZONES
Seagrass Protection
Wildlife Protection


MILYU
0 200 400
metres
KWINANA
Existing Nature Reserve
LABOUCHERE ROAD
SWAN RIVER
FREEWAY
SPECIAL PURPOSE ZONES
Seagrass Protection
Wildlife Protection
SOUTH TCE
MAP 3

enforcement will be used to keep speeds to a minimum. The restricted speed limit aims to maintain important seagrass beds and protect conservation values contained within this zone.

Special Purpose (Wildlife Protection) Zone

Areas within the wildlife protection zone have been designated to protect important waterbird feeding and lofting sites including those used by protected transequatorial migratory waders. It also includes areas of habitat identified as juvenile fish nursery grounds. Wildlife protection (in particular waders and waterbirds) is a central conservation focus for the Marine Park and the primary reason for the Park being established. This wildlife protection zone is mainly comprised of sand and mud flats. Only uses compatible with habitat protection will be allowed. The zone will exclude spearfishing for cobbler, motorised craft (including remote control), windsurfing/sailing, swimming and boat mooring or anchorage. The location of the zone is shown on Map 3.

Limited commercial net fishing is allowed in this zone. Commercial activities permitted in the Park are closely monitored and controlled through a limited number of commercial licences being issued and stringent monitoring conditions placed on the licences (See Table 2).

Nature Reserves

The CALM land-based reserves at Alfred Cove, Pelican Point and Milyu have significant conservation value for flora and fauna and, in particular, for birds and their habitat. These land-based reserves will be managed as nature reserves from the landward boundary to the vegetation line. The reserves include important nesting sites for birds and complex wetland ecosystems important for scientific study and education. The shallows in these area are recognised as important feeding grounds for waterbirds, including migratory species protected under international treaties. Management of these Reserves will include limited access arrangements at Pelican Point, which was formerly a 'C' Class nature reserve and is now proposed as an 'A' Class nature reserve. Management will be consistent with management of other 'A' Class nature reserves using regulations already in place for this land category. Passive recreational uses such as nature appreciation, bird watching, scientific study and education are permitted. Pets, including cats and dogs, are excluded from the Reserve system as they can have a devastating impact on the Park's conservation values. The low lying samphire vegetation in the Marine Park, adjacent to the land-based reserves, will become part of the nature reserves.

General

Research is subject to permit and extractive or manipulative research techniques will be permitted only under strict conditions. Access may be prohibited or restricted for a specified time in the case of special natural events such as wildlife breeding, where protection is required or in the case of an event where access may be dangerous. Applications for commercial activities other than fishing, such as tours and organised events, will be assessed. No activities will be permitted in either of the special purpose zones unless provided for in this plan. This includes other commercial fisheries such as aquaculture, any structures, facilities and developments not consistent with the management objectives of this Plan (See Section 35).

The zoning scheme may be reviewed as more information becomes available on any adverse impacts of various activities. Any zoning scheme changes will be subject to public consultation and participation.

RECOMMENDATIONS:

1. **Implement the zoning scheme and survey and mark zone boundaries on the land and in the estuary (H).**

2. **Review the zoning scheme as more information on the reserve system's values and the impacts of various activities becomes available (H).**

Table 2. **PERMITTED USES IN MARINE PARK ZONES AND IN NATURE RESERVES**

	NATURE RESERVES	WILDLIFE PROTECTION	SEAGRASS PROTECTION
Commercial			
Netting	No	Yes(a)	Yes(a)
Aquaculture	No	No	No
Windsurfing/Sailing	No	No	Yes(b)
Commercial Tour Operators	Yes(b)	Yes(b)	Yes(b)
Recreational			
Line Fishing	No	Yes(a)	Yes(a)
Spearfishing	No	No	No
Prawning/Crabbing	No	Yes(a)	Yes(a)
Recreational Netting	No	No	No
Collecting	No	No	No
Windsurfing/Sailing	No	No	Yes
Motorised & Remote Control Craft	No	No	Yes(d)
Non-motorised Boating	No	Yes	Yes
Pets	No	No	No
Swimming	No	No	Yes
Anchorage	No	No	Yes
Structures and Development			
Moorings	No	No	Being Phased Out
Boat Ramps, Jetties or Dredging	No	No	No
Resource Development/Exploration No	No	No	
Placement of markers	Yes	No	Yes
Research			
Research - fish	N/A	Yes(a)	Yes(a)
- other	Yes(c)	Yes(c)	Yes(c)

(a) Regulated under the Fish Resources Management Act

(b) Licence under the CALM Act

(c) Permission required from CALM (Permit)

(d) Subject to an 8 knot speed limit under the Navigable Waters Regulations

7. INTERAGENCY RESPONSIBILITIES AND INTEGRATED OPERATIONS

The objective is to integrate management programs between CALM and other agencies with management responsibilities in and adjacent to the Marine Park.

Marine parks and nature reserves are vested in the National Parks and Nature Conservation Authority. The following agencies have management roles and responsibilities within this Marine Park, its adjacent Nature Reserves and in nearby areas:

The **Swan River Trust** is responsible for managing the Swan River Trust Management Area described under the Swan River Trust Act 1988. The Swan River Management Strategy is in place to manage this area. The Marine Park and adjacent CALM reserves fall within this area. The Swan River Trust's roles and responsibilities include aspects of day-to-day management, liaison with local government, establishing facilities, advising on the impact of structures, commercial proposals and developments and making and enforcing by-laws and powers delegated by the Department of Environmental Protection, such as the licensing of industrial discharges.

CALM is responsible for managing the CALM reserve system under the CALM Act 1984. The CALM Act provides for the proclamation of marine parks. CALM is also responsible for the conservation of flora and fauna in accordance with the Wildlife Conservation Act.

Local Government Authorities under City By-laws are responsible for managing areas adjacent to the Reserve system.

Fisheries Department is responsible for managing commercial and recreational fishing under the Fish Resources Management Act 1994. The Fish Resources Management Act and Regulations apply in marine parks. Regulations under the Fish Resources Management Act are enforced by the Fisheries Department in collaboration with CALM.

Department of Transport is responsible for regulating boating activities within the Park, including encouraging safe navigation and establishing and maintaining navigational aids.

River pollution prevention or clean-up efforts are coordinated through a State Combat Committee, chaired by the Department of Transport with technical advisory representation from the Swan River Trust, CALM and other relevant State Government Departments. CALM advises on conservation and recreation values. Wildlife rescues are coordinated by CALM with assistance from other government and voluntary agencies.

RECOMMENDATIONS:

1. **Develop a Memorandum of Understanding between the Swan River Trust and CALM that sets down guidelines and procedures for management responsibilities in the Marine Park area (H).**

2. **Liaise with all other relevant agencies to ensure integrated management of the Park and its surrounding areas (M).**

3. **Prevent, or if they occur clean-up, spills of polluting substances in the Marine Park through the State Combat Committee (M).**

4. **Coordinate efforts with Government and volunteer agencies to rescue wildlife as required (H).**

CONSERVATION

8. CONSERVATION OVERVIEW

The conservation focus for this 'A' Class reserve system is to protect and maintain important habitats and ecological diversity. The intertidal zone is an important feeding area for protected migratory species from the northern hemisphere. The wetland vegetation is important habitat for fauna and a resting area for waterbirds. Sand and mud flats and seagrass beds provide important feeding grounds and shelter for juvenile fish.

These important habitats can be degraded by disturbance from activities and by introducing exotic species, disease or pollutants. The conservation focus is, therefore, on minimising adverse impacts on habitats and sensitive native species and their numbers through managing, reducing and excluding activity, particularly in susceptible areas. This can be achieved with education, zoning or through controlling activities using regulations and licences, or all three.

9. GEOLOGY, GEOMORPHOLOGY AND SOILS

The objective is to protect and conserve geological and geomorphological features and soil substrate.

The Swan River system occurs in wide channels and extensive flood plains with low relief and is part of the Avon and Swan Coastal Plain drainage system. The geology, geomorphology and soils of the Swan Coastal Plain have been described by Seddon (1972) and by Collins (Curtin University, 1987).

This CALM Reserve system encompasses mud and sand flats and shallows consisting primarily of alluvial sand, silts and clay deposits.

A thin film of dark clay often forms an impermeable layer in the drier areas of the wetlands allowing shallow pools of water to exist following flooding of the flats. Sand banks form features along much of the shoreline. The land components of these wetlands are composed of relatively recently deposited sediment colonised by intertidal vegetation such as sedges and salt marsh. All these areas are prone to additional sediment build-up which is deposited through wave and tidal action. Alfred Cove, in particular, is prone to sediment build up which can also bring nutrient enrichment or toxins. Pelican Point, as a spit formation, is prone to erosion resulting from wind driven waves and wakes from passing vessels.

The sand and mud flats and the soil substrate in the intertidal zone are valued components of these wetlands. The soil substrate is habitat for benthic flora and fauna that are important as food for waterbirds and fish. If disturbed through trampling, the benthic fauna of this soil substrate is very likely to be affected (Rose, 1994).

Fossil deposits are often found in shallow tidal flats and are particularly well defined in the Point Waylen area (Swan Location 5519) adjacent to the Marine Park and Alfred Cove Nature Reserve (Map 2). These fossils occur in sediments of Holocene age and are of palaeontological and geological importance in understanding the evolution of fauna and the estuary over the last 6,000 years (Yassini and Kendrick, 1986).

RECOMMENDATIONS:

1. **Identify important geomorphological features within or near the reserve system that are valuable and vulnerable to damage, including the sand and mud flats in each of the three areas and the fossil sites at Point Waylen and Alfred Cove (M).**

2. **Protect fossil sites on the reserve system, and inform relevant authorities of the significance of the fossil sites near the reserve system and encourage suitable management (M).**

10. FLORA, FAUNA AND HABITAT

The objectives are to:

- **Protect and conserve habitats with an emphasis on important and threatened communities.**
- **Protect and conserve indigenous flora and fauna with an emphasis on threatened or priority species including migratory waders.**

Flora

Plant species recorded number 178 at Alfred Cove, 111 at Pelican Point and 73 at Milyu in a recent CALM survey (G. Keighery, unpublished data). No threatened or priority species have been found in any of the three areas. Restricted and

geographically interesting flora such as *Burchardia bairdiae*, *Gyrostemon ramulosus* and *Tribonanthes violacea* occur in Alfred Cove and the *Schoenus subfascicularis* is considered particularly vulnerable there.

Fauna

The fauna in these areas has not been surveyed, and other than migratory waders, there is no indication that any particularly important fauna is present. The southern Brown Bandicoot, *Isoodon obesulus* and the Common Brushtail Possum, *Trichosurus vulpecula* may still be present. In 1987, 132 bird species were recorded at Alfred Cove (Keeling, 1987). Waterbirds and birds associated with wetlands make up 63% of the total number. These will be discussed in detail in Section 11. Bushbirds recorded in the reserves reflect the importance of the fringe woodland vegetation. Birds seen include the Red-capped Robin, White fronted Chat, Pallid Cuckoo, Sacred Kingfisher and Osprey. Mosquitoes and midges are not a problem in most of the reserve areas partly because of a lack of ditches from human and vehicle disturbance, which otherwise would favour breeding. The large biomass and diversity of the salt marsh also tend to keep midges and mosquitoes at an acceptable level. A program to control mosquitoes in the pools at the end of Pelican Point has been ongoing and discussions have occurred concerning physically modifying these pools by connecting them to the river to allow greater flushing. Any mosquito and midge control programs or modifications to increase water exchange with the Swan River should be referred to CALM's Director of Nature Conservation for approval as the overall impact on nature conservation values will have to be carefully assessed (NPNCA Policy Statement A3, Mosquito Control).

Aquatic fauna includes a diverse and rich population of polychaetes (eg. *Capitela capitata)*, molluscs (eg. *Arthritica semen*, *Sanqumolaria biradiata*) and crustaceans (eg. *Penaeus latisulacatus, Melita* sp.). The majority of the species found in the mud flats, are detritus/filter feeders and would form an integral part of the fish and wading birds diet. The benthic fauna 'purify' the water and remove the detritus material and any dead matter which might pollute the water (Chalmers et al, 1976). The larger polychaetes and molluscs would be an important food source and susceptible to trampling. The mollusc, *Coxiella striatula*, although well represented in the Alfred Cove-Point Waylen area, is one of the few remaining populations of this species left in the region. This freshwater gastropod and its habitat are regionally unique and its conservation should be ensured (Slack-Smith, pers. comm.).

Common species of fish in the Swan River include the yellow-eye mullet, *Aldrichella forsteri*, the sea mullet, *Mugil cephalus*, the Perth herring, *Nematalosa vlaminghi* and the cobbler, *Cnidoglonis macrocephalus*. Prawns include both the king prawn, *Penaeus latisulcatus* and the school prawn, *Melapenaeus dalli*. The shallows provide both a feeding ground and a nursery area for juvenile fish and prawns.

Habitat

Aquatic habitats in the reserve system include areas of relatively deep water, shallow areas containing seagrass beds, sand and mud flats (shown on Map 4), and seasonal ponds of water that can be fresh to extremely salty depending on the season. It is this range of aquatic habitats that supports the migratory waders and waterbirds and the diversity of species contained within the Reserve system.

The vegetation communities at Alfred Cove, Pelican Point and Milyu include salt marsh, samphire and fringing low forests or dense tree and shrub areas that are important in maintaining the estuarine ecosystem.

Samphire forms a low shrub community that includes species such as *Sarcocornia blackiana*, sedge-like *Triglochin striata* and succulent *Suaeda australis*. Further from the estuary other samphire species occur such as *Halosarcia indica* subsp *bidens* and *Halosarcia halocnemoides*, and above this less salt tolerant species such as *Juncus kraussi* and *Melaleuca* species

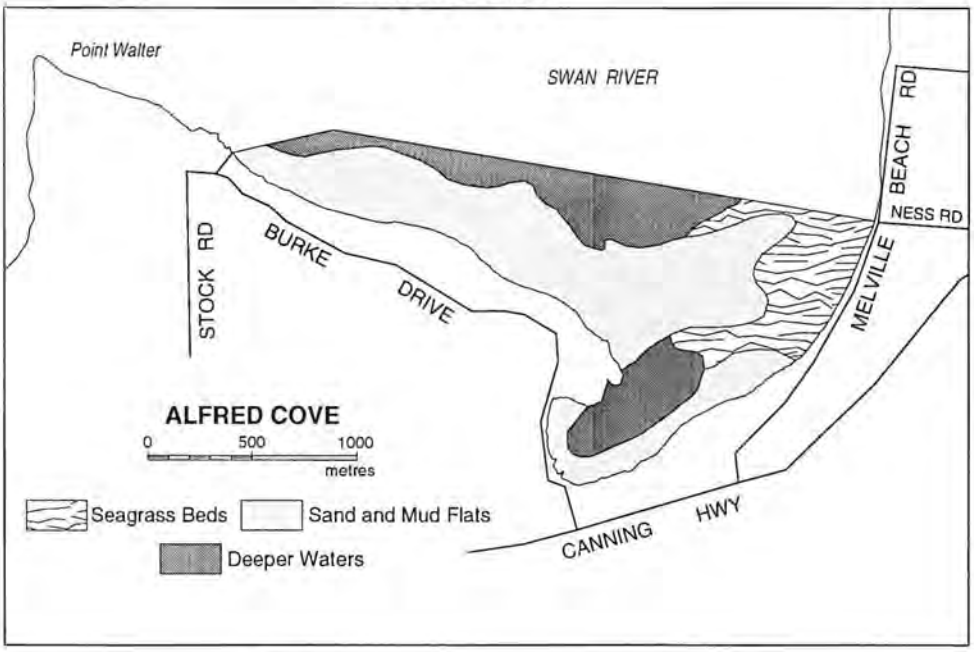
Fringing woodland species include *Eucalyptus rudis*, *Melaleuca cuticularis*, *Melaleuca rhaphiophylla* and occasionally *Melaleuca hamulosa*. Remnant isolated trees of *Casuarina obesa* are also present. The *Melaleuca-Juncus* and *Eucalyptus-Melaleuca* complexes increasingly dominate where freshwater flushing from drains is occurring. Freshwater flushing from drains also increases weed and introduced species problems. (See Non-local plants, weeds and disease)

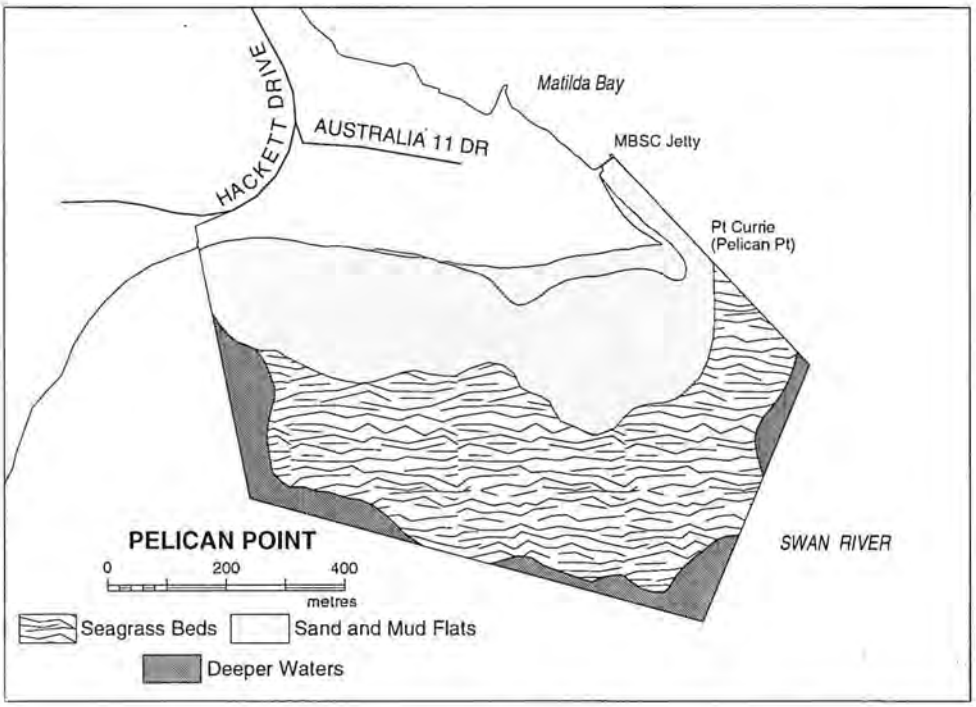
RECOMMENDATIONS:

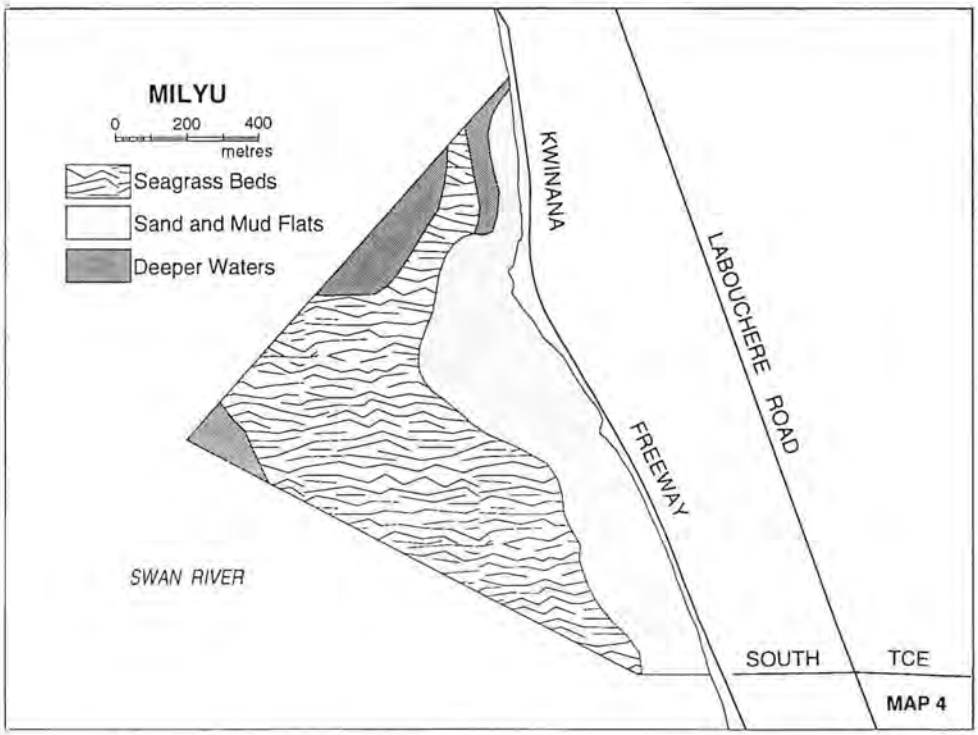
1. **Minimise or prevent native vegetation being removed or damaged by reserve maintenance or visitor facility developments (M).**

2. **Protect and enhance areas with native species, particularly those vegetation communities and species important to the overall health and vitality of the ecosystem (See Rehabilitation) (H).**

3. **Locate important flora and fauna habitats, priority species and fire sensitive species, and develop management recommendations for their conservation, particularly preceding any new recreational site development or burning operation (H).**


Point Walter
SWAN RIVER
BEACH RD
NESS RD
STOCK RD
BURKE
DRIVE
MELVILLE
ALFRED COVE
0 500 1000
metres
Seagrass Beds
Sand and Mud Flats
Deeper Waters
CANNING HWY


HACKETT DRIVE
AUSTRALIA 11 DR
Matilda Bay
MBSC Jetty
Pt Currie
(Pelican Pt)
PELICAN POINT
0 200 400
metres
Seagrass Beds
Sand and Mud Flats
Deeper Waters
SWAN RIVER


MILYU
0 200 400
metres
Seagrass Beds
Sand and Mud Flats
Deeper Waters
KWINANA
FREEWAY
LABOUCHERE ROAD
SWAN RIVER
SOUTH TCE
MAP 4

4. **Provide visitors with opportunities to observe and increase their knowledge of the Park's flora, fauna and habitats (H).**

5. **Protect flora and fauna and habitats from pets, weeds, disease, wildfires or any other physical disturbance (H).**

6. **Seek the approval of CALM's Director of Nature Conservation by virtue of the authority delegated to him by the NPNCA before any mosquito and midge control programs or modifications to increase water exchange are carried out (H).**

7. **Liaise with the Fisheries Department and tertiary institutions to ensure monitoring of fish populations in the Marine Park (M).**

8. **Monitor benthic fauna to assess any impact from trampling, particularly within the wildlife protection special purpose zone (H).**

11. WADERS AND OTHER WATERBIRDS

The objective is to protect and conserve waders and waterbirds and their habitat.

The reserve system's sand flats, mud flats and beaches provide the only remaining substantial feeding and roosting areas for waders and other waterbirds in the Swan Estuary. Waders and waterbirds move daily between Alfred Cove/Point Waylen, Pelican Point and Milyu. A large number of the waders using these areas are transequatorial migratory species protected by agreements Australia has with Japan and China.

The Swan Estuary forms a part of a network of wetlands that includes a chain of wetlands to the north and south as well as the Rottnest Island salt lakes to the west. Transequatorial migratory waders use the Swan Estuary Marine Park as a staging area before moving on to other areas.

Long-term observations and wader waterbird counts have been carried out by ornithologists from CALM and members of the Royal Australasian Ornithologists Union (RAOU) and WA Naturalists Club. In the early 1980s, a total of 11,443 waders and other waterbirds were counted in Alfred Cove (Jaensch, 1988). During the 1980s the number of migratory waders counted on the Swan Estuary occasionally approached or exceeded 10,000, while numbers counted more recently seldom exceed 2000 (pers comm Mike Bamford).

Mud flats at Point Waylen and Alfred Cove are the primary foraging areas with Milyu and neighbouring freeway foreshore areas also very important. Transequatorial migratory waders observed in the Swan Estuary Marine Park are declining in total numbers for some species, in particular Bar-tailed Godwit, Sharptail Sandpipers, Curlew Sandpipers and Red-necked Stint. The reasons for this decline are not known, however disturbance from dogs is suspected to have contributed. Prawning parties may have also contributed to this decline, particularly at Pelican Point since the 1980s (pers comm Mike Bamford). This decline has been documented for Pelican Point (Bailey and Creed, 1989).

Damage to the larger benthic fauna in the mud and sand flats may be occurring as a result of trampling, particularly from large groups of people such as prawning parties (Rose, 1987). The larger benthic fauna are the most valuable food for migratory waders, as less time and energy is required to forage. Restricting the numbers of people walking through the waterbird feeding areas may therefore be an important strategy to protect and maintain the productivity of these important waterbird feeding habitats.

Important waterbird roosting areas are provided in the Reserve system. Milyu is used by migratory waders mainly during the day and Pelican Point is used extensively during the night. The freeway foreshores, including Milyu and neighbouring beaches, face into the seabreeze making flight take off easier. These freeway foreshore areas are particularly important during the day when tides are too high to permit feeding and roosting at Point Waylen and Alfred Cove.

Breeding in the three areas is greatest in Alfred Cove where 30 species have been recorded breeding. Over two-thirds of the species thought to have bred in Alfred Cove are bush birds that reflect the importance of the fringing woodlands. Rushlands are also important for duck, rail, plover and stilt breeding. Of particular importance is the breeding by the Buff-banded Rail, the Little Grassbird, the Spotless Crake and the Black-winged Stilt. The Red-capped Plover was recorded breeding at Milyu and Australian Shelducks were seen with young there in September 1984. The Buff-banded Rail breeds in sedges along the river and is particularly common in these three areas.

RECOMMENDATIONS:

1. **Prevent all forms of disturbance of principal wader roosting sites (H).**

2. **Prevent disturbance of waders and other waterbirds and their habitat by dogs and cats (H).**

3. **Reduce disturbance of waders and other waterbirds and their feeding ground by visitors to acceptable levels (H).**

4. **Minimise any adverse environmental impact to the intertidal mud and sandflats (H).**

5. **Monitor wader and waterbird numbers feeding or breeding in the reserve system (H).**

6. **Provide visitors with opportunities to view and increase their awareness, appreciation and understanding of the Park's waders, waterbirds and their habitat (H).**

12. ESTUARINE PROCESSES AND WATER QUALITY

The objective is to protect and maintain estuarine processes and water quality.

Water and Sediment Dynamics

Erosion and deposition is a dynamic on-going process in the Swan River. The natural flow of water within Alfred Cove is anti-clockwise and erosion is strongest on the northern and western banks and deposition greatest on the southern bank. Erosion on the northern and western banks is exacerbated by activities such as bait digging, which contributes to breaking down the banks and destroying samphire root systems. Pelican Point, being an exposed sandy spit, is also subject to erosion and deposition, with the wake and wash from large boats contributing to the erosion rate.

Sediment is continuously being transported down the Avon River, the greatest contributor of water to the Swan River. The finer material is being deposited in the Swan River as it widens and the water flow slows down. Past developments in the Swan River system included dredging and reclamation projects that increased sediment and its transport. Recent developments have concentrated more on stabilising the river banks either with meshing rocks and concrete or native vegetation, such as has occurred in the Milyu Nature Reserve.

Salinity and Drainage

The Swan River has a low tidal range with the likelihood of flooding reduced because of the dams constructed on upstream tributaries and certain parts of the river being dredged. Flooding and flushing of the Swan Estuary occurs with a strong predominantly winter fresh water flow to the sea coupled with a strong sea breeze, high sea levels and winter storms.

The low elevation of the surrounding land and the superficial nature of the shallow, fresh groundwater aquifer can result in groundwater infiltrating during winter months. The use of groundwater for private or public reticulation can result in deeper salt water layers being dragged up and a salt water wedge moving towards the surface and further inland (salt water intrusion). This has the potential not only to salinate bore water but also adversely affect the composition of floral communities within the reserve system.

During summer the waters within the wetlands, particularly at Pelican Point and Alfred Cove, are extremely saline and create a distinctive ecosystem and feeding habitats. Drainage systems introducing fresh water into the ecosystem can create localised pockets of fresh water where weed species can persist and spread. A drainage rationalisation strategy is being developed to minimise the numbers of drains into these wetland areas thereby reducing the areas where weeds can become established and spread. In Alfred Cove, the number of drains discharging into the Cove has been reduced, weeds have been removed, and the impact of existing drains lessened by allowing better exchange between the river water and the drain water.

Pollutants and Nutrification

Stormwater drains can also be the source of pollutants into the wetland system and into the Swan River. Drains can potentially deliver into the river fecal coliforms, pesticides, fertilisers, heavy metals, oil and petrol residues as well as a range of chemicals that could come from an accidental spill on a major road nearby.

Water quality parameters recording the physio-chemical status of the Swan River have been measured since 1981 by the Swan River Trust and indications are that in areas near the Marine Park, waters are healthy in terms of temperature, pH, turbidity, dissolved oxygen, biochemical oxygen demand, ammonia, lead, pesticides, sediment and nitrogen. Phosphorus levels measured indicate that eutrophication is a potential problem in the Swan River and algal blooms have occurred in recent years. Algal blooms can emit a putrid odour, reducing the amenity of an area and kill local fish because of reduced oxygen content in the water.

Neighbours to the Park can minimise phosphorus and pollutant inputs into the river through using water wisely, protecting local vegetation, replanting and reducing run-off which includes nutrients and chemical pollutants (see Sections 37 and 38). Industrial discharges to the Swan River are strictly controlled by the Water and Rivers Commission under powers delegated by the DEP. Licenses for industrial discharges are being phased out over time.

Rubbish such as plastics, bottles, wire, food scraps and fishing gear can also pollute the river and entangle aquatic life. Rubbish along the foreshore not only reduces the amenity of an area but also can result in loss of bird life by attracting cats to the area (see Section 16).

RECOMMENDATIONS:

1. **Maintain liaison between local government agencies and CALM to protect and conserve natural processes and water quality (H).**

2. **Ensure the existing water quality monitoring program is adequate for the Marine Park's management requirements (H).**

3. **Support monitoring and research programs being undertaken by other government agencies and educational institutions (M).**

4. **Maintain only the minimal number of fully functional drainage lines to reduce the growth of freshwater-dependent weeds in land reserves (H).**

5. **Discourage practices that rubbish and pollute the land and water of these Reserves. Encourage clean-up initiatives (H).**

13. CULTURAL HISTORY

The objective is to protect and promote the historical and cultural values of the reserve system.

Aboriginal History

Aboriginal people frequented the Swan Estuary for estuarine and terrestrial food resources. Accounts by explorers and settlers recorded Aborigines in the lower Swan Estuary in the 1600, 1700 and 1800s (Curtin University, 1987). Major campsites that are registered sites of importance to Aboriginal people in the Swan-Canning Estuary include Pelican Point and an area along the South Perth foreshore.

Nyoongar Aborigines, who camped along the Swan River, were particularly drawn to areas which combined freshwater, terrestrial and estuarine environments. Pelican Point was a popular camping, fishing and hunting area for this reason. Fish, shellfish, reptiles and birds were all easily accessible at Pelican Point. The Mooro Tribe, led by Yellagonga, used the Pelican Point area. The Alfred Cove area was used regularly by the Beeliar Tribe who migrated through the area mainly in the summer months. The Milyu area, also abundant with plants and animals including fish and waterbirds, was also used for food resources. Milyu is part of a traditional Aboriginal hunting and fishing area used by Nyoongar people of the Ballaruk Tribe (City of South Perth, 1993). Milyu is Aboriginal for samphire which is the low-lying succulent vegetation indicative of these estuarine wetlands. Aboriginal impact on these areas would have been minimal as Aborigines were nomadic within set territorial areas and took only what was necessary for their subsistence (Berndt and Berndt, 1980).

European History

The Swan River was first sighted by Europeans on 5 January, 1697, when a party lead by Willem de Vlamingh landed in the Cottesloe area. In 1801 the French led by Ensign Francois Heirrison carried out a scientific and exploratory voyage of the Swan River in the French ship Naturalist. James Stirling led the first British exploration of the Swan River in 1827. Stirling's exploratory party found the numbers of swans, pelicans and ducks in Pelican Point area to be "truly astonishing" (Seddon, 1972). Captain MJ Currie, first Harbourmaster of Fremantle, first took up land at Crawley, and Pelican Point at that time was officially given the name Point Currie.

Alfred Cove and Point Waylen were named after Alfred Waylen who took up land at Alfred Cove in 1830. Earlier the bay had been known as Frenchman's Bay from 1801 when the French ship Naturaliste landed there during their scientific and exploratory voyage.

Alfred Waylen, and subsequent owners of this property in the Alfred Cove area ran cattle and a dairy of about 100 cows was established in 1919. In the 1930s the majority of land surrounding Alfred Cove was subdivided for suburban development and 53 acres of land was set aside along the foreshore from Attadale jetty to Alfred Cove for recreational purposes. Between 1952 and 1964 the foreshore area from Tompkins Park to Cunningham Street was used as a public refuse landfill site. Between 1965 and 1969 the tip site was transferred to the Attadale foreshore. A dredging and landfill program was also initiated at this time resulting in some minor changes in the foreshore boundaries and the sandbank distribution.

In 1958, a radio transmitter facility for Perth Airport was constructed at Point Waylen, Location 5519 (See Map 2). This facility was managed by the Civil Aviation Authority as an integral component of Perth airport's navigational guidance system.

RECOMMENDATIONS:

1. **Identify and consult with Nyoongar people having cultural links and ongoing interests in the Swan Estuary reserve system (M).**

2. **Ensure that CALM's obligations under relevant legislation are fulfilled if any activities in the reserve system involve development (M).**
3. **Liaise with local historical societies and establish an archive of visual and written cultural history, and make this information available for interpretive displays (M).**

4. **Where appropriate, incorporate information on cultural history of the reserve system into interpretive material (M).**

14. LANDSCAPES AND SEASCAPES

The objective is to protect and enhance the reserve system's visual aesthetic values.

The reserve system is located on the lower reaches of the Swan River and the landscape character type is Swan Coastal Plain. The reserve areas represent some of the least disturbed estuarine and wetland vegetation associations combining salt marshes, samphire, freshwater pools and estuarine woodlands and shrublands. The diversity of colour, height, species and waterbird habitats in relatively small areas makes for very high scenic quality experiences in very centrally located areas within the Perth metropolitan area.

Scenic views are available from vehicles, boats and on foot in locations within or on adjacent foreshores. The surrounds to the three reserve system areas are extremely important and adjacent land development should be sensitive to form, line, colour, texture and scale found within the reserve system.

Landscapes and seascapes can be described as high, medium or low visual quality and mapped using the Visual Management System (CALM,1994). Proposed modifications within the Park or in adjacent areas can be assessed according to visual quality ratings and the ability of the landscape to incorporate the proposed modification. Modifications can contribute either negatively or positively to visual quality. Examples of modifications to seascapes and landscapes either proposed or approved which warrant close scrutiny include any clearing of native vegetation within or adjacent to the reserve system, communication towers, rubbish or pruning disposal sites, residential housing developments particularly multi-storied buildings and markers, jetties or structures on the water which are not necessary.

RECOMMENDATIONS:

1. **Consider CALM's Visual Landscape Management Policy Statement No. 34 and seek specialist advice when implementing this Plan (M).**

2. **Classify visual resource features in the management area according to CALM's Visual Management System (CALM, 1994) (L).**

3. **Ensure that any modification to the natural environment be subtle and remain subordinate to natural elements by borrowing extensively from form, line, colour, texture and scale found commonly in the surrounding land and seascapes (H).**

4. **Continue staged rehabilitation programs to protect and enhance native vegetation and landscape values (See Rehabilitation) (H).**

5. **Use interpretive and explanatory signs before and during operations that affect visual qualities (H).**

6. **Encourage local authorities, other government agencies and private landholders to use visual resource management skills when siting facilities and signs, selecting site-compatible materials and colours, planning planting programs and planning for utilities, roads and building envelopes (H).**

15. REHABILITATION

The objective is to restore vegetation communities to a condition resembling the natural environment as close as possible.

Rehabilitation works in the reserve system should use local native plants from locally collected seed. Non-local plants, including plants whose seed source is not locally collected, are not likely to support the same number of invertebrate fauna, in particular arthropods, the most numerous and diverse fauna group in terrestrial ecosystems. Arthropods are of enormous importance as food for other animals (such as birds), as pollinators of plants and as recyclers of nutrients. In some cases

an unhealthy balance of species of arthropods can be associated with non-local plants as non-local plants have not co-evolved and established a balance with the local arthropod species.

Non-local plants in a number of cases support fewer plant-eating arthropods and also fewer parasites such as rust-fungi and mistletoe. Non-local plants can outcompete local plants, grow faster and larger and reproduce freely. By growing faster and larger than the equivalent local plants and by being largely unblemished, and, therefore, more brightly coloured than the local species, non-local plants tend to be visually dominant. These plants disrupt the visual harmony of conservation reserves, whose visual character is based on natural associations of local plants and can have an affect on a healthy balance of arthropods.

Examples of non-local species include the river gum *Eucalyptus camaldulensis* and swamp oak *Casuarina glauca*. These non-local species have been established at Pelican Point and Alfred Cove. The local species, salt sheoak,*Causarina obesa*. readily supports two species of mistletoe, *Amyema linophylum* and *Lysiana casuarinae*. Mistletoe foliage is habitat for the larvae of the wood-white butterfly *Delias aganippe* and the brilliant blue amaryllis azure *Ogyris amaryllis* and possibly the silky azure *Ogyris oroetes*. Also the mistletoe bird and species of honeyeaters eat the berries of the mistletoe.

Both the non-local species, being close relatives of local species, may be able to hybridise with their counterparts and further reduce the flora and fauna values of the nature reserves. Re-establishing native local species, including flooded gum, *Eucalyptus rudis* and salt sheoak in these areas where they formerly occurred, and encouraging regeneration will restore the natural environment as close as possible to its former condition.

A rehabilitation program to remove weeds, excess landfill and introduced species in association with the planting of local species should be produced for each of the three locations. Special care will need to be taken not to affect the population of fauna species. The variegated fairy-wren *Malurus lamberti* subsp *assimilis* for example can be affected by extensive removal of introduced shrub species.

The rehabilitation programs should adopt a staged approach with a replacement strategy to maintain a similar structure in the understory and overstory where possible, unless views are being obstructed. Priorities for areas to rehabilitate first could consider the degree to which non-local species are outcompeting local species or affecting habitat diversity or reproductive rates.

The seedlings of river gum and flooded gum can be readily distinguished by their different juvenile leaves. CALM staff and others involved in vegetation rehabilitation programs can be trained to make distinctions between local and non-local species. Historical photographs can also be used to recreate original landscape and vegetation associations. In recreating the former vegetation structure and condition, any impact on views and any cultural, historical or aesthetic value of particular species may also need to be considered.

RECOMENDATIONS:

1. **Develop a rehabilitation program for each of the three locations to remove weeds, excess landfill and non-local species in conjunction with the planting of local species (H).**

2. **Adopt a staged approach to rehabilitation programs to protect and enhance local vegetation and landscape values (H).**

3. **Take special care not to affect any other flora or fauna conservation values, such as populations of the variegated fairy-wren (H).**

4. **Maintain and restore local vegetation to its former structure and condition where possible while considering the need to retain views and cultural or aesthetic values of particular species (H).**

5. **Train staff and others involved in vegetation rehabilitation programs to distinguish between non-local and local species (eg. river gum from flooded gum and swamp oak from salt sheoak) (H).**

16. NON-LOCAL PLANTS, WEEDS AND DISEASE

The objective is to minimise the impact non-local plants and weeds and their control have on reserve system's values.

Non-local species include the tree species river gum *Eucalyptus camaldulensis* and swamp oak *Casuarina glauca*, , both of which are outcompeting native species and need to be removed (See Rehabilitation). Fauna habitat modification, particularly for birdlife by the removal of non-local species, should be considered in determining species control program strategies and priorities. All possible control techniques should be investigated, including mechanical, chemical and biological techniques.

Most of the weed species could be removed selectively and replaced with local species propagated from nearby seed sources. Weeds generally become a problem in disturbed areas. Most of the weeds are fresh water species and associated with either fresh water discharge around drains, or garden refuse dumping on the edge of the reserves.

Weed and non-local plants in the reserve system include Kikuyu grass *Pennisetum clandestinum*, Couch grass *Cynodon dactylon*, Buffalo Grass *Stenotaphrum secundatum*, Bulrush *Typha orientalis*, Italian Poplar *Poplus italica*, *Casuarina glauca*, *Canna generalis*, *Cyperus haspan*, *Vitis vinifera*, *Acacia longifolia*, *Schinus terebinthifoliua*and Pigface *Carpobrotus edulis*.

Weed control through herbicide use on Swan River foreshores is being trialled to ensure the river and foreshore conservation values are not affected. Disturbance caused by urban water drainage causes much of the weed problem. This can be solved by rationalizing the drainage system as well as community education to reduce the influx of fresh water and dumping of garden refuse.

Public access into the reserve system is restricted to boat access or by foot. Disease and weed introduction is not a threat. However, every effort should be made to minimise the possible introduction of weed seed or disease while carrying out any necessary management activity.

RECOMMENDATIONS:

1. **Identify, map and maintain records of all known weeds and non-local species. (M).**

2. **Develop a program to control and eradicate weeds and non-local species on a priority basis and in stages, while considering the effect the program has on native species (M).**

3. **Monitor any effects a control program has on the reserve system's conservation values and make changes to procedures if required (M).**

4. **Avoid any unnecessary disturbance to soil and minimise the possibility of introducing weeds, seed or disease while carrying out management activities (M).**

17. PETS AND FERAL ANIMALS

The objectives are to:

- **Protect the reserve system's conservation values from the negative impacts of pets.**
- **Minimise the impact feral animals and their control have on the reserve system's conservation values.**

Pets, in particular dogs and cats, can disturb wildlife and Park visitors and can impede native fauna activity because of their presence and smell. They can also introduce weeds and disease and foul recreation sites. Dogs are often seen interfering with waders and waterbirds within the reserve system. Pets are not permitted in the reserve system and enforcing this will be very important to maintain the reserve system's conservation values. Waders and waterbirds, as a key conservation value, are threatened by both cats and dogs entering the reserve system. The Dog Act under local government By-Laws can be used by local authorities to require that dogs remain on a leash in nearby local government reserves. Further fencing at Alfred Cove will also be important to exclude dogs from the Nature Reserve (See Day Use, Access and Nature Walks).

Feral animals such as the house mouse *Mus musculus*, the black rat *Rattus rattus*, feral cat *Felis catus*, rabbit *Oryctolagus cuniculus* and fox *Vulpes vulpes* may occur within the reserve system. The fox and feral cat are a major threat to wildlife and if detected or are suspected to be present, will need to be controlled. A variety of contol techniques can be used depending on the area and its neighbouring locations. Any control measures involving poisoning house mice and black rats need to consider the risk to those native birds that feed extensively on rodents.

Rabbits can affect efforts to revegetate areas as they feed on fresh new plant growth. Rabbits can also be controlled through baiting if they are causing problems. The house mouse and black rats living on Swan River foreshores have been on the increase and their numbers should be assessed and a control program considered as they can be a health threat to humans.

RECOMMENDATIONS:

1. **Inform visitors and neighbours living near the reserve system about the negative impacts of pets, emphasising that pets are not permitted in the reserve system (H).**

2. **Monitor feral animal populations and regularly assess the effectiveness of control programs as well as any possible threat from the control programs to non-target species (M).**

18. FIRE

The objective is to protect people, property and conservation values in and near the reserves by appropriate fire management and suppression techniques.

Wildfire threat in and around Alfred Cove, Pelican Point and Milyu has been analysed and a strategy that considers values at risk, chance of ignition, fire behavior and suppression response capability has been adopted. Suppression is the responsibility of the WA Fire Brigade. However, an interactive capability between the WA Fire Brigade and CALM is being developed. The WA Fire Brigade is better located than CALM to respond quickly to a wildfire on these locations.

Values at risk include neighbouring reserves and facilities and infrastructure within them, such as Matilda Bay and the Point Waylen communication facilities. Other reserves and private properties are more isolated by sealed roads or areas of lawn. However, people and property could be threatened, particularly in windy conditions. Peak use of the reserve system and adjoining areas by people also coincides with the high fire risk summer period.

Conservation values at risk include vegetation, flora and wildlife habitat. The reserve areas are small enough not to need internal fire breaks or a strategy to prescribe burn within the Reserves to regenerate specific species or create habitats for specific fauna. Fuel reduced buffers can be created by slashing or could combine slashing and burning if appropriate.

A cooperative approach with local WA Fire Brigades, local government authorities and neighbouring landholders is encouraged so that responsibility for wildfire control is shared. Mutual aid arrangements with the WA Fire Brigades will be encouraged to ensure an effective fire fighting force is in place.

RECOMMENDATIONS:

1. **Develop and adopt a fire suppression strategy in consultation with the WA Fire Brigade (M).**

2. **Continue to develop an interactive capability with the WA Fire Brigade to ensure an effective fire suppression force (M).**

3. **Maintain strategically placed fuel reduction areas where required (H).**

4. **Contain all fires in or threatening the reserves, considering values at risk, disease risk, fire behaviour and ecological values (H).**

RECREATION

19. RECREATION OVERVIEW

The Swan River is a major recreation resource used extensively by the community and tourists. Pressure on the reserve system's conservation values is likely to increase as the population and numbers of Park users increase. Low impact recreation activities and those that increase awareness, appreciation and understanding of the estuarine environment will be favoured and encouraged within the Park. Providing better information and emphasising educational programs will be an important part of increasing this awareness, appreciation and understanding.

20. LINE FISHING

The objective is to manage line fishing and associated activities to maintain fish populations and species and protect the environment.

Recreational fishing is a popular activity on the Swan River. Management aims to maintain and protect fish stocks and species that are restricted in abundance or distribution. The fishery resource depends on suitable water quality and habitats for all stages of fish life being maintained. The use of unattended lines and set nets by recreational fishers is not permitted in Western Australian waters under the Fish Resources Management Act. Recreational fishing is controlled by the Fisheries Department under the Fish Resources Management Act and Statewide bag limits apply within the Park. Common species include the yellow-eyed mullet, sea mullet, Perth herring, tailor, cobbler and black bream.

RECOMMENDATIONS:

1. **Continue to allow recreational line fishing in the Park according to the Fish Resources Management Act (H).**

2. **Monitor and manage the Park's recreational line fishery to sustain numbers and species (H).**

21. COLLECTING

The objective is to protect the conservation values of the Park by managing and controlling the collecting of invertebrate species.

Collecting of worms, molluscs or other estuarine invertebrate species, unless otherwise provided for in this plan, is not permitted in the marine park. Collecting of live animals may have a considerable impact on and consequently detract from, the conservation, recreational and educational values of the Park. A permit may be given to collect invertebrate species for genuine educational and scientific research purposes.

RECOMMENDATIONS:

1. **Prohibit collection of invertebrate species within the reserve system unless otherwise provided for in this Plan (H).**

2. **Provide for limited collection of invertebrates for educational and scientific research purposes by permit, in accordance with the Wildlife Conservation Act (M).**

22. PRAWNING AND CRABBING

The objective are to:

- **Minimise the impact of prawning and crabbing on waders and waterbirds.**
- **Minimise the impact of prawning and crabbing on important wildlife habitats and other conservation values of the reserve system.**

The Swan River is popular for king prawns (*Penaeus latisulcatus*), school prawns (*Melapenaeus dalli*) and blue manna crabs (*Portunus pelagicus*) particularly during summer. Prawning and crabbing and associated activities will not be permitted in the Nature Reserve areas and banning these activities in the wildlife protection zone, which generally encompasses the shallow mud flats close to shore, will be considered. Prawning and crabbing in the mud flats may reduce the abundance and biomass of foraging gastropods, remove floating algae and its associated epifauna, remove or expose previously buried shells and disturb wader and waterbird roosting at night (See Waders and other Waterbirds).

The impact from walking in the mud flats and shallows may be detrimental to the ongoing production of invertebrate fauna affecting the viability of these areas to support the diverse range of aquatic fauna and waterbirds (Rose, 1987). The results of a preliminary study on the impact of recreational prawning in the Alfred Cove, Point

Waylen area were not conclusive, however, a more elaborate study may show conclusively that the impact on the benthos is significant (Rose pers. comm.). Subject to results of further investigations, CALM could classify the special purpose (wildlife protection) zone within the Marine Park a prohibited or limited access area under Section 62 of the CALM Act to minimise disturbance to waders and waterbirds and their habitat. This would mean that in these mud flats and shallows entry would be either restricted or prohibited.

Prawning and crabbing have resulted in other impacts, particularly the by-catch and rubbish left behind that supports a feral animal population, including cats, which also hunt birds and other native fauna. Using the CALM nature reserves for boat landing or as a base for this recreational fishery will not be permitted. By-catch has also occasionally included species with high conservation value such as the gastropod *Coxiella striatula*.

No recreational fishing licence is currently required to take prawns or crabs although bag and size limits or gear restrictions and seasons apply under the Fish Resource Management Act to help manage this fishery.

RECOMMENDATIONS:

1. **Prohibit recreational prawning and crabbing and related activities including any boat landing in the nature reserves and proposed nature reserve areas (H).**

2. **Further assess the impact of prawning and crabbing on the conservation values of the reserve system particularly in relation to disturbance of waders, waterbirds and the impact on benthic fauna.**

3. **Consider prohibiting recreational prawning and crabbing and related activities in the wildlife protection zone within the Marine Park.**

4. **Consider declaring the wildlife protection zone, within the Marine Park, a prohibited or limited access area under Section 62 of the CALM Act (H).**

5. **Allow prawns and crabs to be collected in other areas of the Marine Park according to restrictions and regulations under the Fish Resources Management Act (M).**

23. SPEARFISHING

The objective is to protect wildife and their habitat from the impact of spearfishing activities.

Spearfishing has the potential to be environmentally damaging to fish and waterbirds and their habitats and may cause disturbance to fish and bird communities. Spearfishing can also rapidly deplete fish stocks in accessible areas. Spearfishing will not be permitted in the nature reserves or the Marine Park.

RECOMMENDATION:

1. **Prohibit the use of gidgees, spearguns or any form of spear, as defined under the Fish Resources Management Act, in the nature reserve areas and in the Marine Park (H).**

24. BOATING AND SURFACE WATER SPORTS

The objective is to provide for boating and surface water sports in specific areas as long as the activities are compatible with maintaining conservation values.

Boats can be launched from a number of locations on the Swan River adjacent to the Marine Park. The location of launching access largely governs the type of boating use which may occur and determines the level of impact that recreational boaters may have on the estuarine environment.

The types of impacts from recreational boating relevant to management include:

- safety of and conflict between users;
- possible disturbance of important or specially protected species or their habitat; and
- the safety of and disturbance to other recreational users.

The zoning scheme (Section 6) allows for particular uses in the Marine Park to minimise conflicts between surface water sports and other activities. Various areas within the Park are suitable for windsurfing, sailing and boating. Designated areas for water skiing and jet skis already occur at several places on the Swan River and these activities will not be permitted in the Marine Park.

The 8 knot speed limit for vessels under the Navigable Waters Regulations will be enforced in the seagrass protection zones of the Marine Park. Where further protection of wildlife from boating activity is required, the issue will be considered in

respect of the powers provided in the Wildlife Conservation Act.

RECOMMENDATIONS:

1. **Integrate the regulatory and enforcement roles of CALM and the Department of Transport within the Swan Estuary Marine Park (M).**

2. **Prohibit jet skis within the Marine Park and in nearby adjacent areas (H).**

3. **Phase out any boat moorings within the Marine Park through the Department of Transport (M).**

4. **Provide signs and brochures to educate boat users about the statutory 8 knot speed limit under the Navigable Waters Regulations (H).**

5. **Consider gazetting the Marine Park as an 8 knot speed limit area (H).**

25. WILDLIFE OBSERVATION AND INTERACTION

The objective is to provide and promote safe wildlife observation while minimising disturbance to wildlife and their habitat.

Within this plan wildlife interaction refers to any activity where people and wildlife interact without physical contact. This does not include recreational or commercial capture and removal of a species.

The diverse range of waders and waterbirds, which include transequatorial migratory species, can be easily observed from footpaths and cycleways adjacent to the Marine Park. Breeding in the three areas is greatest in Alfred Cove where 30 species have been recorded.

A lookout platform at the edge of the Pelican Point Nature Reserve is used extensively for observing birdlife in the reserve. A similar facility could be developed at Alfred Cove with appropriate interpretation and education opportunities, and its use encouraged through public information.

RECOMMENDATIONS:

1. **Ensure wildlife and waterbird observation and interaction activities comply with the Wildlife Conservation Act and develop appropriate guidelines as required (M).**

2. **Provide information to the public about opportunities and guidelines for observing wildlife in the reserve system (H).**

3. **Monitor the impact observation and interaction activity has on wildlife and take action where adverse impacts are occurring (H).**

4. **Discourage feeding of wildlife by any visitors to the reserve system (H).**

5. **Provide wildlife observation facilities and interpretive information in appropriate locations in the reserve system (See Section 24) (H).**

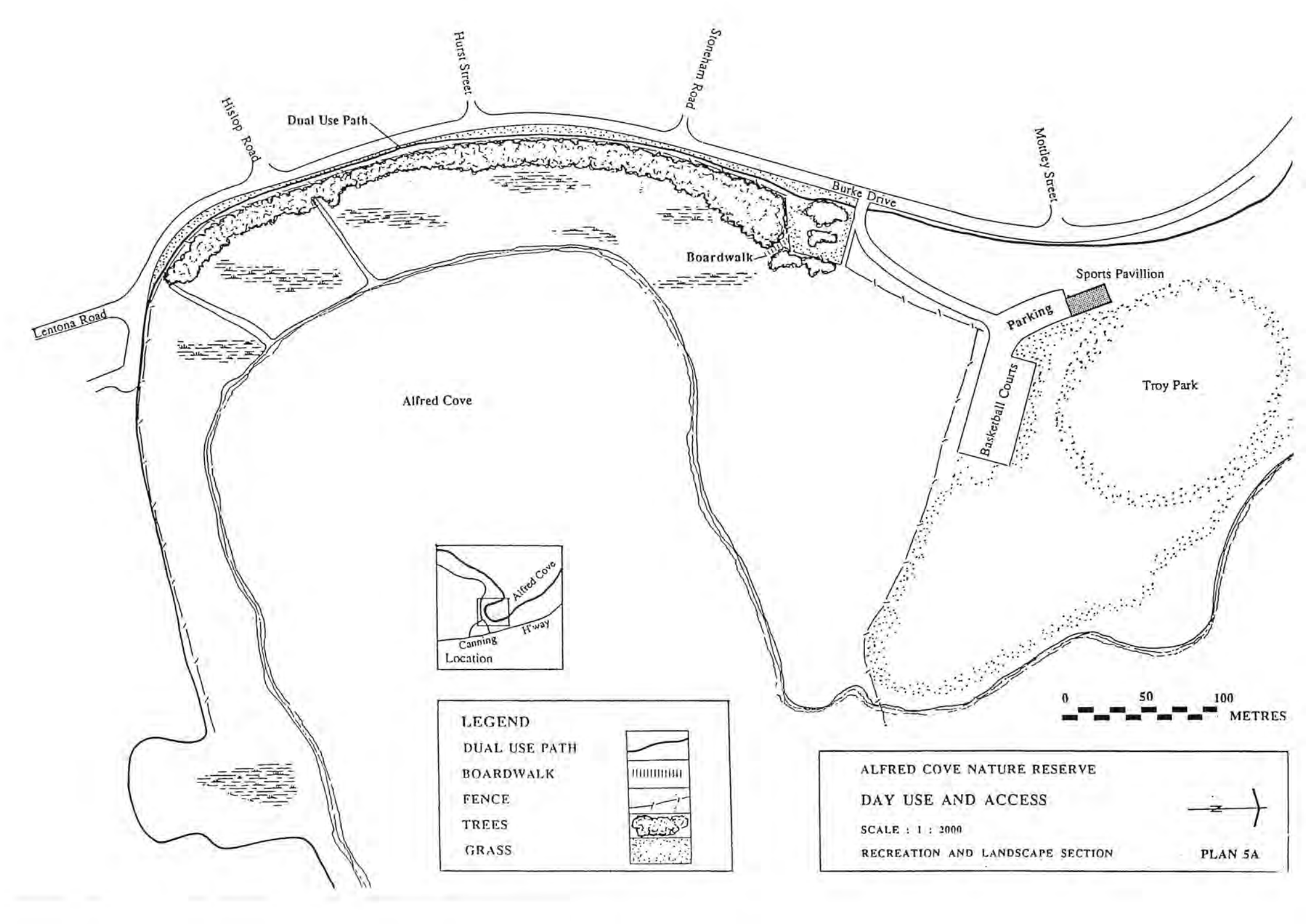
26. DAY-USE, ACCESS AND NATURE WALKS

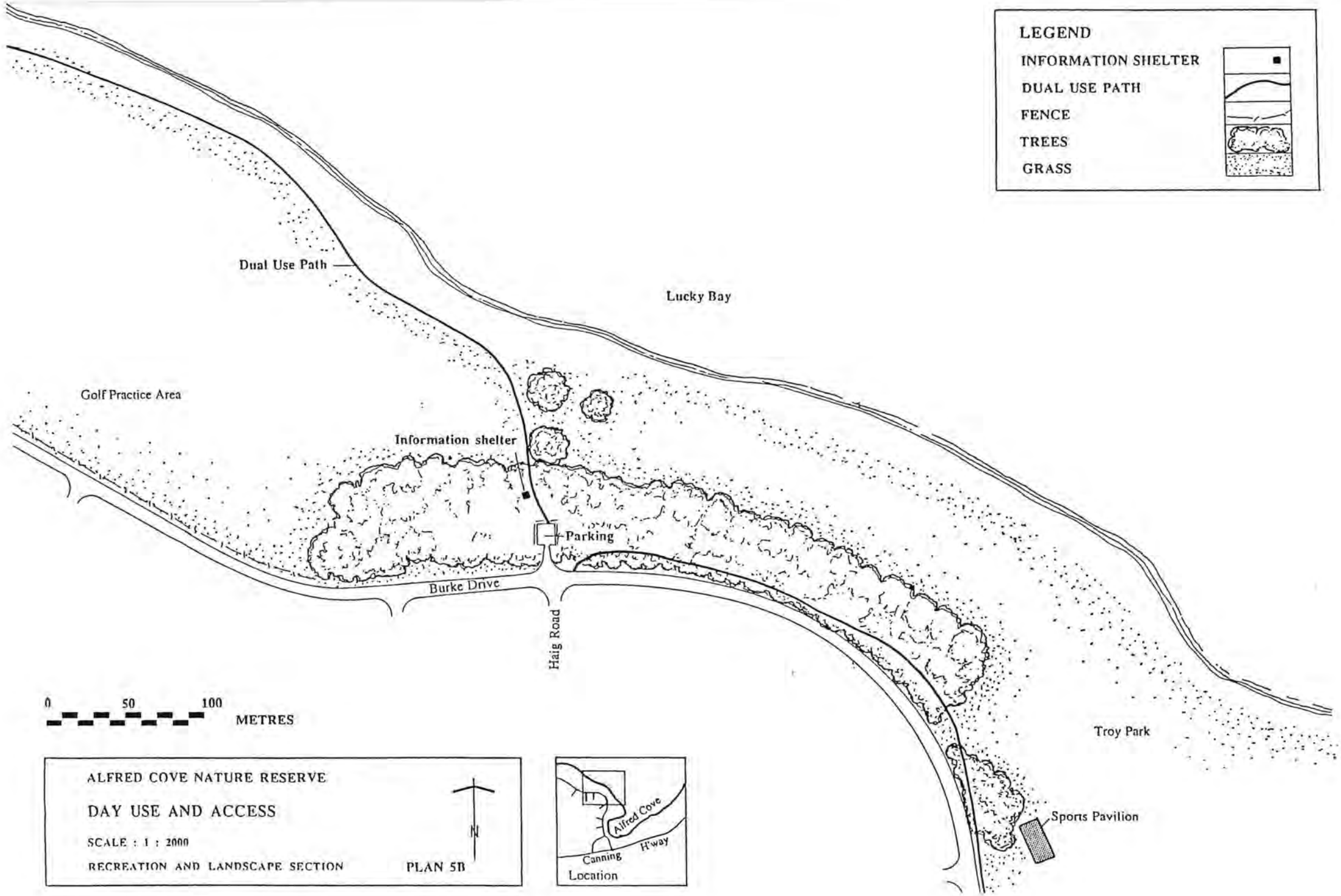
The objective is to provide walks, information, observation points and day-use facilities appropriate to the environmental setting that encourage visitor enjoyment and understanding of the reserve system's values.

Dual use pathways for bikes and pedestrians are present along the outside edge of Alfred Cove and Milyu. An elevated gazebo with information on waterbirds is located at Pelican Point and an information shelter is provided at Milyu.

Access to the Milyu information shelter is via a dual use path and Kwinana Freeway overpasses. One overpass connects to one end of the Nature Reserve and another connects to the Como Reserve adjacent to Milyu. The Como Reserve, which is under the control of the City of South Perth, has recreational facilities including a children's play area, picnic tables and a barbecue. The South Perth Heritage Trail is also located near the Como Beach Recreation Area. Further waterbird observation facilities are not needed at Milyu because birds can be sighted along the length of the foreshore.

At Alfred Cove, the dual use path provides a number of locations for nature observation into the Nature Reserve and Marine Park. Neighbouring reserves under the control of the City of Melville provide space for more active recreational pursuits. The Melville Historical Cultural Trail is available for long nature walks in this area. Alfred Cove has further need for more information displays on waterbirds. A boardwalk is proposed for wildlife observation near Point Waylen looking back into Alfred Cove with views of important waterbird feeding and roosting areas (See Map 5A).


Hurst Street
Stoneham Road
Hislop Road
Dual Use Path
Burke Drive
Mottley Street
Boardwalk
Sports Pavillion
Parking
Lentona Road
Basketball Courts
Troy Park
Alfred Cove
Alfred Cove
H'way
Canning
Location
0
50
100
METRES
LEGEND
DUAL USE PATH
BOARDWALK
FENCE
TREES
GRASS
ALFRED COVE NATURE RESERVE
DAY USE AND ACCESS
SCALE : 1 : 2000
RECREATION AND LANDSCAPE SECTION
PLAN 5A


LEGEND
INFORMATION SHELTER
DUAL USE PATH
FENCE
TREES
GRASS
Dual Use Path
Lucky Bay
Golf Practice Area
Information shelter
Parking
Burke Drive
Haig Road
0
50
100
METRES
Troy Park
Sports Pavilion
ALFRED COVE NATURE RESERVE
DAY USE AND ACCESS
SCALE : 1 : 2000
RECREATION AND LANDSCAPE SECTION
PLAN 5B
N
Alfred Cove
Canning
H'way
Location

Information associated with the boardwalk will be provided and a future possible information centre could be located at Location 5519 (Map 2) subject to this area being added to the reserve system. An information shelter is proposed for the Alfred Cove Nature Reserve opposite Haig Road in an area of native vegetation near the dual use path (See Map 5B). The fencing from the eastern section of Alfred Cove should be extended to enclose the Point Waylen area, with management access and a self closing gate provided for boardwalk access.

RECOMMENDATIONS:

1. **Design and develop recreational facilities in accordance with the Department's Policy Statement No. 18 Recreation, Tourism and Visitor Services (M).**

2. **Design and construct a boardwalk and possible information centre near Point Waylen that provides for waterbird observation and includes interpretive information as shown in Map 5A (M).**

3. **Provide an Information Shelter opposite Haig Road in the area of native vegetation near the dual-use path as shown in Map 5B (M).**

4. **Extend fencing of Alfred Cove to enclose Alfred Cove and Point Waylen. Provide for management access and instal a self closing gate for boardwalk access (M).**

27. ORGANISED EVENTS

The objective is to protect the reserve system's conservation values from the negative impacts of organised events in the area.

Organised events such as fishing competitions, the annual Sky Show and other sporting events, can affect the reserve system. Management problems can occur that either adversely affect the environment or result in conflicts with other users. Organised events involve close liaison with other organizations such as local government agencies, the Department of Transport and the Swan River Trust.

RECOMMENDATIONS:

1. **Seek the support of competitors and the public who are witnessing events to protect the reserve system's values (H).**

2. **Charge fees or obtain bonds from the organizers of special events, if required, to cover costs that may incur, in accordance with CALM policy (H).**

COMMUNITY RELATIONS

28. INFORMATION, PROMOTION AND INTERPRETATION

The objective is to increase awareness, appreciation and understanding of the reserve system and the concept of managing river, estuarine, wetland and marine systems.

Information about the reserve system, its wildlife and habitats should be provided to the local and broader communities through a range of ways. Signs should be provided that inform the public where zones within the reserve system are located as well as interpretive information on conservation values. Ongoing liaison should occur between local government agencies, Fisheries Department, Swan River Trust, Department of Transport, interest groups, other relevant organisations, groups and individuals and CALM. An information interpretation shelter, similar to that provided at Milyu, is proposed for Alfred Cove.

Interpretation will be provided at Alfred Cove and Point Waylen in association with the proposed boardwalk.

Important features of the reserve system should be incorporated in a larger strategy that complements and supplements planned and existing interpretive facilities and activities in other related areas. The migratory wader waterbird theme, for example, will be related to other wetlands in the State important to migratory species as well as those countries in the northern hemisphere where they reside. Scientific study groups and organisations, such as the Royal Australasian Ornithologists Union and CALM's Science and Information Division, have a wealth of information on these three areas and interpretive programs could be tied in with ongoing monitoring. Interpretation can also tie in other related river systems such as the neighbouring Canning River, other similar estuarine systems and other marine parks within the State.

RECOMMENDATIONS:

1. **Develop and implement a communications plan that incorporates information, education, promotion and interpretation programs and strategies (H).**

2. **Liaise with scientific study groups and organisations to develop an information base (M).**

3. **Provide interpretive information on the geology, geomorphology, soils and vegetation of the reserve system (L).**

4. **Investigate the potential of scientific study activities in interpretation programs (M).**

5. **Continue to provide information to the local and broader communities through a range of means, including distributing CALM brochures and releasing media articles (M).**

6. **Develop interpretive signs associated with proposed boardwalks (H).**

7. **Develop further interpretive information for information shelters including zone locations within the reserve system (H).**

29. EDUCATION

The objective is to encourage educational and other groups to use the reserve system in ways that minimise their impacts while maximising educational benefits.

The Swan Estuary Marine Park and its adjacent reserves are both easily accessible to educational groups and a valuable educational resource. All three areas have been used extensively for school group excursions. The Perth Zoo, South Perth Primary School and the City of South Perth have been involved in a revegetation program at Milyu that has been going for a number of years and was awarded a Greening Australia (WA) prize in recent years. All three areas have been the subject of studies by tertiary institutions culminating in the production of valuable information that has been useful in preparing this plan.

Student projects and interpretive excursions have great educational value as well as a great deal of potential to add to the accumulated knowledge about the areas with the added advantage of being able to contribute to the development of management strategies. Close liaison between CALM and school groups can be beneficial to both parties particularly if a long-term approach to monitoring is planned and students can feel part of an important management initiative.

RECOMMENDATIONS:

1. **Assist and encourage educational programs and group activities (M).**

2. **Review and combine educational and monitoring programs where practical to maximise benefits to both CALM managers and the students and teachers involved (M).**

3. **Modify any educational activities that are not compatible with other values and uses within the reserve system (L).**

30. COMMUNITY INVOLVEMENT

The objective is to liaise with the community and encourage and facilitate its involvement in management.

The community, be it individuals, organisations or special interest groups, can become involved in managing the reserve system. Students, local residents and State and local government agencies can become involved in educational, research and rehabilitation programs.

The South Perth Primary School, the Perth Zoo, the City of South Perth and the Royal Australasian Ornithologists Union have contributed to both on-going management and data collection which have influenced management strategies. A Friends group has recently been formed to encourage individuals to continue a rehabilitation project at Milyu Nature Reserve that started over 15 years ago (City of South Perth, 1993).

RECOMMENDATIONS:

1. **Maintain and foster close communications with organisations and groups actively involved in the reserve system (H).**

2. **Identify recommendations within this Plan that can be implemented by community involvement (M).**

3. **Support and integrate programs that involve community organisations, educational groups and volunteers in managing and monitoring the reserve system and surrounding areas (H).**

COMMERCIAL AND OTHER USES

31. COMMERCIAL USE OVERVIEW

The commercial directions for this reserve system will focus on developing nature-based tourism programs that highlight the area's conservation values, particularly as a feeding ground for migratory waders and other waterbirds.

Fisheries activities in marine parks are regulated under the Fish Resources Management Act and managed by the Fisheries Department in consultation with CALM. The only licensed commercial fishing activity in the Marine Park is net fishing, a traditional use involving only a small number of operators. Recreational fishing pressures are expected to increase but should not affect the viability of the commercial fishing industry. Commercial wind surfing equipment hire and instruction operations are permitted to a limited extent (See Section 33).

Other commercial uses of the reserve system are not likely to play a major role (See Section 35). Licences with conditions for any commercial recreational uses will be necessary to ensure impacts on other reserve system values are minimised and manageable.

32. COMMERCIAL FISHING

The objective is to maintain long-term sustainability of fish populations, their habitat and the commercial fishing industry.

Currently 10 commercial fishermen operate in the Swan-Canning River system using techniques that have changed very little over the last 50 years. Small narrow boats with haul and set nets are used. Motors are used only to get the boat near the area to be fished and the best fishing occurs during the quiet of early morning and late at night.

The shallow areas within the Marine Park are productive fishing grounds. This traditional way of fishing has a minimal impact because the gear used is selective in terms of size of fish caught, the net length and mesh size required. The majority of fish species caught, such as sea mullet, can only be taken with a net. Some species are caught both by recreational anglers and commercial net fishermen but there is little conflict. The only species which has been declining significantly in the last few years is cobbler. This popular eating species has been targeted both by recreational and commercial fishers.

Out of the 10 commercial fishermen operating in the Swan Canning River System, only six are making a full time living from the profession. No new estuarine fishing licences are being issued within this 'restricted entry fishery' and licences can only be transferred to a close member of the licensee's family or a trainee after approval of the Minister for Fisheries. The number of commercial fishermen has been reduced from over 60 to 10 in the last 50 years.

Commercial net fishing within the Swan Estuary Marine Park is considered to be a closely managed and minimal impact activity with a traditional, historical value, which will continue to be permitted subject to a limited number of licensed operators to sustain the estuarine fishery. The operating times early in the morning and late at night also minimise the impact on waterbird and recreational activities. The sight of this traditional activity occurring during these times of the day also has some visual aesthetic appeal.

RECOMMENDATIONS:

1. **Permit commercial net fishing as regulated and managed under the Fish Resources Management Act, to continue in the Marine Park waters up to the vegetation line (H).**

2. **Liaise with the Fisheries Department to sustain cobbler and other fish species and populations in the Swan River (H).**

3. **Ensure that commercial net fishing has a minimal impact on other Park values (H).**

33. COMMERCIAL CONCESSIONS

The objective is to ensure commercial concessions in and near the reserve system are environmentally sensitive and are of educative or interpretive value to visitors.

A commercial concession is a right granted by way of licence for occupation or use of an area of land or water managed by CALM. Each proposal for a concession by way of licence will require approval of the NPNCA and the Minister. All compatible commercial operations operating within the reserve system are to conform to the management plan and be licensed under the provisions of the

Conservation and Land Management Regulations 1992.

The potential exists to establish nature-based tourism activities by licensed tour operators, particularly to observe waders and waterbirds. Some lease arrangement may be appropriate if the Point Waylen communications building becomes part of the reserve system. Preference will be given to some community-based organization concerned with nature conservation or an organization that could utilise the existing communications facility, such as a radio station.

Other licence or lease arrangements may need to be negotiated where facilities or services already established in the reserve system prove to be in conflict with other activities or have an impact on conservation values. Net revenue acquired from licence or lease fees would be used for management of the reserve system.

RECOMMENDATIONS:

1. **Develop commercial concession operations that are consistent with CALM policy and the objectives of this Plan (H).**

2. **Require commercial operators to acquire licences and encourage activities with interpretive, educational and nature-based orientation within the reserve system (H).**

3. **Ensure all commercial operations within the reserve system are licensed (H).**

34. WATER TRANSPORT SERVICES

The objective is to ensure water transport services operating in or near the Park are environmentally and socially sensitive and, where possible, provide educative or interpretive value to visitors.

Water transport services in the Swan River which go near Marine Park waters are valuable for promoting Park values both in terms of written material such as posters and brochures, and also through ferry boat operators speaking to their passengers during the trip.

Water transport services can also have an adverse impact on the Reserve system's values if they travel too close to the shoreline. Backwash from boats can cause wakes that accelerates erosion rates, particularly at Pelican Point. Educating transport service operators of this impact could reduce it significantly.

RECOMMENDATIONS:

1. **Liaise with the Department of Transport, Swan River Trust and water transport services to promote and disperse information on the Swan Estuary Marine Park and adjacent CALM reserves (M).**

2. **Encourage water transport service operators to be sensitive to the Swan Estuary and foreshore values and to minimise their impact on the values in the reserve system (L).**

35. STRUCTURES, FACILITIES AND DEVELOPMENTS

The objective is to approve and establish only those structures, facilities and developments that are compatible with other Park values and management objectives.

Markers for assisting boat navigation within marine parks are installed and maintained by the Department of Transport in consultation with CALM. Approval for moorings, launching ramps, platforms or any other structures in the reserve system is required from the Department of Transport in consultation with CALM. Design, location, licensing and installation is the responsibility of the Department of Transport. Further structures, facilities and developments are not likely unless they are designed to enable greater appreciation of the nature conservation values of the reserve system or help to demarcate management zones to protect conservation values.

Mineral or petroleum resource exploration and development are unlikely to occur anywhere within or near the marine park as this area is considered, from available geological evidence, to be non-prospective. Access to Marine Park areas to explore or develop resources is subject to legislation, State Government policy and interdepartmental procedures between the Departments of Minerals and Energy, CALM, Swan River Trust and the Department of Environmental Protection.

RECOMMENDATIONS:

1. **Liaise with the Swan River Trust, Department of Transport, local government and other relevant**

government departments on matters involving structures, facilities and development (M).

2. **Prohibit any further structures, facilities and developments within the reserve system unless approved by the appropriate authority or authorities (M).**

INTERACTION WITH NEARBY LANDS AND WATERS

36. PRIVATE PROPERTY

The objective is to encourage complementary management of nearby private property with the reserve system.

Private property owners near the reserve system should be encouraged to become familiar with the management plan's objectives. The social and environmental sensitivity of any proposed development is assessed through the local government process with State consultation, advice or impact assessment if required. Residential density and infrastructure can influence drainage quantity and quality. Residential groundwater extraction and domestic water pollution inputs are concerns that can be addressed through educational programs and controls and regulations. Private property owners near the reserve system can be encouraged to use water wisely, to protect and replant local native species and to reduce nutrient run-off and pollution. Private property owners near the reserve system should also be informed of the importance of keeping pets from straying onto the reserve system (See Section 17).

RECOMMENDATIONS:

1. **Inform near or adjoining private property owners of the reserve system's values and sensitivities and the various ways that they can participate in the planning process and in ongoing management programs (M).**

2. **Encourage private property owners to manage their properties in sympathy with the management objectives of this Plan (M).**

37. GOVERNMENT LANDS AND WATERS

The objective is to encourage complementary management of Government lands and waters that are adjacent to the reserve system.

Local government land adjacent to and close to the reserve system includes that held by the Cities of South Perth, Melville, Subiaco and Nedlands. Foreshore reserves under local government control require complementary management with the CALM conservation reserve system to ensure management plan objectives can be met. Management plans for these local government foreshore reserves are important particularly where conservation values are at risk or where conflict with activities is occurring.

State Government departments with land or water management responsibilities in the reserve system or nearby include the Swan River Trust, the Department of Transport, the Fisheries Department, the Water Corporation and the Department of Land Administration. The Point Waylen area held by the Department of Land Administration includes vacant Crown land and an area leased for communication purposes. This area, which is almost an enclave in the reserve system, is an important wader and waterbird feeding area and contains significant fossil sites giving the area a high conservation value.

Main Roads of WA manages roads and their drainage near Milyu and Alfred Cove. Road design, drainage and foreshore stabilisation developments in areas near these nature reserves need to be planned in collaboration with CALM, the Swan River Trust and other relevant government agencies.

RECOMMENDATIONS:

1. **Seek local government and State Government agencies' support for the complementary management of areas near or adjacent to the reserve system (H).**

2. **Encourage and assist local or State Government agencies to assess impacts, plan sympathetically and prepare management plans where conservation values of the reserve system or nearby areas are at risk (H).**

3. **Refer to CALM any development proposal that is likely to have a negative impact on the reserve system's values or which is not consistent with the management objectives of this plan (M).**

RESEARCH AND MONITORING

38. OVERVIEW

Nature conservation and social research have been carried out and data collected by local government, educational institutions and a number of State and Commonwealth Government agencies, including the Swan River Trust, the Fisheries Department, CSIRO and tertiary institutions. There are also cooperative research programs by organizations and institutions proposed or being undertaken by the Western Australian Estuarine Research Foundation. A large number of books, publications and reports are available on the Swan Estuary and its natural and social history and biology.

The Swan River Trust is responsible for planning and managing the Swan River Trust Management area. The Swan Estuary Marine Park and adjacent CALM reserves are within this management area. The Swan River Trust is, therefore, a regional focus and logical central organisation for Swan River research information. All research information specific to the CALM reserve system should be held with CALM's Swan Region Marine Operations Unit, and its Perth District Office. State Government organisations should liaise closely to ensure easy access to all research information.

39. NATURE CONSERVATION

The objectives are to:

- **Identify and increase knowledge of the reserve system's estuarine and terrestrial biota.**
- **Identify and increase knowledge and understanding of the reserve system's natural processes.**
- **Assess and evaluate the environmental impact of activities in the reserve system.**

Research and monitoring in the Swan Estuary Marine Park and the adjacent CALM reserves has included wader and waterbird studies by members of the Royal Australasian Ornithologists Union and CALM research scientists, and fish population studies by the Fisheries Department. CALM has also carried out flora assessments and the Waterways Commission, through the Swan River Trust, has monitored water quality and activity impacts in neighbouring foreshores. Staff and students from Western Australian tertiary institutions have also gathered important information and presented management strategies for areas of the reserve system.

Future studies by a number of State Government agencies will be focussing on water quality of the Swan River. Activity impact studies will be equally important to develop regulations and area restrictions in the Swan River. Of particular importance in the Swan Estuary Marine Park will be evaluating any impact in the special purpose zone for wildlife protection.

RECOMMENDATIONS:

1. **Collate and store research information on the Swan River and its foreshores with the Swan River Trust, CALM's Swan Region Marine Operations Unit and the CALM Perth District Office (M).**

2. **Coordinate research efforts and exchange of information between research agencies on an annual basis, and undertake, commission or encourage projects that assess and evaluate environmental impacts of activities within the reserve system (H).**

3. **Encourage and support research by government agencies, volunteer organisations and educational institutions (H).**

40. SOCIAL RESEARCH

The objectives are to:

- **Monitor use and forecast future recreational demands.**
- **Monitor the impact of visitor use and management activities.**
- **Increase knowledge of cultural values.**

Social research in the reserve system in the past has concentrated in the Alfred Cove area with a number of visitor and neighbour surveys having been carried out. The issue survey carried out during the preparation of this draft plan illustrates the public's concerns about certain activities in the reserve system (See Section 3). Social research at Alfred Cove carried out by Murdoch University Environmental Management students indicated that most visitors were only walking or cycling through the area. People who used the Cove were for the most part a small group of birdwatchers. However, the survey indicated that many more people would use the Cove if bird observation points, a boardwalk or a nature trail were provided. It will be

important to encourage all social research that can assess visitor expectations and perceptions of reserve management.

RECOMMENDATIONS:

1. **Monitor use of the reserve system by assessing patterns and preferences of use. From this information forecast future recreational demands (M).**

2. **Survey visitor expectations and perceptions of reserve management and equity of use (L).**

3. **Encourage volunteers, educational institutions and other agencies to participate in social research projects (M).**

PLAN IMPLEMENTATION

41. STAFFING AND MANAGEMENT

The objective is to ensure that staffing levels are sufficient to manage the reserve system.

CALM's Swan Region Marine Operations Unit is responsible for managing the Swan Estuary Marine Park and CALM's Perth District Office is responsible for ongoing terrestrial reserve management.

CALM provides coordination for an integrated interagency management approach that includes officers from the Swan River Trust, Fisheries Department, Department of Transport and local government authorities.

RECOMMENDATIONS:

1. **Ensure regular interagency liaison between CALM and agencies involved in managing the reserve system and surrounding areas (M).**

2. **Ensure sufficient staff and resources to implement the recommendations of this plan (M).**

42. FUNDING

The objective is to provide sufficient funds to implement this Plan from available resources and through alternative sources.

Implementing the recommendations in this Plan will require some increase in funding particularly to provide the recreational facilities proposed. In addition to the usual budgetary sources, alternative funding could come from special grants, sponsorship or future possible commercial concession operations.

RECOMMENDATIONS:

1. **Ensure sufficient funds to implement this Plan (H).**

2. **Seek revenue to implement this Plan from external sources and from licensing commercial concessions under the CALM Act (H).**

43. PLAN MONITORING AND REVIEW

The objective is to periodically monitor the progress made in implementing this Plan and review the Plan as required.

In the light of new information, the Plan may be revised. Implementation should be reviewed periodically and priorities revised. The NPNCA in its statuatory resposibility has a standard monitoring procedure that guides the review of progress, priority and relevance of strategies, and enables management deficiencies, should they be present, to be addressed. If reviews indicate it is necessary, the CALM Act provides for the plan to be amended or a new plan produced. The term of this Plan will be 10 years. Any proposed revision is subject to NPNCA approval, and if approved will be released for public comment.

RECOMMENDATIONS:

1. **Monitor the implementation of this Plan periodically and review the works programs as required (H).**

2. **Review the Plan, if necessary, in the light of new information (M).**

44. PRIORITY IMPLEMENTATION

The objective is to assign priorities to the recommendations made in this Plan and to implement the Plan accordingly.

The special purpose wildlife protection zone in the intertidal area is important for waders and waterbirds and juvenile fish and is a focus for protection and conservation measures. Recommendations that are specific to this area will be given a high priority. Conserving the wetland and surrounding vegetation will also be as high a priority as protecting and conserving the wildlife habitat, particularly for avifauna.

The scientific study and educational values of this reserve system will also be developed and promoted to enhance the conservation values and heighten community awareness and support for protecting and conserving values. It will be a high priority to inform the community of the zoning scheme area restrictions and activity regulations.

Recommendations are prioritised into high (H), medium (M) and low (L) (Table 3). While many

recommendations have become standard practice, higher priority will be given to any new initiatives or prescriptions for actions and developments that represent positive new directions for management. Priorities will be reviewed on an annual basis or as circumstances change and a need for changing of priorities becomes apparent.

RECOMMENDATIONS:

1. **Seek resources to implement the recommendations of this plan (H).**

2. **Review periodically the recommendation priorities detailed in this Plan (M).**

TABLE 3 MANAGEMENT PRIORITIES

(by Section and Recommendation)

HIGH PRIORITY

5. TENURE AND BOUNDARIES
   1. Identify areas of low lying vegetation such as samphire flats, important for waders and waterbirds in the Marine Park, and extend the three land-based CALM reserves from high water mark to include these areas (H).
   3. Change the tenure and purpose of the Pelican Point Reserve to nature reserve for flora and fauna conservation (H).

7. INTERAGENCY RESPONSIBILITIES AND INTEGRATED OPERATIONS
   1. Develop a Memorandum of Understanding between the Swan River Trust and CALM that sets down guidelines and procedures for management responsibilities in the Marine Park area (H).

6. ZONING
   1. Implement the zoning scheme, and survey and mark zone boundaries on the land and in the estuary (H).
   2. Review the zoning scheme as more information on the reserve system's values and the impacts of various activities becomes available (H).

7. INTERAGENCY RESPONSIBILITIES AND INTEGRATED OPERATIONS
   4. Coordinate efforts with Government and volunteer agencies to rescue wildlife as required (H).

10. FLORA, FAUNA AND HABITAT
   2. Protect and enhance areas with native species, particularly those vegetation communities and species important to the overall health and vitality of the ecosystem (See Rehabilitation) (H).
   3. Locate important flora and fauna habitats, priority species and fire sensitive species, and develop management recommendations for their conservation, particularly preceding any new recreational site development or burning operation (H).
   4. Provide visitors with opportunities to observe and increase their knowledge of the Park's flora, fauna and habitats (H).
   5. Protect flora and fauna and habitats from pets, weeds, disease, wildfires or any other physical disturbance (H).
   6. Seek the approval of CALM's Director of Nature Conservation by virtue of the authority delegated to him by the NPNCA before any mosquito and midge control programs or modifications to increase water exchange are carried out (H).
   8. Monitor benthic fauna to assess any impact from trampling, particularly within the wildlife protection special purpose zone (H).

11. WADERS AND WATERBIRDS
   1. Prevent all forms of disturbance of principal wader roosting sites (H).
   2. Prevent disturbance of waders and other waterbirds and their habitat by dogs and cats (H).
   3. Reduce disturbance of waders and other waterbirds and their feeding ground by visitors to acceptable levels (H).
   4. Minimise any adverse environmental impact to the intertidal mud and sandflats (H).
   5. Monitor wader and waterbird numbers feeding or breeding in the reserve system (H).
   6. Provide visitors with opportunities to view and increase their awareness, appreciation and understanding of the Park's waders, waterbirds and their habitat (H).

12. ESTUARINE PROCESSES AND WATER QUALITY
   1. Maintain liaison between local government agencies and CALM to protect and conserve natural processes and water quality (H).
   2. Ensure the existing water quality monitoring program is adequate for the Marine Park's management requirements (H).
   4. Maintain only the minimal number of fully functional drainage lines to reduce the growth of freshwater-dependent weeds in land reserves (H).
   5. Discourage practices that rubbish and pollute the land and water of these Reserves. Encourage clean-up initiatives (H).

14. LANDSCAPES AND SEASCAPES
   3. Ensure that any modification to the natural environment be subtle and remain subordinate to natural elements by borrowing extensively from form, line, colour, texture and scale found commonly in the surrounding land and seascapes (H).
   4. Continue staged rehabilitation programs to protect and enhance native vegetation and landscape values (See Rehabilitation) (H).
   5. Use interpretive and explanatory signs before and during operations that affect visual qualities (H).

HIGH PRIORITY

6. Encourage local authorities, other government agencies and private landholders to use visual resource management skills when siting facilities and signs, selecting site-compatible materials and colours, planning planting programs and planning for utilities, roads and building envelopes (H).

15. REHABILITATION

1. Develop a rehabilitation program for each of the three locations to remove weeds, excess landfill and non-local species in conjunction with the planting of local species (H).
2. Adopt a staged approach to rehabilitation programs to protect and enhance local vegetation and landscape values (H).
3. Take special care not to affect any other flora or fauna conservation values, such as populations of the variegated fairy-wren (H).
4. Maintain and restore local vegetation to its former structure and condition where possible while considering the need to retain views and cultural or aesthetic values of particular species (H).
5. Train staff and others involved in vegetation rehabilitation programs to distinguish between non-local and local species (eg. river gum from flooded gum and swamp oak from salt sheoak) (H).

17. PETS AND FERAL ANIMALS

1. Inform visitors and neighbours living near the reserve system about the negative impacts of pets, emphasising that pets are not permitted in the Reserve system (H).

18. FIRE

3. Maintain strategically placed fuel reduction areas where required (H).
4. Contain all fires in or threatening the reserves, considering values at risk, disease risk, fire behaviour and ecological values (H).

20. LINE FISHING

1. Continue to allow recreational line fishing in the Park according to the Fish Resources Management Act (H).
2. Monitor and manage the Park's recreational line fishery to sustain numbers and species (H).

21. COLLECTING

1. Prohibit collection of invertebrate species within the reserve system unless otherwise provided for in this Plan (H).

22. PRAWNING AND CRABBING

1. Prohibit recreational prawning and crabbing and related activities including any boat landing in the nature reserves and proposed nature reserve areas (H).
2. Further assess the impact of prawning and crabbing on the conservation values of the reserve system particularly in relation to disturbance of waders, waterbirds and the impact on benthic fauna.
   - Consider prohibiting recreational prawning and crabbing and related activities in the wildlife habitat protection zone within the Marine Park.
   - Consider declaring the wildlife habitat protection zone, within the Marine Park, a prohibited or limited access area under Section 62 of the CALM Act (H).

23. SPEARFISHING

1. Prohibit the use of gidgees, spearguns or any form of spear, as defined under the Fish Resources Management Act, in the nature reserve areas and in the Marine Park (H).

24. BOATING AND SURFACE WATER SPORTS

2. Prohibit jet skis within the Marine Park and in nearby adjacent areas (H).
4. Provide signs and brochures to educate boat users about the statutory 8 knot speed limit under the Navigable Waters Regulations (H).
5. Consider gazetting the Marine Park as an 8 knot speed limit area (H).

25. WILDLIFE OBSERVATION AND INTERACTION

2. Provide information to the public about opportunities and guidelines for observing wildlife in the reserve system (H).
3. Monitor the impact observation and interaction activity has on wildlife and take action where adverse impacts are occurring (H).
4. Discourage feeding of wildlife by any visitors to the reserve system (H).
5. Provide wildlife observation facilities and interpretive information in appropriate locations in the reserve system (See Section 24) (H).

27. ORGANISED EVENTS

1. Seek the support of competitors and the public who are witnessing events to protect the reserve system's values (H).
2. Charge fees or obtain bonds from the organizers of special events, if required, to cover costs that may incur, in accordance with CALM policy (H).

28. INFORMATION, PROMOTION AND INTERPRETATION

1. Develop and implement a communications plan that incorporates information, education, promotion and interpretation programs and strategies (H).
6. Develop interpretive signs associated with proposed boardwalks (H).

HIGH PRIORITY

7. Develop further interpretive information for information shelters including zone locations within the Reserve system (H).

30. COMMUNITY INVOLVEMENT

1. Maintain and foster close communications with organisations and groups actively involved in the reserve system (H).
3. Support and integrate programs that involve community organisations, educational groups and volunteers in managing and monitoring the reserve system and surrounding areas (H).

32. COMMERCIAL FISHING

1. Permit commercial net fishing as regulated and managed under the Fish Resources Management Act, to continue in the Marine Park waters up to the vegetation line (H).
2. Liaise with the Fisheries Department to sustain cobbler and other fish species and populations in the Swan River (H).
3. Ensure that commercial net fishing has a minimal impact on other Park values (H).

33. COMMERCIAL CONCESSIONS

1. Develop commercial concession operations that are consistent with CALM policy and the objectives of this Plan (H).
2. Require commercial operators to acquire licences and encourage activities with interpretive, educational and nature-based orientation within the reserve system (H).
3. Ensure all commercial operations within the reserve system are licensed (H).

37. GOVERNMENT LANDS AND WATERS

1. Seek local government and State Government agencies' support for the complementary management of areas near or adjacent to the reserve system (H).
2. Encourage and assist local or State Government agencies to assess impacts, plan sympathetically and prepare management plans where conservation values of the reserve system or nearby areas are at risk (H).

39. NATURE CONSERVATION RESEARCH

2. Coordinate research efforts and exchange of information between research agencies on an annual basis, and undertake, commission or encourage projects that assess and evaluate environmental impacts of activities within the reserve system (H).
3. Encourage and support research by government agencies, volunteer organisations and educational institutions (H).

42. FUNDING

1. Ensure sufficient funds to implement this Plan (H).
2. Seek revenue to implement this Plan from external sources and from licensing commercial concessions under the CALM Act (H).

43. PLAN MONITORING AND REVIEW

1. Monitor the implementation of this Plan periodically and review the works programs as required (H).

44. PRIORITY IMPLEMENTATION

1. Seek resources to implement the recommendations of this plan (H).

MEDIUM PRIORITY

5. TENURE AND BOUNDARIES

2. Investigate other areas important for waders and waterbirds of high conservation and recreation value as future possible additions to the Swan Estuary Marine Park, particularly those adjacent to the Marine Park or adjacent to important foreshore conservation areas (M).
4. Investigate adding to the reserve system at Alfred Cove, Reserve 35486 and a portion of the Burke Drive Road Reserve as nature reserve and Swan Location 5519 as a 5g Reserve. Remove all infrastructure in Swan Location 5519 surplus to management requirements (M).
5. Consider amending the Alfred Cove Nature Reserve boundaries between areas of grass and native vegetation to better reflect local and State Government management responsibilities (M).

7. INTERAGENCY RESPONSIBILITIES AND INTEGRATED OPERATIONS

2. Liaise with all other relevant agencies to ensure integrated management of the Park and its surrounding areas (M).
3. Prevent, or if they occur clean-up, spills of polluting substances in the Marine Park through the State Combat Committee (M).

9. GEOLOGY, GEOMORPHOLOGY AND SOILS

1. Identify important geomorphological features within or near the reserve system that are valuable and vulnerable to damage, including the sand and mud flats in each of the three areas and the fossil sites at Point Waylen and Alfred Cove (M).
2. Protect fossil sites on the reserve system, and inform relevant authorities of the significance of the fossil sites near the reserve system and encourage suitable management (M).

MEDIUM PRIORITY

10. FLORA, FAUNA AND HABITAT

1. Minimise or prevent native vegetation being removed or damaged by reserve maintenance or visitor facility developments (M).
7. Liaise with the Fisheries Department and tertiary institutions to ensure monitoring of fish populations in the Marine Park (M).

12. ESTUARINE PROCESSES AND WATER QUALITY

3. Support monitoring and research programs being undertaken by other government agencies and educational institutions (M).

13. CULTURAL HISTORY

1. Identify and consult with Nyoongar people having cultural links and ongoing interests in the Swan Estuary reserve system (M).
2. Ensure that CALM's obligations under relevant legislation are fulfilled if any activities in the reserve system involve development (M).
3. Liaise with local historical societies and establish an archive of visual and written cultural history, and make this information available for interpretive displays (M).
4. Where appropriate, incorporate information on cultural history of the reserve system into interpretive material (M).

14. LANDSCAPES AND SEASCAPES

1. Consider CALM's Visual Resource Management Policy Statement No. 34 and seek specialist advice when implementing this Plan (M).

16. NON LOCAL PLANTS, WEEDS AND DISEASE

1. Identify, map and maintain records of all known weeds and non-local species. (M).
2. Develop a program to control and eradicate weeds and non-local species on a priority basis and in stages, while considering the effect the program has on native species (M).
3. Monitor any effects a control program has on the reserve system's conservation values and make changes to procedures if required (M).
4. Avoid any unnecessary disturbance to soil and minimise the possibility of introducing weeds, seed or disease while carrying out management activities (M).

17. PETS AND FERAL ANIMALS

2. Monitor feral animal populations and regularly assess the effectiveness of control programs as well as any possible threat from the control programs to non-target species (M).

18. FIRE

1. Develop and adopt a fire suppression strategy in consultation with the WA Fire Brigade (M).
2. Continue to develop an interactive capability with the WA Fire Brigade to ensure an effective fire suppression force (M).

21. COLLECTING

2. Provide for limited collection of invertebrates for educational and scientific research purposes by permit, in accordance with the Wildlife Conservation Act (M).

22. PRAWNING AND CRABBING

5. Allow prawns and crabs to be collected in other areas of the Marine Park according to restrictions and regulations under the Fish Resources Management Act (M).

24. BOATING AND SURFACE WATER SPORTS

1. Integrate the regulatory and enforcement roles of CALM and the Department of Transport within the Swan Estuary Marine Park (M).
3. Phase out any boat moorings within the Marine Park through the Department of Transport (M).

25. WILDLIFE OBSERVATION AND INTERACTION

1. Ensure wildlife and waterbird observation and interaction activities comply with the Wildlife Conservation Act and develop appropriate guidelines as required (M).

26. DAY USE, ACCESS AND NATURE WALKS

1. Design and develop recreational facilities in accordance with the Department's Policy Statement No. 18 Recreation, Tourism and Visitor Services (M).
2. Design and construct a boardwalk and possible information centre near Point Waylen that provides for waterbird observation and includes interpretive information as shown in Map 5A (M).
3. Provide an Information Shelter opposite Haig Road in the area of native vegetation near the dual-use path as shown in Map 5B (M).
4. Extend fencing of Alfred Cove to enclose Alfred Cove and Point Waylen. Provide for management access and instal a self closing gate for boardwalk access (M).

28. INFORMATION, PROMOTION AND INTERPRETATION

2. Liaise with scientific study groups and organisations to develop an information base (M).
4. Investigate the potential of scientific study activities in interpretation programs (M).

MEDIUM PRIORITY

5. Continue to provide information to the local and broader communities through a range of means, including distributing CALM brochures and releasing media articles (M).

29. EDUCATION
1. Assist and encourage educational programs and group activities (M).
2. Review and combine educational and monitoring programs where practical to maximise benefits to both CALM managers and the students and teachers involved (M).

30. COMMUNITY INVOLVEMENT
2. Identify recommendations within this Plan that can be implemented by community involvement (M).

34. WATER TRANSPORT SERVICES
1. Liaise with the Department of Transport, Swan River Trust and water transport services to promote and disperse information on the Swan Estuary Marine Park and adjacent CALM reserves (M).

35. STRUCTURES, FACILITIES AND DEVELOPMENTS
1. Liaise with the Swan River Trust, Department of Transport, local government and other relevant government departments on matters involving structures, facilities and development (M).
2. Prohibit any further structures, facilities and developments within the reserve system unless approved by the appropriate authority or authorities (M).

36. PRIVATE PROPERTY
1. Inform near or adjoining private property owners of the reserve system's values and sensitivities and the various ways that they can participate in the planning process and in ongoing management programs (M).
2. Encourage private property owners to manage their properties in sympathy with the management objectives of this Plan (M).

37. GOVERNMENT LANDS AND WATERS
3. Refer to CALM any development proposal that is likely to have a negative impact on the reserve system's values or which is not consistent with the management objectives of this plan (M).

39. NATURE CONSERVATION RESEARCH
1. Collate and store research and monitoring information on the Swan River and its foreshores with the Swan River Trust, CALM's Swan Region Marine Operations Unit and the CALM Perth District Office (M).

40. SOCIAL RESEARCH
1. Monitor use of the reserve system by counting visitors and boats, recording recreational activity observations and assessing patterns and preferences of use. From this information forecast future recreational demands (M).
3. Encourage volunteers, educational institutions and other agencies to participate in social research projects (M).

41. STAFFING AND PARK MANAGEMENT
1. Ensure regular interagency liaison between CALM and agencies involved in managing the reserve system and surrounding areas (M).
2. Ensure sufficient staff and resources to implement the recommendations of this plan (M).

43. PLAN MONITORING AND REVIEW
2. Review the Plan, if necessary, in the light of new information (M).

44. PRIORITY IMPLEMENTATION
2. Review periodically the recommendation priorities detailed in this Plan (M).

LOW PRIORITY

9. GEOLOGY, GEOMORPHOLOGY AND SOILS
3. Provide interpretive information on the geology, geomorphology and soils of the reserve system (L).

14. LANDSCAPES AND SEASCAPES
2. Classify visual resource features in the management area according to CALM's Visual Management System (CALM, 1994) (L).

28. INFORMATION, PROMOTION AND INTERPRETATION
3. Provide interpretive information on the geology, geomorphology, soils and vegetation of the Reserve system (L).

29. EDUCATION
3. Modify any educational activities that are not compatible with other values and uses within the reserve system (L).

34. WATER TRANSPORT SERVICES
2. Encourage water transport service operators to be sensitive to the Swan Estuary and foreshore values and to minimise their impact on the values in the reserve system (L).

LOW PRIORITY

40. SOCIAL RESEARCH

2. Survey visitor expectations and perceptions of reserve management and equity of use (L).

REFERENCES

Bailey, M. and Creed, K. (1989) *Observations of Bird Species at Pelican Point, Perth Western Australia* The Western Australian Naturalist: Volume 17, No. 8, January, 1989.

Berndt and Berndt (1980) *Aborigines of the West.* University of Western Australia Press. Perth. WA. Second Edition (rev).

Central Perth Foreshore Study Group (1985) *Central Perth Foreshore Study* Interim Report. Report for the Central Perth Area Technical Advisory Committee, Perth, Australia.

Chalmers, P.N., Hodgkin, E.P. and Kendrick, G.W. (1976) Benthic Faunal Changes in a Seasonal Estuary of South-Western Australia. Rec. West. Aust. Mus 4:383-410.

City of South Perth (1993) Western Foreshore Management Plan. Committee including CALM, DEP, MRD, SRT, and community representatives.

Conservation and Land Management (1994) Reading the Remote, Landscape Characters of Western Australia, Co-produced by DPUD and DEP. Published by CALM, Como WA.

Curtin University of WA (1987) *Swan River Estuary Ecology and Management,* Proceedings of a Symposium; Environmental Studies Group Reports.

Curtin University of WA, (1993). *Management Proposal for Pelican Point Reserve.* Student Project: Denise Kirkpatrick

Department of Conservation and Environment (1983) *The Darling System - System 6* Part 1, General Principles and Recommendations Part 2, Recommendations for Specific Localities. Report 13. Department of Conservation and Environment, Perth, Western Australia.

Environmental Protection Authority (1981) *Water Quality Criteria for Marine and Estuarine Waters of WA.* Department of Conservation and Environment, Perth.

Environmental Protection Authority (1986) *Draft Guidelines for Wetland Conservation in the Perth Metropolitan Area.* Department of Conservation and Environment, Perth.

Forbes and Fitzhardinge (1977) *Swan and Canning Rivers Activity Study.* Department of Conservation and Environment, WA.

Government of WA (1988) *Swan River Management Strategy.* Report prepared by the Swan River Management Strategy Task Force.

Hillman, K (1987) The production ecology of the seagrass *Halophila ovalis* in the Swan-Canning Estuary. In J John (ed.) *Swan River Estuary, Ecology and Management.* Curtin University Studies Group Report 1.

Hodgkin, E.P. and Lenanton, R.C. (1981) Estuaries and Coastal Lagoons of South Western Australia. In B.J. Nielson and L.E. Cronin (eds.) *Estuaries and Nutrients.* Humana Press. Clifton.

Jaensch, R.P. (1987) Waterbirds in the Swan-Canning Estuary. In J. John (ed.) *Swan River Estuary, Ecology and Management.* Curtin University Environmental Studies Group Report 1.

Jaensch, R.P. (1988) *Waterbirds in Nature Reserves of South Western Australia,* 1981-1985. RAOU Report.

Keeling, S. (1987) *Alfred Cove - A Wildlife Habitat.* Environmental Protection Authority, Perth, Western Australia. Bulletin 298.

Lenanton, R.C.J. (1978) *Fish and Exploited Crustaceans of the Swan - Canning Estuary* Department of Fisheries and Wildlife, Perth, WA. Report No. 35.

Majer, J.D., Recher, H.F. and Postle A.C. (1994) *Comparison of Arthropod species richness in Eastern and Western Australian Canopies: A contribution to the species number debate* Queensland Museum **36** (1): 121-131. Brisbane.

Murdoch University (1989). *Management Proposal for Alfred Cove.* Students of Environmental Management. July 1989.

Olsen, P.D. (1983). The Water Rat, *Hydromys chrysogaster.* In R. Strahan (ed) *The Australian Museum Complete Book of Australian Mammals.* Angus and Robertson, Sydney. 367-368

Pen, L.J. (1983) *Peripheral Vegetation of the Swan and Canning Estuaries 1981.* Department of Conservation and

Environment, Western Australia; Swan River Management Authority. Bulletin No. 113.

Riggert, T.L. (ed.) (1978) *The Swan River Estuary Development, Management and Preservation.* Swan River Conservation Board, Perth. WA.

Rose, T. (1987) *Comparisons of the Benthic and Zooplankton Communities in the Eutrophic Peel-Harvey and nearby Swan Estuary*

Rose, T. (1994) *A preliminary investigation into the impact of recreational prawning on the benthos at Point Waylen, Alfred Cove, in the Swan Estuary during the autumn of 1987.* Report to WA Department of Conservation and Land Management 22pp

Seddon, G. (1972). *Swan River Landscapes.* University of Western Australia Press. Nedlands, WA.

Slack-Smith, S. (unpublished) *WA. Museum Report,* July 1975.

Swan River Management Strategy Task Force (1988). *Swan River Management Strategy and Public Submissions.* WA State Government

Thurlow, B.H., Chambers, J. and Klemm, V.V. (1986) *Swan-Canning Estuarine System: Environment, Use and the Future.* Waterways Commission Report No. 9. Waterways Commission. Perth. Western Australia.

W.A. Government (1987). *State Counter Disaster Plan,* Pollution of the Sea and Inland Waters. Western Australian Government, Perth, WA.

Wallace, J. (1977) *The macrobenthic invertebrate fauna of Pelican Rocks.* Department of Conservation and Environment and the Public Works Department, Perth, WA.

Yassini, I. and Kendrick, G.W. (1986) *Middle Holocene Ostracodes, Foraminifers and Environments of Beds at Point Waylen, Swan River Estuary, SW Australia.* Alcheringa 12 pp 107-121.

APPENDIX A

Marine Park Zoning

- **General Use Zone**: Provides for commercial and recreational uses consistent with the conservation of natural resources. In this context, conservation includes fishing within the sustainable limits of fish stocks and habitat. Permissible activities are specified by regulations under the Fish Resources Management Act (governing all forms of fishing) and the CALM Act (governing other activities).

- **Recreation Zone**: Provides for recreational use consistent with conservation of natural resources. Recreational fishing is regulated under the Fish Resources Management Act. Commercial operations for recreation activities are regulated under the CALM Act and are permitted where they are compatible with other uses, however commercial fishing is not permitted.

- **Sanctuary Zone**: Provides for the total protection of environmental values and allows recreational uses consistent with the protection of these values. Fishing and the extraction of any other organisms are not permitted. Non-extractive commercial operations are regulated under the CALM Act and may be permitted where they do not conflict with other uses or values.

- **Special Purpose Zone:** Can be specified for any purpose if the General Use, Recreation or Sanctuary zones are not appropriate. Uses consistent with the stated zone purpose will be permitted. These may include a combination of commercial and/or recreational uses.

Sanctuary zones will usually cover areas containing vulnerable or special interest biota, which require the highest possible level of protection. Sanctuary zones should preserve representative areas of the park's marine ecosystems free from disturbance. Sanctuary zones may also be selected to provide visitors or research workers with opportunities to see and study marine life in an undisturbed state.

Activities are defined and regulated within each zone. Regulations which apply to the management of each zone will be promulgated from time to time under the Wildlife Conservation Act, the CALM Act, the Fish Resources Management Act and other relevant legislation.

In all zones, the occurrence of particular natural events (eg. breeding) or incidents (eg. shipwrecks) may require access or use to be restricted for a specified period of time or limited to specified means. These limitations may be declared by the Minister from time to time after appropriate consultation, under Section 62 of the CALM Act.