Gippsland Lakes Ramsar Site
Strategic Management Plan



Victoria The Place To Be

Department of
Sustainability and Environment

Parks Victoria developed this Strategic Management Plan in conjunction with the Department of Sustainability and Environment and key stakeholders, and coordinated the public comment process on the draft document.

This report was prepared with financial support from the National Wetlands Program, under the Natural Heritage Trust.

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This report is prepared without prejudice to any negotiated or litigated outcome of any Native Title Determination Applications covering land or waters within the plan's area. It is acknowledged that any future outcomes of Native Title Determination Applications may necessitate amendment of this report; and the implementation of this plan may require further notifications under the procedures in Division 3 Part 2 of the *Native Title Act 1993* (Cwlth).

The plan is also prepared without prejudice to any future negotiated outcomes between the Government/s and Victorian Aboriginal communities. It is acknowledged that such negotiated outcomes may necessitate amendment of this plan.

Published in July 2003 by the Department of Sustainability and Environment
Level 14, 8 Nicholson Street, East Melbourne, Victoria.

Copies of this document are available at www.dse.vic.gov.au

National Library of Australia

Cataloguing-in-Publication entry

Victoria. Department of Sustainability and Environment.
Gippsland Lakes Ramsar Site: Strategic Management Plan

Bibliography.

ISBN 1 74106 581 X

Cover: Gippsland Lakes (Photographs: Parks Victoria collection)

Printed on recycled paper.

Contents

1 Introduction

The Draft Strategic Management Plan for the Gippsland Lakes Ramsar site is an integral component of a program to develop a comprehensive management framework for Victoria's Wetlands of International Importance (or 'Ramsar sites') listed under the Convention on Wetlands (Ramsar, Iran, 1971). The primary goal of the management framework is to maintain the ecological character of Victoria's Ramsar sites through conservation and wise use.

1.1 Strategic Directions Statement

The Strategic Directions Statement establishes Management Objectives for Victoria's Ramsar sites and Statewide Management Strategies to achieve these objectives (NRE 2002a). The Strategic Management Plans for individual Victorian Ramsar sites apply the Management Objectives and Statewide Management Strategies, promoting a range of specific Site Management Strategies that will maintain, and in some cases, restore the ecological character of the sites. Individual plans cover 10 of Victoria's 11 Ramsar sites. Victoria's eleventh Ramsar site, the Edithvale-Seaford Wetlands, was officially listed in 2001 (EA 2001) and is covered by a separate management plan. A diagram of the framework and related documents is shown below in Figure 1.1.

The Strategic Directions Statement provides the overarching policy framework for managing Ramsar sites in Victoria. It establishes Management Objectives for Ramsar site management across the State, which are then translated to the site-specific level by each of the Strategic Management Plans. The Management Objectives outlined by the Strategic Directions Statement are:

1. Increase the scientific understanding of wetland ecosystems and their management requirements.
2. Maintain or seek to restore appropriate water regimes.
3. Address adverse processes and activities.
4. Manage Ramsar sites within an integrated catchment management framework.
5. Manage resource utilisation on a sustainable basis.
6. Protect, and where appropriate enhance, ecosystem processes, habitats and species.
7. Encourage strong partnerships between management agencies.
8. Promote community awareness and understanding and provide opportunities for involvement in management.
9. Ensure recreational use is consistent with the protection of natural and cultural values.
10. Develop ongoing consistent programs to monitor ecological character.

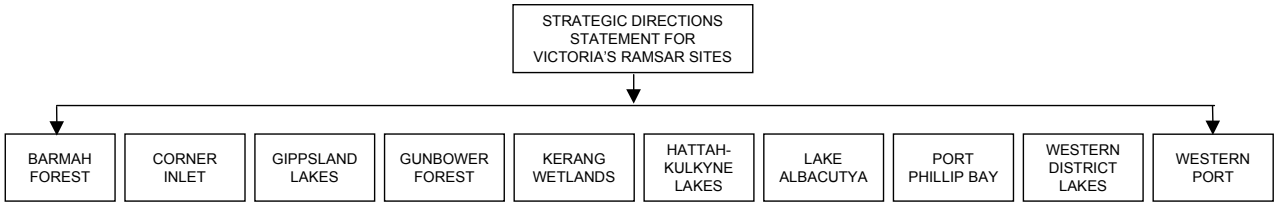
The Strategic Directions Statement also provides background information on the suite of relevant international conventions, as well as related Commonwealth and State policy and legislation which directs and supports the management and utilisation of Ramsar sites. The Strategic Directions Statement and Strategic Management Plans are therefore intended to be read as complementary documents.

1.2 Purpose of the Strategic Management Plan

The primary purpose of the Strategic Management Plan (SMP) for the Gippsland Lakes Ramsar site is to facilitate conservation and wise use of the site so as to maintain, and where practical restore, the ecological values for which it is recognised as a Ramsar wetland. This will be achieved by implementing Site Management Strategies under each of the key objectives (derived from the Strategic Directions Statement).

The SMP for the Gippsland Lakes Ramsar site provides management agencies and stakeholders with an appropriate management framework and the necessary information to ensure that decisions regarding land use and development, and ongoing management are made with full regard for wetland values in environmental, social and economic terms.

Figure 1.1 Framework for the strategic management of Victoria's Ramsar sites



The SMP has been structured in order to:

- provide a comprehensive site description;
- examine the legislation, policy and any related management instruments which direct or otherwise influence management both within and adjacent to the site;
- clarify the roles and responsibilities of management agencies;
- identify the values for which the site is recognised as a Ramsar site;
- assess threats to these values through systematic analysis of both current and potential risks; and
- list and give priority to Site Management Strategies that minimise and, where possible, eliminate identified risks to values.

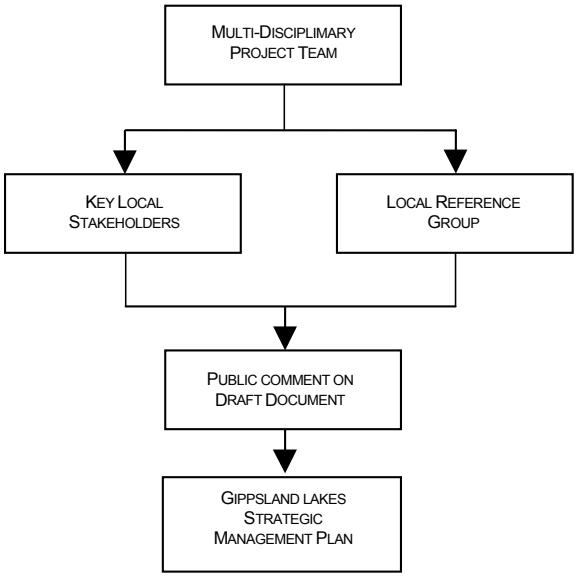
1.3 Consultative framework

The SMP has been developed collaboratively through a multi-disciplinary team comprised of consultants and Parks Victoria staff from regional and central offices. Throughout the process key local stakeholders have provided input (see Figure 1.2).

The SMP is a public document formalised through a government approval process. As such, the SMP was subject to a public comment phase commensurate with State Government consultative processes. All comments received during this public consultation phase were considered in finalising this document.

The SMP is intended to operate over a six-year time frame and will be reviewed every three years to coincide with national reporting requirements under the Convention on Wetlands.

Figure 1.2 Process for developing the SMP for the Gippsland Lakes Ramsar site



2 Ramsar Site Description

2.1 Location

The Gippsland Lakes Ramsar site is located on the low-lying South East Coastal Plain bioregion (Gippsland Plains subregion) east of the La Trobe Valley and south of the Eastern Highlands, approximately 300 kilometres from Melbourne. The Gippsland Lakes Ramsar site consists of a group of coastal lagoons separated from the sea by a barrier system of sand dunes and fringed on the seaward side by the Ninety-Mile Beach.

The following wetlands are included in the Gippsland Lakes Ramsar site covering an area of 58,824 ha: Lake Wellington system (18,000 ha); Lake Victoria (10,850 ha); Lake King system (7,100 ha); Lake Bunga (460 ha); Lake Tyers (1,186 ha); Macleod Morass (520 ha) (PV 1998) and Lake Reeve system (5,158 ha). The Gippsland Lakes Ramsar site also includes areas of land adjacent to these wetlands.

These wetlands are fed by a number of river systems. The largest of the rivers are the La Trobe River and Avon River (flowing into Lake Wellington), and the Mitchell River, Nicholson River and Tambo River (flowing into Lake King) (DCE 1991). The system is linked to the sea by an artificial entrance, opened in 1889, where the town of Lakes Entrance is now situated (DCE 1991).

2.1 Wetland type

Within the Gippsland Lakes Ramsar site, three wetland types are recognised under the Ramsar Convention: coastal brackish/saline lagoons, permanent saline/brackish pools, and permanent freshwater marshes.

In Victoria, wetlands are classified into eight categories (Corrick and Norman 1980). The Gippsland Lakes Ramsar site includes areas of six wetland types under this system: permanent saline (24,323 ha); permanent open freshwater (14,711 ha); semi-permanent saline (7,137 ha); deep freshwater marsh (4,705 ha); shallow freshwater marsh (8 ha); and sewage pond (2 ha).

2.3 Criteria for Ramsar listing

To be listed as Wetlands of International Importance or 'Ramsar sites', wetlands must meet one or more internationally accepted criteria in relation to their zoology, botany, ecology, hydrology or limnology and importance to waterbirds. The Ramsar Convention updated the criteria in 1999. The new criteria will be applied to Gippsland Lakes when the site Ramsar Information Sheet is next updated in 2005. The former criteria met by the Gippsland Lakes site when listed in 1982 were:

1(a) – it is a particularly good representative of natural or near-natural wetland characteristic of the appropriate biogeographical region;

3(a) – it regularly supports 20,000 waterbirds;

3(b) – it regularly supports substantial numbers from particular groups of waterfowl, indicative of wetland values, productivity or diversity; and

3(c) – it regularly supports 1% of individuals in a population of one species or subspecies of waterfowl.

Information on how the Gippsland Lakes Ramsar site meets these criteria is detailed in Chapter 4.

2.4 Land tenure and management

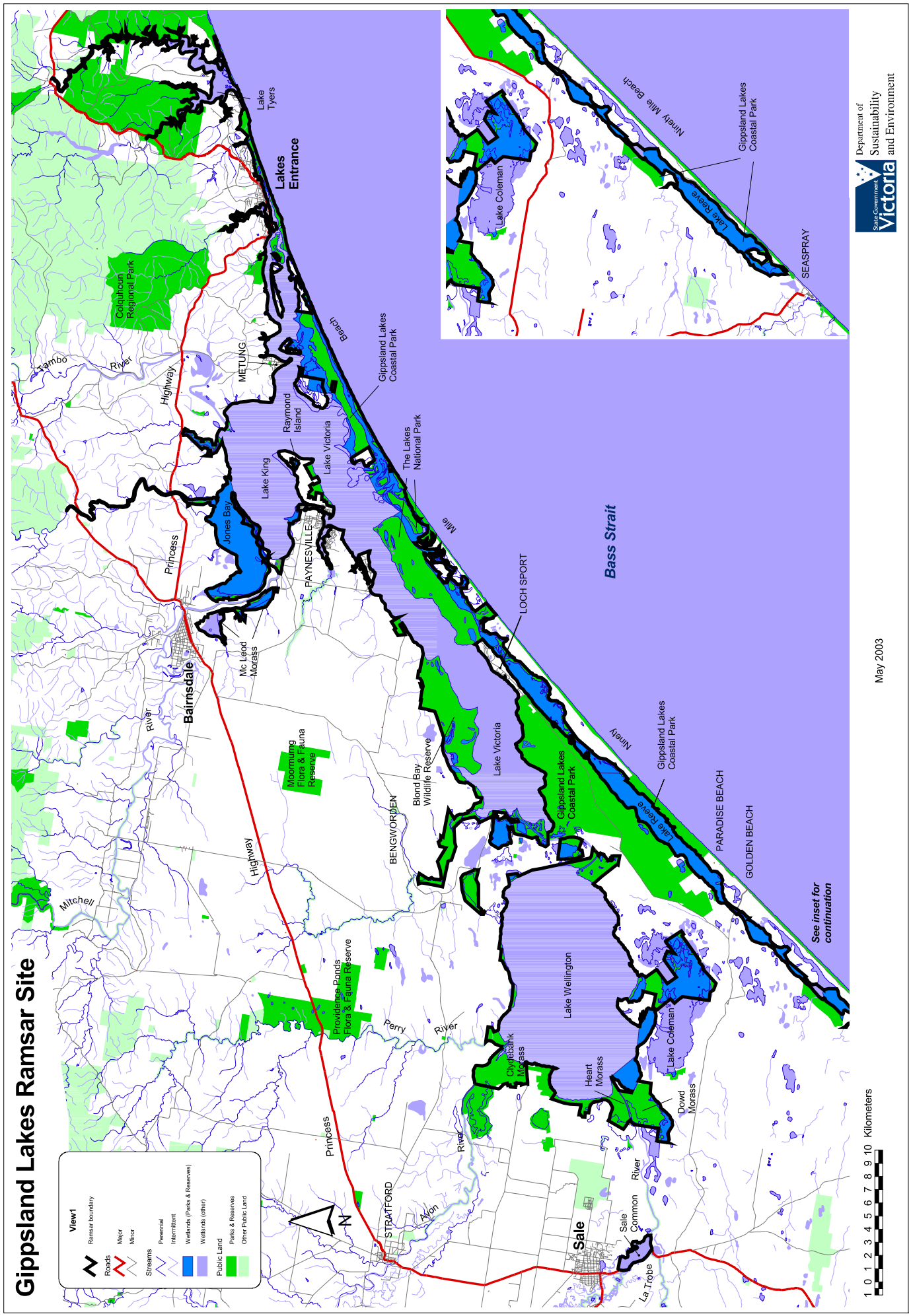
The majority of the site (approximately 38,000 ha) is reserved under the *Crown Land (Reserves) Act 1978* as Nature Conservation Reserve, Natural Features Reserve, and Public Purpose Reserve.

Approximately one third of the Gippsland Lakes Ramsar site is located within the Lakes National Park (2,390 ha) and Gippsland Lakes Coastal Park (17,584 ha) (PV 1998). Both Parks are proclaimed under the *National Parks Act 1975*. The Lakes National Parks and Gippsland Lakes Coastal Park are listed under Schedule 2 and Schedule 3 of the Act respectively. The land status and management responsibilities are summarised in Table 2.1.

In addition a range of agencies are responsible for ensuring that management of the site complies with a broad range of legislative requirements. The successful management of the Gippsland Lakes Ramsar site therefore relies on effective cooperation and partnership between various management agencies.

2.5 Adjacent land use

Nature conservation reserves and other land managed primarily for conservation surround 45% of the Ramsar site, and include parks and reserves (20%) and coastal and waterway areas (25%) (NRE 2002a). Other land uses surround 55% of the site, and include grazing (45%), residential (5%) and industrial (5%). In general terms urban development is increasing in areas bordering the site, while agriculture is gradually decreasing.


Gippsland Lakes Ramsar Site
View1
Ramsar boundary
Roads
Major
Minor
Streams
Perennial
Intermittent
Wetlands (Parks & Reserves)
Wetlands (other)
Public Land
Parks & Reserves
Other Public Land
N
Lake Tyers
Lakes Entrance
Colquhoun Regional Park
Tambo River
Highway
METUNG
Beach
Gippsland Lakes Coastal Park
Raymond Island
Lake Victoria
The Lakes National Park
Lake King
Jones Bay
Princess
PAYNESVILLE
Mile
Bass Strait
LOCH SPORT
Mc Leod Morass
Bairnsdale
River
Moormung Flora & Fauna Reserve
Blond Bay Wildlife Reserve
BENGWORDEN
Nintey
Lake Reserve
PARADISE BEACH
GOLDEN BEACH
Mitchell
Providence Ponds Flora & Fauna Reserve
Perry River
Lake Wellington
Clydebank Morass
Heart Morass
Lake Coleman
Dowd Morass
Princess
River
STRATFORD
Avon
Sale
Sale Common
La Trobe River
See inset for continuation
Nintey Mile Beach
SEASPRAY
1 0 1 2 3 4 5 6 7 8 9 10 Kilometers
May 2003
Department of Sustainability and Environment
State Government Victoria

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act), that came into force on 16 July 2000, identifies Ramsar sites as matters of national environmental significance for which the Commonwealth has a significant responsibility. Wise use principles extend beyond the Ramsar site boundaries. The EPBC Act sets out procedures for assessing actions with potentially significant impacts on Ramsar values, whether these actions are proposed within or outside site boundaries.

Located south of this Ramsar site is the Ninety Mile Beach Marine National Park, proclaimed in November 2002. No fishing, extractive or damaging activities are permitted in marine national parks.

2.6 Catchment setting

The catchment of the Gippsland Lakes, an area of over 2 million hectares, is heavily used for multiple purposes (DCE 1991). It includes several large towns and cities (Sale, Bairnsdale, Warragul, Traralgon, Morwell and Moe), Victoria's major electricity generating facilities, the La Trobe Valley industrial development area, extensive dryland and irrigated farmland and a significant proportion of Victoria's hardwood and softwood timber resources (DCE 1991).

The water resources of the river systems have been extensively developed to support agricultural activities, urban development, and as cooling water for thermal electricity generation (DCE 1991). A significant portion of the lower reaches of the La Trobe, Macalister and Mitchell Rivers are surrounded by irrigation areas, primarily comprising dairy farming and horticulture.

The La Trobe River receives a number of licensed discharges of waste, the major contributions being treated sewage from Warragul, Moe and Morwell, and industrial wastewater from the power generating companies (DCE 1991). The lower reaches of the rivers in the western part of the catchment are experiencing elevated groundwater tables and associated saline discharge, as well as nutrient and sediment discharges from irrigation drainage.

The Tambo, Avon and Nicholson rivers also drain into the lakes system. Within the Tambo catchment there are erodible former mining areas around Cassillis and erodible agricultural areas, particularly in granitic areas. Both the Avon and Nicholson catchments drain essentially cleared agricultural land.

2.7 Local Government

The Gippsland Lakes Ramsar site is located in both the East Gippsland Shire and the Wellington Shire.

Table 2.1 Land tenure and management

Area	Land tenure	Legal status	Management
Sale Common	Nature Conservation Reserve – Wildlife Reserve	*Crown Land (Reserves) Act 1978 and Wildlife Act 1975*	PV
Dowd Morass (part) Heart Morass	State Wildlife Reserve classified as State Game Reserve*	*Crown Land (Reserves) Act 1978* and *Wildlife Act 1975*	PV
Clydebank Morass	State Wildlife Reserve classified as State Game Reserve*	*Crown Land (Reserves) Act 1978* and *Wildlife Act 1975*	PV
Lake Wellington (western shoreline)	Public Purposes Reserve	*Crown Land (Reserves) Act 1978*	DSE
Lake Wellington (shoreline – Disher Bay)	Public Purpose Reserve, Unreserved Crown Land	*Crown Land (Reserves) Act 1978*	DSE
Lake Wellington (shoreline – Swell Point to Roseneath Point)	Public Purpose Reserve	*Crown Land (Reserves) Act 1978*	DSE
Lake Wellington (eastern shoreline)	Public Purpose Reserve, Salt Lake – Unreserved Crown Land	*Crown Land (Reserves) Act 1978*	DSE
Lake Wellington	Crown Land Reserve	*Crown Land (Reserves) Act 1978*	DSE
Lake Coleman	State Wildlife Reserve classified as State Game Reserve*	*Crown Land (Reserves) Act 1978* and *Wildlife Act 1975*	PV
Land adjoining Lake Coleman Wildlife Reserve to south	Land vested in Gippsland Water	*Water Act 1989*	Gippsland Water
Lake Reeve	Gippsland Lakes Coastal Park	*National Parks Act 1975*	PV
Gippsland Lakes Coastal Park	Coastal Park	*National Parks Act 1975*	PV
Land near McLennan Strait	Part of Gippsland Lakes Coastal Park	*National Parks Act 1975*	PV
	Public Purpose Reserve	*Crown Land (Reserves) Act 1978*	DSE
Morley Swamp	Natural Features Reserve – Gippsland Lakes Reserve	*Crown Land (Reserves) Act 1978*	PV
Backwater Morass	Natural Features Reserve – Gippsland Lakes Reserve	*Crown Land (Reserves) Act 1978*	PV
Red Morass	Natural Features Reserve – Gippsland Lakes Reserve	*Crown Land (Reserves) Act 1978*	PV
Victoria Lagoon	Natural Features Reserve – Wildlife Reserve classified as State Game Reserve*	*Crown Land (Reserves) Act 1978*	PV
Lake Victoria	Crown Land Reserve	*Crown Land (Reserves) Act 1978*	DSE
The Lakes National Park	The Lakes National Park	*National Parks Act 1975*	PV
Blond Bay	Natural Features Reserve – Wildlife Reserve classified as State Game Reserve*	*Crown Land (Reserves) Act 1978* and *Wildlife Act 1975*	PV
Lake King	Public Purposes Reserve	*Crown Land (Reserves) Act 1978*	DSE
Macleod Morass	Natural Features Reserve – Wildlife Reserve classified as State Game Reserve*	*Crown Land (Reserves) Act 1978* and *Wildlife Act 1975*	PV
Jones Bay	Natural Features Reserve – Wildlife Reserve classified as State Game Reserve* and Natural Features Reserve – Gippsland Lakes Reserve	*Crown Land (Reserves) Act 1978* and *Wildlife Act 1975*	PV
Mitchell River	Water Reserve	*Land Act 1958*	PV

Area	Land tenure	Legal status	Management
Swan Reach	Natural Features Reserve – Gippsland Lakes Reserve	*Crown Land (Reserves) Act 1978* and *Wildlife Act 1975*	PV
Lake Tyers	Forest Park	*Crown Land (Reserves) Act 1978*	DSE, Shire
Land to the south of Lake King	Gippsland Lakes Coastal Park	*National Parks Act 1975*	PV
North Arm (near Lakes Entrance)	Public Purpose Reserve	*Crown Land (Reserves) Act 1978*	DSE
Lakes Entrance to Lake Tyers including Lake Bunga	Lakes Entrance – Lake Tyers Coastal Reserve	*Crown Land (Reserves) Act 1978*	PV, EGSC

* - State Game Reserves are Wildlife Reserves that have been further classified to allow for game hunting in season.

Source: NRE (n.d.). See page 29 for abbreviations.

Table 2.2 Lead management agencies and their key responsibilities

Agency	Responsibility	Local agency	Responsibility
Parks Victoria	Manage parks and reserves.	Parks Victoria	Manage areas including The Lakes National Park, Gippsland Lakes Reserve, Macleod Morass, The Sale Common, Mitchell River Water Reserve as well as Heart, Dowd and Clydebank Morasses.
Department of Sustainability and Environment (DSE)	Strategic direction for park and reserve management; flora and fauna management and implementation of the Ramsar Convention in Victoria; catchment and water management, forest management, coastal and port management; leasing, licensing and management of public land, strategic and statutory land use planning including the administration of the Victorian Planning Provisions.	DSE Gippsland Regional Office	Policy advice for the management of the Gippsland Lakes Ramsar site. Management of hunting at the Gippsland Lakes Ramsar site. Management of waterbody lake beds.
Department of Primary Industries (DPI)	Provides strategic direction for fisheries management and research, agricultural services and sustainable development of Victoria's energy and mineral resources.	DPI Gippsland Regional Office	Manage commercial and recreational fishing for the Ramsar site in accordance with Fisheries Act 1995. Strategic and operational catchment management services e.g. soil conservation, vegetation management, salinity management, water quality monitoring and management.
Local Government	Regulation of local development through planning schemes, on-ground works and management of urban and some rural drainage.	East Gippsland Shire	Administer the planning scheme.
		Wellington Shire	
Rural Water Authority	Provide irrigation, drainage, water supply, and manage specific water supply catchments.	Southern Rural Water	Supply rural water across southern Victoria including bulk supply to non-metropolitan urban water authorities and La Trobe Valley electricity generators.
Non Metropolitan Urban Water Authority	Provide urban water supplies and wastewater disposal services.	East Gippsland Water	Provide water and sewerage services to townships neighbouring the Ramsar site. Manage water supply catchments and sewage treatment plants.
Victorian Catchment Management Council	Advise State Government on catchment management, and land and water resource issues and priorities. Encourage cooperation between land and water managers. Promote community awareness on catchment management issues.	West Gippsland CMA	Develop and implement Regional Catchment Management Strategies. Prepare and implement Action Plans. Manage surrounding catchment and inflowing streams and drainage.
		East Gippsland CMA	

Agency	Responsibility	Local agency	Responsibility
Committees of Management	Manage reserved Crown land on behalf of the Minister. Committees are usually the Local Shire or publicly elected.	DSE Municipalities Elected Committees	Manages reserves for the purposes for which they are gazetted.
Environment Protection Authority (EPA)	Responsibility for and coordination of all activities relating to the discharge of waste into the environment and the generation, storage, treatment, transport and disposal of industrial waste and the emission of noise and for preventing or controlling pollution and noise and protecting and improving the quality of the environment.	EPA East Region	Licence sewage and other discharges. Monitor water quality.
Victorian Coastal Council	Strategic Statewide coastal planning; preparation of the Victorian Coastal Strategy; advise the Minister; monitor development of Coastal Action Plans; and coordinate the implementation of the Victorian Coastal Strategy and Coastal Action Plans.	Gippsland Coastal Board	Develop Coastal Action Plans and guidelines for coastal planning and management within the region; provide advice to Minister and Council on coastal development within the region; and implementation of, and facilitating public awareness of the Victorian Coastal Strategy, Coastal Action Plans and coastal guidelines.
Gippsland Ports	Establish, manage, dredge and maintain channels in port waters; provide and maintain navigation in connection with navigation of port waters; direct and control movement of vessels within port waters.	Gippsland Ports	Operation of commercial port of Lakes Entrance. Maintenance of navigational aids and channels. Management of public facilities.

3 Policy Framework

A suite of relevant international conventions, and the Commonwealth and Victorian legislation and policy which directs management and use of Ramsar sites, are outlined in the Strategic Directions Statement. This Chapter covers the local policy framework comprising plans, strategies and municipal planning provisions as well as statewide strategies approved after publication of the Strategic Directions Statement.

3.1 Strategies

There are a range of existing plans and strategies that provide for the protection and enhancement of the natural and cultural values of the Gippsland Lakes Ramsar site. Victoria has a strong planning framework and as a result these plans and strategies demonstrate a high level of integrated planning and address many aspects of wise and sustainable use. These plans include:

- Macleod Morass and Jones Bay Wildlife Reserves Draft Management Plan (PV 2002);
- Draft: Integrated Coastal Planning for Gippsland - Coastal Action Plan (GCB 2001);
- Gippsland Lakes Coastal Action Plan (GCB 1999);
- Macalister Irrigation District Nutrient Reduction Plan (SRWA 1998);
- The Lakes National Park and Gippsland Lakes Coastal Park Management Plan (PV 1998);
- East Gippsland Regional Catchment Management Strategy (PV 1997);
- West Gippsland Regional Catchment Strategy (NRE 1997); and
- Code of Forest Practice for Timber Production Revision No. 2 (NRE 1996).

(See Appendix 2 for complete references.)

Catchment management authorities in Victoria are currently reviewing their regional catchment strategies. The revised regional catchment strategies, once accredited by government, will guide future investment in the catchment under some State natural resource management programs, the National Action Plan for Salinity and Water Quality and the Natural Heritage Trust. This strategic management plan will be recognised under the East and West Gippsland Regional Catchment Strategic frameworks.

Three recently developed statewide strategies are relevant to the management of Gippsland Lakes Ramsar site.

The Victorian River Health Strategy (VRHS) provides a framework that enables Government and community to manage and restore rivers in the State. The VRHS aims to achieve healthy rivers, streams and floodplains which meet the environmental, economic, recreational and cultural needs of current and future generations (NRE 2002d). The VRHS establishes regional planning processes for CMAs to prepare regional river health strategies which will coordinate other river-related action plans and direct the development of annual works programs.

The Indigenous Partnership Strategy (NRE 2001) provides the framework for building effective relationships with Indigenous communities, who have a fundamental role in the management of Victoria's natural resources, as traditional custodians of the land and waters. This strategy sets out key initiatives to assist in the development and delivery of services to indigenous people, which should be applied during management planning.

Victoria's Native Vegetation Management – A Framework for Action (NRE 2002d) establishes the strategic direction for the protection, enhancement and revegetation of native vegetation across the State. The framework focuses on managing native vegetation to provide sustainable landscapes and to protect productive capacity and environmental values of land and water resources.

3.2 Municipal Strategic Statements, zoning and overlays

The Wellington and East Gippsland Shire Councils have prepared Municipal Strategic Statements, consistent with the requirements of the Victorian Planning Provisions. These statements provide policy direction for Councils and include a range of commitments related to environmental protection, including waterways, wetlands and biodiversity, of relevance to the wise use of the Gippsland Lakes Ramsar site.

Zoning pursuant to the *Planning and Environment Act 1987* has been applied to the Gippsland Lakes Ramsar site in the local planning schemes to control land use and development.

The Public Conservation and Resource Zone (PCRZ) has been applied by the East Gippsland Shire Council to many of the public land components of the site (especially coastal and nature reserves), including Lake Tyers. The PCRZ allows for the protection of areas of significance. The PCRZ aims to:

- protect and conserve the natural environment and natural processes for their historic, scientific, landscape, habitat or cultural values;

- provide facilities which assist in public education and interpretation of the natural environment with minimal degradation of the natural environment or natural processes; and
- provide for appropriate resource based uses.

The Wellington Shire Council has applied a Public Park Recreation Zone (PPRZ) to most of the area within the Ramsar site surrounding Lake Wellington. The East Gippsland Shire Council has applied a PPRZ to the majority of waterways within the site including Lake Victoria and Lake King as well as a number of foreshore areas. The PPRZ aims to:

- recognise areas for public recreation and open space;
- protect and conserve areas of significance where appropriate; and
- provide for commercial uses where appropriate.

In addition the East Gippsland Shire Council has applied an Environment Rural Zone (ERZ) to a number of areas adjacent to the Ramsar site (ERZ). The ERZ aims to:

- conserve and permanently maintain flora and fauna species, soil and water quality and areas of historic, archaeological and scientific interest and areas of natural scenic beauty or importance so that the viability of natural ecosystems and the natural and historic environment is enhanced;
- encourage development and the use of the land which is in accordance with sound management and land capability practices, and which takes into account the environmental sensitivity and the biodiversity of the locality; and
- ensure that subdivision promotes effective land management practices and infrastructure provision.'

The ERZ requires planning permits for a broad range of activities with potential impacts on soil, water and biodiversity. In this way, Councils can exercise tighter control over works and development.

The Gippsland Lakes Ramsar site is covered by overlays within the planning schemes of the two municipalities. Relevant overlays used to cover the Gippsland Lakes include:

- Environmental Significant Overlay (ESO), the aim of which is to regulate uses close to and in environmentally significant areas around the Gippsland Lakes (numbers and detailed provisions vary slightly between municipalities).
- Land Subject to Inundation Overlay (LSIO), the aim of which is to ensure that development maintains the free passage and temporary storage of flood waters
- Vegetation Protection Overlay (VPO) the aim of which is to protect areas of significant vegetation for their special significance, natural beauty and to maintain and enhance habitat and habitat corridors for indigenous fauna.
- Erosion Management Overlay (EMO) the purpose of which is to protect areas prone to erosion, landslip or other land degradation processes, by minimising land disturbance and inappropriate development.

Table 3.1 summarises the overlays in each municipality that cover the Gippsland Lakes Ramsar site and adjacent land.

Table 3.1 Planning scheme overlays covering the Gippsland Lakes Ramsar site and adjacent private land

Municipality	Overlays
Wellington Shire	• ESO1: Coastal and Gippsland Lakes Environs • ESO2: High Value Wetlands • LSIO: Land Subject to Inundation
East Gippsland Shire	• ESO1: Coastal and Foreshore Areas • LSIO: Land Subject to Inundation • VPO: Areas of Significant Vegetation • EMO: Areas Prone to Erosion

4 Values

The key environmental values of the Gippsland Lakes Ramsar site for which it was listed (representativeness, flora and fauna and waterbirds) are summarised below. Other values described include natural function, cultural heritage, scenic, economic, education and interpretation, recreation and tourism and scientific.

4.1 Wetland representativeness

The Gippsland Lakes system is the largest estuarine lagoon system in Australia. The Lakes receive flows from seven major rivers of Gippsland from a catchment area of approximately 2,000,000 hectares (EGRCLPB 1997).

Although the Gippsland Lakes have a high degree of internal diversity in terms of wetland types, Permanent Saline is the best represented wetland type. Permanent Saline is also the wetland type least depleted since European settlement (NRE 2002a).

4.2 Flora and fauna

The Gippsland Lakes Ramsar site accommodates approximately 540 flora species, of which at least 25% are non-indigenous, and 300 species of indigenous fauna (NRE 1999a, NRE 1999b). Of these species, 41 (6 flora and 35 fauna) are listed under the *Flora and Fauna Guarantee Act 1988* and 12 of these have Action Statements prepared under the Act.

Flora and fauna species listed under the *Flora and Fauna Guarantee Act 1988* that consistently occur within the site and are the highest priorities for management are:

- Dwarf Kerrawang;
- Purple Blown Grass;
- Metallic Sun-orchid;
- Southern Bent-wing Bat;
- Fairy Tern;
- Hooded Plover;
- Little Tern;
- New Holland Mouse; and
- White-bellied Sea-eagle.

Three flora and 2 fauna species recorded at the Gippsland Lakes Ramsar site are classified as nationally endangered, and 4 flora and 10 fauna species as nationally vulnerable. Forty-one flora and 81 fauna species are considered to be threatened in Victoria have been recorded at Gippsland Lakes Ramsar site (Appendices 4 and 5).

Twenty four bird species under the Japan-Australia Migratory Birds Agreement (JAMBA) and 26 species under the China-Australia Migratory Birds Agreement (CAMBA) have been recorded at the Gippsland Lakes (Appendix 4). The Lakes also have 25 bird species listed under the Bonn Convention on the Conservation of Migratory Species of Wild Animals. A diversity of bird species is attracted to the wetlands. More than 185 species of birds have been recorded at Lake Wellington and surrounding wetlands alone (PV 1997).

The vegetation of Gippsland Lakes is structurally and botanically diverse due to variations in soil fertility, drainage and salinity (DCNR 1993). Several distinct terrestrial communities have been described and major species listed in the Land Conservation Council's descriptive report on the Gippsland Lakes Hinterland Area (LCC 1982). The Lakes also support aquatic and emergent species (DCE 1990).

Most of the wetlands of the Gippsland Lakes are bordered by emergent reed beds dominated by Common Reed or saltmarsh communities (DCNR 1993). Characteristic saltmarsh species are Beaded Glasswort and Sea Rush (DCNR 1993). Saltmarsh communities are typically fringed by periodically inundated wet scrub vegetation dominated by dense stands of Swamp Paperbark. Parts of the Lakes system with water depths of less than two metres support meadows of the aquatic seagrass *Zostera muelleri* (DCNR 1993).

Woodland communities dominated by *Eucalyptus* and *Acacia* species occur on the deeper soils around the Lakes (DCNR 1993). Remnant areas of open Shining Peppermint, Manna Gum, and Saw Banksia, and Sheoak forests are found on the northern shores of Lakes Wellington, Victoria and Reeve, the Roseneath Peninsula, the Boole Poole Peninsula and Raymond Island (DPUG 1990 and DCE 1990). Eucalypt woodland communities grade into dry Tea Tree scrub and Coast Banksia woodland where adjacent to the coastline.

Native vegetation in the Gippsland Lakes region has a number of critical functions: (a) it is fundamental in stabilising the barrier between the Lakes and the sea, thereby counteracting erosion; (b) it has a key role in the regulation of water quality; (c) it is an important element in the landscape; (d) it provides a diversity of habitat for wildlife; and (e) it is an important area for biodiversity conservation in south-east Australia (DPUG 1990 and DCE 1991, EGRCLPB 1997). In addition, remnant streamside vegetation provides critical links between the larger areas of remnant vegetation (DPUG 1990 and DCE 1991).

4.3 Waterbirds

According to the Ramsar Convention, waterbirds are one of the most important components of wetland ecosystems (RCB 1997). Gippsland Lakes provide important feeding, resting and breeding habitat for approximately 80 waterbird species (PV 1998). In terms of carrying capacity, Gippsland Lakes and associated swamps and morasses regularly support approximately 40,000 to 50,000 waterbirds (NPS 1995).

Clydebank Morass, Macleod Morass and Jones Bay (within Lake King) support many species of migratory waders (ANCA 1995). Lake Wellington, Lake Victoria and Lake King support migratory seabirds, including the Little Tern and Fairy Tern, which are listed under the *Flora and Fauna Guarantee Act 1988*, as well as a range of other waterfowl (ANCA 1995). Lake Reeve provides highly significant habitat for a large number of migratory waders, and is one of the five most important areas for shorebirds in Victoria (ANCA 1995, PV 1998).

Although small wetlands of the Gippsland Lakes system do not attract large numbers of waterbirds, they are nevertheless important for the conservation of waders and seabirds. For instance, Bunga Arm, which is part of the Gippsland Lakes, supports breeding populations of species listed under the *Flora and Fauna Guarantee Act*, e g Little Tern, Fairy Tern, Hooded Plover and White-bellied Sea-Eagle (ANCA 1995).

Breeding populations of waterbirds occur at Dowd Morass, Heart Morass and Blond Bay (ANCA 1995). One of only two regular breeding colonies of Pied Cormorants in Victoria occurs in wetlands adjacent to Lake Coleman (DPUG 1990 and DCE 1991).

The Gippsland Lakes system supports an estimated 4% of Victoria's shorebird population (ANCA 1995).

The permanence of the main lakes and the regular flooding of the adjacent wetlands provide an important drought refuge for many waterbirds (NPS 1995).

4.4 Natural function

The Ramsar Convention Bureau (1997) defines 'wetland function' as the natural processes and derivation of benefits and values associated with wetland ecosystems. The wetlands of Gippsland Lakes provide a suite of vital hydrologic, biological, chemical and physical functions.

The Gippsland Lakes was once a primarily freshwater system with its entrance opening to the sea generally only during periods of high river flows (Bird 1978). In the 1880's, the port of Lakes Entrance was established and the tidal entrance to the lakes was opened permanently with the construction of two training walls. This has lead to a gradual increase in salinity of the system, with consequences for the ecological functioning of the lakes. They now resemble a number of marine embayments rather than a system of largely freshwater lakes (Harris et al. 1998). This has lead to a loss of reed beds, increased salinity of adjacent groundwater and the death of extensive stands of paperbark. The progression to a more marine-like ecosystem has no doubt fundamentally changed the fish and waterbird communities using the lakes.

Wetland vegetation has numerous functions essential for the conservation of natural wetlands (refer to Section 2.3). Wetlands around the edges of the lakes, particularly adjacent to the lower reaches of rivers entering the lakes, remove a significant amount of nutrients from river water before it enters the lakes (Harris et al. 1998). The vegetation and waters of the Gippsland Lakes furthermore provide fish and wildlife habitat, as well as tourism, recreational, educational, scientific, aesthetic benefits, and opportunities for water extraction, commercial fishing and cattle grazing.

4.5 Cultural heritage

The Gippsland Lakes have a long history as a resource-rich refuge for the traditional Aboriginal Tatungalung clan of the Kurnai tribe (PV 1998). Lands surrounding the Gippsland Lakes are an extremely sensitive Indigenous cultural landscape with one of the highest incidences of Aboriginal sites in the State.

The sites are predominantly middens surrounding the wetlands containing shellfish remains, charcoal and scorched pebbles. All Aboriginal sites, places and objects are protected under the *Archaeological and Aboriginal Relics Preservation Act 1972* (Vic.) and the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Cwlth).

Ongoing discussions need to take place with local Aboriginal people in order to facilitate the management of Aboriginal cultural heritage. In particular, managers need to ensure that Aboriginal heritage values are not adversely impacted in the course of implementing other site management strategies.

European occupation of the Gippsland Lakes catchment in the 1840s resulted in much of the area being cleared and grazed. Historic sites which mark European activities include homesteads on Rotamah Island and Point Wilson, Snapper Cottage, the blowhole sites on the outer barrier adjacent to Bunga Arm, and the site of construction of the artificial

entrance to the sea. Relics of early industries, such as boat building, timber (mill and tramways), wattle bark harvesting, oil exploration and fishing are still in existence (DPUG 1990 and DCE 1991).

4.6 Scenic

The National Trust of Australia has classified the Gippsland Lakes area as being of special regional landscape significance. Of prime visual importance is the contrast of land and water, particularly due to the sandy barrier system which formed the coastal lagoons comprising the Gippsland Lakes (PV 1998).

Sites of National, State and regional geological and geomorphological significance which are visual attractions include Lake Reeve, Sperm Whale Head, Boole Poole Peninsula, Bunga Arm, Rotamah Island, McLennan Isthmus, the Outer Barrier and the well known Ninety Mile Beach (Rosengren 1984). The Mitchell River Delta is a site of international geomorphological significance as it is one of the finest examples of a classic digitate delta in the world (Rosengren 1984).

The abundant bird life, distinctive communities of flora and fauna, and heritage sites are other scenic features.

4.7 Economic

The components, functions and attributes of the Gippsland Lakes provide a variety of direct and indirect economic benefits to the area. The direct economic benefits provided by Gippsland Lakes include fisheries, sewage treatment, grazing of domestic stock, and use of the Lakes for tourism and recreation (DCE 1991, EGRCLPB 1997). The indirect economic benefits include coastal protection and water quality maintenance.

Tourism and recreation are among the most important uses of the Gippsland Lakes, and have a major impact on employment and the economic wealth of the region. The economic impact of recreational fishing is recognised as regionally important, as approximately 1.3 million hours/year are spent by recreational fishers on the Gippsland Lakes (DCNR 1995). Tourism developments in the major lakeside towns are therefore encouraged (GCB 1999b). The Gippsland Lakes Coastal Action Plan (GCB 1999b) directs that appropriate tourism development will proceed, where possible, in existing development footprints, utilising existing infrastructure, and adopting good design practices (e.g. the Victorian Coastal Siting and Design Guidelines for Structures on the Victorian Coast).

The annual commercial fish catch from the Gippsland Lakes currently amounts to around 800 tonnes and is worth about $2 million per year (NRE 2002b). A larger catch is landed by the Bass Strait fishing fleet that uses the port of Lakes Entrance. The major components of the Gippsland Lakes fishery are Black Bream, European Carp and Tailor (NRE 2002c). Eels have been taken for commercial purposes from Sale Common, Dowd Morass, Lake Coleman, Heart Morass and Clydebank Morass (PV 1997). Eel fishing remains commercially viable in Macleod Morass and in a number of the Gippsland Lakes embayments. Licensed bait operators and commercial fisherman also carry out commercial collections of bait (sandworm, prawns, shrimp, crabs, and shellfish).

Aquaculture enterprises do not currently exist in Gippsland Lakes (DCNR 1995). Mussels, Native Flat Oysters and Trout have been trialled in the Lakes system in the past with varying success (DCNR 1995). Competition with other users may limit the leasing of several hectares of lake waters required for such enterprises, particularly in the favoured eastern sections.

Commercial tour operators run tours and make use of Gippsland Lakes and its parks, particularly Gippsland Lakes Coastal Park and The Lakes National Park.

4.8 Education and interpretation

Current information and interpretation services and facilities at the Gippsland Lakes include walking tracks, visitor centres at Lakes Entrance and Bairnsdale, advice and support to school education programs, education kits (e.g. Wetlands Education Kits), self-guided nature trails, brochures, and information boards (PV 1997). An interpretation sign, located at Eagle Point, was produced as part of the Victorian Ramsar wetlands interpretation project with the aim of promoting understanding and gaining community support for Ramsar sites and wetlands (NRE 2002a).

Wetlands, including those of the Gippsland Lakes, provide a wide range of educational opportunities and accessible sites for field studies. Due to the Lakes' natural diversity, complexity and productivity, they can be used to teach and demonstrate a variety of scientific principles in the disciplines of ecology, biology, hydrology, chemistry, physiography, geology and geomorphology.

Groups from local schools and from other parts of the State, particularly Melbourne, currently utilise the Ramsar wetlands and surrounding parks and reserves of Gippsland Lakes. Students from Camp Cooinda and the Banksia Peninsula are also frequent visitors. Schools make intensive seasonal use of the group camping facilities on Rotamah Island and at Red Bluff.

While education and interpretation programs appear to be reaching locals, efforts may need to be made to increase awareness in the wider community about the Ramsar Convention and the JAMBA and CAMBA agreements.

4.9 Recreation and tourism

Recreational use of Gippsland Lakes is highly valued by the community, and the Lakes have been a popular visitor destination for many years. The parks and reserves of the Lakes system attract 200,000 or more visitors annually (GCB 1999b).

A survey by the Victorian Tourism Commission in 1987 (VTC 1987) revealed that the majority of visitors to the Gippsland Lakes came from Victoria, with a significant number of interstate visitors, and a comparatively small but economically important number of international visitors. A later survey by the Victorian Regional Travel and Tourism Survey in 1996 revealed the same trend.

Most recreational use of the Lakes occurs during the warmer summer months. Visitors undertake a wide range of activities on and around the Lakes. This includes bushwalking, boating and sailing, fishing, swimming, camping, hunting, birdwatching, horse riding, picnicking and sight-seeing. Boating and fishing are, however, the main recreational activities, with most visitors attracted to the Lakes for angling and boating opportunities.

National Parks, Coastal Parks and reserves in the Gippsland Lakes contain about 300 campsites, 150 picnic and other visitor areas, boating facilities (including 260 private licensed jetties providing some 300-400 berths), and more than 60 toilet blocks (GCB 1999b). These are generally well sign-posted and have good access (GCB 1999b).

4.10 Scientific

Scientific research is the key element to understanding the complex nature of the Gippsland Lakes. Harris et al. (1998) highlights the need to undertake further research that informs management decisions regarding the Gippsland Lakes.

Scientific investigations of the Gippsland Lakes in the past have focussed on water quality monitoring as a result of major algal outbreaks, which have occurred about every ten years (Harris et al. 1998). Victorian State agencies have carried out regular water quality monitoring. The data are scattered, sampling frequencies have changed over the years and the data have been summarised in various ways (i.e. means, medians, and in terms of compliance with State Environment Protection Policies) making it difficult to present good data on long-term trends on water quality (Harris et al. 1998).

Other investigations of Gippsland Lakes have been the result of monitoring fisheries and other aquatic ecosystem impacts, such as crab plagues and the loss of seagrasses. There is also much anecdotal information about changes in aquatic macrophyte populations, losses of fringing reed beds and *Melaleuca* swamps, increasing salinity and other effects (Harris et al. 1998).

The volunteer-based Little Tern Task Force Inc., together with Parks Victoria and DSE, monitor the success and numbers of breeding Little Tern. This species, along with Fairy Terns and Common Terns are monitored and banded annually by the Victorian Wader Study Group (C. Minton, pers. comm.).

4.11 Condition

Vegetation

The indigenous vegetation of Gippsland Lakes has undergone significant change since European settlement (PV 1997). Parts of many wetlands are degraded, with continued degradation resulting from dieback, weed infestations, pest animals, salinity and numerous other factors (PV 1997). Nevertheless, some areas still contain remnants of high quality.

The Lakes National Parks and Gippsland Lakes Coastal Park are described as supporting 'valuable' remnants of Coast Banksia Woodland, Coastal Saltmarsh, Estuarine Wetland, Coastal Dune Scrub Complex and Damp Sands Herb-rich Woodland (PV 1998). Six significant plant species also occur in the Parks (PV 1998), further indicating that the condition of the indigenous vegetation is reasonably good. The structural and botanical diversity of other areas, such as the Blond Bay State Wildlife Reserve (DCNR 1993) similarly indicates a reasonable level of condition.

Water quality

The water quality of the Gippsland Lakes region has been the subject of a number of studies and reviews. Some of the more recent work has been the Gippsland Lakes Environmental Audit (Harris et al. 1998), and the Gippsland Lakes Environmental Study: Assessing Options for Improving Water Quality and Ecological Function (Webster et al. 2001).

Since the 1840s, land use changes in the major Gippsland catchments, primarily associated with agriculture, has increased nutrient and sediment input to the Lakes, causing deterioration of water quality and leading to regular algal blooms (Webster et al. 2001).

The La Trobe River is one of the most highly polluted rivers in Victoria (DCE 1991). The river annually washes several thousand tonnes of suspended sediment into Lake Wellington, mostly derived from erosion of the river's banks and lower tributaries, but also through point-source discharges from industry and urban developments and diffuse-source discharges from agricultural activity and degradation in its highly-modified catchment (DCE 1991). The nutrient status of Lake Wellington is consequently eutrophic by OECD standards, and the biological diversity of the lake is poor, being dominated by phytoplankton (Bek and Bruton 1979, Robinson 1995).

Lakes Victoria and King, the lower two lakes of the Gippsland Lakes system, are not as severely affected by pollution as Lake Wellington, due to their location and their more marine nature (Harris et al. 1998). Analysis of EPA water quality records shows no clear or marked deterioration in the water quality of these lakes since the mid-1980s.

Reduced freshwater inflow from the catchment, together with the creation of a permanent opening at Lakes Entrance in 1889, has transformed what was previously a freshwater system into a marine system. Increased salinity levels cause suspended solids to flocculate and settle out, which in turn accommodate extensive beds of seagrasses, aquatic macrophytes and a rich benthic fauna (Harris et al. 1998).

5 Management of Risks

The key risks to the environmental values of the Gippsland Lakes are discussed below and summarised in Table 5.4. The risks include altered water regimes, salinity, pollution, pest plants and animals, inappropriate resource utilisation and recreation.

These risks result from activities in the wetland, on adjoining land and in the catchment areas. Protection of the site therefore requires an integrated approach. A wide variety of measures are being implemented at the Gippsland Lakes to deal with risks. They include planning, research, site works, catchment works and education. Regional Catchment Strategies are being revised for the East and West Gippsland catchments to continue to address risks associated with catchment processes. A brief summary of the measures relevant to each risk is provided.

5.1 Altered water regimes

The opening of the artificial connection to the sea at Lakes Entrance in 1889 clearly had a significant impact on the hydrology of the lakes systems and a number of other activities within the catchment have also altered water regimes.

The catchment of the Gippsland Lakes is heavily used for many purposes. It includes several large towns and cities (Sale, Bairnsdale, Traralgon, Morwell and Moe), Victoria's major electricity generating facility, the La Trobe Valley industrial development area, extensive dryland and irrigated agriculture, and a significant proportion of Victoria's timber resources. The water resources of the river systems have been extensively developed to support such activities. The waters of the Thomson, Macalister, Tanjil and Tyers rivers have been impounded, while irrigation water is diverted from most major streams (DCE 1991). Water from the Thomson River is diverted to the Yarra catchment to supply Melbourne and the reservoir represents Melbourne's largest water storage.

Annual water extractions from the rivers flowing into the Gippsland Lakes are listed in the table below. These are the maximum average water extractions permitted under the *Water Act 1989* (Boehm n.d.). The allocation of water is determined via the processes of negotiating bulk entitlements (for regulated rivers), and streamflow management plans (for unregulated rivers).

The objective of a bulk entitlement is to convert existing previously held but poorly-defined rights with the aim of improving the environmental flow regime where possible. The objective of a streamflow management plan is to establish a water sharing plan for the management of diversions on an unregulated river that will provide water users with agreed levels of security and provide the environmental flow regime required to maintain an ecologically healthy river.

Within the Gippsland Lakes catchment area, bulk entitlements or streamflow management plans have already been developed for the Upper Latrobe, Latrobe, Thompson and Macalister rivers, resulting in greater flows in summer. A streamflow management plan is proposed for the Mitchell River which has been identified as a river of very high community value in the Victorian River Health Strategy (NRE 2002c).A Streamflow Management Plan is being prepared for Avon River.

Tidal influence on this Ramsar site is greatest nearest Lakes Entrance. In these areas, work by CSIRO (Harris et al. 1998) has demonstrated that regular stratification (layering effect) of the water results in oxygen depletion in the lower, saltier layers. This reduces the survival of bottom-dwelling fauna, changes the behaviour of fish and leads to reductions in lake water quality, particularly as nutrients can accumulate in the lower layers during calm conditions. Once mixing occurs, nutrient entrainment in the oxygenated part of the water column can cause blue-green algal blooms.

High freshwater flows from the catchment occur from time to time and they result in very significant increases in turbidity and nutrient levels in the water of the lakes. This can lead to very serious blue-green algae blooms. It can take many months before the water clears again, and more "marine" conditions return.

Alterations to natural flooding regimes, primarily through impoundment and extraction, have reduced waterbird habitat and resulted in observable changes to the composition and diversity of flood dependent indigenous vegetation. Depending on the timing, flooding regulation can significantly reduce the breeding success of waterbird and fish species. This is of particular concern given the importance of the Lakes for a wide range of migratory and non-migratory waterfowl, some of which are under threat.

With an increase in agricultural, industrial and urban development in the catchment, upstream demand for water is increasing. This has the potential to further reduce through-flows of water in the Lakes, leading to further reductions in water quality.

The consequences of water extraction will worsen if environmental allocations of water are not made to maintain the Lakes' ecosystems. Modelling by

Webster et al. (2001) predicts that increased freshwater flows will increase flushing rates and subsequently reduce accumulation of nutrients.

The Gippsland Lakes and Catchment Taskforce has recently been established to facilitate coordination between the key players in the catchment. The Taskforce is chaired by the Secretary to DSE and has representatives from the Gippsland Coastal Board, Southern Rural Water, Catchment Management Authorities, and the Environment Protection Agency. It will develop an overarching plan for the Lakes and surrounding catchments. This increased level of coordination is a significant step in addressing risks to the ecosystems on which so many of the economic, environmental and cultural values of the Lakes depend.

Apart from the general catchment scale issue of environmental flows to the Gippsland Lakes, there are site-specific issues related to the hydrological management of wetlands in the Ramsar site. The lower reaches of the larger rivers flowing into the lakes (e.g. La Trobe River, Mitchell River) have extensive floodplains in which there are large wetlands, often separated by natural levees from the main river channels. These are highly significant waterbird and wetland plant habitat and include Dowd, Heart, Clydebank and Macleod Morass. In the context of the historical salinity of the Lakes, these wetlands are significant in that they represent the last remaining freshwater wetlands around the lakes. They are now subject to significantly altered hydrological regimes due to a combination of factors including:

- water control structures connecting the river at these sites allow for artificial water regulation. Water regimes are not always managed in line with natural regimes;
- erosion of the riverbanks separating these wetlands from the Lakes leads to saltwater inundation and more stable water levels (e.g. Clydebank Morass); and
- influxes of saline water from the Lakes enter these wetlands during periods of flooding (e.g. Heart Morass).

The failure to establish appropriate water level and salinity management of these remaining freshwater wetlands represents a high risk to the diversity and environmental values of the Lakes.

Table 5.1. The maximum average extraction of waters from rivers flowing into the Gippsland Lakes

River	Average annual extraction	Mean annual flow	% of total in river
La Trobe	308,000	908,000	30
Thomson-Macalister	454,000	967,000	47
Avon	8,800	248,000	4
Mitchell	18,000	858,000	2
Tambo	4,000	271,000	2
Nicholson	100	37,000	-

Source: Boehm, n.d.

5.2 Salinity

The opening of an artificial entrance at Lakes Entrance in 1889 introduced seawater to the lake system, which was originally fresh to brackish. This has substantially changed the Gippsland Lakes. The widespread dieback of lakeshore and lakebed vegetation and subsequent shoreline erosion in the lower reaches of the Lakes are examples of the negative consequences of this action (GCB 1999b). Freshwater vegetation communities are unlikely to persist under the current salinity trends around the Lakes (DCE 1991). Additional effects resulting from the intrusion of marine salinity are well documented by EA (n.d.).

DCFL (1989) identifies catchment driven salinity as a current and future problem. Salinity caused by rising groundwater levels was identified in the Nambrok-Denison irrigation district over thirty years ago. The consequences of past native vegetation clearing, followed by replacement of the deep-rooted native vegetation with shallow rooted pasture species (leading to rising watertables and associated salinity) are also becoming apparent. Although catchment driven salinity around the Gippsland Lakes is not as severe as in some other parts of Victoria, there is potential for the problem to become more serious. Salinity problems have been identified around Lake Wellington (where at least 10,000 ha are affected), with other small affected areas scattered throughout the catchment (DCFL 1989).

Recent (unpublished) work undertaken by DSE relating to Clydebank Morass indicates that this wetland is accumulating salt at a greater rate than it is being exported during overbank floods from the Avon River. About half of salt entering the wetland is from

the local catchment during rainfall events. DSE is currently investigating a number of options to reverse this trend towards salinity in the freshwater wetlands. Artificial management of water regimes in Dowd Morass and Sale Common is one of the options being considered.

Salinity affects the Gippsland Lakes in a number of ways. Increases in salinity of the groundwater may change the ecology of the streams, wetlands and the Lakes, ultimately affecting the value of the Lakes for the conservation of native flora and fauna, the value for commercial activities such as fishing, and community enjoyment of the natural environment (DCFL 1989).

The fisheries data seem to indicate that at present the influence of habitat change and environmental factors (water temperature and salinity) is more severe than the influence of over-fishing (GCB 1999b). Salinity conditions are important for the breeding of indigenous fish species (e.g. Black Bream and Australian Bass) in the Lakes, and for viable populations to occur the appropriate salinity conditions must occur. Salinity conditions also affect the levels of dissolved oxygen in the water. As oxygen does not move readily across the stratification between fresh water and lower salty water layers, oxygen below the stratification is depleted, and fish trapped in the layer die resulting in the large-scale fish kills sometimes seen in the Lakes (DCE 1991).

A number of actions are being undertaken in Gippsland Lakes to address salinity, for example, a salt and water budget model has been developed for Clydebank Morass. This model compares current and historical inputs and outputs of salt and water into the site and where necessary, makes recommendations about how best to restore a natural salt and water budget.

5.3 Pollution

Pollutants from point and diffuse sources within the catchment tend to accumulate and concentrate in Gippsland Lakes (Harris et al. 1998). Nutrients constitute the most significant pollutant in the Lakes. In addition to background inputs of nutrients from natural processes occurring in the catchment, urban run-off, run-off from agricultural and forestry activities and septic tank leachate from unsewered areas have been identified as sources of nutrients (Cottingham 1995). The main source of the nutrients is from run-off from agricultural land, particularly from dairy farming in the Maffra-Warragul area.

Nutrient inputs from the catchment have led to eutrophication of the Gippsland Lakes (Webster et al. 2001). Major outbreaks of blue-green algae have occurred about every ten years in the Gippsland Lakes (Harris et al. 1998). When compared to other estuaries around the world, the nutrient load to the Lakes is similar to (or even greater than) nutrient loads to heavily impacted estuaries such as Tokyo Bay and parts of San Francisco Bay (Harris et al. 1998). Excessive nutrient levels result in changes to the composition of flora and fauna, and sometimes lead to fish kills (GCB 1999a; GCB 1999b).

Waste water inputs from the Bairnsdale Waste Water Treatment Plant, leachate from the Bairnsdale Landfill and the Bairnsdale saleyards, and stormwater run-off from the town of Bairnsdale have all provided major pollutant loads to Macleod Morass, which ultimately enter the Lakes system via the Mitchell River (MMCWMWP 1995). Lake Coleman also has a history of problems associated with high levels of pollution.

Recent work by Harris et al. (1998) on sampling toxicants indicates that, with the exception of mercury and possibly selenium, toxicants are not problematic in the Gippsland Lakes. Levels of pesticides and polyaromatic hydrocarbons are lower than in Port Phillip Bay. The evidence also indicates, however, that mercury levels in sediment are approaching alarmingly high levels – i.e. up to 40 times the recommended upper limit (Harris et al. 1998). Such levels imply a likelihood of ecosystem impacts, although the presence of high sulphide concentrations in sediments make it likely that mercury is present as an insoluble mercury sulphide, and therefore not biologically available (GCB 1999b).

According to Harris et al. (1998) the likely sources of mercury are historical gold mining operations, which were active until earlier last century. A paper mill and the La Trobe Valley power stations might also have contributed mercury although the exact amount is not known (Harris et al. 1998). Under the high rates of decomposition that occur in the sediments of the Lakes, cycling of various readily available forms of organic mercury will be rapid and contribute to the accumulation of mercury in food chains (Harris et al. 1998). Such processes are not well understood and further research is warranted (Harris et al. 1998).

Nutrient pollution represents a significant risk to all values of the Gippsland Lakes. Blue Green Algae blooms result from excessive nutrient pollution and they displace fish populations, excessive organic growth can lead to oxygen stratification (i.e. layering) of the water leading to the release of nutrients that would otherwise remain in sediments, and ultimately to morbidity of fish and bottom-dwelling fauna. The algal blooms are also toxic, leading to the closure of beaches and restrictions on boating activity. Algal blooms can also reduce the amenity of large parts of the Lakes. The combination of toxicity and reduced amenity deters recreation and tourism. Nutrient

pollution therefore also represents a significant risk to the economic well being of the region's tourism industry.

Litter is well established as a risk to wildlife. Plastic litter is particularly problematic, as wildlife (including waterbirds and marine mammals) sometimes consume or become entangled in it. Sources of litter include large residential areas adjacent to the Ramsar site as well as land and water based recreation in and around the Gippsland Lakes. Strategies to minimise the impact of litter in this Ramsar site should be investigated.

Spills of oil and fuels from offshore oil and gas platforms and shipping pose a risk to the natural values of the Gippsland Lakes Ramsar site. The spilt substance and/or the clean-up techniques used have the potential to cause damage or death to aquatic organisms, wildlife and essential habitat. The Victorian Marine Pollution Contingency Plan has been prepared to counter major oil spills in Victoria (PMA 1997).

Current actions to address pollution include the establishment of the Gippsland Lakes and Catchment Taskforce, and implementation of the Macalister Irrigation District Nutrient Management Plan. Water treatment arrangements to be implemented at Macleod Morass will have a positive impact on water quality in the Gippsland Lakes by reducing nutrient and sediment loads entering Lake King.

5.4 Pest plants and animals

Pest plants of the Gippsland Lakes include exotic and indigenous agricultural weeds, and environmental weeds. Environmental weeds are mostly exotic plants that invade native vegetation, adversely affecting the survival of the indigenous flora (Carr et al. 1992). Most pest plants are associated with disturbed areas such as tracks, firebreaks, previously grazed areas, park boundaries and recreation sites (PV 1998). Major weeds and their risk are detailed below in Table 5.2.

Pest plants have the potential to reduce opportunities for regeneration of indigenous flora through competitive growth, and by changing soil conditions required for successful germination and development of native flora (Carr et al. 1992). The species mentioned, particularly blackberry, also provide harbour for pest animals such as rabbits (which feed on native flora) and foxes (which predate on native fauna). Parks Victoria undertakes annual control programs for species such as blackberry, boxthorn and willow. The programs have kept these species in check within the Lake Wellington wetlands, although regular follow-up work is required.

Introduced pest animals are widespread in the Gippsland Lakes (GCB 1999b, EGRCLPB 1997, PV 1998). A number of introduced animals have been recorded in the Gippsland Lakes, including the fox, feral and domestic cat, dog, rabbit, feral goat, feral pig, and carp (PV 1998). Details of the main pest animals are given in Table 5.3.

Carp are present in large numbers in the Ramsar site particularly in Lake Wellington. The feeding habits of carp cause severe damage by muddying the water and making the environment unsuitable for many of the aquatic biota that naturally thrive in the lake.

Some insect species have the potential to cause severe defoliation of wetland vegetation. After partial drying of Dowd Morass in 1995, some dieback of Swamp Paperbark occurred due to attack by sawfly larvae (PV 1997). The Gum-leaf Skeletoniser poses a risk to valuable remnant eucalypts on the margins of some wetlands.

Large numbers of mosquitoes pose a risk to human health via the transmission of mosquito-borne diseases and also impact on amenity and well being. Chemical control agents, primarily larvicides, are used in control programs. They have the potential to impact non-target organisms and food webs within the wetland system. However, the effects of chemical mosquito control on the wetlands system is not well understood and requires further investigation. A statewide strategy is currently being prepared to guide local government and other agencies in planning mosquito control programs.

No detailed information is available on the status of marine pests in the Gippsland Lakes Ramsar site.

Parks Victoria undertakes annual control programs for pest animals on the land that it manages within the Ramsar site. Examples include intensive rabbit control works at sites such as Rotamah Island and in the Lake Wellington Wetlands. Carp barriers have been installed on Dowd Morass and Sale Common in an attempt to minimise numbers of large carp entering these wetlands.

5.5 Resource utilisation

Licensed grazing by domestic stock occurs on less than 5% of the foreshore and riverbanks of the Gippsland Lakes, but occurs on approximately 45% of the fringes of the other wetlands in the Ramsar site. Illegal grazing occurs where inadequate fencing permits access of stock to Crown Reserves from adjacent freehold grazing land.

Rabbits, goats, Hog Deer, Eastern Grey Kangaroos and Swamp Wallabies also exert grazing pressure on native vegetation (DCNR 1993). The latter two native grazers have increased their numbers since clearing of some areas has encouraged the growth of more pasture (DCNR 1993).

Table 5.2 Location and risk of pest plants in the Gippsland Lakes Ramsar site

Pest Plant	Location	Risks
Blackberry	Macleod Morass, Lake Wellington Wetlands and rapidly increasing in disturbed areas.	Threat to native vegetation. Harbour for pest animals.
Willow	All freshwater wetland areas around Lake Wellington such as Sale Common and Clydebank Morass.	Chokes up wetlands, impeding water movement. Colonise shallow ephemeral wetland areas. Allows no understorey species to persist.
Brazilian Water Milfoil	Lake Wellington, Sale Common and Heart Morass	Impedes the growth of all other aquatic plants.
Bridal Creeper	GLCP, Raymond Island, Lakes Entrance, and Lakes Tyers.	Invades Swamp Paperbark and other communities at fringe of lakes.
Box Thorn	GLCP and Lake Wellington Wetlands.	Invades indigenous communities.

Table 5.3 Location and risk of pest animals in the Gippsland Lakes Ramsar site

Pest Animal	Location	Risks
European Carp	Present in large numbers throughout the fresh and brackish waters of the Ramsar site, and particularly in the rivers draining into the lakes.	Threat to native fish and water quality of the Lakes due to their destructive feeding habits. Their presence in high numbers in wetlands such as Lake Wellington may counteract the effectiveness of any nutrient management plans.
Fox	Throughout the Ramsar site.	Predate upon arboreal mammals, ground dwelling or nesting bird species (e.g. Little Tern), reptiles and frogs.
Dog	Near towns, Barrier Landing, Ocean Grange and Lake Tyers.	As for fox Particularly impact on breeding bird colonies and plovers.
Feral and domestic cat	Macleod Morass and adjacent urban areas and tips.	As for fox
Rabbit	Prevalent at Rotamah Island, Emu Bight, Point Wilson and in the Lake Wellington wetlands.	Hamper revegetation programs and reduce food availability to indigenous herbivores.
Feral goat	Seacombe area, Lake Reeve and Lake Coleman State Game Reserve.	Cause damage and destruction to vegetation.
Feral pig	Only a small number left on Boole Poole Peninsula.	Disturb vegetation.

Hog Deer are declared wildlife under the *Wildlife Act 1975* and management objectives are generally related to maintaining populations for game hunting. Notwithstanding, the population of introduced Hog Deer (on Boole Poole Peninsula and in Blond Bay Game Reserve) may be affecting native vegetation values. If adverse impacts are confirmed through further investigation, appropriate control programs may need to occur in areas of high conservation significance.

A study has recently been initiated to investigate the abundance, density and distribution of Hog Deer at Wilson's Promontory National Park. The study aims to identify techniques to monitor Hog Deer within Victoria and any environmental impacts associated with these populations.

Research has demonstrated that grazing and trampling by stock and other animals can destroy and hinder regeneration of indigenous flora, causing a reduction in plant density, diversity and structure. Such conditions are ideal for invasion by weed species that may eventually replace indigenous vegetation. Simplified systems supporting a groundcover pasture species with no other strata usually results from frequent grazing. Uncontrolled stock grazing close to waterways and wetlands leads to bank erosion which reduces water quality, causes muddying and fouling of the water, results in increased turbidity and nutrient levels and depleted oxygen levels.

Uncontrolled grazing by both domestic stock and introduced herbivores (e.g. rabbits, deer) as well as excessive grazing by native grazers (e.g. Eastern

Grey Kangaroos) represents a significant potential risk to native flora diversity and condition, and to fauna habitat integrity. On the other hand, in some settings grazing can promote succession, creating vegetation and habitat diversity of value to some flora and fauna species.

Stock grazing can be allowed within the Ramsar site for management purposes and is regulated through a licensing system that sets outs a number of restrictions to minimise any negative impacts. Some illegal stock grazing does occur within areas of the Ramsar site, mainly due to poorly maintained fences on adjoining properties. Site managers have the authority to impound stock found illegally within the Ramsar site.

Gippsland Lakes supports commercial fishing, including commercial eel harvesting. The most important fishery within the lakes system, the Black Bream fishery, has declined. In the 1980s, annual catches ranged between 194 and 446 tonnes. In the 1990s, they ranged from 89 to 185 tonnes. Along with reducing native fish stocks, commercial fishing activities have the potential to disturb or accidentally catch wildlife which in turn affects fish eating species of native fauna (NRE 2002a). In particular, the reproductive success of the endangered Little Tern in the Gippsland Lakes is greatly influenced by the availability of small schooling fish throughout the breeding season (NRE 2002a).

5.6 Dredging

Dredging of the Gippsland Lakes is required to: maintain a navigable entrance to Bass Strait; maintain channels for boating access within the Lakes system; and provide, in some cases, sand for replenishment of beaches and eroding shorelines. About 300,000 m^3 per annum is dredged at Lakes Entrance to maintain navigability of the ocean entrance and other areas (NRE 2002a). Dredging also occurs at the sand bar adjacent to the entrance to the Lakes, immediately outside the Ramsar site. Gippsland Ports is responsible for all dredging both inside and outside the Ramsar site.

There are a number of environmental impacts associated with dredging sediment, primarily through the damage/destruction of benthic vegetation and the alteration of bathometric features. Damage and destruction to vegetation from dredging may be caused by physical removal, smothering, and reduced light penetration for photosynthesis caused by increased turbidity. The removal of aquatic fauna, spread of aquatic weeds, and transportation and mobilisation of toxicants and/or nutrients from polluted sediments are additional impacts which may occur (NRE 2002a). Dredge spoil can interfere with the suitability of breeding sites for a number of shorebirds including terns, plovers and oystercatchers.

Dredging on the Victorian Coast requires the consent of the Minister for Environment under the *Coastal Management Act 1995*. In evaluating proposals for dredging, the DSE consults with the Environment Protection Authority's Technical Advisory Committee. The Committee has regard to Best Practice Environmental Management Guidelines for Dredging (EPA 2001) which encourage environmentally sound approaches to dredging to minimise impacts.

5.7 Recreation and tourism

Some recreational activities pose a threat to wetland values. Many fauna species, particularly waterbirds, are sensitive to disturbance at feeding and nesting sites. Disturbance by visitors during the breeding season may pose a potential threat to the survival of threatened species such as the Little Tern and Hooded Plover. Successful management of breeding colonies by the Little Tern Task force Inc. and Parks Victoria has ensured successful breeding by these species over the last 20 years.

The Gippsland Lakes system is Victoria's major boating destination east of Melbourne. Boating activities can damage foreshore flora, disturb fauna (Paton et al. 2000) and introduce a range of pollutants into the Gippsland Lakes Ramsar site (GCB 2001). There are currently no legislative provisions under the *Marine Act 1988* to restrict boat access or speeds for the protection of wildlife or environmental values (GCB 2001). Boat sewage, in terms of the siting of pump-out stations and installation of boat holding tanks, is another issue (GCB 2001). Though the contribution of sewage from boats to total nutrient loads in the Lakes is not significant, it may be of a problem in confined places (DCE 1991).

Camping and recreational fishing are particularly popular in the Gippsland Lakes (PV 1998). At some sites, these activities have led to problems associated with litter, water pollution, fire, removal and damage to native vegetation, and hence soil erosion and soil compaction (PV 1997, PV 1998). Like commercial fishing, recreational fishing also has the potential to have a detrimental impact upon native fish stocks (NRE 2002a). Preliminary results of a survey of recreational catches in the Gippsland Lakes indicate that there has been a 53% decline in the seasonally adjusted mean catch rates over the past 13 years (EGRCLPB 1997). The reasons for this are not known.

Hunting is permitted at certain sites in the Gippsland Lakes, including parts of the Gippsland Lakes Coastal Park, and Wildlife Reserves that have been further classified as State Game Reserves (see Table 2).

Lake Reeve is the major area for duck hunting within the Gippsland Lakes Coastal Park.

Proclaimed game (i.e. appropriate duck species, Hog Deer and Stubble Quail) may be hunted during the open season only, whereas pest animals may be hunted at any time on some Crown Land. The duck hunting season usually occurs annually in autumn (subject to pre-season censuses) and is subject to tight controls by DSE. The numbers of duck shooters in the Gippsland Lakes is not as large as in other parts of Victoria and current hunting levels are not considered detrimental. Where there is potential for duck hunting to cause serious disturbance to active waterbird breeding colonies the relevant wetlands are closed to hunting. Deer hunting is strictly controlled by a ballot system on Boole Poole Peninsula.

Hunting can create both physical and noise disturbance to fauna and result in the accidental shooting of protected and threatened fauna species (NRE 2002a). Disturbance to colonies of breeding waterbirds, and the effects of Tea-tree removal for hide construction on wildlife habitat present some risk and require management (PV 1997). The use of firewood by campers is a significant localised risk to native vegetation near camping areas.

Contamination of wetlands from the accumulation of lead shot is listed as a threatening process under the *Flora and Fauna Guarantee Act 1988* (NRE 2002a). Lead shot was prohibited for duck hunting in Victoria in 2002 but can still be used for hunting quail, pest animals and for clay target shooting. Waterbirds which feed in or on the edges of wetlands are still at risk of lead poisoning due to residual lead in sediments (FFG Action Statement No.32). The extent of the lead contamination in Gippsland Lakes is not known.

5.8 Fire

Wildfires can cause significant losses to wetland values (NRE 2002a). Major wildfires in the wider Gippsland region occurred in 1939, 1965, 1978 and 1983, burning areas of up to 100,000 ha in a single fire season. The principle causes of wildfires are lightning strikes, breakaways from tips, deliberate lighting, barbeques and campfires and escapes from burns on private property and inappropriate fuel reduction burning. Drought and high temperatures often exacerbate fires (PV 1998).

Major wildfire and large-scale fuel reduction burning is not compatible with the conservation of some of the vegetation communities of the Gippsland Lakes Ramsar site. For instance, Banksia and Allocasuarina woodlands exist in mature stands in The Lakes National Park and Blond Bay State Wildlife Reserve, and so would be destroyed by intense fire (DCNR 1993).

Conversely, suppression of fire can also have a significant impact on the environmental values of some wetland ecosystems, by adversely affecting the diversity of flora and its dependent fauna (NRE 2002a). Heathland communities require prescribed burning to produce mosaics of different aged heaths in order to maintain species diversity (DCNR 1993). The Gippsland Lakes heathlands are a regular habitat and feeding area for Ground Parrots. The endangered Metallic Sun-orchid and New Holland Mouse also require sensitive management of fire regimes in their habitat (PV 1998).

Fire intensity is another important consideration. An extensive and intensive wildfire burning large fuel quantities can, in some cases, cause lasting damage (EGRCLPB 1997). Stream sediment and turbidity, due to the loss of protective vegetation cover, are likely to significantly increase immediately following such fires. An ecological burning program for The Lakes National Park and the Gippsland Lakes Coastal Park has been agreed to under the regional fire plan and will result in fire regimes that are appropriate for local conditions.

5.9 Erosion

Erosion is a natural process, detaching and transporting sediment from one area to another. Natural erosion rates under undisturbed natural vegetation are generally low, however about 100,000 tonnes of suspended solids (excluding bottom sediments) are estimated to enter the Gippsland Lakes each year from the catchments of the Mitchell, Tambo and Nicholson Rivers alone (Bek and Bruton 1979). Studies of the Lakes show a strong relationship between the amount of suspended solids in streams and the extent to which these catchments have been altered from natural vegetation cover to artificial systems like farmland and urban precincts (EGRCLPB 1997).

Many factors contribute to the vulnerability of soil to erosion in Gippsland farmland:

- Lack of suitable vegetation cover (coinciding with high rainfall events);
- Soil exposed by fire, roads and tracks, pest animals, stock movement or tillage; and
- Farming management decisions that inadequately address the risk factors of different practices. For instance, stream banks have long been recognised as a site of soil erosion, yet stock have access to stream banks in many areas (EGRCLPB 1997).

Sedimentation in streams flowing into the Gippsland Lakes can increase due to forestry operations. The Code of Forest Practices for Timber Production: Revision No. 2 (NRE 1996) is designed to reduce the risk to streams from logging operations.

Erosion along the shoreline of some of the Lakes has resulted from the die-back of fringing reed communities, such as those dominated by the Common Reed. As previously mentioned, a range of recreational activities are other commonly identified causes of shoreline erosion (PV 1997, GCB 1999b, DCE 1991).

Accelerated erosion reduces opportunities for regeneration of indigenous flora by making soil less favourable for germination and development. Aquatic habitat is also degraded by sediment inputs. Increases in turbidity and suspended sediment loads, that eventually settle, alter stream and lakebed environments for aquatic plant life, benthic macroinvertebrates and fish.

Nutrients (phosphorous, nitrogen) and chemicals (e.g. heavy metals) adsorbed to eroding soil particles are carried to aquatic environments and can lead to pollution and eutrophication of waterways and lakes with negative consequences for aquatic ecosystems (NRE 2002a). Harris et al. (1998) state that the major source of nutrients in the Gippsland Lakes is catchment erosion during flood events.

The foreshores of the Gippsland Lakes Ramsar Site are also subject to significant erosion. This may be attributed to decreasing water quality throughout the Gippsland Lakes catchment and increasing utilisation of the lakes system as a recreational amenity. The reduction of naturally occurring riparian and aquatic vegetation along lake foreshores, wetland levees and river banks has led to destabilisation of these areas. Saltwater intrusion into freshwater wetlands within the Gippsland Lakes Ramsar site has occurred as a result of the foreshore erosion.

If the process of erosion is not abated, it may contribute to a loss of habitat and biodiversity, increased sedimentation, nutrient loads and turbidity, all of which will have a negative impact on the natural values of the Gippsland Lakes Ramsar site.

Catchment and shoreline erosion are therefore a fundamental problem requiring rectification. The associated pollution of streams, rivers and the lakes themselves places most of the environmental, recreational and economic values of the lakes at significant risk.

5.10 Level of risk to Ramsar values

The goal of the integrated management framework (incorporating the Strategic Directions Statement and corresponding Strategic Management Plans) is to facilitate the maintenance of ecological character at Victoria's Ramsar sites by minimising risks to values. This objective will be achieved through the implementation of strategically prioritised management actions. The proposed management actions are prioritised according to their ability to address the identified threats or risks.

A *strategic risk assessment* process based on the broad concepts and principles of ecological risk assessment has been undertaken for the Strategic Directions Statement and Strategic Management Plans (NRE 2002a – Appendix 7). This process relied on a clear understanding of the range of direct and indirect pressures facing the wetlands, as well as the legislative and policy context.

A systematic and strategic analysis of risk provides the necessary information to site managers; and facilitates priority setting, resource allocation and informed decision-making. It also provides a better understanding of management issues.

The strategic risk assessment process has established the basis for objectively assigning higher, medium and lower priority levels to risks at Ramsar sites and the management actions designed to address them. The strategic risk assessment approach also facilitates an understanding of the relationship between specific risks and values. The strategic risk assessment framework draws on two major relevant documents: the US Environment Protection Authority's Guidelines for Ecological Risk Assessment (1997) and the Ramsar Convention's Wetland Risk Assessment (RBC 1999).

The main risks to the environmental values and ecological character of the Gippsland Lakes Ramsar site are summarised below in Table 5.4. It should be noted that the level of risk has not been assessed against the effort currently being applied to mitigating the risk. Based on our current understanding pollution and pest animals are considered the most serious threat to the site's environmental values and ecological character.

Table 5.4 Level of risk to the ecological character of the Gippsland Lakes Ramsar site

Ramsar site	Risks								
	Altered water regimes	Salinity	Pollution	Pest plants	Pest animals	Resource utilisation	Dredging	Recreation	Erosion
Gippsland Lakes	◆◆	◆◆	◆◆◆	◆	◆◆◆	◆	◆	◆◆	◆◆

◆◆◆ **Higher priority risk** – risks that currently or may potentially result in the significant loss of the site's environmental values and ecological character.

◆◆ **Medium priority risk** – risks that currently or may potentially result in the moderate loss of the site's environmental values and ecological character.

◆ **Lower priority risk –** risks that currently or may potentially result in the minor loss of the site's environmental values and ecological character

6 Site Management Strategies

A number of Site Management Strategies have been developed in response to the analysis of risks to the values at the Gippsland Lakes Ramsar site. The Site Management Strategies are grouped under the relevant Management Objectives established by the Strategic Directions Statement.

The Site Management Strategies for the Gippsland Lakes Ramsar site promote a range of specific management actions that will maintain, and in some cases restore the ecological character of the site. The Site Management Strategies are designed to:

- address risks that are having an adverse impact, or are likely to have an adverse impact on ecological character; and
- highlight existing strategies and actions that are consistent with wise use principles.

The successful coordination and cooperation of the lead agencies as well as the continued efforts of the many community and interest groups, is essential for the long-term conservation of the Gippsland Lakes Ramsar site. The Strategic Directions Statement, statutory mechanisms, management plans and management strategies will guide the implementation of this Strategic Management Plan.

DSE will have overall responsibility for:

- facilitating the implementation of the Strategic Directions Statement and Strategic Management Plans for Ramsar sites by ensuring relevant agencies incorporate relevant strategies into their work programs;
- coordinating and reporting on the progress and/or issues with implementation of the Strategic Directions Statement and Strategic Management Plans for Ramsar sites;
- ensuring monitoring programs are established in accordance with the Strategic Directions Statement and Strategic Management Plans for Ramsar sites;
- ensuring the regular review of Strategic Management Plans for Ramsar sites;
- preparing the Victorian chapter of Australia's National Report to triennial Conferences of the Contracting Parties to the Ramsar Convention; and
- the six yearly update of the Ramsar Information Sheets for each site.

In order to clarify accountabilities, the lead agency responsible for the implementation of each strategy is identified. Lead agencies will monitor implementation of the strategies for which they are responsible. Lead agencies are encouraged to record progress on their responsibilities and extent of implementation and provide information in the form of annual summary reports to DSE. This information will be consistent with a format to be developed by DSE and will contribute to Victoria's chapter in the National Report to the Convention on Wetlands, prepared every three years.

A rating of relative priority accompanies each Site Management Strategy. Definitions of these priorities are as follows:

Higher: Strategies that, when implemented, will significantly contribute to the maintenance of ecological character.

Medium: Strategies that, when implemented in conjunction with Higher priority strategies, will support the maintenance and contribute to the restoration of ecological character.

Lower: Strategies that, when implemented in conjunction with Higher and Medium priority strategies, will result in enhancement of ecological character.

Management Objective 1

Increase the scientific understanding of wetland ecosystems and their management requirements

	Site Management Strategy	Lead agency	Priority
1.1	Ensure a full understanding of the importance of the role of research and monitoring in the environmental management of the Gippsland Lakes among organisations responsible for management of the Lakes.	DSE, PV	Higher
1.2	Undertake and support research needed to address key issues in the management of the Gippsland Lakes Ramsar site. Priority areas include: • Coordinated water quality monitoring in the lakes and their catchment; • Development of nutrient budgets for the Lakes and their catchment as a basis for setting sustainable nutrient input limits; • Identification and monitoring of indicators of ecosystem health in the Gippsland Lakes; • Coordinated sedimentation monitoring in the Lakes and their catchment; and • Coordinated monitoring of freshwater flows into and through the Lakes and their catchments.	DSE, PV, WGCMA, EGCMA, SRW, EGW, GW, MW, GCB	Higher

Management Objective 2

Maintain or seek to restore appropriate water regimes

	Site Management Strategy	Lead agency	Priority
2.1	Develop works and operational plans for the management of ecological values in freshwater wetlands within the Gippsland Lakes Ramsar site to minimise the risk of saline intrusion, particularly during extreme climatic events (i.e. droughts or floods).	DSE, PV	Higher
2.2	Identify environmental assets in the Ramsar site requiring environmental flows for their protection and negotiate for flows to be provided in bulk entitlement and streamflow management plan processes.	DSE, WGCMA, EGCMA, PV	Higher
2.3	Implement the actions of the Gippsland Lakes Coastal Action Plan related to sewering small townships near the Lakes (e.g. Golden Beach).	GW, EGW	Higher
2.4	Ensure new wastewater treatment plants meet the highest environmental standards and comply with EPA State Environmental Protection Policies.	GW, EGW	Higher
2.5	Continue to implement the agreed joint rehabilitation program for Macleod Morass incorporating the development of a constructed wetland. The wetland will act as a nutrient filter for discharges from the wastewater treatment plant.	PV, DSE, EGSC, EGW	Higher
2.6	Examine effectiveness, feasibility and appropriateness of restricting saline flows through McLennan Strait into Lake Wellington through the construction of a flexible barrier.	DSE	Medium
2.7	Where urban stormwater run-off is causing particular problems (e.g. Macleod Morass, Merriman Creek), develop and implement urban run-off controls (e.g. retarding basins, litter traps) for improving run-off quality.	EGSC, EPA, WSC	Medium
2.8	Develop improved stormwater management practices to reduce nutrient and pollution levels from McGees Gully and Crooke Street drains.	EGSC, PV	Medium

Management Objective 3

Address adverse processes and activities

	Site Management Strategy	Lead agency	Priority
3.1	Develop and implement a weed management strategy for the Ramsar site to address weed infestations in areas of high conservation value.	PV	Higher
3.2	Participate in appropriate consents for use and development on adjacent land under the *Planning and Environment Act 1987* and during the Environmental Effects Statement process (*Environmental Effects Act 1978*).	PV, DSE	Higher
3.3	Review state and local planning policies and provisions to ensure that the environmental values of the Gippsland Lakes, including its Ramsar status, are recognised and that strategic planning and development control provisions are based on best practice environmental management. This should include matters such as: • Location, design and management of urban development, especially stormwater; • Location and design of tourism and resort facilities; • Location, design and management of marinas and other boating facilities; and • Location, design and management of rural residential development.	GCB	Higher
3.4	Ensure proponents are made aware that development proposals that may impact on Ramsar values should be referred to Environment Australia or an approved State authority as directed by the EPBC Act 1999.	DSE, EGSC, WSC, EGCMA, WGCMA	Higher
3.5	In accordance with the Gippsland Lakes Coastal Action Plan, improve dredging and spoil disposal and consult with community and environmental; groups when establishing dredge spoil disposal programs.	DSE, GP, EPA	Higher
3.6	Identify areas subject to erosion within the Gippsland Lakes Ramsar site, investigate appropriate erosion control/rehabilitation techniques required, and undertake erosion control works at locations of priority concern.	PV, GCB	Higher
3.7	Maintain strong contingency plans and capabilities for dealing with oil spills from mobile or fixed facilities, or from off-shore oil production platforms.	DSE	Higher
3.8	Undertake environmental projects in conjunction with adjacent and other landowners to address soil erosion as well as pest plant and animal control.	DPI, PV	Higher
3.9	Introduce speed restrictions on boating and personal watercraft in parts of the lakes where shoreline erosion or waterbird disturbance is a demonstrated problem.	DSE, GP, MBV	Medium
3.10	Develop and implement a Lakes-wide Carp Management Plan, consistent with the directions of the National Carp Management Guidelines.	DPI, GCB, PV, EGCMA, WGCMA	Medium
3.11	Investigate and develop priorities for the fencing of currently unfenced wetland and foreshore areas of the Gippsland Lakes to assist grazing management.	PV	Medium
3.12	Implement revegetation programs to ensure shore, bank and levee stabilisation, including fencing of sensitive shoreline, bank and levee areas to minimise disturbance by visitors and cattle grazing.	PV	Medium
3.13	Support programs to rehabilitate wetlands in the lower reaches of major rivers in the catchment to improve water quality (i.e. nutrients, turbidity, salinity) entering the Gippsland Lakes Ramsar site.	DSE, WGCMA, EGCMA, GCB	Medium
3.14	Review the impacts of licensed grazing in wetland and foreshore areas of the Gippsland Lakes and the relative environmental values of shoreline areas as a basis for determining the future of such activities.	DSE, PV, WGCMA, EGCMA	Lower
3.15	Continue controls on deer hunting to ensure a sustainable harvest and minimal impact on Ramsar values.	DSE, PV	Lower
3.16	Monitor eel harvesting and its impact on the Lakes habitat, particularly in relation to spreading of noxious weeds	PV, DPI	Lower

Management Objective 4

Manage within an integrated catchment management framework

	Site Management Strategy	Lead agency	Priority
4.1	Develop an overarching plan to provide a high level and integrated approach to the management of the Gippsland Lakes and their catchments.	DSE, GCB, SRW, EGCMA, WGCMA	Higher
4.2	Provide leadership on integrated catchment management through the Gippsland Lakes and Catchment Taskforce.	DSE, GCB	Higher
4.3	Implement the West Gippsland Regional Catchment Strategy and associated action plans, giving priority to the water, salinity and land programs.	WGCMA	Higher
4.4	Implement the East Gippsland Regional Catchment Strategy and associated action plans, giving priority to the programs on water erosion and waterways, and river flow management.	EGCMA	Higher
4.5	Apply the strategic directions and implement the specific actions for sustaining the Gippsland Lakes in the Gippsland Lakes Coastal Action Plan.	GCB	Higher
4.6	Implement the Macalister Irrigation District Nutrient Reduction Plan.	SRW, WGCMA, DPI	Higher
4.7	Promote plans among major water users in the catchment (i.e. irrigators and industry) for conserving water resources, consistent with existing plans (e.g. WGCMA, EGCMA, DSE, Nutrient Management Strategies).	WGCMA, EGCMA, DPI, SRW, EGW, GW	Higher
4.8	Implement the water quality protection measures of the East Gippsland Forest Management Plan, including the effective implementation of the Code of Forest Practices for Timber Production: Revision No. 2 (NRE 1996).	DSE	Medium
4.9	Enforce the Code of Forest Practice for Timber Production: Revision No. 2 (NRE 1996) in their respective forestry areas.	WSC, EGSC, DSE	Medium

Management Objective 5

Manage resource utilisation on a sustainable basis

	Site Management Strategy	Lead agency	Priority
5.1	Participate in appropriate consents for use of adjacent land including, mineral extraction, intensive animal husbandry, and forestry under the *Planning and Environment Act 1987* and during the Environmental Effects Statement process.	PV, DSE	Higher
5.2	Implement priority Fisheries Victoria strategies to ensure ongoing sustainability of fisheries resources.	DPI	Higher
5.3	Ensure any aquaculture is sustainable, environmentally sensitive and managed in accordance with the Victorian Aquaculture Strategy.	DPI	Higher
5.4	Ensure that any future aquaculture developments in the Ramsar site only occur if they do not impact on Ramsar site values and also meet other legislative and administrative requirements.	DPI	Higher
5.5	Continue current controls on duck hunting in the Gippsland Lakes to ensure a sustainable harvest.	DSE, PV	Higher

Management Objective 6

Protect, and where appropriate enhance, ecosystem processes, habitats and species

	Site Management Strategy	Lead agency	Priority
6.1	Control pedestrian and boat access to sensitive habitats, including bird nesting sites, breeding sites and migratory seabird/shorebird habitats.	PV	Higher
6.2	Implement action statements for threatened species and threatening processes (fox and feral cat control) under the *Flora and Fauna Guarantee Act 1988*.	DSE, PV	Higher
6.3	Protect geomorphological processes through assessment of impacts of new marina/harbour dredging proposals and of proposed shore erosion control works.	DSE, PV, WSC, EGSC, GP	Medium

Management Objective 7

Encourage strong partnerships between management agencies

	Site Management Strategy	Lead agency	Priority
7.1	Foster cooperative approaches to land management in areas on and adjacent to the Gippsland Lakes Ramsar site, to complement management activities in the Ramsar site.	DSE, PV, WGCMA, EGCMA, WSC, EGSC, GW	Higher

Management Objective 8

Promote community awareness and understanding and provide opportunities for involvement in management

	Site Management Strategy	Lead agency	Priority
8.1	Raise the profile of the Ramsar Convention, the environmental problems and solutions surrounding Gippsland Lakes, through the stepping up of interpretative signage, brochures and other information activities recommended in the Gippsland Lakes Coastal Action Plan.	DSE, PV	Higher
8.2	Encourage involvement of local Aboriginal people in all facets of Ramsar site management, consistent with the commitment of the Indigenous Partnership Strategy to recognise the fundamental role Aboriginal indigenous communities have in natural resource management.	DSE, PV	Higher
8.3	Consult with local Aboriginal people to ensure that other site management strategies in this plan do not adversely impact on Aboriginal cultural heritage values.	DSE, PV	Higher
8.4	Involve key stakeholders actively in habitat management throughout the Ramsar site.	DSE, PV	Higher
8.5	Promote greater understanding, awareness and protection of Ramsar sites in extension and voluntary programs to landholders and the community, through programs such as Land for Wildlife, Landcare and Waterwatch.	DSE, PV	Higher
8.6	Support the activities of community groups in the research and protection of flora and fauna in the Gippsland Lakes (including Little Tern Task force Inc., Victorian Wader Study Group, Birds Australia, Coast Action, Landcare and Friends of Gippsland Lakes Groups etc.)	DSE, PV	Higher
8.7	Encourage and maintain individual and group voluntary involvement in site management activities (e.g. Landcare Groups, Little Tern Task Force Inc.)	DSE, PV	Medium
8.8	Promote events based on the Gippsland Lakes that complement Statewide or national events (e.g. World Wetlands Day and World Environment Day) as a focus for voluntary activities related to the management of the Lakes.	DSE, PV	Medium
8.9	Investigate the use of a community education program to reduce the impact of litter on native wildlife.	DSE, PV	Lower

Management Objective 9

Ensure recreational use is consistent with the protection of natural and cultural values

	Site Management Strategy	Lead agency	Priority
9.1	Maintain the access and use controls recommended in the management plans for the Lakes National Park and Gippsland Lakes Coastal Park Management Plan, and in the Lake Wellington Wetlands Draft Management Plan.	DSE, PV	Higher
9.2	Ensure that identified significant natural and cultural sites are protected from the effects of recreational visitation through the implementation of appropriate controls on recreational access and the provision of visitor management infrastructure.	PV, GCHU, DVC	Higher
9.3	Develop a protection and interpretation strategy for Aboriginal cultural heritage in the Gippsland Lakes in consultation with and involving local Aboriginal groups.	DSE, PV	Medium
9.4	Develop a protection and interpretation strategy for European cultural heritage in the Gippsland Lakes in consultation with and involving local historical societies.	DSE, PV	Medium
9.5	Develop a Victorian position on mosquito control that encompasses social, economic and environmental values.	DSE, PV, WSC, EGSC, WGCMA, EGCMA	Medium

Management Objective 10

Develop ongoing consistent programs to monitor ecological character

	Site Management Strategy	Lead agency	Priority
10.1	Develop an ongoing consistent program to monitor the ecological character of the Gippsland Lakes Ramsar site.	DSE, PV	Higher
10.2	Continue to record fauna species usage of the Gippsland Lakes and provide date to update relevant Victorian databases.	DSE	Higher
10.3	Monitor the condition of wetlands and their vegetation (including pest plant and animal species) and the status and breeding output of key fauna species (e.g. Little Tern, White-bellied Sea-eagle, shorebirds, FFG listed species).	DSE, PV	Higher
10.4	Integrate monitoring programs into a catchment-wide framework including a public report on the environmental status and trends of the Lakes and their catchment every 3 to 6 years.	DSE, PV, WGCMA, EGCMA, GCB, SRW, EGW, GW, MW	Higher

Lead agency key:

DPI	Department of Primary Industries
DSE	Department of Sustainability and Environment
DVC	Department of Victorian Communities
EGCMA	East Gippsland Catchment Management Authority
EGSC	East Gippsland Shire Council
EGW	East Gippsland Water
GCB	Gippsland Coastal Board
GCHU	Gippsland Coastal Heritage Unit
GP	Gippsland Ports
GW	Gippsland Water
MBV	Marine Board of Victoria
MW	Melbourne Water
PV	Parks Victoria
SRW	Southern Rural Water
WGCMA	West Gippsland Catchment Management Authority
WSC	Wellington Shire Council

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Appendix 1 List of Contributors

Multi-disciplinary Project Team Members

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Leona Waldegrave-Knight	Flora and Fauna Officer, Gippsland Region, DSE

Public Submissions

Aboriginal Affairs Victoria

Australasian Wader Study Group

Australian Defence Organisation

Bird Observers Club of Australia

Birds Australia

Coalition Against Duck Shooting

Concerned Residents of East Gippsland

East Gippsland CMA

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Field and Game Australia Inc.

Field Naturalists Club of Victoria Inc.

Gibson, Erin

Gippsland Coastal Board

Gippsland Ports

Victorian Farmers Federation

Victorian Wader Study Group Inc.

Watson, J. W.

Appendix 2 Resource List

Further reading

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Contacts for further information and collaboration

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Gippsland Coastal Board

Gippsland Cultural Heritage Unit

Gippsland Ports

Natural Resources Conservation League

PPK Environment and Infrastructure

Rotamah Island Bird Observatory

Seafood Industry Victoria

Swinburne University of TAFE

University of Ballarat

Victorian Wetlands Trust Inc.

Water Studies Centre

Wellington Shire Council

West Gippsland Catchment Management Authority

Related websites

www.ramsar.org

www.ea.gov.au

www.dse.vic.gov.au

www.parkweb.vic.gov.au

Appendix 3 Research List

Priority	Research Topic
Higher	• Water quality monitoring • Development of nutrient budgets for the Lakes and their catchments • Identification and monitoring of indicators of ecosystem health • Coordinated sedimentation monitoring • Coordinated monitoring of freshwater flows into and through the Lakes and their catchments
Medium	• Mosquito control • Effects and impact of grazing
Lower	• Impact of eel harvesting • Control of European Carp

Appendix 4 Threatened Status of Flora

Common name	Scientific name	FFG Listed	Status in Victoria	Status in Australia
Austral Moonwort	*Botrychium australe*		v	
Austral Toad-flax	*Thesium australe*	L, A	v	V
Bassian Pomaderris	*Pomaderris oraria*		r	R
Bushy Hedgehog-grass	*Echinopogon caespitosus*		e	
Coast Fescue	*Austrofestuca littoralis*		r	
Coast Grey-box	*Eucalyptus bosistoana*		r	
Coast Mistletoe	*Muellerina celastroides*		r	
Common Spleenwort	*Asplenium trichomanes*		r	
Compact Bent-grass	*Deyeuxia contracta*		r	
Dark-flower Rush	*Juncus phaeanthus*		r	
Dune Wood-sorrel	*Oxalis rubens*		r	
Dwarf Kerrawang	*Rulingia prostrata*	L, A	e	E
Eastern Water-ribbons	*Triglochin microtuberosum*		r	
Fisch's Greenhood	*Pterostylis fischii*		r	
Gippsland Lakes Peppermint	*Eucalyptus aff. willisii (Gippsland Lakes)*		r	
Limestone Blue Wattle	*Acacia caerulescens*		v	V
Limestone Pomaderris	*Pomaderris oraria ssp. calcicola*		r	R
Maroon Leek-orchid	*Prasophyllum frenchii*	L, A	e	E
Marsh Saltbush	*Atriplex paludosa ssp. paludosa*		r	
Metallic Sun-orchid	*Thelymitra epipactoides*	L, A	e	E
Native Orache	*Atriplex australasica*		k	
Oval-leaf Pseudanthus	*Pseudanthus ovalifolius*		r	
Paddock Love-grass	*Eragrostis leptostachya*		k	
Purple Blown-grass	*Lachnagrostis punicea ssp. filifolia*	L	r	
Ribbed Thryptomene	*Thryptomene micrantha*		r	
Ruddy Blown-grass	*Lachnagrostis rudis*		r	
Salt Lawrencia	*Lawrencia spicata*		r	
Slender Pink-fingers	*Petalochilus vulgaris*		r	
Small-leaf Star-hair	*Astrotricha parvifolia*		v	R
Swamp Everlasting	*Xerochrysum palustre*	L	v	V
Thick-lip Spider-orchid	*Arachnorchis tessellata*		r	V
Tight Bedstraw	*Galium curvihirtum*		r	
Tiny Arrowgrass	*Triglochin minutissimum*		r	
Variable Bossiaea	*Bossiaea heterophylla*		r	
Violet Westringia	*Westringia glabra*		r	
Violet Westringia	*Westringia glabra var. williamsonii*		r	
Viscid Daisy-bush	*Olearia viscosa*		v	
Wallaby-bush	*Beyeria lasiocarpa*		r	
Woolly Waterlily	*Philydrum lanuginosum*		v	

Common name	Scientific name	FFG Listed	Status in Victoria	Status in Australia
Yellow Milk-vine	*Marsdenia flavescens*		r	
Yellow-wood	*Acronychia oblongifolia*		r	

Source: Victorian Flora Information System DSE/DPI (2003)

FFG Listed

L Listed under the *Flora and Fauna Guarantee Act 1988*

A An action statement has been prepared for the management of this species.

Status in Victoria

e Endangered, i.e. rare in Victoria and at risk of disappearing from the wild state if present land use and other causal factors continue to operate.

v Vulnerable, i.e. rare in Victoria, not presently endangered but likely to become so soon due to continued depletion, or which largely occur on sites likely to experience changes in land use which would threaten the survival of the species in the wild.

r Plants which are rare in Victoria but which are not considered otherwise threatened. This category does not necessarily imply that plants are substantially threatened, but merely that there are relatively few known stands.

k species poorly known, suspected of being in one of the above categories.

Status in Australia under the EPBC Act 1999

CE A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.

E A native species is eligible to be included in the endangered category at a particular time if, at that time:
(a)it is not critically endangered; and
(b)it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

V A native species is eligible to be included in the vulnerable category at a particular time if, at that time:
(a)it is not critically endangered or endangered; and
(b)it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

Appendix 5 Threatened Status of Fauna

Common name	Scientific name	FFG Listed	Status in Victoria	Status in Australia
Mammals				
Eastern Horseshoe Bat	*Rhinolophus megaphyllus*	L	Vul	
Large-footed Myotis	*Myotis macropus*		LR	
Long-nosed Potoroo	*Potorous tridactylus*	L	End	V
New Holland Mouse	*Pseudomys novaehollandiae*	L, A	End	
New Zealand Fur Seal	*Arctocephalus forsteri*		LR	
Southern Bent-wing Bat	*Miniopterus schreibersii bassanii*	L	End	
Spot-tailed Quoll	*Dasyurus maculatus*	L	End	V
Subantarctic Fur Seal	*Arctocephalus tropicalis*			V
Birds				
Australasian Bittern	*Botaurus poiciloptilus*	L	End	
Australasian Shoveler	*Anas rhynchotis*		Vul	
Azure Kingfisher	*Alcedo azurea*		LR	
Baillon's Crake	*Porzana pusilla*	L	Vul	
Black Falcon	*Falco subniger*		Vul	
Black-eared Cuckoo	*Chrysococcyx osculans*		LR	
Black-faced Cormorant	*Phalacrocorax fuscescens*		LR	
Black-tailed Godwit	*Limosa limosa*		Vul	
Blue-billed Duck	*Oxyura australis*	L	End	
Brown Quail	*Coturnix ypsilophora*		LR	
Brown Treecreeper	*Climacteris picumnus*		LR	
Cape Barren Goose	*Cereopsis novaehollandiae*		LR	
Caspian Tern	*Sterna caspia*	L	LR	
Chestnut-rumped Heathwren	*Hylacola pyrrhopygia*		Vul	
Common Diving-Petrel	*Pelecanoides urinatrix*		LR	
Common Sandpiper	*Actitis hypoleucos*		Vul	
Diamond Firetail	*Stagonopleura guttata*	L	Vul	
Eastern Curlew	*Numenius madagascariensis*		LR	
Fairy Prion	*Pachyptila turtur*		Vul	V
Fairy Tern	*Sterna nereis*	L	End	
Freckled Duck	*Stictonetta naevosa*	L, A	End	
Glossy Ibis	*Plegadis falcinellus*		LR	
Great Egret	*Ardea alba*	L	Vul	
Great Knot	*Calidris tenuirostris*	L	End	
Grey Goshawk	*Accipiter novaehollandiae*		Vul	
Grey Plover	*Pluvialis squatarola*		LR	
Grey-headed Albatross	*Thalassarche chrysostoma*		Vul	V
Grey-tailed Tattler	*Heteroscelus brevipes*	L	CEn	
Ground Parrot	*Pezoporus wallicus*	L	End	
Gull-billed Tern	*Sterna nilotica*	L	End	

Common name	Scientific name	FFG Listed	Status in Victoria	Status in Australia
Birds continued				
Hardhead	*Aythya australis*		Vul	
Hooded Plover	*Thinornis rubricollis*	L, A	Vul	
Hooded Robin	*Melanodryas cucullata*	L	LR	
Intermediate Egret	*Ardea intermedia*	L	CEn	
Latham's Snipe	*Gallinago hardwickii*		LR	
Lesser Sand Plover	*Charadrius mongolus*		Vul	
Lewin's Rail	*Rallus pectoralis*	L	Vul	
Little Bittern	*Ixobrychus minutus*	L	End	
Little Egret	*Egretta garzetta*	L	End	
Little Tern	*Sterna albifrons*	L, A	Vul	
Magpie Goose	*Anseranas semipalmata*		Vul	
Masked Owl	*Tyto novaehollandiae*	L	End	
Musk Duck	*Biziura lobata*		Vul	
Nankeen Night Heron	*Nycticorax caledonicus*		LR	
Pacific Golden Plover	*Pluvialis fulva*		LR	
Pacific Gull	*Larus pacificus*		LR	
Painted Snipe	*Rostratula benghalensis*	L	CEn	
Pectoral Sandpiper	*Calidris melanotos*		LR	
Pied Cormorant	*Phalacrocorax varius*		LR	
Powerful Owl	*Ninox strenua*	L, A	Vul	
Red Knot	*Calidris canutus*		LR	
Regent Honeyeater	*Xanthomyza phrygia*	L, A	CEn	E
Royal Spoonbill	*Platalea regia*		Vul	
Sanderling	*Calidris alba*		LR	
Shy Albatross	*Diomedea cauta*		Vul	V
Sooty Owl	*Tyto tenebricosa*	L	Vul	
Sooty Oystercatcher	*Haematopus fuliginosus*		LR	
Speckled Warbler	*Chthonicola sagittata*	L	Vul	
Spotted Quail-thrush	*Cinclosoma punctatum*		LR	
Swift Parrot	*Lathamus discolor*	L, A	End	E
Terek Sandpiper	*Xenus cinereus*		End	
Wandering Albatross	*Diomedea exulans*		End	V
Whimbrel	*Numenius phaeopus*		Vul	
Whiskered Tern	*Chlidonias hybridus*		LR	
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	L, A	Vul	
White-fronted Tern	*Sterna striata*		LR	
White-winged Black Tern	*Chlidonias leucopterus*		LR	
Yellow-nosed Albatross	*Thalassarche chlororhynchos*		Vul	
Reptiles				
Glossy Grass Skink	*Pseudemoia rawlinsoni*		LR	
Leathery Turtle	*Dermochelys coriacea*	L	CEn	V
Swamp Skink	*Egernia coventryi*	L	Vul	

Common name	Scientific name	FFG Listed	Status in Victoria	Status in Australia
Reptiles continued				
Tree Goanna	*Varanus varius*		Vul	
Amphibians				
Green and Golden Grass Frog	*Litoria aurea*		LR	V
Warty Bell Frog	*Litoria raniformis*	L	End	V

Source: Atlas of Victorian Wildlife DSE/DPI (2003)

FFG Listed

L Listed under the *Flora and Fauna Guarantee Act 1988*.

A An action statement has been prepared for the management of this species.

Status in Victoria

CEn Critically Endangered: A taxon that is facing an extremely high risk of extinction in the wild in the immediate future.

End Endangered: A taxon that is not Critically Endangered but is facing a very high risk of extinction in the wild in the immediate future.

Vul Vulnerable: A taxon that is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future.

LR Lower Risk – near threatened: A taxon that does not satisfy the criteria for any of the threatened categories, but which is close to qualifying for Vulnerable. In practice, these species are most likely to move into a threatened category should current declines continue or catastrophes befall the species.

DD Data Deficient - A taxon where there is inadequate information to make an assessment of its risk of extinction based on its distribution or population status. Listing in this category indicates that more information is required and acknowledges that future investigation may show that a threatened classification is appropriate.

Status in Australia under the EPBC Act 1999

CE A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.

E A native species is eligible to be included in the endangered category at a particular time if, at that time:
(a)it is not critically endangered; and
(b)it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

V A native species is eligible to be included in the vulnerable category at a particular time if, at that time:
(a)it is not critically endangered or endangered; and
(b)it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

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Appendix 6 JAMBA, CAMBA and Bonn Species

Common name	Scientific name	JAMBA	CAMBA	Bonn
Arctic Jaeger	*Stercorarius parasiticus*	✓		
Bar-tailed Godwit	*Limosa lapponica*	✓	✓	✓
Black-tailed Godwit	*Limosa limosa*	✓	✓	✓
Caspian Tern	*Sterna caspia*	✓	✓	
Cattle Egret	*Ardea ibis*	✓	✓	
Common Greenshank	*Tringa nebularia*	✓	✓	
Common Sandpiper	*Actitis hypoleucos*	✓	✓	
Common Tern	*Sterna hirundo*	✓	✓	
Curlew Sandpiper	*Calidris ferruginea*	✓	✓	✓
Eastern Curlew	*Numenius madagascariensis*	✓	✓	
Fork-tailed Swift	*Apus pacificus*	✓	✓	
Glossy Ibis	*Plegadis falcinellus*		✓	✓
Great Egret	*Ardea alba*	✓	✓	
Great Knot	*Calidris tenuirostris*	✓	✓	
Grey Plover	*Pluvialis squatarola*	✓	✓	
Grey-tailed Tattler	*Heteroscelus brevipes*	✓	✓	✓
Latham's Snipe	*Gallinago hardwickii*	✓	✓	✓
Lesser Sand Plover	*Charadrius mongolus*	✓	✓	
Little Tern	*Sterna albifrons*	✓	✓	✓
Marsh Sandpiper	*Tringa stagnatilis*	✓	✓	✓
Pacific Golden Plover	*Pluvialis fulva*	✓	✓	
Painted Snipe	*Rostratula benghalensis*		✓	
Pectoral Sandpiper	*Calidris melanotos*	✓		
Rainbow Bee-eater	*Merops ornatus*	✓		
Red Knot	*Calidris canutus*	✓	✓	✓
Red-necked Stint	*Calidris ruficollis*	✓	✓	✓
Ruddy Turnstone	*Arenaria interpres*	✓	✓	✓
Sharp-tailed Sandpiper	*Calidris acuminata*	✓	✓	✓
Short-tailed Shearwater	*Puffinus tenuirostris*	✓		
Terek Sandpiper	*Xenus cinereus*	✓	✓	
Wandering Albatross	*Diomedea exulans*	✓		
Wedge-tailed Shearwater	*Puffinus pacificus*	✓		
Whimbrel	*Numenius phaeopus*	✓	✓	
White-bellied Sea-Eagle	*Haliaeetus leucogaster*		✓	✓
White-throated Needletail	*Hirundapus caudacutus*	✓	✓	
White-winged Black Tern	*Chlidonias leucopterus*	✓	✓	

Primary Source: (NRE 1999a)

Appendix 7 Gippsland Lakes Ramsar Information Sheet[1]

Information Sheet on Ramsar Wetlands

Categories approved by Recommendation 4.7 of the Conference of Contracting Parties.

1. Date this sheet was completed/updated:

May 1999

2. Country:

Australia

3. Name of wetland:

Gippsland Lakes, Victoria

4. Geographical coordinates:

Latitude: 37° 49' to 38° 12'S

Longitude: 147° 04' to 148° 08'E

5. Altitude:

Less than 20 metres above sea level

6. Area:

60,015 ha

Note: This is a revised area figure based on GIS Mapping (1995) and does not represent any change to the Ramsar Site boundary.

7. Overview:

The Gippsland Lakes are a group of coastal lagoons in eastern Victoria, separated from the sea by sand dunes and fringed on the seaward side by the Ninety Mile Beach.

The Gippsland Lakes together form the largest navigable inland waterway in Australia. These features create a distinctive regional landscape of wetlands and flat coastal plains which is of considerable environmental significance in terms of its landforms, vegetation and fauna. They include a number of sites of national and international importance.

8. Wetland Type:

Marine : J

Inland : Sp and Tp

9. Ramsar Criteria:

1a, 3a, 3b and 3c

Please specify the most significant criterion applicable to the site:

10. Map of site included?

Please tick yes □ -or- no ✓

11. Name and address of the compiler of this form:

Parks Victoria

378 Cotham Road

Kew VIC 3101 Australia

12. Justification of the criteria selected under point 9:

1(a) *The wetland is a particularly good representative example of a natural or near-natural wetland characteristic of the appropriate biogeographical region.*

Gippsland Lakes forms the larges navigable inland waterway in Australia and has a distinctive regional landscape of wetlands and flat coastal plains which is of considerable environmental significance in terms of its landforms, vegetation and fauna.

3(a) Regularly supports 20,000 waterfowl

and

3(b) Regularly supports substantial numbers of waterfowl from particular groups

The Gippsland Lakes are particularly important in supporting large numbers of waterbirds as outlined below (ANCA 1996).

- Grey Teal (7,270 recorded in Lake King, Lake Victoria and Lake Wellington wetlands).
- Chestnut Teal (6,300 recorded in Lake King, Lake Victoria and Lake Wellington wetlands).
- Black Swans (10,000 recorded at Lake King wetlands, 1,700 at Lake Victoria wetlands, 10,000 at Lake Wellington wetlands).
- Australasian Grebe (4,500 recorded at Lake King wetlands).
- Eurasian Coot (10,000 recorded at Lake King wetlands, 1,000 at Lake Victoria wetlands, 2,000 at Lake Wellington wetlands).
- Great Cormorants (7,000 recorded at Lake Victoria wetlands, 440 at Lake Wellington wetlands).

3(c) Regularly supports 1% on the individuals in a population of one species or subspecies

[1] [1] Ramsar Information Sheets are formal documents lodged with the Ramsar Bureau. They are updated every six years. The last update was in 1999. New or revised information has not been added since 1999 and there may be inconsistencies with that in the body of the plan. The Ramsar Information Sheets will be updated next in 2005.

The Lake King wetlands in the Ramsar site have supported 1% of the national population of the Little Tern (*Sterna albifrons*), 5% of the Victorian population of the Common Tern (*Strena hirundo*), and 10% of the regional population of the Black Swan (*Cygnus atratus*) (ANCA 1996).

The Lake Victoria wetlands have supported 5% of the Victorian population of Great Cormorants and Great Crested Grebe (ANCA 1996).

The Lake Wellington wetlands have supported more than 5% of the Victorian population of the Common Tern and Australian Pelicans (ANCA 1996).

13. General location:

Eastern Victoria; a system of lakes and swampland extending eastward from Sale to Lake Tyers.

14. Physical features:

The Gippsland Lakes are a group of coastal lagoons separated from the sea by a broad sandy barrier known as the Ninety Mile Beach. The main lakes - Wellington, Victoria and King cover an area of 340 km^2 and have a shoreline of 320 km. The lakes are fed by a number of river systems. The largest of the rivers are the LaTrobe River and the Avon River (flowing into Lake Wellington), and the Mitchell River, Nicholson River and Tambo River (flowing into Lake King). The system is linked to the sea by an artificial entrance near the eastern end, opened in 1889, where the town of Lakes Entrance is now situated. Before 1889 the entrance moved during floods or storms and became restricted during periods of low river flow. The artificial entrance both lowered and reduced annual variation in lake levels.

There is one site of international geological/geomorphological significance, two of national significance and seven of state significance.

Site of International Geological/Geomorphological Significance

Mitchell River Delta - Eroded digitate delta

The Mitchell delta extends from the vicinity of Bairnsdale southwards along the western shoreline of Lake King to Eagle Point Bluff and then eastwards as long winding silt jetties bordering the Mitchell River. The silt jetties extend almost 8 km into the lake as low, narrow tongues of sediment that were formerly bordered by a wide zone of Phragmites reed swamp. The Mitchell delta is a classic form of digitate delta and must rank as one of the finest example of this type of landform in the world.

Sites of National Geological/Geomorphological Significance

Sperm Whale Head to Boole Poole Peninsula (including the Outer Barrier and Ninety Mile Beach, Relict Tidal Cannels and Tidal Delta, Rotomah Island, Boole Poole Peninsula and Sperm Whale Head)

The barrier formations, dunes and dunes lakes, relict entrances channels and tidal delta islands are of major importance in illustrating the evolution of the barrier systems of the Gippsland Lakes. Many details still remain to be elucidated concerning the sequence of Pleistocene and Halocene depositional and erosional events, and the sites described could be the subject of major studies in geomorphology supported by stratigraphy, palynology and radiometric dating.

Cunninghame Arm (South-east of Lakes Entrance)

Cunninghame Arm is a remnant of the narrow channel that connected the Gippsland Lakes to the sea prior to the opening of the Entrance in 1889. This site demonstrates clearly some physiographic consequences of the opening of the Entrance. It provides a classic example of active lake-shore segmentation, i.e. the conversion of a long narrow lagoon into a series of smaller, rounded to oval shaped lakes divided by elongated supate spits.

Sites of State Geomorphological Significance

Lake Reeve and Outer Barrier - Paradise Beach

The area includes the widest section of the outer barrier of the Gippsland Lakes and the area with the greatest number of parallel dune ridges (10-13) found along the entire length of the Ninety Mile Beach.

Lake Reeve differs fundamentally from other lagoons in the Gippsland Lakes in its ecology as well as its geomorphology. The floor of Lake Reeve is of sand, shell and mud, and as large areas of the lagoon frequently dry up completely, extensive saltmarsh areas develop.

Tambo River Delta - Eroding cuspate river delta

The delta has an elongated shape and protrudes 2.5 kms south-westward into Lake King. The delta has infilled a funnel-shaped embayment and continued sedimentation has extended the delta into Lake King.

Comparison of maps made during the 19th century and aerial photographs taken between 1940 and 1976 indicate that erosion of the delta is taking place. The southern arm has receded by approximately 500 metres since 1849 and detailed field mapping since 1970 has shown that some sectors are retreating at rates of up to 10 metres per year.

The critical factor in shoreline erosion here appears to be the die-back of fringing reedswamp as a result of salinity increase in the lakes since 1889. Other factors such as trampling by cattle grazing on river banks, access by anglers, and scouring by boat wash are of increasing importance as the reed fringe disappears.

This is a major example of the processes of delta growth and little detailed investigation has been undertaken here.

MacLeod Morass - Extensive backswamp, marginal bluff, relict gravel beach and spit

The Mitchell delta from Bairnsdale towards Eagle Point Bluff is surmounted by well-defined levee banks. These slope away from the river on the western side towards the abandoned cliff that marks the former shore of Lake King during the mid-Holocene when the sea reached its present level. At the foot of the abandoned cliff is a distinctive low ridge formed from an abandoned beach, a relic of a former high sea level. These beach deposits consist of sands and gravels eroded from the former cliff and reworked to form a beach extending from Skene Creek to the mouth of MacLeod Creek. There has been some quarrying of the beach deposits for gravel, if this is extended it will greatly reduce the value of this site.

MacLeod Morass is a freshwater swamp, now partly drained and confined as a backswamp of the Mitchell River between the sloping levee banks and the base of the marginal bluff.

The assemblage of factors described has been used as evidence that the Mitchell River silt jetties grew as a true deltaic form and are not submerged levees of a more extensive pre-Holocene flood plain system.

Point Turner - Banksia Peninsula

The cliffed shoreline near Point Turner is the best example of the composition and form of the prior barrier exposed in the Gippsland Lakes.

Outer Barrier near Seaspray

For approximately 5 kilometres north-east of Seaspray, the outer barrier is a single, high (5-8 metres) sand ridge usually steeply cliffed on the seaward edge. The dunes are very young and it is probable that most of the vertical growth of this section of the barrier has taken place since the introduction and spread of the dune grass Ammophila over the last 100 years.

This single high and grassy outer barrier ridge is unique in the Gippsland lakes region. It illustrates further the physiographic changes accompanying the introduction of Ammophila.

McLennans Isthmus and McLennans Strait

Lakes Victoria and Wellington are separated by a long broad tract of sandy and swampy terrain that represents an advanced stage of segmentation of a formerly larger lagoon. The lakes are now connected only by a narrow residual channel (McLennans Strait) and exhibit a marked contrast in hydrological and ecological conditions.

McLennans Isthmus is a long, sandy promontory that extends south-east from Roseneath Point as a narrow, gently curving beach, backed by low beach ridges crossed by numerous small blowouts and parabolic dunes.

The southern section of McLennans Isthmus is a compound recurving spit with several parallel ridges that terminate in the swampland north of McLennans Strait. McLennans Strait is a deep narrow channel that connects Lakes Wellington and Victoria and maintains sufficient current flow to prevent the extension of the sandspit and incursion by reedswamp that would result in complete closure of Lake Wellington.

This is a large scale example of the processes of lake fragmentation by growth of spits which eventually become oriented at right angles to the direction of approach of dominant waves.

LaTrobe Delta - Prograding Cuspate Delta

The LaTrobe River has a cuspate delta consisting of two silt jetties, an extension of natural river levees, that protrude over two kilometres into Lake Wellington. The delta is formed by reedswamp which is growing in the lake in water up to 1.5m deep. The reedswamp consists chiefly of Phragmites, Cladium, and Typha. The reedswamp traps river silt and the accumulation of this and decaying vegetation matter builds up the lake floor to a level that can be colonised by Melaleuca ericifolia.

The area demonstrates a mode of delta formation that is active only in the part of Lake Wellington where water salinity is below the tolerance level for regeneration of reedswamp.

15. Hydrological values:

Fringing wetlands are used for industrial and domestic waste disposal at several places around the Lakes, with the undesirable effects of increased sedimentation, nutrient addition and, in Lake Coleman, with the disposal of industrial pollutants, the possibility of ecological change.

Sale Common receives water from Flooding Creek and this water is known to contain pollutants from urban run-off, but further investigation is necessary to determine the extent of pollution and its impact on wetlands.

At MacLeod Morass, the Bairnsdale sewage treatment system is a known source of nutrients and other wastes. Run-off from the nearby rubbish tip and saleyards also contributes polluted wastewater.

16. Ecological features:

The permanence of the main lakes and the relatively regular flooding of the adjacent wetlands mean that this wetland system is an important drought refuge for many waterfowl.

The lakes and their associated swamps and morasses regularly support an estimated 40,000 to 50,000 ducks, swans, coots and other waterfowl.

Sale Common is a permanent freshwater marsh. Through management as a game refuge and the creation of a range of habitats, this marsh supports high populations of a variety of waterbirds, birds of prey and small mammals.

Dowd Morass and Heart Morass are both permanent freshwater marshes supporting significant breeding populations of waterbirds. Dowd Morass has supported up to nine species of colonial nesting waterbirds.

Clydebank Morass varies seasonally from fresh to saline, particularly close to the Lake Wellington shoreline. The floods of April 1990 have substantially increased the size of the opening between the wetland and Lake Wellington; it is not known yet what effect this will have on the water regime in the wetland. Clydebank Morass carries substantial populations of waterbirds and wading birds but there are no substantial breeding colonies.

Blond Bay wetlands are generally shallow and intermittent. They include fresh, saline and hypersaline wetlands that support breeding waterfowl and migratory waders.

Lake Reeve is an extensive intermittent saline wetland providing a highly significant habitat for large numbers of migratory waders.

MacLeod Morass is the largest permanent freshwater marsh at the eastern end of the Gippsland Lakes. It supports large numbers and many species of colonial waterbirds including migratory waders.

Lake Wellington, Lake Victoria, Lake King are permanent deep saline wetlands supporting populations of migratory seabirds, including the Little and Fairy Terns and a range of waterfowl.

Jones Bay is a permanent shallow saline wetland supporting large numbers of waterfowl and migratory waders.

Lake Bunga is a relatively small coastal wetland that is fresh to brackish, supporting waterfowl, Little Tern, Hooded Plover and White-bellied Sea-Eagle.

The Gippsland Lakes offer a wide range of conditions for aquatic and emergent vegetation. The vegetation is highly variable for a number of reasons, including seasonal factors, penetration of light, salinity and availability of nutrients.

In low lying areas which are periodically inundated, the vegetation is a wet scrub type dominated by Swamp Paperbark, which occurs as dense thickets up to 10 metres tall. This wet scrub is fringed on the lake side by reed and reed mace. In the more saline parts of the swamps around the lakes there is salt marsh vegetation of Glasswort with Shore Rush, Saw-sedge and Salt Grass. In some of the swamps around the lakes the swamp scrub is dying back and is being replaced by salt marsh, due largely to increased salinity.

17. Noteworthy flora:

Threatened Plants of the Lakes Environs

Endangered in Victoria

- Veined Caladenia (Caladenia reticulata)
- Bushy Hedgehog-grass (Echinopogon caespitosus)
- Metallic Sun-orchid (Thelymitra epipactoides)

Vulnerable in Victoria

- Limestone Blue Wattle (*Acacia caerulescens*)
- Gilgali Blown Grass (*Agrostis billardierei var. filifolia*)
- Coast Fescue (*Austrofestuca littoralis*)
- Austral Moonwort (*Botrychium australe*)
- Swamp Everlasting (*Bracteantha sp. aff. subundulata*)
- Tiny-hair Bent-grass (*Deyeuxia microseta*) - Poorly Known in Australia
- Swamp Diuris (*Diuris palustris*)
- Purple Diuris (Diuris punctata)
- Rough-grain Love-grass (*Eragrostis trachycarpa*)
- Glossogyne (*Glossogyne tenuifolia*)
- Dwarf Kerrawang (*Rulingia prostrata*) - Vulnerable in Australia

Rare in Victoria

- Common Spleenwort (Asplenium trichomanes)
- Small-leaf Star-hair (Astrotricha parviflora) -

Rare in Australia

- Wallaby Bush (Beyeria lasiocarpa)
- Pinkwood (Beyeria viscosa)
- Common Caladenia (Caladenia patersonii)
- Veiled Fringe-sedge (Fimbristylis velata)
- Spicy Everlasting (Helichrysum argophyllum)
- Dark-flower Rush (Jancus phaeanthus)
- Yellow Milk-vine (Marsdenia flavescens)
- Coast Mistletoe (Muellerina celastroides)
- Open Marshwort (Nymphoides sp. aff. exifolia)
- Viscid Daisy-bush (Olearia viscosa)
- Woolly Waterlily (Philydrum lanuginosum)
- Limestone Pomaderris (Pomaderris oraria ssp. calcicola)
- Coast Pomaderris (Pomaderris oraria)
- Slaty Leek-orchid (Prasophyllum frenchii)
- Tawny Leek-orchid (Prasophyllum fuscum)
- Cobra Greenhood (Pterostylis grandiflora)
- Ribbed Thryptomene (Thryptomene micrantha)
- Pink Zieria (Zieria veronicea)

Insufficiently known

- Narrow-head Love-grass (*Fragrostis leptostachya*)

18. Noteworthy fauna:

Lake Reeve is a site of international zoological significance. It attracts up to 12,000 migratory waders and is one of the five most important areas for waders in Victoria. The total concentration of waders at the south-western end of Lake Reeve fluctuates in response to local conditions of salinity, water depth and probably human disturbance.

The lake has supported the largest concentration (5,000) of Red Knot (Calidris canutus) recorded in Victoria, as well as up to 3,000 Sharp-tailed Sandpiper (Calidris acuminata) and up to 1,800 Curlew Sandpiper (Calidris ferruginea).

Threatened Fauna

Birds

Was Extinct in Victoria but has been Reintroduced

- Magpie Goose (*Anseranus semipalmata*)

Endangered in Victoria

- Little Tern (*Sterna albifrons*)
- Swift Parrot (*Lathamus discolor*)
- Regent Honeyeater (*Xanthomyza phrygia*)

Vulnerable in Victoria

- Hooded Plover (*Charadrius rubricollis*)
- Fairy Tern (*Sterna nereis*)

Rare in Victoria

- Brolga (*Grus rubicundus*)
- Ground Parrot (*Pezoporus wallicus*)
- White-bellied Sea-Eagle (*Haliaetus leucogaster*)
- Freckled Duck (*Stictonetta naevosa*)
- Blue-billed Duck (*Oxyura australis*)
- Grey Goshawk (*Accipiter novaehollandiae*)
- Black Falcon (*Falco subniger*)
- Little Bittern (*Ixobrychus minutus*)
- Powerful Owl (*Ninox strenua*)
- Eastern Curlew (*Numenius madagascariensis*)
- Lewin's Rail (*Rallus pectoralis*)
- Masked Owl (*Tyto novaehollandiae*)
- Sooty Owl (*Tyto tenebricosa*)

Restricted Colonial Breeding or Roosting Sites in Victoria

- Pacific Gull (*Larus pacificus*)
- Royal Spoonbill (*Platclea regia*)
- Great Egret (*Egretta alba*)
- Pied Cormorant (*Phalacrocorax varius*)
- Intermediate Egret (*Ardea intermedia*)
- Whisked Turn (*Chlidonias hybridus*)

Insufficiently known

- Australasian Bittern (*Botaurus poiciloptilus*)
- Ballion's Crake (*Porzana pusilla*)
- Painted Snipe (*Rostratula benghalensis*)

Mammals

Endangered in Victoria

- New Holland Mouse (*Pseudomys novaehollandiae)*

Rare in Victoria

- Large-footed Myotis (*Myotis macropus*)

Restricted Colonial Breeding or Roosting Sites in Victoria

- Common Bent-wing Bat (*Miniopterus schreibersii)*
- Eastern Horseshoe Bat (*Rhinolophus megaphyllus*)

Amphibians

Indeterminate (Known to be Rare, Vulnerable or Endangered) in Victoria

- Giant Burrowing Frog (*Heleioporus australiacus*)

Fish

Endangered in Victoria

- Freshwater Herring (*Potamalosa richmondia*)

Vulnerable in Victoria

- Australian Grayling (*Prototroctes maraena*)

Rare in Victoria

- Australian Bass (*Macquaria novaemaculata*)
- Pouched Lamprey (*Geotria australis*)
- Spotted Galaxias (*Galaxias truttaceus*)
- Dwarf Galaxias (*Galaxiella pusilla*)
- Broad-finned Galaxias (*Galaxias brevipinnis)*

Indeterminate (Known to be Rare, Vulnerable or Endangered) in Victoria

- Striped Gudgeon (*Gobiomorphus australis*)
- Cox's Gudgeon (*Gobiomorphus coxii*)

Invertebrates

Endangered in Victoria

- Stonefly (*Thaumatoperla timmsi*)
- Caddisfly (*Tanjistomella verma*)

Reptiles

Rare in Victoria

- Swamp Skink (*Egernia coventryi*)

Insufficiently known

- Leathery Turtle (*Dermochelys coriacea*)
- Glossy Grass Skink (*Pseudemoia rawlinsoni*)

Insects

Endangered in Victoria

- Small Ant-blue butterfly (*Acrodipsas myrmecophila*)

19. Social and cultural values:

There is a high concentration of archaeological sites in the Gippsland Lakes area including artefact scatters, shell middens, scarred trees, occupation sites, burials and axe-grinding grooves.

20. Land tenure/ownership:

Clydebank Morass, MacLeod Morass, Blond Bay, Jones Bay, Heart Morass, Lake Gleman, Sale Common and Dowd Morass are State Wildlife Reserves.

Lakes Wellington, Victoria, Kings, Tyers and Bunga are Crown Land Reserves.

Lake Reeve is in the Gippsland Lakes Coastal Park and the Lakes National Park.

21. Current land use:

Parts of the Lakes system are heavily used for commercial and recreational fisheries and for other water-based recreation, while the immediate hinterland has been developed for agricultural uses and limited residential and tourism purposes.

22. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects:

Long term changes in ecological character in the Gippsland Lakes are primarily attributed to changed water and salinity regimes associated with the permanent artificial entrance to the lakes opened in 1889 and reduced water quality associated with changed land use in the catchment. There has been no significant change in ecological character since the Ramsar information sheet was last updated in 1992.

Factors affecting ecological character at selected locations within the Ramsar site include:

- alteration to its ocean outlet, with consequent alteration of the salinity regime and gradient of the lakes;
- reduction of flooding frequencies and flooding duration for the major tributary rivers through water storage developments and water extraction;
- changes to water quality due to high nutrient input from catchment run-off;
- land drainage; residential development and recreational pressures.

The increasing problem of salinity has particularly affected the low-lying land and fringing wetlands around Lake Wellington. Some 10,000 ha of land are affected.

The effects of the intrusion of marine salinity into the Gippsland Lakes are:

- depletion of shoreline vegetation such as the Common Reed (Phragmites australis), leading to shoreline erosion and thus accelerated deposition in lakes;
- increased stress from wind-borne salt on vegetation near to the shoreline and above water level;
- wetland habitat degradation and loss through vegetation change, with a consequent loss of wetland fauna. The shift to saline conditions has restricted the available habitat for a number of bird species some of which are regarded as endangered (e.g. the Little Tern Sterna albifrons);
- loss of breeding habitat for fish (i.e. through loss of Ribbon Weed (Vallisneria spiralis), leading to fluctuations and declines in estuarine fish populations. The eastern lakes were important as breeding and nursery grounds for some species of fish, such as the commercially important Black Bream and the rare Australian Bass. Both species still breed in the Lakes or the

inflowing rivers, whenever suitable temperatures and salinities occur. Many other species of fish - riverine, estuarine and marine - also make use of the lakes to breed, grow or feed; and

- formation of 'halocline stratification' producing a layer of deoxygenated water at the bottom of the lakes, contributing to fish kills and, through the release of phosphorus from the sediments and to algal blooms. There have been regular ongoing algal blooms in the Lakes in recent years. Major blooms have substantial effects on the biological systems of the lakes and on the tourism industry and local economy generally.

23. Conservation measures taken:

The East Gippsland and West Gippsland Regional Catchment Strategies 1996 outline actions to address water quality and salinity issues in the lakes and land management issues in the catchment.

Reservation of part of the Ramsar site under the National Parks Act 1975 (Vic) in the Lakes National Park and the Gippsland Lakes Coastal Park provides a legislative basis for protection of the natural values of these areas. Other parts of the site are reserved for the protection and management of wildlife.

The Gippsland Lakes Management Plan 1990 and the Lake Wellington Wetlands Draft Management Plan 1997 includes strategies to protect the environmental values of the lakes.

A project to map seagrass in the Gippsland Lakes has been completed. The mapping provides a baseline for future seagrass monitoring.

A fisheries habitat assessment report has been completed.

A significant boundary fencing program has been undertaken at McLeods Morass to prevent uncontrolled access by grazing livestock along the wetland margins.

A joint initiative between Parks Victoria, the local council and the local water authority has commenced works at McLeods Morass to improve the water regime and water quality by better managing water flow and controlling nutrient input from treated sewage and saleyards run-off.

Action Statements under the Flora and Fauna Guarantee Act 1988 have been produced for the following fauna species which occur at the Ramsar site. The action statements outline conservation measures for the species.

- Little Tern (1994)
- Regent Honeyeater (1994)
- Hooded Plover (1992)
- White-bellied Sea-eagle (1994)
- New Holland Mouse (1996)
- Giant Burrowing Frog (1994)
- Small Ant-blue butterfly (1996)

24. Conservation measures proposed but not yet implemented:

A Coastal Action Plan is being prepared for the Gippsland Lakes which will review the existing Gippsland Lakes Management Plan (1990) addressing issues such as water quality and integrated catchment management.

In an integrated approach to planning at Ramsar sites, management strategies are being prepared for all Ramsar sites in Victoria, including Gippsland Lakes, to provide general strategic direction and site specific strategies. The strategies will be completed by June 1999.

25. Current scientific research and facilities:

Monitoring at Dowd Morass has been undertaken to collect baseline data for the implementation of a drying phase for the Morass hydrological regime.

A number of ongoing research and monitoring programs are being undertaken in Ramsar sites on a small scale:

- Pre and post duck season surveys
- Aerial surveys of waterbirds of the Gippsland Lakes
- Lake Wellington Little and Fairy Tern monitoring
- White-bellied Sea Eagle monitoring
- Monitoring of colonial breeding sites

26. Current conservation education:

There is a Royal Australasian Ornithologists Union Bird Observatory located at Rotamah Island.

Sale Common and MacLeod Morass are used for education and interpretation purposes; and

ESSO and the Department of Conservation and Environment are jointly conducting an education project in the area.

27. Current recreation and tourism:

The Lakes waters and environs provide for a wide range of recreation activities, the main ones being boating and fishing. Research has indicated that 30% of visitors to the Lakes were attracted by boating opportunities, while 55% of visitors to the Lakes came for fishing. Over 250,000 anglers each year spend approximately 1.4 million hours each year to take over 1.5 million fish, mostly Black Bream, weighing around 400 tonnes, from the Lakes system. In financial terms tourism accounts for nearly 20% of the capital generated in the region each year and a

large part of that stems, at least indirectly, from recreational fishing.

28. Jurisdiction:

Government of Victoria.

29. Management authority:

Managed under the Department of Natural Resources and Environment Parks Program by Parks Victoria - 58,108 Ha (97%)

Natural Resources and Environment - 1,600 Ha (2.5%)

Private Freehold - 192 Ha (0.3%)

Local Government - 115 Ha (0.2%)

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