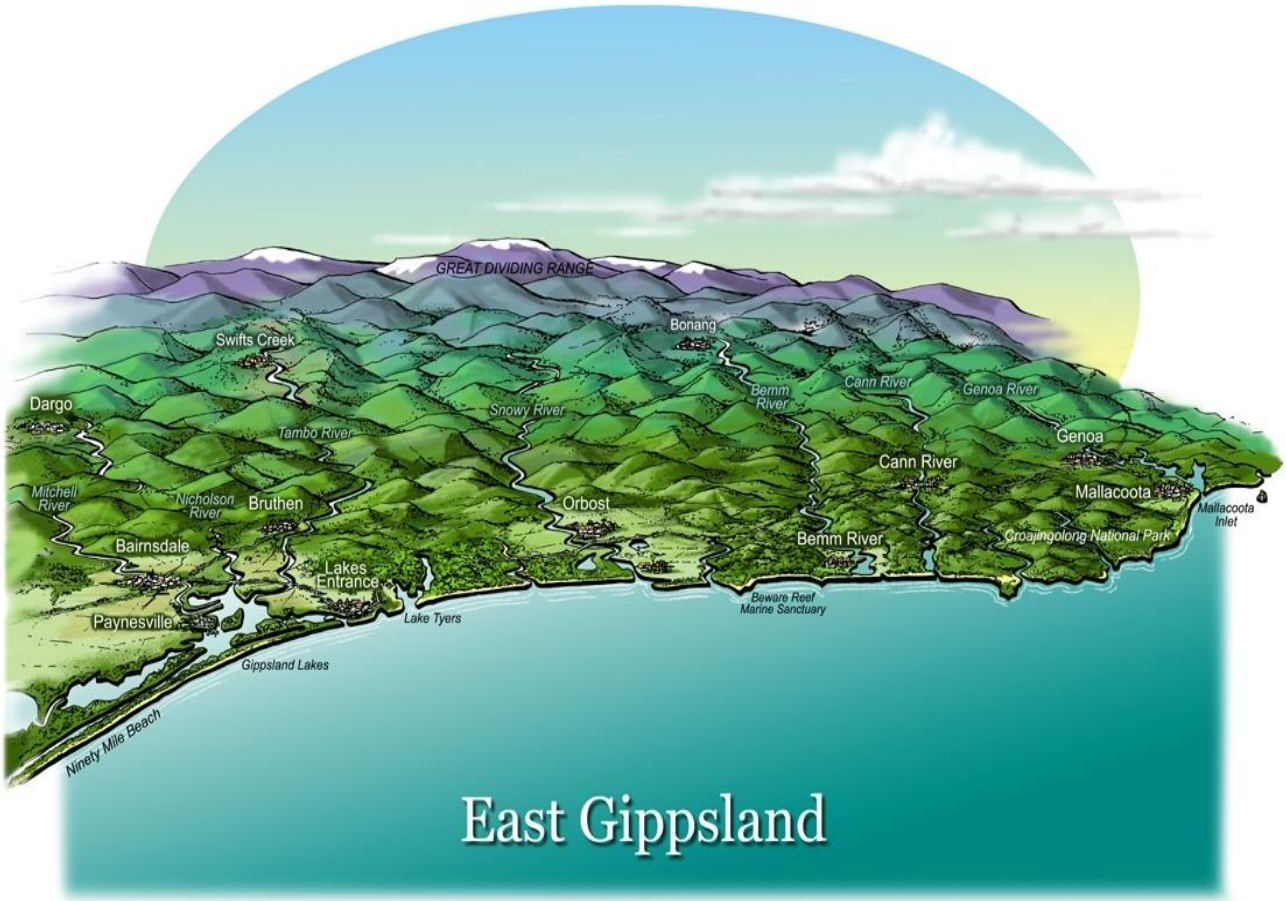
EAST GIPPSLAND

REGIONAL CATCHMENT STRATEGY



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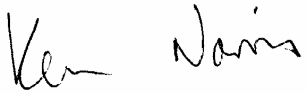
EAST GIPPSLAND CATCHMENT MANAGEMENT AUTHORITY

FOREWORD

In truth, the 'strong sense of belonging to and being a part of the land' held by Indigenous Australians resonates, at least in part, with most residents of East Gippsland. We have no doubt about the value of our country: its productive capacity; its potential; and its bounty of plants and animals. Our abiding concern is to provide a rational, efficient way forward that both keeps our natural resources together and provides for present and future generations. The responses to and outcomes from this Regional Catchment Strategy will measure the success with which we have articulated both our concerns for our natural resources and the methods for dealing with those concerns.

In the development of the Strategy, the East Gippsland Catchment Management Authority conducted an exhaustive and sometimes exhausting process of consultation with communities of East Gippsland. We trust the Strategy ably reflects the collective view of East Gippsland. We offer our sincere thanks to the many people who took part. We apologise to those who were left out.



Ken Norris
Chairman, East Gippsland Catchment Management Authority

June 2005

TABLE OF CONTENTS

List of Figures

List of Tables

LIST OF ABBREVIATIONS

ABS	Australian Bureau of Statistics
ANF	Average Natural Flow
BoM	Bureau of Meteorology
CALP	Victorian Catchment and Land Protection Act 1994
CAMBA	China–Australia Migratory Bird Agreement
CFA	Country Fire Authority Victoria
CMA	Catchment Management Authority
CNR	Former Victorian Department of Conservation and Natural Resources
CTU	Alpine National Park Cobberas–Tingaringy Unit
DNRE	Former Victorian Department of Natural Resources and Environment
DSE	Victorian Department of Sustainability and Environment
EGCMA	East Gippsland Catchment Management Authority
EGNVP	East Gippsland Native Vegetation Plan
EGSC	East Gippsland Shire Council
EGTRAP	East Gippsland Technical and Regional Assessment Panel
EPBC	Commonwealth Environmental Protection and Biodiversity Conservation Act 1999
FCC	Fisheries Co-management Council
FFG	Victorian Flora and Fauna Guarantee Act 1988
FMA	Forest Management Area
GA	Greening Australia
GCB	Gippsland Coastal Board
GINRF	Gippsland Integrated Natural Resources Forum
GIS	Geographic Information System
GMA	Groundwater Management Area
ISC	Index of Stream Condition
JAMBA	Japan–Australia Migratory Bird Agreement
MER	Monitoring, Evaluation and Reporting
MERGe	Monitoring, Evaluation and Reporting framework for whole Gippsland region
MU	Management Unit
NRM	Natural resource management
PV	Parks Victoria
Ramsar	Convention on Wetlands (Ramsar, Iran 1971)
RCS	Regional Catchment Strategy
RiVERS	River Values and Environmental Risk System
SEPP	State Environment Protection Policies
SRW	Southern Rural Water

List of Abbreviations (continued)

TFN	Trust for Nature
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Soluble Salts
WSPA	Water Supply Protection Area

Note: There is a glossary of biological terms at the end of the document.

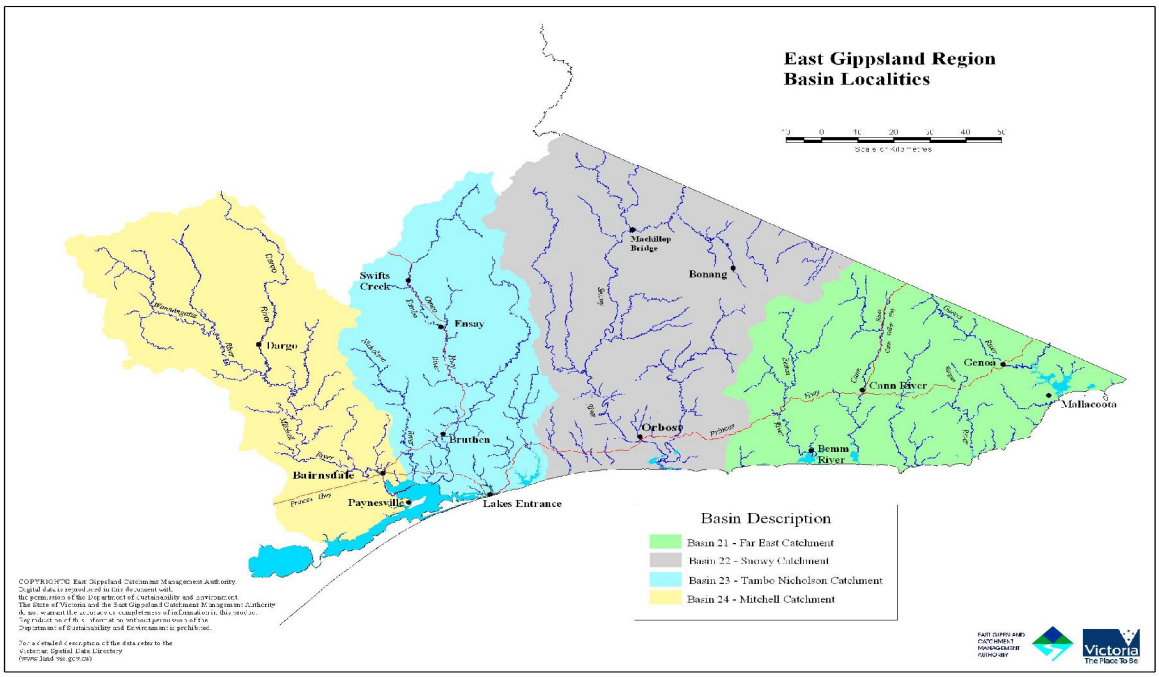
EXECUTIVE SUMMARY

East Gippsland is about 80% public land, little changed from its form 200 years ago. About forty thousand people now live and work along the coastal plains or the strips of farming land up the river valleys and on the mountain plateaux. The current population is about ten times that of the original Aboriginal population of the Kurnai-Gunai, Bidawal and Ngarigo peoples. Human association with and involvement in 'East Gippsland' extends back for possibly 30,000 years.

This strategy is about the beneficial management of East Gippsland's natural resources. It is about the management of the region's natural values so that future generations and we can enjoy them. It is about improving, where possible, the *sustainable* productive use of our assets. It is about continuing the process of establishing clear rights, roles and responsibilities for landowners and managers.

For natural assets, we argue that, from a statewide perspective, East Gippsland is a jewel for conservation of biodiversity and should receive support commensurate with that position.

We argue for sustainable profitability in industry; that we will lose economic vitality, and the capacity to do, without successful industry that utilises natural resources of the region, but within sustainable limits.



Objectives

We worked for the strategy to be technically feasible, economically viable, environmentally sound and socially acceptable. The ultimate objectives of this strategy are to provide collaboration, coordination and direction for the investment of private and public resources to ensure that the use of the region's natural resources:

(a) Continue to generate economic wealth for the region and the state;

(b) Conserve and where necessary restore, the natural environment; and,

(c) Maintain the region's cultural heritage and social well-being.

The strategy sees East Gippsland in the future as rich, biologically diverse, managed on sound scientific principles and with a community engaged in its management. In community forums conducted as part of the preparation of the strategy, community capacity heads the list of assets for investment. Community capacity must be adequate to the task of delivering management outcomes for natural resources. The strategy stresses that it will be individuals and community groups who, working in cooperation with each other and in partnership with land management agencies, will be able to achieve the desired outcomes.

This strategy identifies priorities for action in the region at a strategic level. It does not attempt to define the detail of the plans and projects required to achieve those ends. The detail is provided in the annual Regional Catchment Investment Plan and in the sub-strategies and specific action plans that this strategy supports.

The strategy is for regular and frequent use, as an ongoing resource rather than as a reference volume of only historical interest.

The Resources

Rather than approach the planning task from the point of view of a series of problems to be overcome, we have regarded the region as a group of assets and then identified the threats to each type of asset and proposed ways of controlling these threats. The overall aim being to improve, or at least slow down the deterioration of, the assets of East Gippsland.

The region consists of six classes of assets. Within each class of asset, geographical areas were chosen for management purposes on the basis of common characteristics.

Asset class	**Assets within the class**	**Management Units**
Freehold Land	Predominantly private land used for agricultural production, with some native vegetation. Farm-based infrastructure and some cultural heritage sites. Some small public reserves.	Red Gum Plains, Bairnsdale Foothills, Dargo Mountain Basin, Snowy Mountain Basin, Far East, Coastal Hills, Buchan Valley, Tambo Mountain Basin, Snowy Flats, Lindenow and Bruthen Flats.
State Forests	Areas of State Forest used for timber harvesting, apiaries, recreation, grazing, water production. Areas have also been set aside to protect biodiversity.	State Forest in the Tambo, East Gippsland Forest Management Area, part of the Central Gippsland Forest Management Area
Parks	Areas of Park used for tourism or set aside to preserve the natural environment, biodiversity or cultural heritage.	Mitchell River, Alpine, Snowy River, Errinundra, Coopracambra, Cape Conran, Alfred and Lind, Croajingalong National Parks. Catchment and Hinterland. Gippsland Lakes Coastal Park
Coastal and Marine	Coastal vegetation, reefs, commercial fishing, recreation, tourism, urban development, areas set aside for the preservation of the natural coastal and marine environment.	Coastal Strip. Ocean to 3 nautical miles from the coast.
Catchments	Rivers, riparian vegetation, streams, lakes, wetlands, estuaries, surface water resources for town water supplies, irrigation and industrial purposes.	Mitchell River Catchment, Tambo River Catchment, Snowy River Catchment, Far East Rivers Catchments, Gippsland Lakes
Groundwater	Groundwater water inputs to wetlands and rivers and for irrigation and town water supplies	Wy Yung, Sale, Stratford, Orbost Groundwater Systems.

Prioritising Actions

Actions for intervention to maintain or rehabilitate the condition of an asset derive from the following criteria:

- Protection of high value assets which are in good condition or which have been depleted below sustainable levels;
- Where the benefits of rehabilitation of a high value asset exceed the costs;
- Where a the values of high value assets are in imminent danger of being damaged or irretrievably lost;

- Where the loss of an asset's value will lead to major regional economic, social or environmental impacts; and,
- Where stakeholders have the ability to meet the cost of intervention (i.e. agreed cost sharing arrangements can be developed).

The strategy represents a change in focus towards the recognition that even though much of the region is still in very good condition, there are both localised and widespread threats to natural assets of East Gippsland that require active management. Without appropriate management, degradation of these values will continue or accelerate.

Strategic Priorities

The content of the Regional Catchment Strategy leads us to these key strategic priorities over the next five years:

- Assist the community to improve their management of the region's natural resources;
- Where possible, increase the generation of wealth from the use of the regions' natural resources, while maintaining its environmental and social values;
- Maintain or, if possible, improve, the condition of the streams and receiving waters that are already in good condition;
- Improve the health of the Snowy River by restoring an environmental flow and in-stream and riparian ecosystems;
- Improve the health of the lower reaches of the Mitchell, Tambo, Nicholson and Cann Rivers;
- Maintain or, if possible, improve, the condition of terrestrial ecosystems that are already in good condition, on both public and private land;
- Maintain or, if possible, improve the condition of, the coastal and marine ecosystems that are in good condition;
- Maintain the health of the Gippsland Lakes, by reducing sediment and nutrient input, re-establishing fringing vegetation and improving the condition of contributing catchments; and
- Re-establish native vegetation in modified landscapes to a level consistent with primary land-use.

The interlinked nature of the natural assets generally means that, at the operational level, management for one necessarily integrates with management for another. We therefore need a thorough understanding of how all our assets interact with each other and with the infrastructure of the region to achieve genuinely integrated management.

Regional Catchment Strategy Implementation

The strategy recommends the adoption of regional programs to address common forms of asset condition loss. The programs are designed to ensure that, where possible, implementation of the RCS will:

- Provide focused, timely and collective effort on regional priorities;
- Provide a mechanism to integrate projects and promote partnerships;
- Ensure the transparent allocation of resources; and
- Assist in defining responsibilities for tasks.

The implementation framework acknowledges that integrated regional effort is particularly important where long term results require the coordinated investment from a range of asset owners, managers and local, state and federal agencies.

East Gippsland will excel in program integration and implementation.

OUR VISION FOR EAST GIPPSLAND

The 2050 Environment

A rich, biologically diverse region, managed on sound scientific principles in a way that responds to the values and needs of its human communities; a place where residents and visitors alike respect and conserve its natural wealth, as the foundation of their well-being; a place whose people, acting for all Australians, accept collective responsibility for the region's future.

Goals to achieve this vision:

- ***Efficient and sustainable use of East Gippsland's natural resources for a prosperous community***
- ***Improved conservation management of flora and fauna***
- ***Improved water quality and improved stream management***

1 AN OVERVIEW OF EAST GIPPSLAND

1.1 The East Gippsland Region

The East Gippsland Catchment Management Region (Figure 1-1) covers 2.2 million ha of land, lakes, and coastal waters out to 5.5 km, in the eastern-most part of Victoria. It is entirely south of the Great Dividing Range and includes the catchments of streams from the Mitchell River eastwards. The region covers about ten per cent of Victoria.

The region includes most of the East Gippsland Shire, the northern part of the Wellington Shire, and that part of the Alpine Shire south of the Great Dividing Range. It abuts the Wangaratta Shire at The Crosscut Saw and the New South Wales Shires of Snowy River, Bombala, and Eden Valley.

The Victorian Alps and mountains of the Great Dividing Range extend from the west to east across the northern boundary of the region. Foothills, lowland forests and coastal complexes to the south also extend from west to east, while rivers generally run north to south through the region, dissecting these landforms. Some catchments, such as the Mitchell, Tambo, Snowy and Cann River catchments include deep, mid-catchment, mountain basins which have been extensively cleared for dryland agriculture.

Major land uses and industries include conservation, agriculture, tourism, native forestry, plantation forestry and fisheries. About 80% of the land of the region is in public ownership, mainly as State Forests or National Parks.

Most freehold land is used for farming, ranging from large commercial enterprises to small 'rural residential' properties. Cities and towns occupy a small proportion of land in the region.
Some of the important features of East Gippsland are:

- The Gippsland Lakes, which have significant environmental, social and economic value and are on the Ramsar List of Wetlands of International Importance;
- Its array of streams, especially the wild rivers, including the iconic Snowy River and Victoria's biggest unregulated stream, the Mitchell River;
- Its long coastal reach with undeveloped estuaries, ocean beaches and spectacular headlands;
- Its mountains and forests, which provide great scenery, clean air, clean water, recreational opportunity and forestry products;
- Its scenic and productive farming lands, especially in the river valleys; and
- Its living wealth in the form of native plants and animals, some of which occur only in this region.

The Mitchell, Tambo, and Snowy Rivers have substantial alluvial floodplains in their lower reaches. The alluvial floodplains are the sites of the region's highly productive irrigation areas, including the Lindenow flats (Mitchell River), Bruthen Flats (Tambo River) and the Snowy River flats. The flats are used intensively for horticulture, dairying, and cattle production.

The 'Red Gum Plains' are the one major plain within the region. These plains are located in the south-west of the region, and extend from Bairnsdale to the Perry River in the west. The plains were originally covered by Red Gum and native grasses. The area is now used predominantly for dryland agriculture, and is noted for its dwindling areas of high-value remnant Red Gum.

A complex of dunes and coastal vegetation extends along most of the coastline. The region includes the area of ocean out to three nautical miles from the coast. The three nautical mile limit forms the southern boundary of the region.

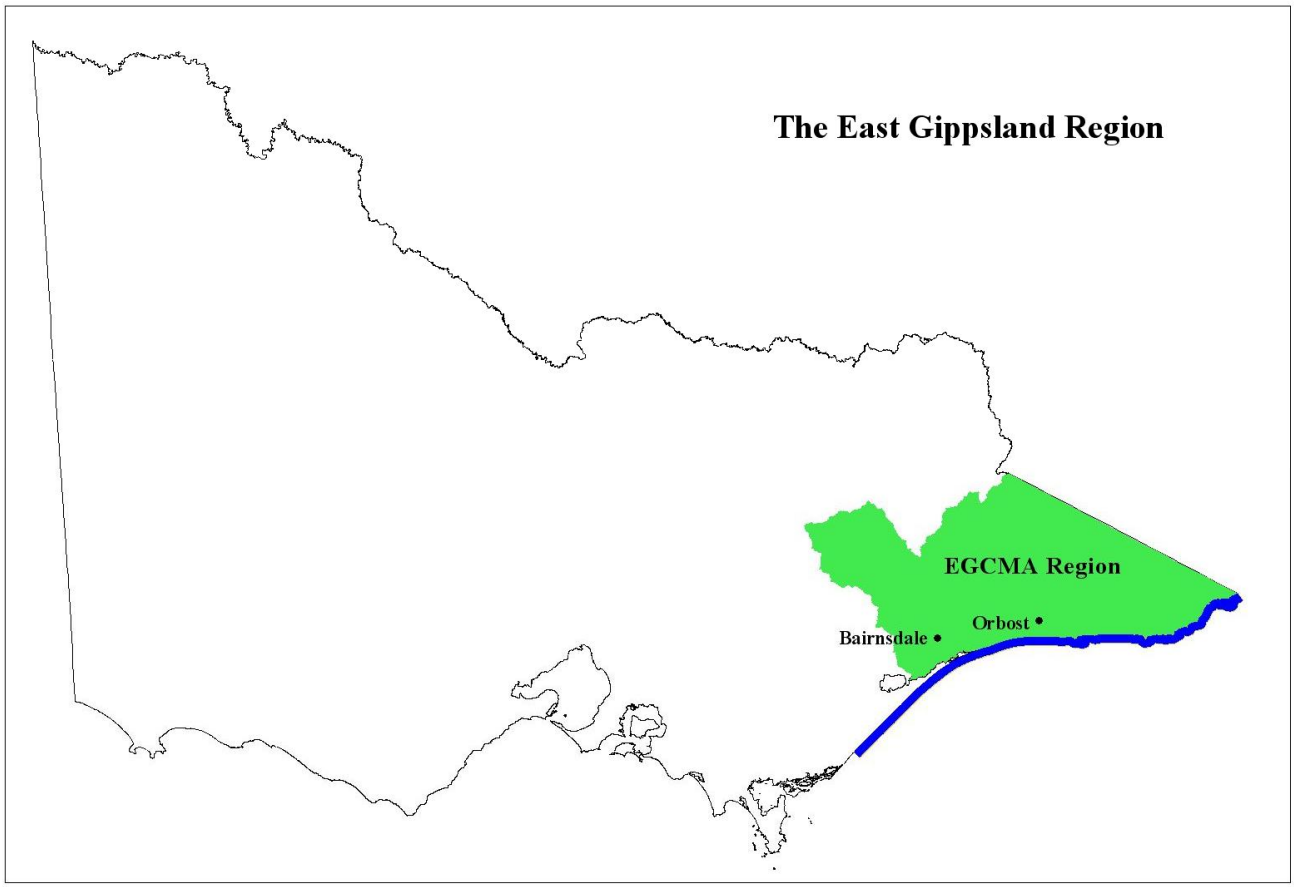


Figure 1-1. The East Gippsland Region

1.2 Indigenous Communities

Communities of Indigenous Australians have a strong sense of belonging to and being a part of the land. The Kurnai-Gunai, Bidawal and Ngarigo peoples of East Gippsland have cultural and traditional associations that stretch back historically for many generations. Their population at the time of European settlement was about 4,000.

The Kurnai-Gunai people's territory included lands around the Gippsland Lakes, northwards to the Great Dividing Range and east to Cann River. The Bidawal people inhabited land north and east from Cann River, into New South Wales. The Ngarigo people inhabited the Monaro Plains in NSW south to and probably including parts of East Gippsland.

Before European settlement, the Kurnai-Gunai and Bidawal communities shared land in some districts. Both groups were semi-nomadic hunters and gatherers. The diverse land and seascapes of East Gippsland held spiritual meaning for them. Within these landscapes, there are numerous special sites of significance to Indigenous communities.

Aboriginal people had regulatory systems for the use of natural resources, although details regarding these systems are unclear. Totem identity, for example, regulated hunting. One common practice involved direction by elders to hunters to move from one place to another at certain times, allowing prey species to recover. Such teachings were part of the skills required for survival during harsh times.

Aboriginal people also manipulated vegetation by means of fire, burning large tracts of scrub and plain. This was done to manage the landscape, but was also commonly practised to drive out game for capture. The character of the forests and woodlands was, at least in part, a result of Aboriginal burning. Some feel that the burning led to a more open and greener forest than we have at present. The burning encouraged new growth of grasses and scrub and attracted grazing animals, providing food resources.

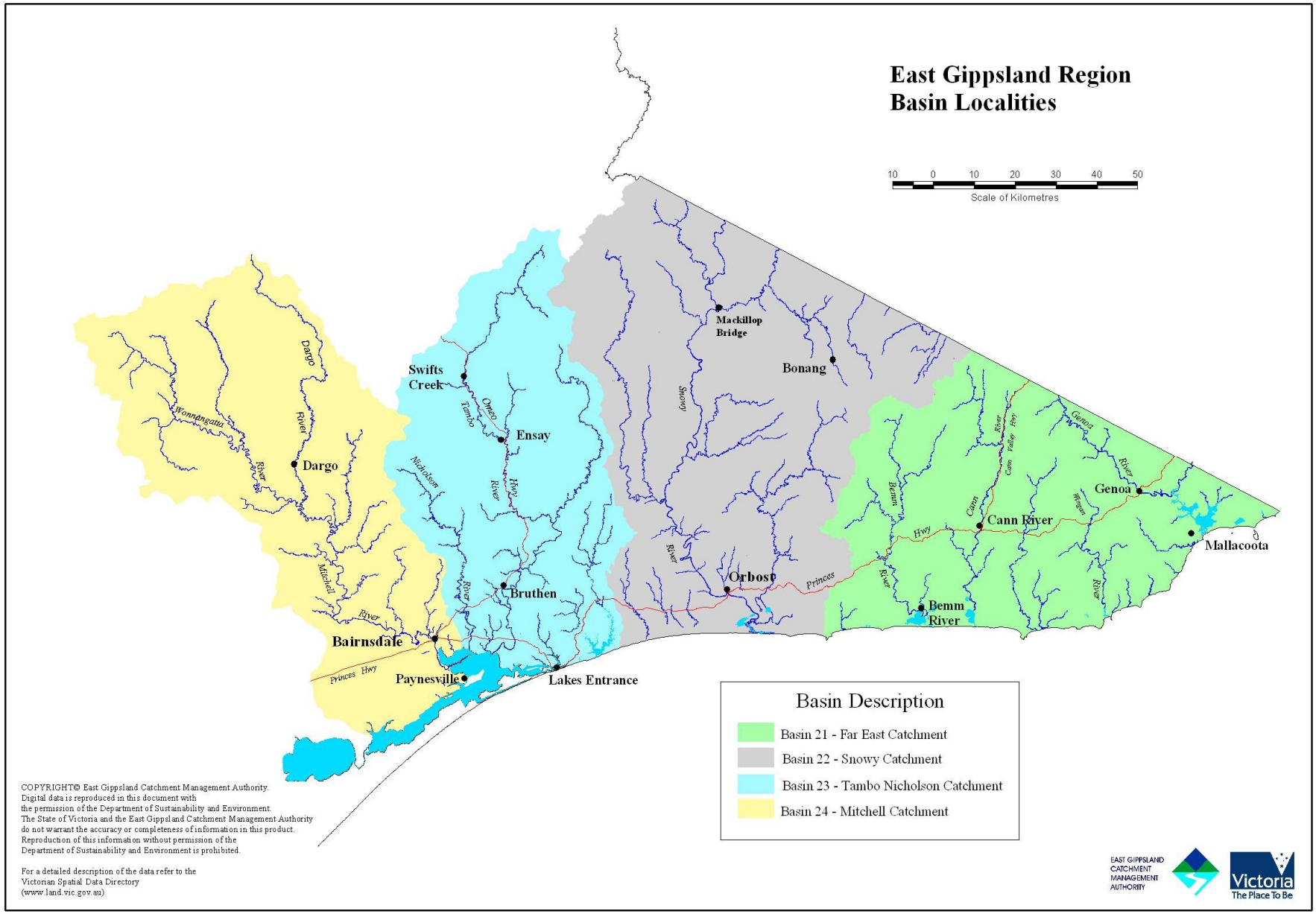


Figure 1-2. East Gippsland Region – Basin Localities

For a short period after European settlement, the region's isolation protected Gippsland's Aboriginal people from the scourges that wiped out populations elsewhere in Victoria. Eventually however, death from disease and starvation, dispossession, forced translocations, massacres carried out by white settlers, and the disruption of religious contacts with the land drastically reduced the Aboriginal population.

Aboriginal people in Gippsland have a close and enduring association with natural assets. Their way of thinking can and should help us retain and restore native vegetation and native animals to our part of Victoria. During consultation, the Aboriginal community expressed the hope that the wider community in Victoria can help restore the vegetation to the land so that we all can all live a better life in a cleaner environment.

1.3 History Of European Settlement

The first European squatters moved into the upper Tambo valley, the upper Suggan Buggan valley and Bendoc areas from the Monaro Plains in the 1830s. The earliest recorded cattle grazing occurred at about the same time as the oft-heralded arrival of the Hentys in Western Victoria. Early runs covered vast areas of open grasslands and forests. Cattlemen established grazing runs at Tongio Munje and Numbla Munge–Ensay in 1836.

By the early 1840s, squatters and their flocks and herds occupied the central Gippsland Plain, extending from east of Bairnsdale to the Latrobe Valley. Settlers mostly moved from north to south, from the Monaro to Omeo, down the Tambo River, and then spread out west and east. In so doing, they influenced the current distribution of settlement, use of natural resources and pattern of removal of native forest. From 1862, closer selection occurred around the Mitchell River flats, in places with fertile soils and access to markets, and then extended to more remote areas. Progressive clearing of the floodplains and draining of wetlands accompanied closer settlement. These fertile areas continue to be highly productive for vegetable cropping and dairying.

Discoveries by the great explorer and anthropologist Alfred Howitt led to the first gold rush, on alluvial claims, in 1851. A short time later reef mining became significant in the Grant, Swifts Creek, Bendoc, Dargo and Bullumwaal areas, but the major reef mines had closed by 1920. Wide areas at alluvial sites and on hills surrounding reef mines were stripped of vegetation and suffered extensive soil erosion. Solids from alluvial sluice mining and tailings from batteries moved into many river systems, causing additional erosion and elevated sediment loads—known as 'sand slugs'—that, in some cases, are still moving downstream.

Victoria's first hydroelectric power plant on the Cobungra River (north of the Great Divide) supplied the Cassilis Gold Mine near Swifts Creek in 1908. Other minerals, worked on a smaller scale at various times, include: silver, lead, zinc, tungsten, copper, molybdenum, manganese, barite and limonite.

The timber industry grew in parallel with European settlement. The earliest industry serviced local markets for timber and firewood, especially for the mines. Export of timber products was difficult until the railway arrived but then it expanded rapidly, producing mainly high-value durable timber products from the coastal and foothill forests. After the 1939 fires, which destroyed most of the ash forests of the central highlands, and the Second World War, motorised methods of extracting and transporting logs became widely available. This helped the second major expansion of the industry.

Towns like Swifts Creek, Bruthen, Nowa Nowa, Orbost, Club Terrace and Cann River developed as industry centres, with timber mills scattered across the region. This phase peaked in the 1970s. The subsequent decline was due to the cutting out of the highest value and most accessible forests, combined with the growth of the conservation movement and subsequent reservation of a high proportion of the public forests. By 2004, conservation had become the largest single use of public land in the region. Nevertheless, the timber industry remains a major regional industry. There has been an expansion of the pulpwood industry, intensive management of regrowth forest and development of plantations on private land.

The first oil found in Australia was extracted from a bore at Lake Bunga in 1924 and the major offshore oil and gas resources of the Bass Strait fields were first mined in the 1960s. Expansion of the eastern sections of these fields can be expected over the next few years. Gas pipelines running through the region now supply Sydney and Canberra.

1.4 Droughts, Floods And Fires

Variability of climate across the region and from year to year is a notable aspect of the region and its natural resources. Rainfall ranges from 2,200 mm in the Errinundra Plateau, to 500 mm in rain shadow areas like the upper Snowy valley. Rainfall is evenly distributed through the year, with large rain events usually being associated with east coast low pressure systems. As a consequence annual rainfall is highly variable which gives rise to frequent droughts and flooding events that have associated fire and other land management impacts.

Annual rainfall totals for Bairnsdale varied between 400 mm and 1,000 mm over the last fifty years. East Gippsland has the greatest frequency of 24-hour rainfall in excess of 75 mm in Victoria. Droughts – extended periods of low rainfall – are also common with water being the limiting factor for plant growth for two consecutive months in about 50% of years.[1](Figure 1-3)

Droughts cause economic stress for agricultural producers and rural communities and create an environment vulnerable to wildfire and, when followed by high rainfall, erosion of soils and nutrient transport to streams.

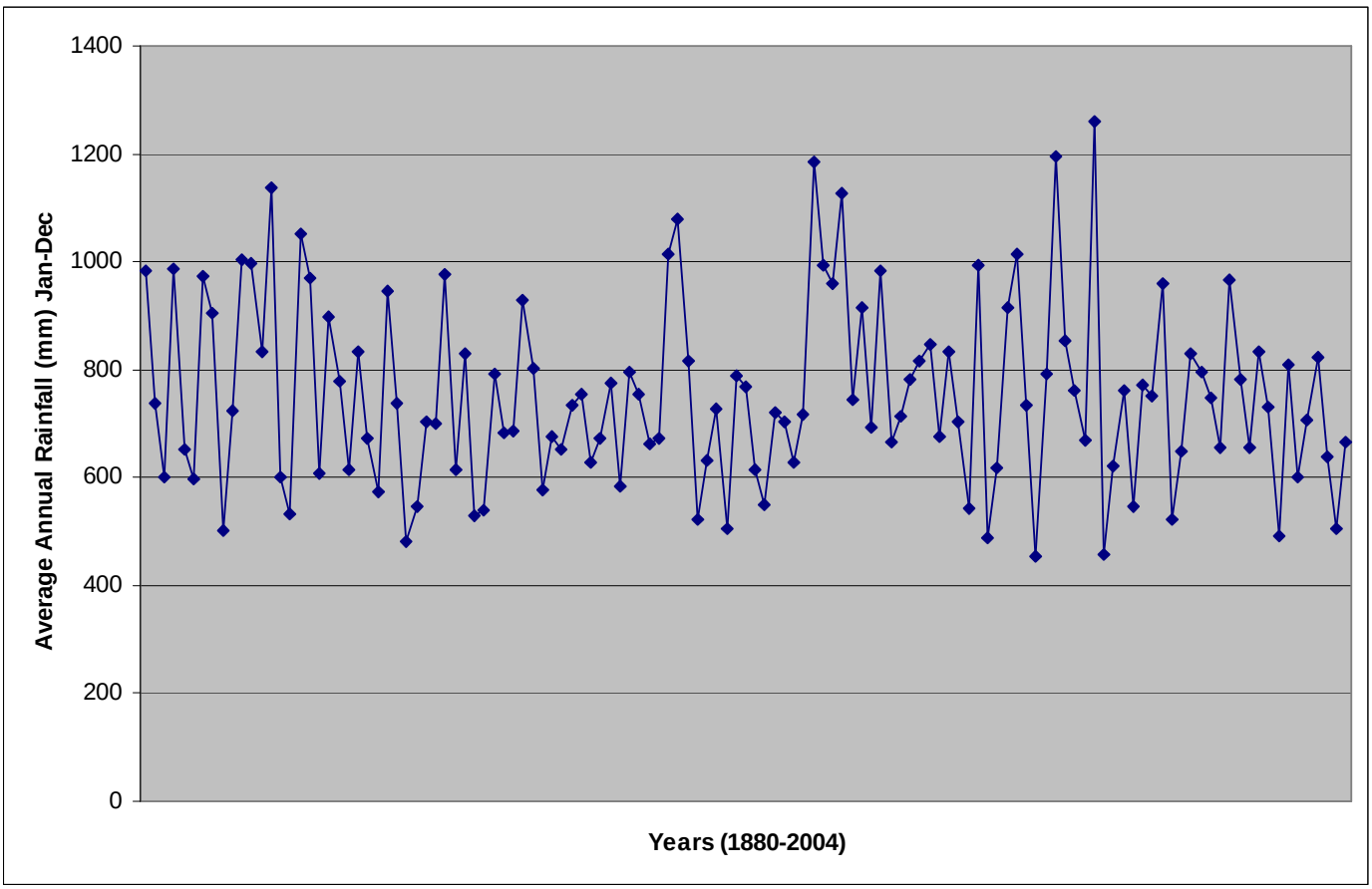


Figure 1-3. Annual Rainfall - averaged for Orbost, Bairnsdale, Bruthen and Lindenow (July to June)

Floods are important for the replenishment of floodplains and wetlands but they also carry large loads of sediment and nutrient to coastal estuaries, including the Gippsland Lakes, and the coastal waters of Bass Strait. Floods can be highly damaging in the generally narrow and steep valleys of East Gippsland. In vulnerable catchments, major floods cause massive erosion and damage to property, and can lead to realignment of rivers in new channels.

Flows in rivers of temperate Australia are amongst the most variable in the world[2]. East Gippsland streams are slightly more variable than the mean for streams in Victoria[3], but the Cann and Genoa Rivers have flow variance three times the world average; flooding can occur at any time of the year. Two of the largest floods recorded in the last 100 years occurred in the driest month, February (1919 and 1971). The more recent 1998 floods occurred in June, after

[1] Linforth (1969) Cited in: Erskine W.D, and ID&A Ltd (1997) Cann River Geomorphic Assessment and Implications for Future Stream Management. East Gippsland River Management Board and Department of Natural Resources and Environment.

[2] Peel, M.C., McMahon, T.A., Finlayson, B.L. and F.G.R. Watson (2001) Identification and explanation of continental differences in the variability of annual runoff. *Journal of Hydrology*, 250:224-240.

[3] R. Grayson (pers. comm.) CRC for Catchment Hydrology and Centre for Environmental Applied Hydrology, Department of Civil and Environmental Engineering, University of Melbourne.

several years of drought. Ocean levels, tidal cycle and the effects of wind can accentuate or reduce river floods. Strong winds within the Gippsland Lakes can affect local water levels by up to one metre.

Table 1-1. Flood variability indices for selected regions

Region	Number of River Gauging Stations	Mean Flash Flood Magnitude Index
World rivers	931	0.28
Australian and southern African rivers	280	0.45
Rest of the World rivers	651	0.21
Hunter Valley, NSW	24	0.65
Genoa and Cann Rivers, Victoria	4	0.62
Ovens and King Rivers, Victoria	8	0.40
Snowy River at Jindabyne, pre-Snowy Mountains Hydroelectric Scheme	1	0.20

(from McMahon et al., 1992; Erskine, 1986; 1993; 1994a; 1994b; 1996).

1.5 The Commercial Resources of East Gippsland

Water for Consumption

The largest consumptive water use is for irrigation, particularly on floodplains in the catchments of the Mitchell and Snowy Rivers. Irrigation from groundwater supplies has increased in the past decade, particularly from the Boisdale aquifer on the Red Gum Plains in the south-west of the region, and from the Curlip Gravel aquifer of the Orbost Groundwater Management Area[4]. East Gippsland's surface water consumptive usage is about 18,000 ML/yr (Table 1-4) and groundwater consumptive use is about 12,000 ML/yr (Table 1-5).

East Gippsland contains ten 'Proclaimed Water Supply Catchments' that supply water for urban use (Figure 1-4). In addition, rural properties not attached to reticulated services also draw from waterways for domestic water supplies in many other, non-proclaimed, catchments of the region.

Forest Industries

Commercial industries that depend on or are associated with forests include timber production, firewood, apiary, recreation and grazing.

Of the forest based industries, timber products provide by far the largest cash flow for the region. About one-quarter of Victoria's sawn hardwood and one-fifth of its pulpwood comes from public land in East Gippsland. The region covers the entire East Gippsland Forest Management Area (FMA), most of the Tambo FMA and a small part of the Central Gippsland and North East FMAs in the upper catchment of the Mitchell River. The productive area of State Forest in the East Gippsland FMA is about 300,000 ha, of which about 3300 ha is harvested annually. In the Tambo FMA, the productive area is about 137,000 ha and about 1,000 ha is harvested annually.

The long-term sustainable yield of sawlog quality timber was reassessed across the state in 2001–02. This led to a 43% reduction (to 143,000 m^3/yr) in volume licensed in the East Gippsland Forest Management Area. In the Tambo Forest Management Area, the sawlog volume was set at 62,000 m^3/yr in 2000 as a result of implementation of the Gippsland Regional Forest Agreement. The long-term sustainable yield review in 2002 confirmed this as a sustainable volume. Both of these figures are under review pending completion of the State Forest Resource Inventory in the East Gippsland FMA and a review of the available resource following the 2003 Alpine fires in the Tambo FMA.

The region also produces substantial amounts of lower quality logs, most of which are chipped as pulpwood. This amount varies according to market demand, but averages 100,000 m^3/yr in Tambo and 250,000 m^3/yr in East Gippsland.

[4] Sinclair Knight Merz, Maffra.

Timber is also harvested from privately owned forests, although the amount is relatively small. As an alternative to traditional agriculture, the area of plantation-based production of timber is increasing.

Agricultural Production

East Gippsland is a relatively small agricultural region, due to its topography and the proportion of forested and public land. It produces 20% of Victoria's vegetables, carries 1% of Victoria's dairy cattle, 6% of its beef cattle and 2.5% of its sheep. The estimated gross value of agricultural production in East Gippsland in 2004 was around $142 million.

Agriculture is important to the wealth and tradition of the region. Agricultural land covers 18% of East Gippsland and involves 16% of local families. Grazing enterprises dominate use of farmland, predominantly on dryland pasture, but with some irrigated pasture on the Mitchell, Nicholson, Tambo, Cann, Snowy and Genoa River floodplains.

Irrigated horticulture is a highly productive land use on the floodplains of the Snowy and Mitchell Rivers. The total area used for vegetables is about 2,600 ha. East Gippsland also produces fruit crops and tree crops such as walnuts.

Throughout Victoria, the agricultural sector continues to experience declining 'terms of trade' for many products, particularly those of the traditional grazing enterprises. This creates pressure to increase productivity, increase farm size and seek greater off-farm income. Farming properties around East Gippsland experienced difficult operating conditions during the 1990s with severe drought, floods, low commodity prices and an outbreak of Ovine Johnes disease in sheep.

In the aftermath, this sequence of events, combined with the impacts of cuts in the timber industry, prompted some local communities and many farmers throughout East Gippsland to re-evaluate their longer-term strategies for survival and growth. For example, residents of the Omeo Region engaged in a large-scale multi-faceted response to the problems[5]. The agricultural programs consisted of land aggregation (buy-backs), pasture improvement, land rehabilitation and reafforestation. The response also involved community infrastructure programs and business and tourism initiatives designed to address broader community issues. The program is currently being evaluated to provide possible lessons for supporting other parts of the East Gippsland region.

Tourism and Recreation

East Gippsland has attracted holidaymakers and tourists for well over 100 years. It includes some of the most significant and concentrated areas for outdoor activities in Victoria.

Public land and waterways are major resources for outdoor recreation. The ocean and lakes and the lower reaches of the rivers are key attractions for fishing, swimming, sailing, and other recreational boating. The higher reaches of the rivers are used for recreational angling, canoeing, kayaking and rafting and their banks provide attractive bush campsites. Forests and coastal heaths and shrub-lands are also popular for walking, camping, horse-riding, sightseeing, fossicking and nature study. Ski-fields and alpine resorts are located to the north of the region. The lakes and forests offer opportunities for historical and environmental education.

Nature-based tourism is a major contributor to East Gippsland's economy. In 1998, tourist expenditure in East Gippsland Shire was about $230 million. An estimated 2.1 million domestic visitors and 150,000 international tourists visited the region in 2000[6].

[5] ARUP (2000) North East Gippsland Environmental and Land Use Consultancy.
[6] Tourism Victoria corporate website, www.tourismvictoria.com.au, research.

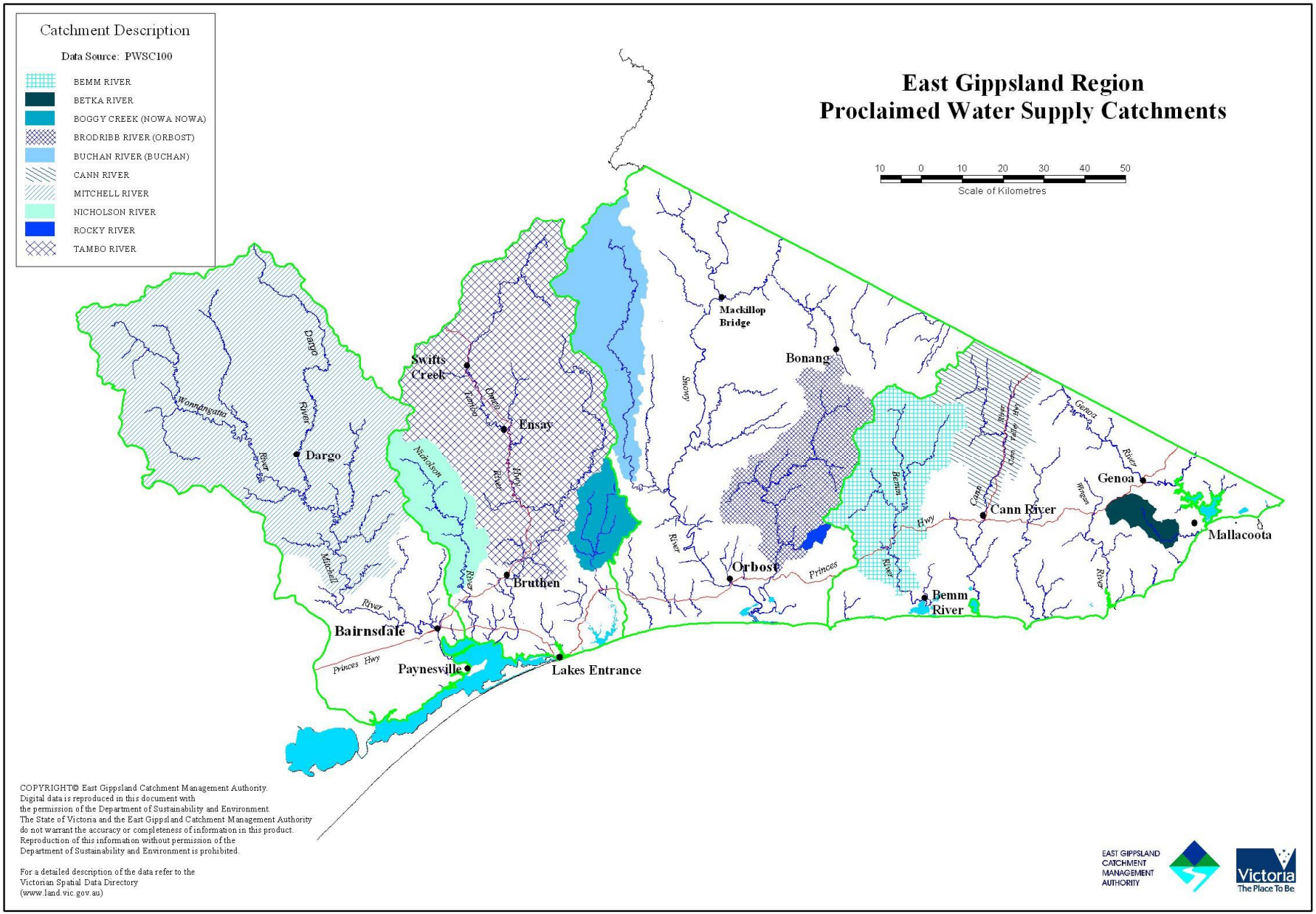


Figure 1-4. East Gippsland Proclaimed Water Supply Catchments

Commercial Fishing

Victoria's largest offshore commercial fishing fleet is based at Lakes Entrance. In the financial year 2002–03, 1523 tonnes of scale fish, 546 tonnes of scallops, 15 tonnes of sharks and 141 tonnes of other species were landed at Lakes Entrance from state-managed fisheries. The value of these landings was over $8 million. In addition, in excess of $10 million average value catch was landed at Lakes Entrance in the last three years from the Commonwealth-managed fishery[7].

In the Eastern Zone of the Victorian abalone fishery, licence holders target reefs between Marlo and Cape Howe. The total available catch for license holders from this fishery is 488 tonnes per year. In the financial year 2002–03, 456 tonnes of abalone were landed in East Gippsland[8].

There are sixteen commercial access licences within the Gippsland Lakes which provide a source of high quality fish to wholesale and retail markets both locally and to Melbourne and Sydney. The average annual landed beach value of the Gippsland Lakes fishery is $1.5 million[9]. Commercial catch-rates in this fishery are variable. Catches of the Black Bream are highly dependent on a range of complex environmental factors that determine the success of recruitment to the fishery. Whilst the Black Bream has historically been the most significant species within the commercial catch, Yellow-eye Mullet, Tailor, Salmon and Trevally are also important.
Other commercial fishing activity in East Gippsland include the taking of bait species, harvesting of European Carp and harvesting Short-finned and Long-finned Eels.

Transport and Communication Networks

Transport and communications networks are important to East Gippsland. To some extent the Gippsland Lakes, once a major thoroughfare for heavy transport and passengers, also continue as a transport medium. The main highways are the Princes Highway, the Great Alpine Road, and the Snowy River Road (Barry Way), the Bonang Road and the Cann Valley Highway that all link to New South Wales. East Gippsland and Wellington Shires manage about 2,500 kilometres of roads while DSE and Parks Victoria are responsible for about 8,700 kilometres of roads and tracks.

An active rail corridor runs from Melbourne to Bairnsdale. The inactive rail corridor from Bairnsdale to Orbost is now a bicycle trail to Nowa Nowa with plans for extension. Public airfields operate at Bairnsdale, Marlo and Mallacoota and there are a variety of private airfields ranging from the commercial, jet-capable Dinner Plain, which is just north of the region, to rough agricultural strips. The Eastern Gas Pipeline and two fibre optic communication cables run through East Gippsland and telecommunication towers occupy prominent hilltops.

Extractive Industry

Mining in East Gippsland has a significant history and opportunities will continue to arise. There are 62 extractive and 29 mining titles, both current and in application, in the East Gippsland Catchment region[10]. The total value of stone production from quarries in the region over the last five years, as reported by operators, is about $3.5 million per year. Stone production includes sand and gravel, limestone, granite, sedimentary, quartzite and rhyodacite. Development of gas and oil fields continues off the East Gippsland coast.

1.6 Population and Socio Economic Trends

Population Change in East Gippsland

The East Gippsland Catchment Management Region corresponds quite closely with the local government municipality of East Gippsland Shire. At the time of the 2001 Census, the Shire had a population of 38,028 people. Most of these live in or near the major regional centre of Bairnsdale. The population of Bairnsdale and its hinterland was 23,712 in 2001 (ABS Statistical Local Area of 'East Gippsland – Bairnsdale'), representing 62% of the Shire's population.

[7] Australian Fisheries Management Authority records.
[8] Fisheries Victoria (2003) Commercial Fish Production Information Bulletin 2003. Primary Industry Research Victoria, Queenscliff, Victoria.
[1] Seafood Industry of Victoria, http://www.siv.com.au/gippsland.html.
[10] Department of Primary Industries, March, 2004.

Overall, East Gippsland has experienced population growth in the past 20 years, although the rate of growth has slowed from very high levels in the early 1980s (2.6%) to levels below 1% in the late 1990s.

Table 1-2: Population and population growth rates, East Gippsland Shire, 1981 to 2001

Year	Population	Time Period	Average Annual Growth Rate (%)
1981	29 488		
1986	33 482	1981–1986	2.57
1991	36 269	1986–1991	1.61
1996	37 893	1991–1996	0.88
2001	38 028	1996–2001	0.07

(Source: DSE unpublished time series database, based on ABS Census data)

Population Change at the Local Level

Within the Shire of East Gippsland there have been quite different population trends over recent decades. Bairnsdale and its immediate hinterland have experienced strong and continued population growth, while many inland towns and rural areas have experienced population decline.

Population change depends on births, deaths and migration flows and these are related to social and economic change. For example, the decline in employment in primary industries such as agriculture and forestry has had a strong impact on the population of towns like Cann River or Swifts Creek which have traditionally been dependent upon such industries. On the other hand, there has been growth in tourism employment, so towns like Lakes Entrance, Paynesville and Metung have experienced both population and employment growth over recent decades. They have also experienced growth as commuter settlements for people working in Bairnsdale. The growth of Bairnsdale has been assisted by the important role it plays as a regional centre for medical, retail, educational and government services.

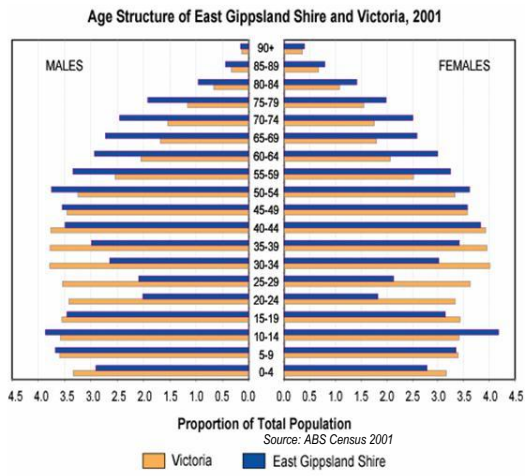
Age Structure

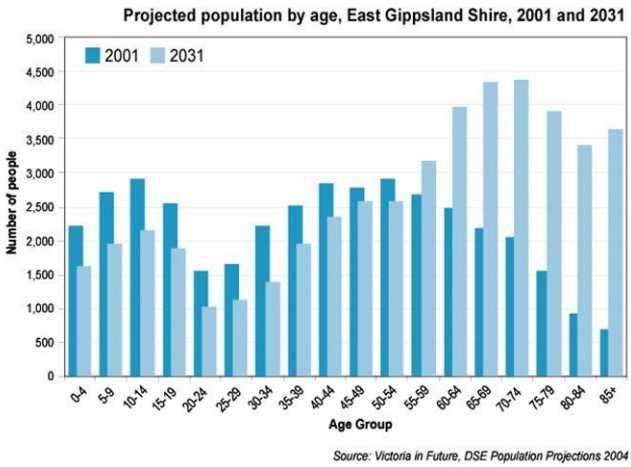
Victoria is experiencing a structural ageing of its population due to declining numbers of births and increasing life expectancies. Women are having fewer children, on average, than in the past. This is a trend that has been occurring for three decades, making it a fundamental feature of our population structure rather than simply a short-term fluctuation.

While the trend of population ageing is occurring across all of Victoria, the impacts are deepened in regional areas because of the effects of internal migration patterns. Young adults tend to leave regional areas and move to the cities (especially Melbourne) in order to seek education and employment. While this trend has existed for decades, there has been a more recent trend of fewer young adults moving in the other direction—from large cities to more remote areas. Large cities offer greater career opportunities, particularly as people now move between jobs more than in the past, and often continue education and training over the course of their careers. Large cities have also become attractive for the services, entertainment and amenities that they provide. In a globalising culture, they have become important cultural (and multicultural) centres that attract many young adults.

At the same time, areas like East Gippsland gain older age groups through retiree migration. The dual effect of net loss of young adults and net gain of retirees means that East Gippsland displays a distinctive age structure compared to Victoria overall. There are significantly lower proportions of young adults than for Victoria overall, but much higher proportions of people aged 55-90 years.

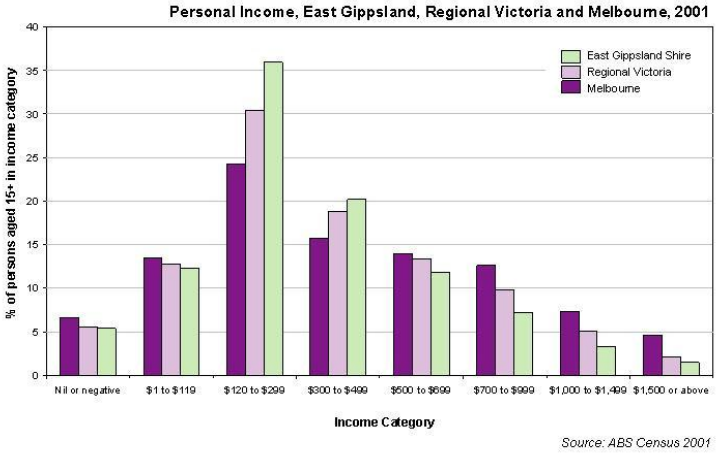
There is another feature of Victoria's changing population structure that is relevant to East Gippsland. The large numbers of people born in the 1950s and 1960s have created a 'baby boomer bulge'. These people are starting to reach retirement age. East Gippsland has long been an attractive location for retirement. Even if the proportion of retirees choosing to live there remains the same, the size of the baby boomer bulge means that there will be a large numerical increase in numbers moving to East Gippsland in the next 20 years. The projected population age structure for East Gippsland therefore shows strong gains in age groups over 55 years.





Income Levels

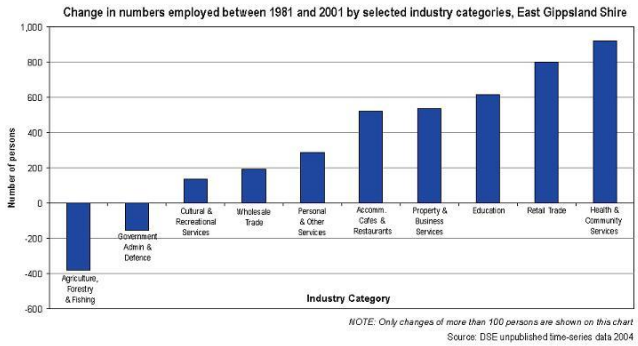
Income levels in East Gippsland are somewhat lower than the average in regional Victoria, and regional incomes, in turn, are lower on average than those in metropolitan Melbourne. However, measuring 'average' incomes tends to hide important features of a community's economic welfare. For example, retirees may have low incomes but may be 'asset wealthy', owning their own homes and having little or no debt.



Some communities have quite polarised income patterns, which is hidden when using an average measure. Melbourne, for examples has groups of very low and very high income earners. In East Gippsland, around 25% of the working population have personal incomes in the lowest quartile – this is the same as the regional Victorian and Melbourne average. However, in the highest income quartile, East Gippsland has only 14% of its working age population in this category compared to 19% for regional Victoria and 27% for metropolitan Melbourne. In other words, the lower income profile of East Gippsland is due less to severe poverty than to the absence of high income earners.

Impacts of Economic Change

Over the past 20 years East Gippsland has seen a large decline in the proportions employed in Agriculture, Fishing and Forestry. Twenty per cent of the region's workforce was employed in this category in 1981 but by 2001 it had fallen to 13%. In numerical terms this was a decline of 380 persons. A similar drop occurred at the statewide level with employment in the sector in regional Victoria falling from 19% in 1981 to 11.5% in 2001. East Gippsland also experienced losses in numbers employed in Government Administration and Defence during the 1981 to 2001 period.



While employment losses have occurred in the primary sector and in government, there has been considerable growth in service sector employment. The strong increase in those employed in Health and Community Services (an increase of 921 persons employed between 1981 and 2001) reflects the older age structure of the region and the role of Bairnsdale as a major provider of both basic and specialist medical services.

Other areas of employment growth have been in Education, and in tourism related industries, either directly through accommodation and food or indirectly through growth in retail trade and property services.

The Diversity of Socio-Economic Characteristics in East Gippsland

The diversity of East Gippsland is not just expressed in geographical terms. There are differences emerging between the socio-economic characteristics of existing populations and those of retiree populations who continue to move into the region. An interesting example can be seen in the patterns of internet use across different age groups. The use of internet is a useful indicator of a community's capacity to network and access information and services. In a relatively remote region like East Gippsland it can provide opportunities for communication and connection. In general, younger age groups have higher use of this technology, and this pattern is evident in East Gippsland. However, closer comparison with regional Victorian averages shows some important differences. Working age groups in East Gippsland have levels of internet use below the regional Victorian average. However age groups over 55 years have usage levels above the regional Victoria average. This suggests that incoming retirees may be bringing professional skills into the community, and may represent an opportunity to contribute to increasing networking and communication capacities within the region. Similar evidence can be found in education levels of East Gippsland's older populations with post graduate qualifications more evident in those aged 55 or more than in the 20–54 year age groups[11].

1.7 Natural Resources of East Gippsland

Mountains, foothills, lowland forests and river flats

The Victorian Alps form the Northern boundary of the region and contain a diverse range of alpine forests, heath lands and woodlands. They have high natural and recreational values and are used for snow sports, tourism, and nature conservation. Snow remains for some months each winter, although summer provides a milder climate. At lower altitudes, the Alpine Ash forests are managed for timber production. The native vegetation is generally in good condition.

A mountain plateau is located in the Bonang and Bendoc areas. This plateau is an extension of the Monaro plains. Much of the area has been developed for dryland agriculture. Settlement was drawn to the area because of its accessible topography, fertile soils and reliable water supply, and the reduced likelihood of hot, dry conditions compared to the lower parts of the region. Native vegetation was originally tall eucalypt.

Foothills and mountains extend west to east across the region and rise to about 1200 m. Soil types and rainfall and vegetation vary from dry rain-shadow areas of low fertility in the upper Snowy River catchment, to tall forests in the Errinundra Plateau. Aspect is a major determinant in this area: cool southern slopes may contain cool temperate rainforest and dry box vegetation is found on the dry northern slopes. Most of the mountain, foothills and lowland forest areas sit within the public estate as either National Park, Reserve, or State Forest. However, some of the foothills and lowland forests are freehold, and have been cleared for agriculture and other private uses. The area of land within the Parks estate is primarily set aside to preserve the natural environment and for tourism. The land within State Forest area includes multiple uses such as timber production, apiaries, nature conservation, recreation and tourism.

The larger mountain basins in the region generally have lower rainfall and a warmer climate than their surrounding mountains. Remnant native vegetation includes riparian vegetation, box woodlands or forest with Manna Gum. Drought and floods are frequent, and travel to these areas can be challenging because of winding access roads.

Lowland forests generally run parallel at a lower elevation to the foothills. Lowland forest areas comprise undulating hills usually on soils of low fertility. Vegetation is diverse and includes rainforest niches, extensive heathlands and hardwood eucalypt forests. Some areas of lowland forest are used for agriculture, apiaries and farm based tourism and residential living nearer Bairnsdale. However, most of the areas of the lowland forest are within the public estate and are managed as a Park or a State Forest.

[11] ABS unpublished census data.

The vegetation across the mountains, foothills and lowland forests contain more-or-less the same species as 200 years ago, and include about 3,000 species of vascular plants (higher plants) and 500 species of vertebrate animals (excluding marine fish). Some species in the region do not occur naturally anywhere else in the world. About 100 species are regarded as 'threatened'. However the non-vascular (or lower) plants and invertebrate fauna of this region are poorly documented.

Rivers, Floodplains, Lakes, Wetlands and Estuaries

East Gippsland has four major river basins (Figure 1-2). These are the Mitchell, Tambo, Snowy and Far East Basins. The total stream length for all waterways in East Gippsland is 61,665 km (Table 1-3).

Table 1-3: Length of waterways in the East Gippsland Catchment Region[12]

Length of Waterway	Basin 21 Mitchell (km)	Basin 22 Tambo (km)	Basin 23 Snowy (km)	Basin 24 Far East (km)	East Gippsland Total (km)
Rivers and Streams	13 979	18 777	12 810	14 577	60 143
Channel, Drain or Canal	4	110	25	31	170
Total Rivers and Streams	13 983	18 887	12 835	14 608	60 313
Wetlands and Lakes (perimeter)	338	271	342	401	1 352
Total Waterways	**14 321**	**19 158**	**13 177**	**15 009**	**61 665**

The variability of the natural rainfall pattern of East Gippsland (Section 1.4) has influenced and shaped the region's river systems. Periods of high flow influence the shape of river channels, distribute nutrients over floodplains and flush sediment, nutrients and salt from waterways and estuaries. Ecosystems supported by rivers have adapted to East Gippsland variable hydrology. Variability also contributes to environmental diversity that supports the wide variety of species and communities of native plants and animals found in and along East Gippsland rivers.

Except for the Snowy and the Nicholson Rivers, all of East Gippsland's rivers are unregulated and have essentially natural flow regimes. This low level of modification is a major factor in the health of the region's rivers. The Victorian Government's Index of Stream Condition assessment data indicates that East Gippsland has a higher proportion of its rivers and streams in excellent or good condition, than the rest of Victoria[13].

Significant water bodies in the region include freshwater lakes, saline lakes, estuaries, salt marshes, salt flats, freshwater marshes, freshwater meadows, riverine wetlands, alpine bogs and farm dams. The Directory of Important Wetlands lists some water bodies as nationally significant, and the Gippsland Lakes are Ramsar listed.

The Gippsland lakes are the largest lake and estuary system in the region. The catchment of this lake system includes the Mitchell, Tambo–Nicholson, and Lake Wellington catchments. The Lake Wellington catchment, a major source of water for the lakes system, is located within the West Gippsland Catchment Management Authority region. Other significant lakes include Lake Tyers, Wingan Inlet, and Ewing Morass.

The rivers and streams of East Gippsland encompass valuable environmental and heritage assets, some of which are recognised at a state, national, or international level. Assets include six out of the eighteen 'Heritage River' listed river reaches in Victoria[14], 18% of nationally significant wetlands in Victoria[15] and the internationally significant Mitchell River silt jetties[16].

Almost all lakes, estuaries, and tributary rivers in the region provide important recreational fishing destinations for anglers. Whilst the Black Bream is the most sought-after species, other species such as King George Whiting, Dusky Flathead, Luderick, and Silver Trevally also form important components of the overall catch.

[12] Corporate Geospatial Data Library. Data derived from Hydro25 data layer – Department of Sustainability and Environment, Victoria.
[13] Environment and Natural Resources Committee (2000) State Government Victoria.
[14] Natural Resources and Environment (1997) Heritage Rivers and Natural Catchment Areas Draft Management Plans. State Government Victoria.
[15] Environment Australia (2001) A Directory of Important wetlands in Australia, Third Edition. Environment Australia, Canberra.
[16] Bird, E.C.F. (1972) The Silt Jetties of the Mitchell River. Gippsland Studies No.1.

As with the land-based ecosystems, a more detailed assessment of the biodiversity associated with streams and estuaries is required, although the overall condition of streams, expressed in the index of stream condition, is good and therefore its associated flora and fauna are also likely to be in good condition. There are 18 species of freshwater fish recorded in the region including Australian Bass, Australian Grayling, Blackfish, Smelt and a number of species of Galaxiids and Gudgeons. The diversity of freshwater crayfish is also comparatively high. The well-being of these species and the biodiversity within these streams is directly related to the presence of a diverse environment, good water quality and quantity and limited impacts from introduced species.

The far eastern streams are of particular note for their high diversity of native fish species. These streams have relatively undisturbed catchments and trout have not been introduced.

The region also contains Victoria's only 'cross-border' rivers, with the headwaters of the Snowy, Genoa and Wallagaraugh Rivers being within New South Wales.

Water Resources

Fresh water plays a critical role in the viability of the region. It is the key element in the health of our river systems and wetlands; it underpins the region's increasingly important irrigated horticulture; it provides drinking water for towns and isolated communities; and it provides the foundation for the region's developing recreation and tourism industries.

In a Victorian context, the water resources of East Gippsland are abundant. Surface runoff is substantial, but highly variable[17]. Compared to the rest of Victoria, consumptive use of surface flows is low. Most of the region's rivers are unregulated, except for the upper Snowy River above Lake Jindabyne in New South Wales, which has 99% of its mean annual flow diverted through the Snowy Mountains Hydro Scheme, and the Nicholson River, where East Gippsland Water operates a small (620 ML) 'drought reserve' water storage.

Water for irrigation is obtained from the Mitchell, Tambo, Nicholson, Genoa, Buchan and Snowy Rivers. Irrigation is the biggest consumptive use of water from these rivers[18]. Water for urban use is extracted at ten sites, whilst water for domestic and stock use is obtained from waterways throughout the region. Consumptive use of water is regulated under the Water Act 1989, through a system of Bulk Entitlements, Licences and Permits.

Considerable reserves of groundwater underlie the southern part of East Gippsland, much of it of good quality. Although current groundwater allocations are still low throughout most of the region, the last decade has seen increasing use of groundwater for irrigation, particularly in the lower Mitchell River and on the Red Gum Plains in the western end of the region.

East Gippsland has four groundwater management areas, of which two are 'over-allocated' (i.e. the known extractions exceed estimated sustainable yields). The two over-allocated areas are the Sale Groundwater Management Area, which is shared with West Gippsland, and the Wy Yung Groundwater Management Area. Both of these areas are 'Water Supply Protection Areas' and Groundwater Management plans must now be prepared. Improved long-term monitoring data arrangements will provide a better basis for the development of the groundwater resource.

[17] Erskine W.D, and ID&A Ltd (1997) Cann River Geomorphic Assessment and Implications for Future Stream Management. East Gippsland River Management Board and Department of Natural Resources and Environment *(after Mc Mahon et al, 1992).*

[18] Geo-Eng Pty Ltd (2002) Water Resource and Allocation, Stage 1. Gippsland Water for Growth Committee.

Table 1-4: Surface Water in East Gippsland

River Basin	Basin Area (km^2)	Average Natural Flow(ANF) (ML/yr)	Runoff (ML/km^2/ yr)	Total Consumptive Use/Water allocated		Unallocated Flow (ML/yr)
				(ML/yr)	% of ANF	
MITCHELL (Basin 24) Major Rivers: Mitchell, Dargo, Wonnangatta	5 218	1 100 000	211	12 100	1.10	1 087 900
TAMBO (Basin 23) Major Rivers: Tambo, Nicholson, Timbarra	4 200	329 000	78	2 961	0.90	326 039
SNOWY (Basin 22) Victoria only	6 666	1 667 000	250	1 667	0.10	1 665 333
SNOWY (NSW only)		1 100 000				
EAST GIPPSLAND (Basin 21) Major Rivers: Bemm, Cann, Genoa	4 689	887 000	189	887	0.10	886 113
Whole of EAST GIPPSLAND	20 773	3 983 000	192	17 615	0.44	3 965 385
Whole of VICTORIA	230 368	35 241 000	153	12 363 120	35.08	22 878 000

Table 1-5: Groundwater in East Gippsland[19]

Ground Water Management Areas	Groundwater Estimated Sustainable yield (ML/yr)	Ground Water allocated (ML/yr)
Wy Yung Ground Water Management Areas	9 070	7 176
(Parts of) Sale Ground Water Management Areas	13 000	2 022
(Parts of) Stratford Ground Water Management Areas		479
Orbost Ground Water Management Areas		1 200
Within East Gippsland but outside of a designated GMA		1 296
Whole of East Gippsland		12 173
Whole of Victoria	3 660 000	622 000

The Coast and Ocean

The southern part of the region is composed of the coast, together with the ocean area within three nautical miles of the coast. The coastal zone supports a wide variety of highly significant coastal landforms including tidal inlets, estuaries and lagoons, dune-blocked lakes and swamp systems, freshwater inter-dune lakes, extensive sand dunes and sand sheets, and prominent rocky cliffs. The wilderness qualities of the East Gippsland coast are among the highest in Victoria. The coast includes two of the three Victorian coastal wilderness areas.

[19] National Land and Water Audit 2000 and Southern Rural Water unpublished data 2004.

Most of the coast is within in the public estate, and is captured in a series of National Parks and Reserves. The major areas of freehold land are located around the Gippsland Lakes, south of Orbost and around the major estuaries to the east.

Marine biodiversity, especially invertebrates, is still poorly documented. However, surveys of a few East Gippsland sites revealed great diversity of plants and animals. Point Hicks, for example, supports a plentiful array of marine flora and fauna, including spectacular sub-tidal reefs with a multitude of marine organisms.

Cape Howe is similarly diverse and has a variety of reefs. It is home to a diverse array of marine species. Many species from the warmer northern waters reach their southern limits in Far East Gippsland. The Skerries is one of four known breeding sites for Australian Fur Seals in Victoria, and Gabo Island holds the largest colony of Little Penguins in Victoria.

The region's relatively undisturbed catchments have ensured that significant coastal streams have remained in a near natural state with good populations of native fish species and an absence of introduced fish species.

The coasts and oceans of East Gippsland support important fishing and tourism industries. Many smaller towns along the coast are economically dependent on the ocean and coast to support fishing and tourism industries.

1.8 Infrastructure

The major infrastructure in the region includes the settlements and towns with their associated urban infrastructure, roads, water supply facilities, telecommunications systems, power supply systems, and ports and boating facilities.

Towns

There are 20 significant towns in the region. The largest town is Bairnsdale which serves as the region's major service centre. Most of the region's towns are located along the southern boundary of the region nearer the coast. The towns of Dargo, Swifts Creek, and Buchan are located in the region's mountain basins.

Orbost, Swifts Creek, Buchan, Nowa Nowa and Cann River are service centres for local timber and agricultural industries, whereas the towns of Marlo, Lake Tyers, Mallacoota, and Eagle Point are important holiday destinations. Lakes Entrance services the region's fishing fleet and is also a major holiday and recreation destination. About three quarters of the population live within the towns, and the remainder live in small settlements or on isolated rural properties.

The main threats to town infrastructure are from fire and floods. Fire is an ongoing threat to both town infrastructure and to the smaller farm based settlements. Flooding of infrastructure built on floodplains is also an issue, but there are planning controls which restrict development in flood prone areas to minimise this risk.

Roads

Most of the approximately 12,000 km of roads and tracks in East Gippsland are unsealed. The major threat to the road network is from the erosive impact of high intensity rainfall and consequent runoff.
Roads and tracks are both a source of sediment and nutrients to waterways and a site for the establishment of pest plants. Public lands throughout the East Gippsland region support an extensive network of unsealed roads that have been developed for forestry activities and recreational purposes. Only a fraction of these roads are regularly maintained for forestry activities. The remainder of the unsealed road network consists of older roads, installed prior to current construction standards. These roads are frequently used for recreational activity and infrequently maintained; their impact on water quality can be significant, depending on a range of factors including road stability, connectivity with receiving waters, slope, and exposure to rainfall and traffic volumes[20].

Levees and drains

East Gippsland has significant investment in flood mitigation and drainage infrastructure. These assets include floodgates, drains, levees, and gulches[21] . Many of the sub-basins have associated mitigation flood infrastructure to protect property from flood events. Flood mitigation infrastructure includes levees on the Tambo River floodplain, and levees, floodgates and pumps on the Snowy River floodplain. Flood-warning systems are in place for the

[20] WBM Oceanics (2001) Water Quality Audit, Stage 1. Prepared for East Gippsland Water Quality Management Plan.
[21] Local term for a designated flood outflow area between the river channel and floodplain, often armoured to reduce scouring or erosion.

Mitchell, Buchan, Snowy, and Cann Rivers. In many circumstances, the existing ageing flood, drainage or water control infrastructure is either impairing the health of rivers or is in need of repair or replacement. In many cases, the cost of repair or replacement is much higher than the benefit provided.

Water supply and wastewater treatment

Urban water supply and wastewater infrastructure in the region includes a network of storages, pipelines and wastewater treatment facilities. Each of the river basins has associated infrastructure for the storage and delivery of water resources to homes and industry.

The East Gippsland Water Authority manages all public urban water supply and wastewater treatment infrastructure in East Gippsland. Infrastructure for water supply includes 796 km of water mains, three water treatment plants, twenty water disinfection plants, in eight separate water supply systems.

Wastewater infrastructure includes 521 km of sewer mains, nine wastewater treatment plants and eight separate wastewater systems.

1.9 Cultural Heritage

The region's contemporary culture is influenced by its cultural heritage. The region's heritage includes artefacts, constructions, and myths, and ranges in diversity from the heritage of the Kurnai-Gunai and Bidawal people complete with artefacts and legend, to the more recent past including engineering works, buildings, thoroughfares, and traditions of European settlement.

To the Kurnai-Gunai and Bidawal people of East Gippsland, the diverse land and seascapes have special spiritual meaning.

The Aboriginal Cultural Resource Management Grid Map for East Gippsland (1997) shows the importance of areas in relation to the likelihood of encountering Aboriginal heritage sites. The known Aboriginal archaeological and heritage sites and places are recorded on a register established and managed by Aboriginal Affairs Victoria.
The land types most likely to contain Aboriginal sites or relics are:

- Landforms relating to freshwater environments, including the surroundings of lakes, swamps, wetlands, dry lake basins and salt pans;
- Coastal or inland dune formations, including lunettes associated with former lake systems; and,
- Land near areas shown on the Cultural Resource Management Grid Map to contain registered Aboriginal archaeological sites.

The Victorian *Archaeological and Aboriginal Relics Preservation Act 1972* and the Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* provide for the conservation and protection of places, sites and objects of Indigenous cultural heritage, whether they have been recorded or not. Special places for Aboriginal people include:

- Burial sites;
- Ceremonial sites;
- Historic meeting places;
- Shield and canoe bark trees;
- Middens;
- Estuarine and coastal food harvesting sites;
- Sharpening stones;
- Sites of massacres; and,
- Rivers as transport routes.

Planning policy requires that local government considers any application for use or development or rezoning of land should have regard to any relevant studies of Aboriginal heritage in East Gippsland.

Unlike the subtle sites of Aboriginal culture, the short period of European history provides many examples of gross change in land use, buildings and other constructions. The registers that cover East Gippsland include hundreds of sites ranging from majestic expressions like the Gabo Island Lighthouse to demonstrations of the destructive power of

modern technology at the Cassilis Historic Area. Although easier to determine, in general, than Aboriginal cultural sites, European culture also has its more subtle, unrecorded sites that are slowly slipping out of reach.

Evaluation of the effects of the 2003 Bogong Complex fires on known historic assets on public land was conducted. The fire destroyed or damaged a number of heritage places including bush huts, former mining or timber mill locations, bridges, lone graves and other sites of significance. The fire also destroyed some heritage assets on private land. However, it also provided the opportunity for exploration.

2 SCOPE AND CONTEXT

2.1 Policy Context

Under Section 3 of the *Catchment and Land Protection (CALP) Act 1994*, each of Victoria's ten Catchment Management Authorities is required to prepare a Regional Catchment Strategy (RCS) for its region, and coordinate and monitor its implementation. Under Section 24(2)(g) of the CALP Act, each must also review its RCS within five years of its publication. Regional Catchment Strategies are required to incorporate and reflect a variety of legislative and strategic initiatives developed at the international, national, state, regional and local scales.

Australia has international environmental obligations through a number of international treaties to which we are signatories. These include the *Convention on Wetlands* (Ramsar, Iran 1971), the *China-Australia Migratory Bird Agreement (CAMBA),* the *Japan-Australia Migratory Bird Agreement (JAMBA), Bonn Convention* (1979) for the conservation of migratory species of wild animals, and *MARPOL (1973–78)* for the prevention of marine pollution from ships. Fulfilment of these obligations is complicated by the Australian Constitution, which does not grant specific environmental protection powers to state governments, though the power is implied as state responsibility everywhere except on Commonwealth lands. As a consequence, treaty enforcement is split between various departments at the state and federal level. International treaty obligations have in some cases been met through the creation of legislation such as the *Environment Protection and Biodiversity Conservation Act 1999 (*Cwlth*).*

State legislation such as the *Water Act 1989,* the *Catchment and Land Protection Act 1994,* the *Coastal Management Act,* the *Victorian Conservation Trust Act 1972,* and *Parks Victoria Act 1998* enable the formation of statutory authorities to plan, manage and protect water, land and coastal resources, and to deliver services.

The *Planning and Environment Act 1987* (Vic) establishes a framework for planning the use, development and protection of land. This framework is put into action through the *Victorian Planning Provisions* and *Local Policy Planning Frameworks* (Planning Schemes) administered by local government. The *Environment Effects Act 1978* (Vic) requires the environmental effects of certain works to be assessed. The Victorian Environmental Assessment Council, established under the *Victorian Environment Assessment Council Act 2001,* conducts investigations and makes recommendations relating to the protection and ecologically sustainable management of the environment and natural resources of public land.

The *Environment Protection Act 1970* (Vic), supporting *State Environment Protection Policies (Waters of Victoria)* and its regional schedules and the *State Environment Protection Policy (Groundwaters of Victoria)* regulate polluting activities to maintain the beneficial uses of surface and groundwater resources. The *Marine Act 1988* (Vic) specifically prohibits the disposal of dangerous or polluting substances, including ballast water that may contain marine pests, into state controlled coastal waters. The recently released Victorian Government White Paper *Securing Our Water Future Together* has flagged legislative changes to improve river health and more efficiently use our limited surface and groundwater supplies. *Bulk Entitlements* for regulated river systems, *Streamflow Management Plans* for unregulated river systems, and *Groundwater Management Plans* for Groundwater Supply Protection Areas are the mechanisms by which existing water rights and environmental water requirements are brought together and resolved into agreed water allocations or provisions. The *Heritage Rivers Act 1992* (Vic) provides for the protection of parts of rivers and river catchments in Victoria that have environmental, amenity, cultural or historical significance.

The *Flora and Fauna Guarantee Act 1988* (Vic) is the main legal framework for protecting Victoria's biodiversity, native plant and animals, and ecological communities. The *Wildlife Act 1975* (Vic) provides for the protection and conservation of wildlife, aiming to prevent taxa of wildlife becoming extinct. The Act also provides for the establishment and management of state wildlife and nature reserves, with national and other types of parks designated and managed by the *National Parks Act 1975* (Vic). The *Crown Land (Reserves) Act 1978* (Vic) provides for the reservation of Crown land for a variety of public purposes, and the management, leasing and licensing of reserves. The *Land Act 1958* (Vic) makes provision for the leasing, occupation and sale of unreserved Crown land.

The *Fisheries Act 1995* (Vic) provides for the management, protection and ecologically sustainable development of the state's fisheries, aquaculture industries and associated aquatic resources, and relates to the Commonwealth *Fisheries Management Act 1991.* The *Forests Act 1958* (Vic) specifies Forest Management Areas for Victoria's forests, and schedules to the Act provide sustainable yield rates for forest production. Targets for production and

reserve systems within the Forest Management Areas are set out in *Regional Forest Agreements* and their associated *Forest Management Plans.*

Mineral, extractive and petroleum exploration and development activities are subject to the *Mineral Resources Development Act 1990* (Vic), the *Extractive Industry Development Act 1995* (Vic), the *Petroleum Act 1998* (Vic), the *Petroleum (Submerged Lands) Act 1957 (*Cwlth*),* the *Petroleum (Submerged Lands) Act 1982* (Vic) and the *Pipelines Act 1967* (Vic). Onshore, and offshore operations within three nautical miles of the coast, are under state jurisdiction and the *Petroleum Act 1998* (Vic) applies. Beyond three nautical miles, the state administers the Commonwealth legislation on its behalf.

The *Native Title Act 1993 (*Cwlth*)* recognises and provides for the protection of native title, determining where native title exists and how it is affected by other Acts. The *Archaeological and Aboriginal Relics Preservation Act 1972* (Vic) works in tandem with the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (*Cwlth*)* to protect Aboriginal cultural property including places, objects and folklore and grant decision making powers to local Aboriginal communities. The *Heritage Act 1995* (Vic) provides for the protection, conservation and registration of places and objects of cultural heritage significance.

There are many sets of guidelines, strategies, frameworks and plans that have been developed in response to various pieces of legislation at national, state, regional and local levels. The Regional Catchment Strategy is one of them, and there is now a growing realisation of the importance of aligning the ideas contained in these documents.

2.2 Scope

This is the second Regional Catchment Strategy for East Gippsland, written in consultation with, and on behalf of, the people of East Gippsland. The first was produced in 1997. This renewed RCS will operate for five years from 2005 to 2010. The RCS covers matters affecting all land and water in the region regardless of ownership or management. Although tenure and management responsibilities are relevant to the use of natural resources, they are not grounds for modifying standards of management.

The RCS is a tool to coordinate and focus the region's management efforts for natural resources towards priority projects. The RCS is backed up by a number of detailed management plans and other planning documents, developed by government agencies and authorities as part of their normal operations, and other documents arising from the consultation involved in developing this RCS. These documents focus on implementation of the broad strategies outlined in the RCS.

The RCS identifies priorities for action in the region at a strategic level. It does not attempt to define the detail of the plans and projects required to achieve those ends but describes broad condition targets for assets, with the aim of improving, or at least slowing the deterioration of, the condition of these assets. The detail is provided in the annual Regional Catchment Investment Plan and in the sub-strategies and specific action plans that the RCS supports.

Integration is the key to successful outcomes for the management of natural resources. The RCS process marks the start of a new phase of integration and coordination by the East Gippsland Catchment Management Authority (EGCMA). For the catchment region of East Gippsland, the EGCMA, in conjunction with community groups and government agencies including Department of Sustainability and Environment (DSE), Department of Primary Industries (DPI), Parks Victoria and Shire Councils, will use all available coordination tools, including the investment process, to deliver actions identified by or consistent with the RCS. To reduce the risk of environmental decline of the Gippsland Lakes, the EGCMA will coordinate actions for the Lakes catchment formulated under the East Gippsland RCS, in conjunction with the West Gippsland RCS and the Future Directions and Actions Plan for the Gippsland Lakes.

Similarly, the East Gippsland RCS must work in parallel with the North East RCS. Communities in some parts of the North East Region (such as Omeo and Benambra) are in the North East catchment. However, socially and economically the communities have more affinity with East Gippsland. Effective cooperation between the North East CMA and East Gippsland natural resource management agencies is essential to ensure that the objectives of each region's RCS can be met without causing confusion within these communities.
Similar processes are required across our border with New South Wales in dealing with natural resource management programs in the headwaters of shared rivers like the Snowy and Genoa.

Figure 2-1. How the RCS Relates to other Strategies, Agreements, Frameworks and Plans.

2.3 Role of the RCS In Regional Funding

Programs of action must flow from the framework of the RCS. The Regional Catchment Investment Plan (RCIP) is the annual mechanism for interpreting the RCS and its associated sub-strategies. It prioritises natural resource management programs, and aims to ensure a cooperative and efficient approach to project planning and implementation.
The East Gippsland RCS establishes the framework for future funding of natural resource management programs and will assist the East Gippsland community to attract direct investment from a range of possible sources including, but not limited to:

- The Victorian Government;
- The Australian Government;
- Philanthropic trusts;
- Industry bodies; and,
- Local Government.

Importantly, forming cooperative partnerships will also provide in-kind support in the form of volunteer labour, technical expertise and knowledge sharing, when implementing actions recommended in the RCS. There is potential to leverage private investment and in-kind support through cost-sharing initiatives designed to maximise benefits for all partners. Joint investment or sharing of expertise may also occur with other regions, or states in projects of common interest to maximise the benefits of investment.

2.4 Role of Statutory Planning

Planning Schemes, established under state law and administered by local government, aim for the orderly use or maintenance of natural resources. They comprise a State Planning Policy Framework, incorporated in the Victorian Planning Provisions as statewide standards, and a Local Planning Policy Framework. The planning system for land use in the three Shires and the Mt Hotham Alpine Resort is an important component in future implementation of the East Gippsland RCS.

Each Shire and the Alpine Resorts have a Local Planning Policy Framework. The first section of this framework, the Municipal Strategic Statement (MSS) for Shires and the Alpine Resorts Strategic Statement for Mt Hotham, identifies issues that will influence future planning for the area by establishing objectives and setting out strategies to achieve them. Each Shire must review its Strategic Statement every three years.

The Strategic Statements also guide the application of zones and overlays with conditions of use. The effective allocation of zones and application of overlays provides a clear indication of the nature and quantity of development that is desirable in each locality and identifies issues of relevance to the evaluation of any proposed changes. Zones define, in general, the range of activities and the intensity of development permitted in different areas of the region. Overlays identify special values or constraints relevant to the use and development of land. Overlays may identify areas subject to flooding or inundation, at risk from erosion, salinisation or fire, areas containing significant vegetation or heritage assets and areas where particular design and development controls apply.

Referral Authorities, including the DSE, the CMA and the EPA, provide expert advice to local government as a mandatory part of the permit system for land use. They advise local government on planning applications for particular uses, or development in defined areas, such as floodplains, or where activities or development might affect protected sites such as native vegetation.

3 THE REGIONAL CATCHMENT STRATEGY PROCESS

The RCS sets priorities for the region and identifies the East Gippsland communities responsible for achieving them. Communities and stakeholders across East Gippsland developed and endorsed these priorities and programs.

3.1 An Overview of The RCS Renewal Process

Renewing the East Gippsland RCS involved the following stages:

- Reviewing the original East Gippsland RCS to identify successes and lessons;
- Assessing the current state of the assets across the region to help identify their values, and the threats to their condition, through a State of the Regional Environment Report;
- Engaging and consulting with a wide range of communities, stakeholders to confirm priority concerns and options for the future management of natural resources;
- Building a renewed RCS through a process that engages communities across East Gippsland; and,
- Consulting with the public and stakeholders on a draft of the renewed East Gippsland RCS prior to submission to government for accreditation.

3.2 A Review of The 1997 RCS

The 1997 RCS was a good first step. The review assessed the 1997 RCS against both the legislative requirements and guidelines provided at that time and a technical workshop met to determine the extent of its implementation. About 85% of actions were undertaken, at least in part. Many actions such as weed, erosion and fire control are, of necessity, ongoing. Other proposed actions require more than five-years to complete.

Table 3-1: Implementation status of Actions in the 1997 Regional Catchment Strategy

Focus of actions	Number of actions	Actions completed or in progress	Actions under performed
Community education, awareness and support	6	6	0
Water erosion and waterways	22	19	5
Pest plants	14	14	7
Pest animals	12	10	1
Fire	8	8	2
Biodiversity conservation	3	3	1
Problem wildlife	1	1	1
Water quality	12	11	6
Soil characteristics	2	1	0
River flow management	6	5	1
Native vegetation removal	3	2	1
Strategy implementation	9	5	0
Macro-scale monitoring	4	2	1
Total	**102**	**87**	**26**

The review found that the following circumstances affected implementation of the 1997 RCS:

- The RCS was a new concept for government agency staff and private land managers;
- The advent of the East Gippsland Catchment Management Authority (EGCMA) as a new, untested entity in natural resource management;
- A three-year drought, severe floods in 1998 and Ovine Johnes Disease in some areas placed great strain on rural communities;
- Response programs to the flood of 1998 of the CMA and other government agencies supplanted programs foreshadowed in the 1997 RCS; and,
- Regional capacity to deliver programs was low or expectations too ambitious relative to that required for timely delivery.

Lessons for this RCS are that:

- Severe natural events and rapid change are potential risks to implementation of the RCS;
- Adequate contingencies and resources are needed to deal with risks; and,
- The technical panel found that a quarter of the partly completed actions could have progressed better in the five-year period.

Table 3-2. Reasons for actions not undertaken or not completed

Reason given	Number of times mentioned*
Inadequate resources.	16
Action found to be inappropriate, needs modification or is unclear.	10
Direction is needed at the state level or state priorities give different directions.	7
Insufficient information or foundation work done.	5
Action (reporting) has not been requested.	4
Lack of enforcement.	3
Action has been overtaken by other priorities, particularly drought and floods.	3
Lack of monitoring.	1

Note: Several reasons were sometimes mentioned in connection with one action.

3.3 Community Consultation

This Regional Catchment Strategy seeks to represent the priorities of the people of East Gippsland. It is the product of a comprehensive process of community engagement that involved all sections and areas of the region.

The initial Community Consultation process for renewal of the RCS, was designed to build on from surveys and workshops undertaken as part of the 1997 Regional Catchment Strategy, and included the following:

- Round 1 consultation, consisting of a series of community workshops regarding key natural assets, their values, threats to these assets and what might be done to enhance the assets;
- A random postal survey was sent to 200 ratepayers and 46 responded. The survey posed similar questions to those addressed in the workshops
  Among the responses:
  - *'East Gippsland is one of Australia's secrets.'*
  - *'Management of Parks Victoria to be taken out of the local greens and so-called academics and instead given to those with the relevant hands-on experience.'*
  - *'The Silt Jetties are a world class icon.'*
  - *'I value the mountains for deer hunting, the ocean around Gabo Island for spear fishing and the Lakes for boating'.*
  - *'No more wood chips for export, only logging for local use'.*
  - *'There is an intangible but extremely valuable asset in having wild untouched places- spiritually, emotionally and mentally, and therefore physically.'*
- Technical workshops were held on 13 and 31 March 2003 at which key stakeholders provided advice ion existing regional strategies and plans and on priority matters for actions and strategies in the RCS;
- Specific consultation with Indigenous communities;

- Round 2 consultation workshops, held at Mallacoota, Swifts Creek, Cann River, Bonang, Bairnsdale and Orbost, in which 58 participants provided further advice regarding priority matters for action; and,
- Targeted consultation with key individuals.

Community Consultation process following the release of the October 2003 Working Draft, included the following:

- A four week period of public exhibition;
- Four information workshops;
- Seeking of written submissions;
- Incorporation of feedback into next draft, by Steering Committee, management Team and technical advisors;
- Submission of draft to Accreditation Coordinating Group, for assessment by Australian and Victorian Governments' Expert Panels during November 2003; and,
- Incorporation of feedback into next draft following a meeting of East Gippsland CMA staff and the Accreditation Coordinating Group in December 2003.

Community Consultation process during and consequent to the completion of the Exhibition Draft dated 26 April 2004 included the following.

- Targeted consultation with key stakeholders;
- Emphasis on discussion and agreement on Resource Condition Targets and Management Action Targets; and,
- Submission of draft to Accreditation Coordinating Group for assessment and feedback.

Since that time, and agreement on the way forward, targeted consultations have occurred on an ongoing basis. However, it was decided that another formal round of general community consultations would be counter-productive in a region where the small population had already had ample opportunity to be engaged in the development and refinement of the RCS.

4 FRAMEWORK FOR THE STRATEGY

4.1 An Explanation of the Concepts and Terms Used Within the Framework

The strategy uses a number of concepts and terms within its framework. This section provides an explanation of some of those concepts and terms.

4.1.1 The Natural Resource Base

The natural resource base is the physical environment of East Gippsland. It includes the mountains, valleys, plains, catchments, rivers, streams, wetlands, coastal areas and oceans. It also includes the natural land and water based ecosystems and their associated plants and animals.

4.1.2 Assets derived from the use of the Natural Resource Base

The definition of the social and natural assets of East Gippsland came from the process of community consultation involved in developing this RCS and from a continuing process of engagement with the Community of East Gippsland since the development of the previous RCS in 1997.

Table 4-1: East Gippsland's Social and Natural Assets

Community Capacity	The social capital, at an individual, group and community level that is essential for successful implementation of effective natural resource management.
Cultural Heritage	Physical features of the landscape of special significance to Indigenous and other communities
Land Resources	The more permanent features of the landscape including soils, landform, hydrology and climate.
Water Resources	The quantity and quality of water available from surface and groundwater sources for a range of productive uses.
Rivers and Streams	Upland streams through to major rivers, with their associated riverine biodiversity.
Lakes, Estuaries and Wetlands	Waters, geomorphology and aquatic biodiversity.
Coasts and Ocean	Beaches and dune systems, rocky coastline and marine biodiversity.
Biodiversity	Native land plants, animals, and their community associations.
Built Infrastructure	Built parts of our region that either effect or benefit our natural resources

An 'assets-based approach' to planning, focuses assessment and investment on the natural resource assets to be cared for or improved, rather than on the issues, symptoms or causes of catchment deterioration. It creates a measurable assets framework to provide both the community and government with confidence that their investments achieve tangible benefits.

Natural resource base assets can be divided broadly into productive and environmental assets. For example, land cleared and used for agriculture is defined as production asset; a relatively unmodified forest ecosystem in a Park is considered as a conservation asset.

Table 4-2: Other examples of asset types

Production Asset	**Conservation and Biodiversity Assets**	**Dual Purpose Asset**
Land used for dryland and irrigated agriculture *Forests used for timber production* *Land used for mining* *Land used for urban living* *Water used for irrigation or other industries*	*Land and water reserved for the conservation of natural ecosystems* *Coastal areas preserved in their natural state* *Forests conserved to maintain environmental values* *Riparian vegetation managed to preserve its natural features* *Physical remnants of the past cultures*	*Coasts used for tourism and for the preservation of the natural environment* *Forest used for conservation of the natural environment and recreation* *Lakes used for recreation, commercial fishing and the preservation of the natural environment* *Rivers used to harvest water for domestic use and to support aquatic ecosystems* *Natural landscape features which add to the social and cultural well-being of an area*

4.1.3 Assessing the values of assets

The use of an asset provides the region or the state with a benefit or value. The values or benefits may be economic, social, or environmental.

Some natural resource based assets are relatively easy to value. There are well-established markets which provide mechanisms to provide monetary values for commercial assets - land and water resources are good examples. Because of the limitations in the availability of data, the strategy has not attempted to make a comprehensive assessment of the economic values of assets. It has, however, provided data to indicate economic value where data is readily available.

Valuations are less straightforward for natural ecosystems and other environmental assets where there are no established markets. Environmental valuations are more subjective and tend to be associated with the rarity of a species or an ecosystem. For example, the Mitchell River is Victoria's largest unregulated stream, which has a high value because of its comparative lack of disturbance and good ecological condition.

Table 4-3: Indicative list of Assets

Economic Values • capacity to generate wealth for the region or the state • ability to produce physical products for harvest and sale. • capacity to create employment.
Social/cultural/spiritual values
Lifestyle
Cultural and spiritual values, sites and landscapes
Beauty
Recreation
Environmental
Biodiversity and rarity

4.1.4 Asset condition

The physical condition of an asset will have an impact on its ability to provide value to the region or the state. For example, the loss of condition of an agricultural land asset might include its loss of capacity to grow crops due to soil erosion, salinity, or acidification. Loss of condition in a natural ecosystem could include a build up weeds which compete with native species and disrupt the ecosystem's ability to function over the long term.

4.1.5 Threats to the physical condition of an asset

The strategy defines a threat to the condition of an asset as: any activity which will change the physical condition of an asset in such a way as to lead a loss of capacity of the asset to maintain its economic, social or environmental values.

Loss of condition can be driven by a range of causes. For example, using agricultural land beyond its capability may lead to a loss of soil structure or loss of soil through erosion; the export of sediment or nutrients to waterways may cause algal blooms in water based assets such as lakes and streams. In both these cases the potential cause of the loss of condition is defined as a threat. Other examples of threats and associated condition loss are listed in Table 4-4.

Table 4-4: Examples of condition loss and selected associated causes

Threat (potential cause of condition loss)	**Condition loss**
Land management practices which lead to prolonged loss of vegetative cover	*Soil erosion*
Removal of native vegetation and or inefficient irrigation practices which increase recharge to the groundwater system and increase watertable levels	*Salt accumulation in soils*
Invasion of weeds into an ecosystem	*Loss of native species through competition with weed species*
Land or water management practices which export nutrients, sediments or toxins to water bodies	*Loss of quality of water in key water-bodies*

4.1.6 Assessing the ability to manage a threat to an asset

The existence of a threat to the condition of an asset is not always a reason to take steps to reduce the threat. The decision to reduce a threat will be made in an environment where the resources available for investment are scarce. The benefits and costs of reducing threats should be assessed to ensure that limited public and private resources are invested in areas where the investment will bring the greatest return to the region and to the state.

4.1.7 Monitoring the condition of assets

Monitoring the condition of assets will be an important task for the future. Monitoring the condition of an asset will alert the region for the need for intervention to reverse trends in condition loss, and monitoring condition will also provide the region with a tool to assess the success of any remedial actions put in place to maintain or improve the condition of the asset.

Although a great deal of work has been carried out on monitoring water quality in the region. More work will be required to gain a full understanding of the trends in the condition of all assets including water based assets. In some cases a full inventory of all the flora and fauna in the region has not been completed, let alone monitored for condition. In other cases the loss of condition of agricultural land in terms of acidity, salinity and soil erosion have not been objectively assessed.

4.1.8 Evaluation of the success of intervention

The state and the private sector will make considerable investments in natural resource management in East Gippsland. It is important that the success or otherwise of these investments is assessed to guide future investment. Cost effective evaluation programs need to be developed to assess the success of the investment in terms of its efficiency in delivering expected outcomes.

4.1.9 Cost sharing

In establishing a course of action to maintain or improve the condition of the region's assets, it is essential that agreed cost sharing arrangements be developed between all stakeholders - there is no point in encouraging landholders or agencies to invest beyond their means, or where they believe that they are carrying an unfair burden of the cost. There are few plans in the region that have a completed benefit-cost analysis, and few that have developed agreed cost sharing arrangements.

As a general rule, land managers or resource users who generate condition losses through inappropriate management practices should bear the costs where (a) they can be identified; (b) they have the ability to pay; and (c) it is sensible and just for them to do so. It is often very difficult to identify individual land or water users as the direct contributors to a natural resource problem. Where this is the case, the beneficiaries of the proposed course of action should bear much of the cost in line with their level of benefit.

4.1.10 Offsite impacts from the use of assets

The use of some assets can lead to the loss of condition of another asset. The strategy defines this relationship as an offsite impact. Examples of offsite impacts include loss of water quality through export of sediment and nutrients; increased salinity levels through recharge to the groundwater system; and increased weed infestations caused by imported seed from neighbouring land.

4.1.11 Whole of government and whole of region approach

The strategy recognises that all stakeholders in both the public and private sector need to work together all levels. The state needs to clearly identify is policy objectives – as it did in the recent white paper on water – and the region needs to ensure that all regional stakeholders work in the interests of the region as a whole. The interests of the region should be put before an individual or an interest group.

4.1.12 Community consultation and engagement

The term 'community' often invokes the impression that there is only one community, when in fact, within any region or state there are many communities. The strategy defines a community as any group of people who have something in common. A community could be bounded by a natural barrier such as a mountain range or an electoral boundary or a by common interest such as a profession or industry.

The community is represented at various levels. The national community is represented by the federal government, the state community is represented by the Victorian State Government, and the East Gippsland Region is, in the case of this strategy, represented by the East Gippsland Catchment Management Authority. Within the region there are numerous groups who, when aggregated, form the regional community. These groups include local government, industry groups, community groups such as Landcare, environmental groups, state government agencies and many others.

4.1.13 Asset Classes and Management units

The relationship between the use and the management of the region's natural resources, and the long-term economic, social and environmental well-being of the region and the state is complex: since colonisation, the region's natural resource base has been developed into a diverse set of economic, social and environmental assets. The use and management of the region's assets now forms the basis of the region's economic, social, and environmental systems.

The use of assets will have varying negative and positive impacts on the region depending on a range of factors including the asset's position in the landscape, what the asset is used for and how efficiently it is used. Assets are also managed by public agencies and the private sector, and the successful implementation of the strategy will depend on the participation and cooperation of both sectors.

The strategy has developed the concept of Asset Classes and Management Units. Economic, social and environmental assets have been aggregated into six asset classes (Figure 4-5); each of the six asset classes have been broken down into smaller Management Units. Asset classes include Freehold Land Class, Parks Class, State Forest Class, Catchments Class, Groundwater Class and Coastal and Marine Class. Each class includes a range of economic, social and environmental assets derived from use of the natural resource base.

The management units are based broadly on land tenure, land use, topography, catchment and where possible communal boundaries. The use of management units allows the strategy to differentiate between assets on the basis of their varying contributions to the economic, social and environmental well-being of the region. Table 4-5 provides a list of asset classes and associated management units.

Table 4-5: Asset Classes and Management Units

Asset class	Assets within the class	Management Units
Freehold Land Asset Class	Predominantly private land used for agricultural production, with some embedded remnants of the natural environment. Includes farm based infrastructure and some cultural heritage sites. The unit also includes some small public reserves	Red Gum Plains, Bairnsdale Foothills, Dargo Mountain Basin, Snowy Mountain Basin, Far East, Coastal Hills, Buchan Valley, Tambo Mountain Basin, Snowy Flats, Lindenow and Bruthen Flats.
State Forests Asset Class	Areas of State Forest used for timber harvesting, apiaries, recreation, grazing, water production. Areas have also been set aside to maintain biodiversity.	State Forest in the Tambo, East Gippsland Forest Management Area, part of the Central Gippsland Forest Management Area
Parks Asset Class	Areas of Park used for tourism or set aside preserve of the natural environment, biodiversity or cultural heritage	Mitchell River National Park, Alpine National Park, Snowy River National Park, Errinundra National Park, Coopracambra National Park, Cape Conran National Park, Alfred National Park, Croajingalong National Park, Catchment and Hinterland, Gippsland Lakes Coastal Park
Coastal and Marine Asset Class	The class contains the region's coastal strip, including ocean 3 nautical miles from the coast. Assets include coastal vegetation complexes, reefs, and areas used for commercial fishing, recreation, tourism, urban development, and areas set aside for the preservation of the natural coastal and marine environment.	Coastal Strip, ocean to 3 nautical miles from the coast.
Catchments Class	Rivers, riparian vegetation, streams, lakes, wetlands, estuaries, and surface water resources used for town water supplies, irrigation and other industrial purposes.	Mitchell River Catchment, Tambo River Catchment, Snowy River Catchment, Far East Rivers Catchments, Gippsland Lakes
Groundwater Asset Class	Groundwater water inputs to wetlands and rivers and for irrigation and town water supplies	Wy Yung Groundwater System, Sale Groundwater System, Stratford Groundwater System, Orbost Groundwater System.

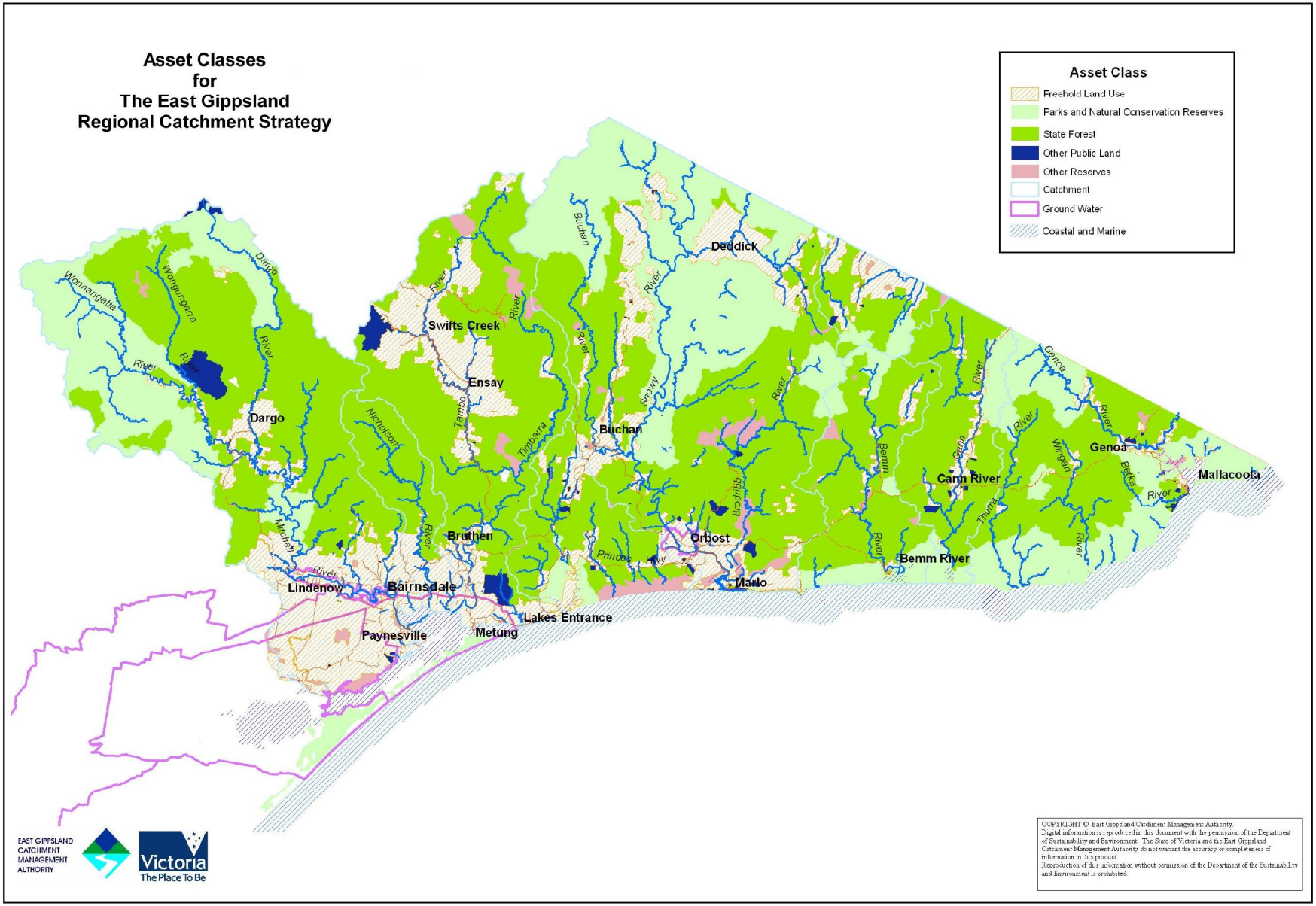


Figure 4-1. East Gippsland Map of Asset Classes

4.2 Structure of the Strategy

4.2.1 Vision for the East Gippsland Region

The East Gippsland Regional Catchment Strategy has the following vision for East Gippsland:

A rich, biologically diverse region, managed on sound scientific principles in a way that responds to the values and needs of its human communities; a place where residents and visitors alike respect and conserve its natural wealth, as the foundation of their well-being; a place whose people, acting for all Australians, accept collective responsibility for the region's future.

4.2.2 Strategic Objectives

The ultimate objectives of this strategy are to provide collaboration, coordination and direction for the investment of private and public resources to ensure that the use of the region's natural resources:

(a) continue to generate economic wealth for the region and the state;

(b) conserve and where necessary restore, the natural environment; and,

(c) maintain the region's cultural heritage and social well-being.

The strategy will be technically feasible, economically viable, environmentally sound and socially acceptable.

4.2.3 General approach and framework for the strategy

The strategy has developed an analytical framework which is based on systematic process to establish strategic directions for investment. The strategy draws on the best information available including the local community and expert opinion.

The analytical process associated with the development of the strategy was as follows:

- Development of broad list of the natural resourced based assets in the region;
- Aggregation the region's assets into management classes and then into area based manageable units;
- Broad assessment of the economic, social and environmental values and overall condition of assets;
- Broad assessment of the threats to the future condition of assets;
- Development of priorities to address asset condition loss;
- Development of a set of strategies, action plans and management actions for the maintenance or improvement in the condition of assets; and,
- Establishment of aspirational goals, condition targets and management action targets for assets within each class.

4.2.4 Limitations

Establishment of justifiable condition and management action targets for specific assets has been particularly challenging. To set specific and meaningful targets and actions requires considerable detailed knowledge of the cause and effect of asset condition loss and a sound knowledge of the public and private benefits of a range of interventions. These relationships are only broadly understood, and more information and analysis is required to make the final decisions on investment priorities.

Therefore, the strategy has focused on the development a strategic framework to assist the region to systematically collect information and develop clear action plans and priorities. Current on-ground works should proceed as they are, until action plans indicate the need for change. Priorities have been set for the development of particular action plans.

4.2.5 Guiding principles for the Strategy

The East Gippsland Regional Catchment Strategy is based on the following principles:

- Good investment decisions will flow from a sound understanding of the likely economic, social and environmental benefits and costs of each decision;
- Investment decisions should result in improvements in the economic, social or environmental well-being of the region and the state. However, economic gains should be balanced against the need to maintain the natural environment, and all changes must be socially just;

- The East Gippsland Region is a system. There is a complex set of relationships between the use and management of the region's natural resources, and the overall economic, social and environmental well-being region and the state. All elements of the system should be considered when natural resource management decisions are made;
- People are part of the system. This RCS is as much about people, production systems and lifestyle, as it is about conservation of 'natural' systems;
- We do not have perfect knowledge of how our regional system works. However, this should not be a reason to refrain from setting out a course of action to improve the use of the region's resources (The Precautionary Principle)[22]. Best bet and adaptive management principles should be employed where possible and investment risks should be spread across as broad a base as possible;
- It is easier and more cost effective to prevent the loss of condition of 'natural' ecosystems than it is to rehabilitate them after the damage is done;
- The region and the state should recognise the complex interrelationships between the region's assets, and work towards integrating the region's strategies and action plans within a 'whole of region' and 'whole of government' framework;
- An overarching principle guiding the development of the Regional Catchment strategy is the concept of ecologically sustainable development[23]. The basic concept is that in order to use natural resources sustainably, their use should not degrade the ecological processes that underpin this use. To do so will see them altered and perhaps lost.
- Trade-offs to balance conflicting resource uses will be inevitable. Society and individuals have multiple and sometimes conflicting objectives for our natural assets. A civil society needs mechanisms to ensure that these trade-offs are sound and fair, and that the trade-offs do not cause the irretrievable loss of a natural asset or irretrievable loss of asset values;
- Within the context of state and national legislation and policy frameworks, where possible natural resource based industries should have secure rights to use the natural resource base, provided their activities do not cause unacceptable impacts or irretrievable loss of assets. Clarification of rights, roles and responsibilities of resource users and managers will ease conflicts and create opportunities;
- Artificial and highly modified ecosystems can deliver sustainable, multiple benefits such as good water quality and some limited natural biodiversity conservation;
- Those who manage the region's natural assets need the capacity to do this well; those who benefit from good management should assist with providing the means for management. The East Gippsland community of 41,000 needs help to manage natural assets of significance on behalf of the Victorian, Australian and international communities;
- Intervention to improve natural resource management should attempt to use market mechanisms where it is sensible to do so;
- The economic social and environmental well-being of the whole community should outweigh the interests of an individual or an interest group. However, the cost and benefits of change should be equitably shared across all beneficiaries of change. Comprehensive cost sharing arrangements should be developed for all natural resource management actions;
- The RCS aims to provide strategic direction for the investment of public and private sector funds to improve the overall use and management of the region's natural resources. Funding is limited, which means that not all desired activities can be implemented at once, therefore priorities for action must be set.
- Where natural resources are used for productive purposes, they should maximise economic returns, provided that adverse on-site impacts limited to acceptable levels.

[22] www.lawlink.nsw.gov.au
[23] National Strategy for Ecologically Sustainable Development (1995) Commonwealth of Australia.

4.2.6 Priorities

The RCS consultative process identified the assets of the region and ranked their value, condition and threats. The priority targets to address threats have therefore been through a process of engagement with a full range of stakeholders across the region and take account of feedback provided during the public consultation phase of this draft.

Priorities for intervention to maintain or rehabilitate the condition of an asset will be based on the following criteria:

- Maintenance of high-value assets which are in good condition or which have been depleted below sustainable levels;
- Where the benefits of rehabilitation of a high-value asset exceed the costs;
- Where the values of high-value assets are in imminent danger of being damaged or irretrievably lost;
- Where the loss of an asset's value will lead to major regional economic, social or environmental impacts; and,
- Where stakeholders have the ability to meet the cost of intervention (i.e. agreed cost sharing arrangements can be developed)

The renewed East Gippsland Regional Catchment Strategy represents a change in focus towards the recognition that even though much of the region is still in very good condition, there are both localised and widespread threats to natural assets of East Gippsland that require active management. Without appropriate management, degradation of these values will continue or accelerate.

Priorities for the implementation of management actions are listed in Chapters 6–12. Management actions have been set for assets at the *Asset Class* Level. However to aid the usefulness of the RCS, priorities for action or intervention have been established at the more detailed *Management Unit* level.

The RCS is based on an adaptive management approach. *A key principle of the RCS in adopting this approach is that current works projects should proceed until action plans, project evaluations or research indicate a compelling need for change.*

The future priorities will be refined using comprehensive benefit-cost analyses in action plans which will include agreed cost sharing arrangements. Action plans will provide the Regional Catchment Investment Plan process with a robust and consistent approach to setting investment priorities.

It is understood that the achievement of our priorities and specific targets and timelines, as set by the region in this document, will be dependent on the availability of resources

5 INTRODUCTION TO THE ASSET CLASS CHAPTERS

5.1 Overview

The following chapters describe, for each asset class, the strategic directions required to improve the management of East Gippsland's natural resource based assets (Chapters 6 to 12). The assets are grouped into the following six asset classes: Freehold Land, Parks, State Forests, Catchments, Groundwater and Coastal and Marine. Each chapter contains:

- An overview of the assets in the class;
- A map of the Management Units within the class;
- A brief description of the economic, environmental and social assets in the class;
- A brief description of the condition, and threats to condition of the assets in the class;
- A table providing an overview of the characteristics of each management unit within the class;
- A snapshot of the assets in each management unit;
- A strategic planning context for the assets within an asset class;
- A set of broad objectives for assets within the asset class;
- A set of strategic directions designed to meet the broad objectives for assets within the class;
- A priority setting analysis;
- A set of *Aspirational Targets* and *Resource Condition Targets*; and,
- A set of *Management Actions And Targets* to address the identified high priority issues.

5.2 Priority Setting Methodology

5.2.1 Outline of Methodology

This section sets out how priorities are set for the implementation of management actions identified within asset classes. Management actions have been set for assets at the *Asset Class* Level. However, to aid the usefulness of the RCS, priorities for action or intervention have been established at the more detailed *Management Unit* Level.

The methodology used to establish priorities for action follows these steps:

Step 1:
For each asset, within each management unit, a rating is set on the need to intervene to maintain the asset's condition. The need for intervention is high; (a) where the probability of condition loss is high; and (b) if condition loss occurs it will have a regionally significant impact on the region's economic, environmental or social well-being.

Step 2:
Where the need to intervene to maintain the condition of an asset is high, then the most appropriate form of intervention is selected. The form of intervention will inevitably fit into one of the following categories:

- Planning: to assess the best course of action to maintain the condition of an asset;
- Works: to maintain the condition of an asset;
- Research: to gain more information about managing the condition of an asset;
- Monitoring: to assess the condition of the asset;
- Evaluation: to determine the success of current efforts to maintain the condition of an asset.

The above methodology while basic, and with a significant margin for error, recognises that any major change in resource management will be preceded by the development of a comprehensive action plan which will thoroughly assess the benefits and costs of intervention. Such an action plan would also include development of agreed cost sharing arrangements.

5.2.2 Interpretation of the Priority Setting Tables

Priorities for action in the RCS are based on a 'need for intervention' rating, which are set out in the Asset Class Chapters, (in Tables 6-2, 7-2, 8-2, 9-2, 10-2 and 11-2). The 'need for intervention' priority ratings are provided for assets within each Management Unit. Each table represents all the assets within a particular management class, (i.e. assets within, Freehold Class, Parks Class, State Forest Class and other classes).

The left hand column of each table lists the assets within the class by Management Unit. The cells across the top of the table identify the key condition losses which are generally associated with the assets within the management units. Condition loss associated with these assets is also discussed in more detail in each of the Asset Class Chapters.

Within each table, a 'need for intervention' rating is provided for each asset and its associated potential condition loss. A rating of high indicates that intervention to manage the threatening process that has the potential for condition loss or is currently leading to condition loss of the asset is a high priority (see Step 1 above).

Priority actions associated with a high 'need for intervention' ratings are listed in each of the Asset Class Chapters (in Tables 6-3 to 6-9, 7-2 to 7-8, 8-2 to 8-8, 9-2 to 9-8, 10-3 and 11-2 to 11-8). These priority actions are also linked to relevant *Aspirational Targets* and *Resource Condition Targets*.

Table 5-1 is an aid to interpreting the 'need for intervention' priority ratings within Tables 6-2, 7-2, 8-2, 9-2, 10-2 and 11-2. The table provides an explanation of what is represented by each condition loss heading, and what is indicated by a high 'need for intervention' rating.

Table 5-1: Aid to Interpreting Priority Setting Tables

Condition Loss	Explanatory note on 'need for intervention' priority rating
Soil erosion and soil structure decline	A high rating indicates that without intervention, the soils associated with the asset may erode or lose their structural integrity. In terms of agricultural assets this may lead to loss of agricultural production. In terms of EVCs this may include damage to ecosystem functions.
Export nutrients and/ or sediment	A high rating indicates that without intervention, the asset might export nutrients and sediment to other assets, which will consequently lead to regionally significant ecological or environmental impacts. In agricultural and forest areas this will generally refer to the export of sediment or nutrients from production systems. In towns this will generally refer to export of nutrients and sediment from developments, or from stormwater runoff. In rivers and wetlands this will refer mainly to the loss of soils from beds and banks, and from lake and wetland foreshores
Sediment and nutrient build up	A rating of high indicates that without intervention, the asset may accumulate nutrients or sediment. The build up of sediment and nutrients is a key factor in reducing water quality, (including increased turbidity and nutrient concentrations associated with algal blooms). Sediment and nutrient build up are significant in water bodies. However, sediment build up can cause losses in stream health and impact on infrastructure.
Loss of fertility	A high rating indicates that without intervention, there is potential for the asset to lose its fertility to such an extent that productive capacity or ecosystem functions are lost. Loss of fertility is particularly significant for agricultural assets.
Increased pollutants including salts.	A high rating indicates that without intervention, the asset may accumulate pollutants which will lead to adverse loss of production or ecosystem function. Increased levels of pollutants are mainly an indicator of condition loss in water bodies including groundwater systems.
Rising watertables	A rating of high indicates that the asset may lose its productive capacity or will sustain damage to its ecological processes through salt accumulation driven by high watertables. High watertables lead to losses in agricultural production and damage to EVCs vulnerable to this threatening process.
Increased numbers of pest plants and animals	A high rating indicates that without intervention, the asset may lose its productive capacity or will sustain damage to its ecological processes through the impacts of increased numbers of pest plants and animals. Pest plants generally reduce the condition of land and water based EVCs and farmland. A high rating also indicates that the assets condition may lead to the export of pest plants and animals to other assets. Weeds identified as Weeds of National Significance, listed on the National Environmental Alert list or identified by state legislation as requiring control will be given a high rating.
Soil acidity	A high rating indicates that without intervention, soils associated with the asset could increase in acidity leading to losses in productive capacity or ecosystem function. Soil acidity is generally associated with areas of agricultural production.

Table 5-1: (continued)

Condition Loss	Explanatory note on 'need for intervention' priority rating
Loss of biodiversity and ecosystem function from grazing, inappropriate fire regimes or clearing	A high rating indicates that without intervention, the asset may lose its biodiversity values through inappropriate management practices. This form of condition loss is generally indicated by the health of relevant EVCs. In streams, loss of biodiversity is associated with degradation of aquatic ecosystems and riparian vegetation, and on land, loss of biodiversity is the result of terrestrial processes threatening relevant EVCs.
Acid sulphate soils	A high rating indicates that without intervention, the asset may lose its value because underlying acid sulphate soils have been exposed. Acid sulphate soil problems are generally associated with lake foreshore developments, and may affect townships, agricultural areas and neighbouring environmental assets. Detailed mapping of acid sulphate soils in the region is required.
Damage to sites of cultural heritage	A high rating indicates that without intervention, the heritage values of the asset may be degraded or lost. Sites of cultural significance can be damaged by infrastructure development, agricultural production, forestry and urban development.
Flood or fire damage to infrastructure or ecosystems	A high rating indicates that without intervention, infrastructure or ecosystems may be damaged by flooding or fire. Generally flooding will severely affect agricultural land and public and private infrastructure in low lying areas of the landscape. To a lesser extent, flooding may also affect cultural and environmental assets. Fire has the potential to spread and affect many assets.
Inappropriate water balances or water allocations	A high rating indicates that without intervention, water diversions or restrictions of flow for irrigation, industrial or urban use may adversely impact on the region's environmental or economic well-being. Groundwater examples include an inability for the groundwater system provide ecologically sustaining groundwater flows to land and water based EVCs, or to meet the licensed groundwater allocations for irrigation. Surface water examples include the environmental impacts on the region's lakes and rivers from water extracted for agriculture, industry or urban use.
Optimising the use of the asset	A high rating indicates that there is room to generate greater returns from the use of the asset or that the asset in danger of being over exploited. This generally applies to production based assets including agriculture, forestry and fisheries. To a lesser extent it also applies to water utilised for industrial and urban purposes.

5.3 Targets

Each of the following Asset Class Chapters contain targets by which the implementation of the RCS is to be measured and evaluated. Targets are based on the best available data, information and understanding, and are presented as:

- ***Aspirational Targets*** (i.e. long-term goals);
- ***Resource Condition Targets*** (targets relating to the anticipated condition of the relevant resource or asset in a 10 year timeframe; or,
- ***Management Action Targets*** *(*targets relating to the anticipated outcome of implementing management action—generally within a five year timeframe)

It is recognised that targets are often difficult to establish because of:

- Lack of baseline data or information on asset condition or status;
- Poorly understood relationships between management actions and the anticipated change resulting in the condition of the asset;
- Inadequacy of systems and arrangements for monitoring and evaluation

The region commits to further development of quantified and time bound targets in the life of this strategy.

5.4 Biodiversity

Overview

Biodiversity, or biological diversity, is the variety of all living life-forms including plants, animals and micro-organisms, the genes they all contain and the ecosystems of which they form a part. Natural biodiversity is composed of those elements of diversity that existed in the region before 1750.

Several techniques can be used to describe biodiversity. Ecological Vegetation Classes are a useful tool for describing biodiversity at the landscape level, whereas the use of the taxonomic species and subspecies is useful for describing individual organisms.

The East Gippsland region has a wide range of landforms and is the overlap zone for three major climatic zones. The combination of landforms and climates provides an environment which supports a wide variety of native plant and animal communities and ecosystems

Healthy plant and animal communities not only provide a habitat for native plants and animals, but also play an important role in providing food, water, air and other resources required to support human activity. For example, healthy forest ecosystems are a source of high quality water used for domestic and industrial consumption, and forests also provide the necessary processes required to convert carbon dioxide to useable timber and oxygen.

For the purposes of analysis, the RCS divides assets into three broad categories (Table 4.2)—production based assets, conservation and biodiversity assets, and dual purpose assets. Conservation and biodiversity assets are discussed in detail at both the Management Class and Management Unit level. Aspirational Targets, Resource Condition Targets and Management Action Targets are set for biodiversity assets at the management class level. Priorities for intervention to reduce the loss of biodiversity condition are identified at the management unit level.

Assumptions

Native plants, animals and their communities are subject to a range of threatening processes that have been recognised at state and national levels. Under state legislation, thirty listed Threatening Processes listed under the FFG Act operate across East Gippsland. These threats have led to the extinction of some species and others have become rare or threatened. At the community level these threats have modified the populations and distributions of plants and animals which existed before 1750.

Failure to recognise the capability of natural resources can lead to overuse and loss of their condition. For example, failure to maintain plant cover can lead to a reduction in carbon and nitrogen levels in the soil, and a breakdown in the nutrient cycles that convert organic nutrients into forms that plants can use. This then leads to a further reduction in plant cover, erosion follows and valuable soil is lost.

Setting Priorities

Priority setting for actions to prevent biodiversity condition loss is guided by (a) the value of the biodiversity asset (b) the level of threat to its condition, and (c) the regional significance of the potential condition loss. The RCS recognises, that in the first instance, maintenance of biodiversity in the best condition is the highest priority.

5.5 Action Plans

Within each Asset Class, some priority management actions involve the preparation of Action Plans. The nature of these proposed plans, their relationships to the RCS and each other, as well as their proposed integration into regional programs and multiple outcome projects are explained in Chapter 13.

6 FREEHOLD LAND ASSET CLASS

6.1 Overview

The Freehold Land Asset Class (Figure 6-1) covers the broad areas of freehold land which are generally used for agricultural production. However, the area does include some small areas of public land including public roads and a number of small public reserves. The class occupies an area of approximately 377,000 ha of the region (about 20%) and is divided into 11 management units. Natural biodiversity is retained as important remnants of the natural environment including native grasslands, grassy woodlands, rainforests, forests and wetlands. Table 6-1 summarises some of the attributes of each management unit in the class.

6.2 Assets within the Freehold Land Asset Class

Production based assets

The agricultural industries within the management units include horticulture, dairy, meat and wool. Intensive industries such as pigs and goat production are also present to a minor extent. There is also a very small but developing grain industry, predominantly for stockfeed. The main agricultural industries include sheep wool production and meat production from both sheep and beef. Dairying is conducted in the higher rainfall areas of the coastal region, along river flats or where supplementary irrigation can be obtained. Dairy enterprises occur on both dryland and irrigated pastures near the coast. Horticultural production, mainly vegetables, is similarly confined to the coastal locations with better soils and access to water. Vegetable seed production, fruit crops and viticultural enterprises are found mainly in coastal locations where there is access to water and suitable soils.

Privately owned areas of eucalypt plantations, and some softwood, are gradually expanding to provide timber resources for a variety of final uses. Plantations also provide other benefits including greenhouse credits, limited natural biodiversity values and improved water quality. Significant plantations in the Snowy River Basin near the New South Wales border provide pulpwood to the paper industry. As well as being profitable enterprises in their own right, plantations offer a sustainable alternative to traditional agricultural enterprises which have become unviable.

The estimated gross value of agricultural production (in 2001) for all the freehold management units was approximately $142 million. Management units vary in their capacity to contribute to the region's wealth. Table 6-1 provides indicative figures on the gross value of agricultural production for each unit. As the table indicates, the irrigated river flats within the Lindenow and Snowy management units provide high production from their relatively small areas. Of the dryland management units, the Red Gum Plains is most productive. It has relatively gentle slopes and fertile soils and some groundwater available to support irrigation. The remaining management units include the more remote mountain basins. Production in these areas is constrained by steep slopes with shallow soils and highly variable rainfall.

Native Biological Assets

Ecological Vegetation Classes (EVCs) broadly describe the native plants and animals in the area. Some of the high conservation status EVCs mapped on freehold land include remnants on the Red Gum Plains of Plains Grassy Woodland, Damp Sands Herb-rich Woodland and Lowland Forest. Areas of Plains Grassy Forest of the Bairnsdale foothills and coastal hills are also high conservation status EVCs.

The rare or threatened species (refer to DSE advisory list of rare and threatened species) that occur on freehold land include Maidens Wattle in the Snowy Flats management unit and Dwarf Kerrawang and Bushy Hedgehog-Grass in the Red Gum Plains management unit. Rare or threatened fauna (ibid) that occur that occur on or within the asset class include Great Egret, Dwarf Galaxias, White-bellied Sea-eagle, and Masked Owl. Some nationally threatened migratory species such as Swift Parrot and Grey-headed Flying Fox rely on food resources (including fruit from exotic vegetation) that occur on freehold land in the region.

Valuable wetlands predominantly occurring on freehold land include Bosses Nebbor Wetland, near Nicholson, part of the diverse wetlands of the lower Snowy River, especially in the Lake Corringle and Lake Curlip area.

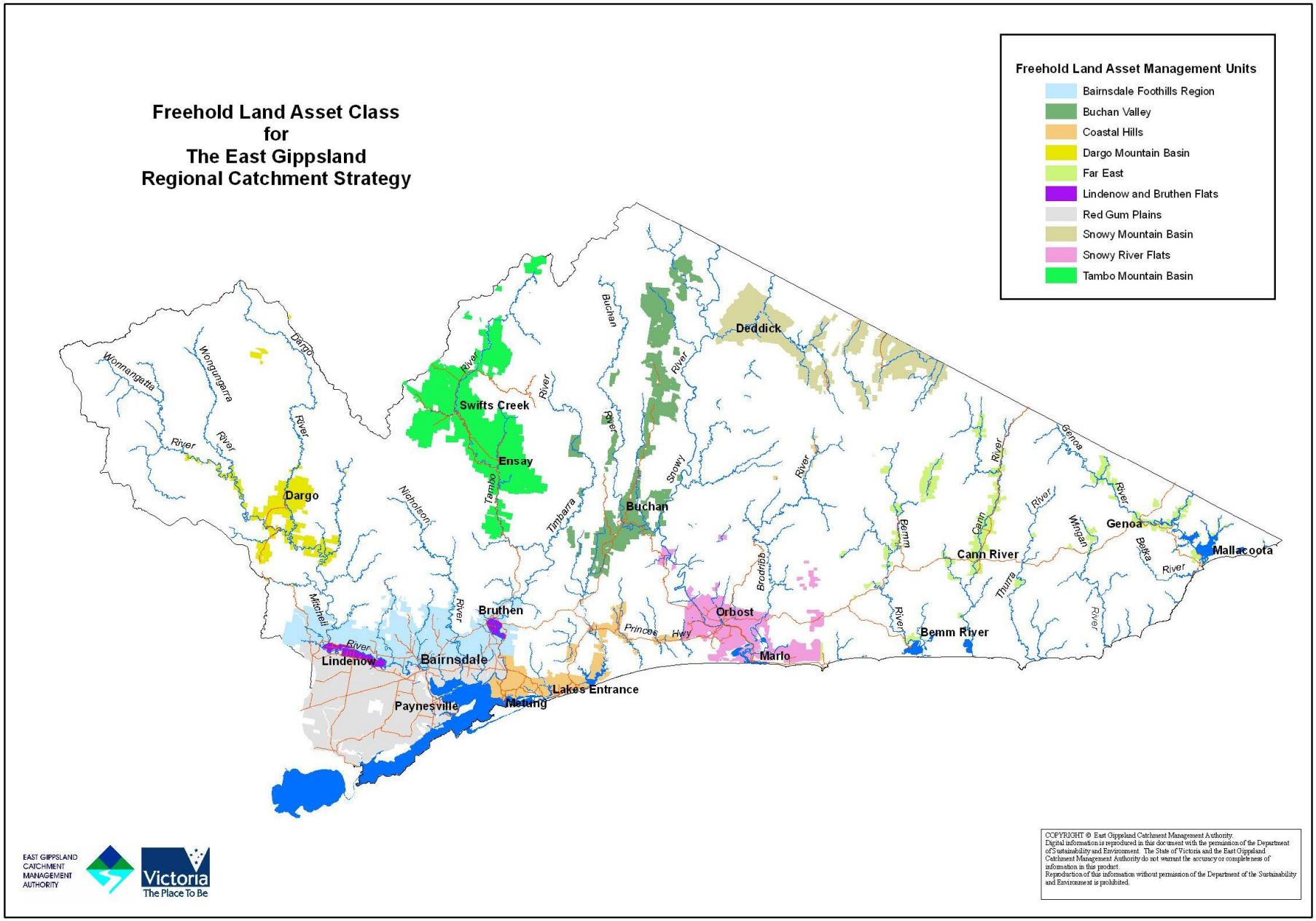


Figure 6-1. Map of the Freehold Land Asset Class in East Gippsland

Cultural assets

Important cultural heritage assets are embedded within some of the farming systems across the region. Of particular importance, are sites associated with the cultural heritage of the region's Indigenous people. Indigenous people have had a long cultural and spiritual association with the land are its traditional custodians.

Indigenous people occupied both the lowland and highland areas of the region and had well-defined travelling routes from one area to another. A significant travelling route traverses private land between Stratford and Mallacoota. Important artefacts such grinding grooves, tools, fragments, canoe trees and other relics can found scattered along the route today. It is highly likely that many more sites of significance will be discovered over time.

6.3 Condition of and Threats to Assets

Condition loss of assets within the freehold land class include soil erosion, loss of fertility, soil acidity, soil salinity, pest plant and animal infestations, nutrient export to water ways and loss of natural biodiversity.

Threats to further condition loss include overgrazing, excessive use of fertilisers, soil structure and use of land beyond its capability.

Additional threats to condition loss include the potential for wildfire to threaten life and property and the lack of appropriate fire regimes required to support the fire needs of natural ecosystems. Some remnant ecosystems are also 'threatened' because they are not large enough to buffer themselves from a range of threats.

Erosion – gully, tunnel, sheet, wind

Erosion occurs naturally in the environment but is often accelerated by poor land management practices. Accelerated erosion is usually associated with poor management practices or with enterprises that use land beyond its physical capability. Some erosion originated from early rabbit infestations, or from ill-advised tampering with stream flows. Rates of sediment export generated by erosion are generally dependent on slope and distance down catchments.

Gully and tunnel erosion processes occur throughout the Freehold Land units. Accelerated erosion affects farms through the loss of production, reduction in land values and inhibits overall farm operations. The offsite impact of erosion contributes to nutrient build up and algal blooms in waterways and coastal estuaries such as the Gippsland Lakes. Erosion also damages roads and other infrastructure, reduces water quality for town water supplies and irrigation users, and damages aquatic flora and fauna through increased turbidity and decreased light intensity in rivers and streams.

Sheet and wind erosion often occur in areas where adverse environmental conditions (drought or flood) combined with grazing have led to the loss of protective vegetation cover. However, some areas, such as the Red Gum Plains, are more prone to wind erosion than others. The steep hillsides of the upper catchments of the Mitchell, Tambo, and Snowy Rivers are prone to sheet erosion. Prevention of erosion is a cheaper and more strategic alternative to rehabilitation of eroded land which is difficult and expensive to treat.

Some assessments have been made of the susceptibility of local soils to erosion. However, there are no known local studies which have objectively measured the current levels of erosion, or predict future trends in soil loss. Further work will be needed to (a) assess the 'on farm' and 'off farm' costs of soil erosion; (b) analyse the benefits and costs of remedial actions; and, (c) develop agreed cost sharing arrangements to pay for the implementation of preferred options. Costs and benefits of soil erosion options will vary within each management unit. Benefit-cost ratios will vary depending on the nature of the erosion, the value of land use and the potential 'off site' impacts of untreated erosion on other parts of the catchment.

Soil acidification

Soil acidification is a major issue for Victoria and East Gippsland[24]. Increasing levels of soil acidity are generally associated with improved pastures and application of fertilisers. Acidification is primarily a problem at the enterprise level; each farmer, through the application of lime or lime derivatives, can adjust the acidity of the soil to promote

[24]The Victorian Catchment Management Council (2002) The health of our catchments. A Victorian report card 2002. The Victorian Catchment Management Council 5 year report.

growth. However, treatment of soil acidity with lime can lead to a build up of heavy metals, which can be a danger to animal health.

Objective assessments of the losses due to acidification have not been carried out. Further work will be required to map the extent of acidification and to assess options to counter the problem.

Salinity

The clearing of native vegetation and its replacement with lower water using pasture based plants, has led to a higher proportion of the rainfall entering the groundwater system. Increased recharge to the groundwater system may lead to rising watertables in areas many kilometres away from the original site of recharge. When the watertable is within 2 metres of the land surface, groundwater evaporates from the watertable to the atmosphere, leaving salts to accumulate in soils and local water bodies.
Salt accumulation in soils and water bodies has a detrimental impact on both agricultural production and the natural environment.

The area of salt affected land in East Gippsland has not been fully mapped, although it is primarily associated with coastal locations. The Bengworden area within the Red Gum Plains management unit has the most extensive mapped area of salinity in the region (2400 ha). The Bengworden area is included in the Lake Wellington Catchment Salinity Management Plan. The potential management options available for salinity in the Bengworden area include the establishment of silviculture, perennial pastures, and maintenance and improvement of remnant native vegetation.

Current production losses from salinity are relatively small from a regional perspective. Some work has been done in the Bengworden area. However, further work needs to be carried out in all the management units to assess trends in watertable levels, potential economic, social and environmental costs of current and future watertable levels, the benefits and costs of potential responses to current and future watertable levels and the development of agreed cost sharing arrangements to pay for the implementation of potential options.

Further work will be required to quantify the risks and impacts of salinity in the Marlo, Corringle, Brodribb, Clifton Creek, Flaggy Creek and Lakes Entrance areas.

Acid Sulphate soils

Acid sulphate soils are found at shallow depths in the estuarine sediments along the coastal plains of region. If disturbed these soils produce concentrated acids which can lead to immediate detrimental effects on aquatic flora and fauna including fish and crustaceans. The longer-term effects can include the pollution of water supplies, and to the corrosion of concrete, aluminium, and iron structures in roads, bridges and buildings. There are an estimated 2,700 ha of land with shallow coastal acid sulphate soils in East Gippsland. The perimeter of the Gippsland Lakes has the largest area of sulphate soils in the region.[25].

Objective assessments of the losses due to acid sulphate soils have not been carried out. Further work will be required to map areas and assess options to counter the problem.

Nutrients

East Gippsland soils have relatively low natural levels of nutrients and are not able to support sustained agricultural production. To be profitable, crops and pasture, require additional nutrients which can be provided through the application of phosphorus, nitrogen and potassium fertilisers.

In many areas of East Gippsland, low levels of fertiliser application have in some instances reduced farm production to economically unsustainable levels. High nutrient loads measured in streams following the 2003 wildfires also suggests that public land management practices may also have an impact on the fertility of land within the public estate. Reduced nutrient levels on both private and public land has profound implications for future vegetation growth, productivity and soil stability.

Current production losses, due to low soil fertility levels, have not been assessed. Some preliminary work (Draft East Gippsland Water Quality Action Plan) is underway to assess viable options to reduce the impact of fertiliser and other land and water management practices on algal blooms in the Gippsland Lakes and other water bodies in East

[25] Centre for Land Protection Research (2003). Acid Sulphate Soil Hazard Map Guidelines for Coastal Victoria. CLPR Report No 12. DPI.

Gippsland. Assessments of the impacts of losses of nutrient and sediment from all management units to key water bodies should be carried out.

Applied phosphorus and other elements have a number of potential fates. They can be taken up through plant production, stored in the soil, or exported to local dams and waterways through the region's catchment drainage lines where it can cause algal blooms: a major threatening process for the economy and the natural biodiversity of the region.

Nutrient build up in farm dams, rivers, streams and lakes often induces costly algal blooms. Algal blooms degrade water quality in these water bodies, and major losses of tourism revenue when blooms occur in water bodies such as the Gippsland Lakes (see Gippsland Lakes management unit). Each algal bloom robs the water of its vital oxygen causing major losses of natural biodiversity that is dependent on oxygen in these water bodies.

Pest Plants

Pest plants include those species proclaimed as noxious weeds under the CALP act and other species like brown top bent and bracken that reduce productive output.

In production systems, pest plants are a major threatening process because they reduce the productive capacity of land or contaminate products. They include both exotic and native species. Exotic species threaten the existence of native plants and animal communities. Once established, pest plants are superior competitors for nutrients and water, and may harbour pest animals. On agricultural land, pest plants compete with preferred species and can affect the quality of produce. Their control also increases the cost of production.

Pest plants are mobile and can move from one management unit to another, and may invade from areas outside the region. Movement of fodder, stock, machinery and plant materials all contribute to movement of pest plants. The threat and impacts imposed by different species of pest plant vary; therefore, the management response to each species should also vary. The spread of a pest plant is affected by its reproductive characteristics, soil type, rainfall, land use, availability of transport agents and management practices. Planing for control of pest plants should occur at the individual enterprise, local area, and the regional level.

At the regional level, East Gippsland's climate is conducive to the rapid spread of resident weeds, and the invasion and spread of weeds from outside. If they are not controlled, or at least contained, in the early stages of spread, the cost of control can become impossible to meet. Therefore keeping out confirmed pest plants not present in East Gippsland is the more strategic and cost effective approach and is therefore a high priority.

Vigilance by responsible agencies and the community in controlling new pests before they become established is one of the keys to successful weed management. It may be possible to eradicate small areas of some significant weeds such as Amsinckia, English Broom, Boneseed, Gorse, Spanish Heath and Serrated Tussock.

At the enterprise level, every landowner, public or private, is obliged under law (CALP Act) to control or eradicate proclaimed pest plants. Landowners also manage the many other pest plants not proclaimed under the CALP Act (e.g. Bracken and Brown-top Bent Grass). DPI offers advisory services to assist land managers manage their pest plants.

At the local area level, the regional community, DPI and local government work in partnership to support cooperative local weed initiatives. Local Area Weed Plans (LAPs) have been developed for specific areas in Gippsland by communities in partnership with the DPI. Each weed plan reflects the state's requirements for noxious weed management under the CALP Act. The plans identify the noxious weeds present in the area, and provide policy direction and priorities for weed management actions.

The CALP Act has an inherent weakness in that it does not allow suitable pest plants to be proclaimed as 'prohibited' at the local area level. The highest 'resolution' to declare a weed 'prohibited' is at the EGCMA level. While it is recognised that some weeds, like Blackberry and various species of thistles are widespread, and that eradication with current control options is not possible, there are small infestations of various weeds in the 'regionally controlled' category where eradication from localised areas is possible and likely to reduce their rate of spread.

Local Area Weed Plans have made a useful contribution to weed control in the region. However, they should be supported by regional and thorough assessments of the 'on farm' and 'off farm 'economic and environmental costs of the presence and spread of weeds, the benefits and costs of weed control measures and development of agreed cost sharing arrangements to pay for the implementation of weed control options.

The ongoing development of Local Area Weed Plans by communities in partnership with DPI is providing the opportunity to identify local priorities and to define sensible and achievable actions. The completion of such plans for the whole of the area needs to be accelerated.

Pest Animals

Pest animals threaten both the productive capacity of land and native biodiversity. They include both exotic and native species and may not necessarily be proclaimed as pest animals under the CALP Act. All but one of the proclaimed pest animals (the Dingo) are exotic species.

Rabbits contribute to soil erosion, loss of vegetation, prevent regeneration and impact on grazing enterprises. Rabbits in coastal and urban areas can cause structural damage to infrastructure. Engagement of communities in key areas, through cooperative control actions, has led to significant reductions in rabbit densities across the region.
Wild dogs threaten agricultural production causing localised severe damage, and have been recognised as a major issue for a long period. The focus of investment on electric fencing, poisoning and concerted trapping through the Gippsland Wild Dog Management Group continues to see progress in reducing the impact.

Pigs and goats threaten vegetation and soil stability and are vectors for disease transmission. The small populations of both pigs and goats on public land should be eradicated to maintain both public and freehold land values. Foxes are present throughout the region and impact on biodiversity and agricultural values across the region. Feral cats contribute to the loss of native species and are widespread. Many land managers also believe that deer and wild horses are also pests.

Exotic birds of note include Starlings, Indian Mynas, and Sparrows. Exotic birds compete with native species especially in rural and urban areas to the west of the region.

Some native animal species can cause serious economic loss. These include Kangaroos, Wombats, Wood Ducks, Cockatoos, Lorikeets, Ravens, Currawongs and Bower Birds on fruit and nut crops. As with Pest Plants, decisions on the investment in pest animal control should be based on thorough local assessments of the economic and environmental costs of the impact of pest animals on both public and private land, the benefits and costs of pest animal control measures and the development of agreed cost sharing arrangements to pay for the implementation of pest animal control options.

Disturbance of cultural heritage sites

Sites of cultural importance can be damaged through everyday land use and land development. Significant Indigenous cultural sites are particularly threatened by activities associated with earthmoving. Without experience, significant sites of Indigenous culture can be difficult to identify. Cultivation for cropping, levelling for construction sites, construction of dams and roads, construction of levees and other activities associated with earthmoving, all pose a threat to Indigenous cultural heritage sites.

The Victorian Archaeological and Aboriginal Relics Preservation Act 1972 and the Commonwealth Aboriginal and Torres Strait Islander Heritage Protection Act 1984 provide for the conservation and protection of places, sites and objects of Indigenous cultural heritage, whether they have been recorded or not.

Planning Policy of both the East Gippsland and Wellington Shires requires that Council, in considering any application for use or development or rezoning of land will have regard to any relevant studies of Aboriginal heritage in East Gippsland.

Many land managers are unaware of the Indigenous cultural heritage of the area and can inadvertently damage important sites through earthworks and other farm activities.

Altered Fire Regimes

In the latter period of post-European settlement, fire management or control has focused on reducing the immediate costs to human safety, human property, water quality, water supply, agriculture, and commercial forests. Fire managers are now beginning to take full account of the long-term impact of fire management on the natural environment.

There are three main issues related to fire in the Freehold Land management units. They are the risk that a fire generated within a unit will damage life and property, the risk that a fire may enter the unit from outside, and ensuring that the ecological fire needs of native species are met.

All management units are at risk from wildfire. The DSE is responsible for fire protection on public land, and the CFA is for fire protection on private land. Both agencies work in partnership to develop fire management plans for the region.

The communities of native plants on private land and within the small public reserves require appropriate fire management to meet their ecological needs. Fire regimes influence plant and animal abundance and distribution. Most communities of native plants have adapted and evolved with fire, and now rely on periodic burning to maintain their floristic composition and structure. With European settlement, these fire regimes have changed, particularly through changes in the timing and frequency of fire. This in turn has changed fuel loads and fuel types which further influences fire intensity and impact.

There is much circumstantial evidence to support the need for increased fire frequency for most native plant communities. However, more work is required to identify best fire management practice for communities and native plants within the Freehold Land management units.

Fire must be managed to maintain productive assets while providing for the ecological needs of East Gippsland's ecosystems. It is essential that government agencies and the community develop a clear common understanding of the risks involved in different fire management strategies and agree on a preferred approach.

Insufficient size of plant and animal communities

Habitat loss and fragmentation are a major threatening process to the natural biodiversity of these units. Some native plant and animal communities are vulnerable because of their size: smaller remnants are likely to suffer more damage from disease, insect attack or invasion by weeds or pest animals.

The long-term health of native plant and animal communities is influenced by:

- The landscape context—both its contiguity (connectedness to other remnants) and proximity (closeness to other remnants);
- The type of vegetation community or EVC;
- The size and shape of the remnant (large and wide is better than small and thin).

Large and interconnected plant communities are more resilient to potentially damaging pressures and threats[26]

Useful actions to maintain or improve sustainability of native plants include:

- Identify existing threatening processes (habitat loss, size, contiguity, connectedness, weed invasion, loss of keystone species, lack of fire etc.);
- Identify potential threats and monitor for immediate intervention;
- Act on priority threats;
- Improve landscape connectedness (expand and connect existing remnants); and
- Maintain existing natural connections (especially road reserves) in good condition.

Meeting the needs of native vegetation on private land is a major challenge. The state's vegetation framework has provided some direction. However a full assessment of the public and private costs of maintaining the remnants needs to be assessed, and then agreed cost sharing arrangements developed between both the state and private sector. The East Gippsland Vegetation Management Plan will provide further guidance and direction in meeting this challenge.

[26] How Much Habitat is Enough ? – Planning for wildlife conservation in rural landscapes, Jim Radford, Andrew Bennet and Lindy MacRaild, School of Ecology and Environment, Deakin University, 2004

Table 6-1: Overview of Freehold Land Management Units

Unit	Area ha	Estimated Population	Summary of Production Based Natural Resource Use and Estimated Gross Value of Production Where available	Some High Conservation Status Biodiversity Assets by Management Unit*	Natural Resource Condition
Red Gum Plains	73 949	Bairnsdale 9901 Paynesville 3019 Eagle Point 407 Newlands Arm 408 Rural 2751	Dryland grazing and some cropping Indicative Gross Value Ag. Prod. $27m	Damp Sands Herb-rich Woodland, Sand Forest, Plains Grassy Woodland, *Gippsland Plains* Lowland Forest, Plains Grassy Forest, Swamp Scrub, Sedge Wetland and Sand Heathland, Dwarf Kerrawang, Bushy Hedgehog-grass, Swift Parrot, Grey-headed Flying Fox, White-bellied Sea-eagle breeding sites, Great Egret.	Weeds and pests including: African Love-grass, Paterson's Curse, Serrate Tussock, Saffron Thistle, Cape Tulip, rabbits, foxes and wild dogs Small area of salinity (524 ha), soil acidification, wind erosion, gully erosion, remnant Red Gum in rapid decline
Bairnsdale Foothills	53 466	Rural 4301	Dryland grazing, dairy, goats, cropping, quarries, wineries, orchards, apiaries, lifestyle properties, farm-based tourism Indicative Gross Value Ag. Prod. $9m	Limestone Box Forest, Riparian Shrubland, Warm Temperate Rainforest, Dry Rainforest, and Gallery Rainforest, Limestone Pomaderris Shrubland, Plains Grassy ForestPowerful Owl, Masked Owl	Small area of salination, significant areas of tunnel and gully erosion, and soil acidity. African Love-grass, Paterson's Curse, Blackberry, Apple of Sodom and Box-thorn.
Dargo Mountain Basin	19 550	Dargo 676	Dryland sheep, goat and deer production, Walnuts, deer hunting, camping and sightseeing. Indicative Gross Value Ag. Prod. $2m	Valley Grassy Forest, Grassy Woodland, Swampy Riparian Woodland, Powerful Owl, Alpine Tree Frog, Australian Grayling	Loss of soil on north facing slopes, gully and tunnel erosion, soil acidification. Soil loss on north facing slopes, gully erosion and tunnel erosion. Amsinckia, Blackberry, English Broom, Paterson's Curse, Ragwort, Saffron Thistle, Scotch Thistle, Saint John's Wort, Thorn Apple (common). Foxes, rabbits, and wild dogs
Snowy Mountain Basin	43 330	Rural 292	Dryland beef, sheep and goat production. Commercial softwood, eco and conventional tourism, Indicative Gross Value Ag. Prod. $4m	Rainshadow Grassy Woodland, Grassy Dry Forest, Riparian Forest, Montane Riparian Woodland, Spot-tailed Quoll,	Gully erosion and loss of soil on north facing slopes, soil acidification. Amsinckia, Blackberry, English Broom, Paterson's Curse, Saffron Thistle, Scotch Thistle, Serrated Tussock and Saint John's Wort
Far East	25 276	Mallacoota 587 Cann River 204 Rural 1033	Dryland cattle breeding and fattening, agroforestry, nut production, farm-based tourism, Indicative Gross Value Ag. Prod $5m	Valley Grassy Forest, Riparian Forest, Warm Temperate Rainforest, Masked Owl, Sooty Owl,	Flooding, soil acidification, Blackberry, Californian thistle, Paterson's Curse, and Saint John's Wort, foxes, rabbits, and wild dogs.
Coastal Hills	20 764	Lakes Entrance 4670 Lake Tyers 500 Nowa Nowa 186 Metung 508 Rural 3574	Wool Production, beef breeding and fattening, dryland dairy, timber processing, lifestyle farming, art galleries, and cottage industries Indicative Gross Value Ag. Prod $7m Tourism ($ unknown)	Limestone Box Forest, Warm Temperate Rainforest, Littoral Rainforest, Plains Grassy Forest, Masked Owl, intact creeks and rivers.	Tunnel and gully erosion, soil acidification, Blackberry, Box-thorn, Paterson's Curse, Saint John's Wort and Sweet Briar. Rabbits foxes and wild dogs
Buchan Valley	46 303	Buchan Township 115 Rural 185	Dryland sheep and cattle production, dryland, dairy, vegetable seed production, lime quarry, tourism at Buchan Caves Indicative Gross Value Ag. Prod $9m	Limestone Grassy Woodland, Gallery Rainforest, Dry Rainforest, Limestone Pomaderris, Limestone Blue Wattle, Eastern Horseshoe Bat, Common Bent-wing Bat	African Love-grass, Amsinckia, Blackberry, Paterson's Curse, Ragwort, Saffron Thistle, Saint John's Wort and Vipers Bugloss. Loss of soil from north facing slopes, soil acidification, and gully erosion particularly in the southern region flows to the Snowy River. Foxes, rabbits, and wild dogs
Tambo Mountain Basin	61 391	Swifts Creek 146 Ensay ? Rural 505	Sheep wool production, mining, tourism, apiaries, Indicative Gross Value Ag. Prod $14m	Montane Riparian Woodland, Valley Grassy Forest , Rainshadow Grassy Woodland, Australian Grayling	Soil erosion on steep cleared north facing slopes, significant gully erosion. Soil acidification. Foxes, rabbits and wild dogs.

Note: *The above figures for Gross Agricultural Production are reworked ABS figures and are indicative figures only*

(Continued)

Table 6-1 (continued):

Unit	Area ha	Estimated Population	Summary of Production Based Natural Resource Use and Estimated Gross Value of Production Where available	Some High Conservation Status Biodiversity Assets by Management Unit*	Natural Resource Condition
Snowy Flats	30 959	Orbost 2121 Marlo 337 Rural 1276	Irrigated Horticulture, dairy, fodder production, beef fattening, crop and seed production, aquaculture, farm based tourism. Indicative Gross Value Ag. Prod. $23m	Littoral Rainforest, Riparian Forest, Warm Temperate Rainforest, Swamp Scrub, White-bellied Sea Eagle, Swift Parrot, Grey-headed Flying Fox, Cabbage Tree Palms, Sooty Owl, Maiden's Wattle, Lake Corringle wetland.	Flooding and drainage. Blackberry, Box-thorn, Paterson's Curse, Saint John's Wort, and Sweet Briar, rabbits, foxes
Lindenow Flats	1 454	Lindenow 286 Rural 384	Irrigated Horticulture, fodder production, irrigated dairy and orchards Indicative Gross Value Ag. Prod $40m	Warm Temperate Rainforest, Swamp Scrub, Billabong Wetland, Dry Rainforest, Riparian Forest, *Tertiary* Limestone Pomaderris Scrubland, Plains Grassy Woodland, Plains Grassland, Yellowwood, Yellow Milkvine, Limestone Blue Wattle, Limestone Pomaderris	Flooding, Tunnel erosion on escarpment areas, riverbank erosion, Bathurst burr, Blackberry, Box-thorn, Californian thistle, Paterson's Curse, and Ragwort.
Bruthen Flats	1 241	Bruthen 43 Rural 174	Fodder production, dairy and beef fattening Indicative Gross Value Ag. Prod. $2m	Warm Temperate Rainforest, Swamp Scrub, Billabong Wetland, Dry Rainforest, Riparian Forest, *Tertiary* Limestone Pomaderris Scrubland, Plains Grassy Woodland, Plains Grassland, Yellowwood, Limestone Blue Wattle, Limestone Pomaderris	Flooding, riverbank erosion, Bathurst burr, Blackberry, Box-thorn, Californian thistle, Paterson's Curse, and Ragwort.

Notes: 1. *The above figures for Gross Agricultural Production are reworked ABS figures and are indicative figures only;*

2. *There are too many high conservation status biodiversity assets by management unit to list in this table and the reader is referred to the relevant appendices of Bioregional Action Plans or the Native Vegetation Plan when published.*

6.4 Snapshot of each Management Unit in the Freehold Land Class

Overview

Across management units there can be significant differences in landform, land use, demographics, farm profitability, productive capacity and threats.

The position of a management unit also provides an indication of its contribution to the economic and social well-being of nearby towns and localities. The location of an in a catchment is also an indicator of its potential to create offsite impacts on other units—especially water bodies.

The following section provides a brief outline of the key natural resource asset management issues in each management unit. The outlines are not a comprehensive analysis of each unit; they are provided to indicate the strategic differences between the units.

Red Gum Plains Management Unit

The Red Gum Plains management unit includes the towns of Bairnsdale, Nicholson, Swan Reach, Johnsonville, Paynesville, Eagle Point, and Newlands Arm. It occupies 73,949 ha of land in the south-west corner of the region.

The management unit is predominantly used for agriculture which has an estimated gross annual agricultural production of $27 million (2001 data). Wool and beef production are the key industries in the area, although agro-forestry, horticulture and cropping are becoming more prevalent. Given its significant areas of flat arable land, and access to limited supplies of groundwater, it has the potential to support a range of alternative land uses, and under the right market conditions, increased economic output.

Wealth generated on the plains is distributed through the service centres of Stratford, Sale and Bairnsdale.

The area suffers from wind and some gully erosion. Wind erosion intensifies during periods of drought. The area has a small area of dryland salinity (2388 ha), which is unlikely to increase rapidly in the short term. Poor irrigation practices may lead to localised watertable problems; therefore, environmentally sound irrigation practices should be encouraged in new and existing irrigation developments.

Field experience (DPI) indicates that the economic, social or environmental impacts of soil erosion, acidification and salinity within the management unit will not escalate in the short term. However, they may have significant economic impacts over the long term. On the other hand pest plants and animals (e.g. deer) may, without intervention, have a severe impact on both production and the environmental assets in the short term. The known significant weeds currently present in the management unit are African Love-grass, Paterson's Curse, Serrated Tussock, Saffron Thistle and Cape Tulip. Rabbits, foxes and wild dogs also have an adverse effect on productivity. Weeds include: Kikuyu, Bridal Creeper, Blackberry and Sweet Pittosporum (the latter outside of its natural range in East Gippsland because of altered fire regimes on the Red Gum Plains).

The Red Gum Plains are part of the Gippsland Lakes Catchment and export both nutrient and sediment to the lakes via the Mitchell, Nicholson, Tambo, and Perry Rivers. The levels of sediment and nutrients exported from the management unit need to be determined to assess the relative contribution that the plains make to the loss of health of the Gippsland Lakes system.

The Red Gum Plains were traversed by Indigenous people as part of a major travelling route through East Gippsland. Important cultural sites and evidence of the Aboriginal culture such as scar trees are have been found on the plains, and it is likely that more sites will be located in the future.

Remnant vegetation in the management unit include Plains Grassy Woodland, Plains Grassland, Gippsland Plains Lowland Forest, and Swamp Scrub. All of the unit's remnant native vegetation is of state or national significance and is under imminent threat from habitat loss, fragmentation, weed invasion, by land use insect attack and disease.

The unit includes significant diverse wetlands surrounding the Gippsland Lakes. Some of these are on freehold land and most are impacted on by adjacent land use (especially grazing), which alters water, salt, sediment and nutrient balances.

Bairnsdale Foothills Management Unit

The Bairnsdale Foothills occupy 53,466 ha of land in the foothills north of Bairnsdale. Land use in the area includes dryland dairy, goat production, cropping, wineries, orchards, apiaries, flowers, beef breeding and fattening, sheep for wool production, fat lambs production and breeding, and horse racing and horse based industries. The management unit also contains a number of quarries and includes numerous lifestyle properties and farm based tourism enterprises. The unit has a high risk of loss to fire given its topography, close proximity to bush land and level of domestic and commercial infrastructure.

There are a few small areas which have high watertables which do not appear to imminently threaten the economic or environmental values. The unit is particularly susceptible to tunnel and gully erosion which has the potential to create major economic losses and contribute to sediment and nutrient export to the Gippsland Lakes which leads to algal blooms. Soil acidity is also a feature in the area but its area has not been quantified. The main weeds found in the management unit are African Love-grass, Paterson's Curse, Blackberry, Apple of Sodom and Box-thorn. Weeds that threaten native plant communities include Bridal Creeper, Hawthorn, English Ivy, Blue periwinkle, Cape Ivy and Pampas Grass.

This area contains significant grassy and riparian ecosystems and provides important habitat for threatened species that include squared-tailed kite (Table 6-1). The management unit also hosts summer breeding migrants which rely on the food and nesting resources which are available in the unit's associated high conservation status EVCs. These include: Swift Parrot, Grey-headed Flying Fox, Dollarbird, Rainbow Bee-eater, Rufous Fantail, Black-faced Monarch and Cicadabird.

The main pest animals in this unit are: rabbits, foxes, deer, and wild dogs.

The area is increasingly being developed for hobby farms and for more intensive land uses, which may create friction between the pre-existing land users and new alternative land uses.

There are a number of Aboriginal travelling routes following ridge lines and major water courses such as the Mitchell and Tambo Rivers. The base of the foothills is rich with Indigenous artefact stone scatters, camping sites and scar trees that extend to the coastline. Occupational sites are noted within the Indigenous cultural heritage database located at Aboriginal Affairs Victoria. Care must be taken to protect significant Indigenous sites as development proceeds in the area.

Dargo Mountain Basin Management Unit

Dargo Mountain Basin occupies an area of 19,550 ha of land and includes the town of Dargo. It is estimated that gross agricultural production for the management unit was $2 million for the 2001 period. The main land uses are sheep, goat, deer and walnut production. The area is increasingly being used by recreational users, deer hunters, campers and sightseers.

Native vegetation types include Valley Grassy Forest, Grassy Woodland, and Swampy Riparian Woodland. The area provides an important habitat for the threatened species: Powerful Owl, Alpine Tree Frog and Australian Grayling.

Soil erosion is prevalent on shale soils on the unit's north facing slopes, and gully and tunnel erosion are also prevalent. Soil erosion is not an immediate threat to the economic and environmental values of the assets in the management unit. The unit exports sediment-borne phosphorus to the Gippsland Lakes via the Mitchell, Dargo, Wonnangatta, and Wentworth Rivers, although the levels are yet to be quantified. Fire, grazing and excavation works all accelerate natural erosion processes in the area.

The main weed species are Amsinckia, Blackberry, English Broom, Paterson's Curse, Ragwort, Saffron Thistle, Scotch Thistle, Saint John's Wort, Thorn Apple (common). Pest animals including foxes, deer, rabbits, and wild dogs contribute to losses in profits. Weeds include: Blackberries and Willows

A number of known archaeological sites are located within this area. Aboriginal people used the area as a link to the higher alpine areas via the Dargo and Wonnangatta Rivers. Surveys to find sites of Indigenous occupation have not been extensive in the area, although many sites associated with excavation works have been unearthed. New finds, made possible after the recent alpine fires, suggest that Indigenous occupation of the area may have been continuous.

Snowy Mountain Basin Management Unit

The Snowy Mountain Basin occupies 43,330 ha in the Mountainous north of the region. High conservations status EVCs of this area include Rainshadow Grassy Woodland Riparian Forest and Montane Riparian Woodland. The area is important for Spot-tailed Quoll and many rare and threatened species including some endemic plant species.

Land use in the Unit includes dryland beef, sheep and goat production. Agricultural production for the management unit is estimated at $4 million for 2001. Extensive areas are committed to commercial softwood plantations. Eco and conventional tourism are important to the unit.

Gully erosion is common and there are significant losses of soil from the north facing slopes. The following weeds are also prevalent: Amsinckia, Blackberry, English Broom, Paterson's Curse, Saffron Thistle, Scotch Thistle, Serrated Tussock, and Saint John's Wort, Blackberry, Willow, Privet and Firethorn.

The area is part of the Buchan and Snowy River catchments and may export nutrient and sediment to the lower Snowy River and Snowy Estuary. The levels of sediment and nutrient export from the management unit need to be determined to assess the relative contribution that the area makes to the loss of health of the lower Snowy River and Snowy Estuary.

Aboriginal sites extend from the coastal fringes an upstream into the Snowy River catchment area well beyond the Bendock Delegate area. There are a large number of registered sites following the Snowy River and its tributaries. Great care must be taken to protect these areas. In some cases the appropriate authorities must be notified before works can proceed.

Far East Management Unit

Private land in the Far East is scattered across the Far East Catchments. The total area of freehold land in the management unit is 25,276 ha and includes the towns of Bemm River, Genoa, Mallacoota and Cann River. Significant vegetation types include Valley Grassy Forest, Riparian Forest and Warm Temperate Rainforest. Threatened species, which have been recorded on freehold land, include Masked Owl, Sooty Owl and some endemic plant species.

Land use for the area includes dryland cattle breeding and fattening, agro-forestry, nut production and farm based tourism. Flooding and soil erosion are threats. Agricultural Production for the 2001 is estimated at $5M.

Pest plants present in the management unit include Blackberries, Californian Thistle, Paterson's Curse, and Saint John's Wort. Foxes, rabbits and wild dogs contribute to production losses. Weeds include: Willows, Wandering Jew, Blue Periwinkle, Cape Ivy and Tutsan.

The area includes the Bemm River catchment which drains to the Sydenham Inlet; the Cann River catchment which drains to the Tamboon Inlet, the Wingan which drains to Wingan Inlet, and the Genoa and Wallagaraugh Rivers which flow to Mallacoota Inlet. Other significant rivers in this area include the Thurra, Mueller and Betka Rivers.

All of the catchments in the area have the potential to export nutrient and sediments to the smaller inlets in the eastern part of the region. The levels of sediment and nutrient export from the unit need to be determined to assess the relative threats that catchment use and management may make to the loss of health of the coastal inlets of this region.

There are a number of sites of Indigenous cultural significance, particularly in the Cann River, Genoa, and Mallacoota Inlet areas. There are clear links between these areas and the higher alpine regions.

Coastal Hills Management Unit

The Coastal Hills management unit occupy 20,764 ha of land between the coast and the foothills. The unit includes the towns of Lakes Entrance, Lake Tyers, Nowa Nowa, and Metung.

Significant vegetation types in the area include Limestone Box Forest, Limestone Pomaderris Shrubland, Foothill Box Ironbark Forest Plains Grassy Forest, and nationally significant areas of Littoral Rainforest and Warm Temperate Rainforest. The area contains many intact, diverse creeks and rivers. Many rare or threatened species persist in the area including Limestone Blue Wattle, Limestone Pomaderris, Yellow Loosestrife, Yellow Milkvine, Maidens Wattle as well as Powerful Owls and Sooty Owls. Many summer breeding migrants such as Shining Bronze Cuckoo, Rufous

Fantail, Black-faced Monarch and Scarlet Honeyeater rely on the rainforests of this management unit as do the irregular migrants: Topknot Pigeon and White-headed Pigeon. The area is important for nationally threatened migratory species including Swift Parrot and Grey-headed Flying Fox that rely on the food resources of Plains Grassy Forest and the rainforests.

Wool production, beef breeding, cattle fattening, dryland dairy, timber processing, lifestyle farming, art galleries, recreational horse riding, horse racing industries and numerous cottage industries are located within the area. The area generated an estimated $7 million of gross agricultural production in 2001.

Tunnel and gully erosion are present. Known weed species include Blackberry, Box-thorn, Paterson's Curse, Saint John's Wort, Sweet Briar, Kikuyu, Blue Periwinkle, Pampas Grass, Cape Ivy, Bridal Creeper, Boxthorn, Mirrorbush, Wandering Jew and Boneseed. Rabbits, foxes, deer (especially destructive in this management unit), and wild dogs are also present.

As with the Bairnsdale Foothills management unit, the mixed land uses within the coastal hills have the potential to result in frictions between the pre-existing land uses and new forms of land use.

The area is part of the Lower Tambo and Nicholson River catchments and consequently exports both nutrient and sediment to Gippsland Lakes. Boggy Creek, Yellow Waterholes Creek, Breakfast Creek and Harris Creek catchments export nutrients and sediment to the Lake Tyers Inlet. The levels of sediment and nutrient export from the unit need to be determined to assess the relative contribution that the area makes to the loss of health of water quality to Gippsland Lakes and Lake Tyers Inlet.

This area has a great deal of evidence occupation by Aboriginal people. The abundance of different food sources and fresh water would have maintained a continuous presence of people, which is evident by the large number of coastal middens and camping sites registered on archaeological databases.

Buchan Valley Management Unit

The Buchan Valley occupies 46,303 ha of land in the mid-Snowy catchment. The only significant town is Buchan. The limestone of this area produces the most significant vegetation types including Limestone Grassy Woodland, East Gippsland Karst Dry Rainforest, Devonian Limestone Pomaderris Shrubland, Gallery Rainforest and Riparian Forest. Important populations of threatened species such as the Limestone Blue Wattle, Limestone Pomaderris (both endemic to East Gippsland) and cave-dependent Eastern Horseshoe Bat. The Bent-wing Bat also occurs on freehold land.

Land use includes dryland sheep and cattle production, dryland dairy, vegetable seed production, a lime quarry, and tourism activities at the Buchan Caves. Agricultural production for 2001 was estimated at $9 million.

Weeds present in the area include African Love-grass, Amsinckia, Blackberry, Paterson's Curse, Ragwort, Saffron Thistle, Saint John's Wort, Vipers Bugloss, Willows, Poplars, European Olive, Blackberry, Blue Periwinkle, Cape Ivy and Kikuyu. Foxes, rabbits, deer and wild dogs are also prevalent.

Soil erosion occurs on the steep cleared north facing slopes and there is significant gully erosion and some soil acidification. Some areas are severely degraded and consideration should be given to taking these areas out of agricultural production and return them to the original vegetation. The land use in the area also has the potential to export sediment and nutrients to water bodies in the Snowy River system via the Buchan River and to the Lake Tyers Inlet via Boggy Creek. Further work will be required to assess this threat.

Carbon dating in local cave sites indicates that Indigenous people have occupied this area for nearly 16,000 years. There are a number of other sites of Indigenous cultural significance listed on the heritage database.

Tambo Mountain Basin Management Unit

The Tambo Mountain Basin occupies 61,391 ha of land within the Tambo River catchment and includes the towns of Swifts Creek and Ensay.

Remnants of the natural environment include Montane Riparian Woodland, Mountain Grassy Woodland, Valley Heath Forest and Montane Grassy Woodland areas. The area also includes the Australian Grayling.

Wool production, mining, tourism and apiaries are the main land uses. Gross agricultural production for 2001 was $14 million. Soil erosion occurs on the steep cleared north facing slopes, particularly with shale soils, and there is significant gully erosion and some soil acidification. Some areas of land have degraded to the extent that they are rapidly eroding and have little potential for viable agricultural use. Consideration should be given to taking these areas out of production. The Tambo 'Restoring the Balance Program' has provided a lead on how this may be achieved.

Weed species include African Lovegrass, Blackberry, English Broom, Horehound, Nodding Thistle, Paterson's Curse, Saffron Thistle, Scotch Thistle, St John's Wort, Willows, Tree of Heaven and Blue Periwinkle. Foxes, rabbits, deer and wild dogs are present in the area and cause significant losses.

The area is part of the Tambo River catchment and consequently exports nutrient and sediment to the Gippsland Lakes. The levels of sediment and nutrient export from the management unit need to be determined to assess the relative contribution that the area makes to the loss of health of Gippsland Lakes.

This area includes a number of Indigenous tribal areas and a number of archaeological sites are listed in Aboriginal Affairs Victoria's database.

Snowy Flats Management Unit

The Snowy flats occupy 30,959 ha of land on the Snowy River Floodplain and include the towns of Orbost and Marlo.

The unit contains remnants of Swamp Scrub, Riparian Forest, Littoral Rainforest and Warm Temperate Rainforest which provide important habitat for threatened species such as Sooty Owl, Grey Goshawk and Grey-headed Flying-fox, White-bellied Sea Eagle, Swift Parrot, Great Egret and Grayling to name a few. A large number of rare or threatened plant species are associated with rainforests in this unit. These include: Cabbage-tree Palm, Supplejack, Yellow Elderberry, Yellowwood, Yellow Milk vine, Buff Hazelwood, Maidens Wattle, Blackfellows Hemp, Black-stemmed Maidenhair. The area also includes significant diverse wetlands.

Land use includes irrigated horticulture, dairy, fodder production, beef fattening, crop and seed production, aquaculture and farm-based tourism. The estimated gross agricultural production for 2001 was $23 million.

Tunnel and gully erosion are present as are weed species including Blackberry, Box-thorn, Paterson's Curse, Saint John's Wort, Sweet Briar, Kikuyu, Blue Periwinkle, Wandering Jew, Cape Ivy, Willow, Arum Lily and Bridal Creeper. Small infestations of the sub-tropical Madeira vine and Lantana are a particular threat to this unit and the region. Rabbits, foxes and wild dogs are also present.

The area is part of the Buchan and Snowy River catchments and consequently exports nutrient and sediment to the Snowy River Estuary. The levels of sediment and nutrient export from the management unit need to be determined to assess the relative contribution that the area makes to the loss of health of the Snowy River and inlet.

The Snowy floodplain includes an array of archaeological sites of Indigenous cultural significance including scatters and scar trees.

Lindenow Flats Management Unit

The Lindenow Flats occupy 1454 ha of land on the floodplain of the Mitchell River. The major town is Lindenow.

Important high conservation status EVCs of the unit include, Dry Rainforest, Gallery Rainforest, Warm Temperate Rainforest, Billabong Wetlands, Riparian Forest, Tertiary Limestone Pomaderris Shrubland, Plains Grassy Woodland and Plains Grassland remnants, which occur along current rail reserves.

The area is very productive and makes a significant contribution to the economic well-being of Bairnsdale. Irrigated horticulture, fodder production, irrigated dairy and orchards are the main land uses. The estimated gross value of agricultural production for 2001 was $40 million.

Threats include loss of soil during floods tunnel erosion and riverbank erosion. The main weeds species present are Bathurst Bur, Blackberry, Box-thorn, Californian Thistle, Paterson's Curse, St John's Wort, Ragwort, Blue Periwinkle, Willow, Bridal Creeper, Hawthorn, Wandering Jew and Madeira Vine.

The Lindenow flats export nutrient and sediment to local waterways and to the Gippsland Lakes. The levels of nutrients exported needs to be quantified.

This Lindenow flats include a large number of sites of Indigenous cultural significance. Recent excavation works have unearthed many signs of Indigenous occupation.

Bruthen Flats Management Unit

The Bruthen Flats occupy 1241ha of land on the floodplain of the Tambo River. The major settlement is Bruthen.

High conservation status EVCs of the management unit include Warm Temperate Rainforest, Billabong Wetlands, Reed Swamps, Riparian Forest, Tertiary Limestone Pomaderris Scrubland, Plains Grassy Woodland and Plains Grassland remnants which occur along disused rail reserves.

The area is very productive and makes a significant contribution to the economic well-being of Bruthen and Bairnsdale. Fodder production for beef and dairying are the main land uses. The estimated gross value of agricultural production for 2001 was $2 million.

Threats include flooding, tunnel and riverbank erosion and weed species including Bathurst Bur, Blackberry, Californian Thistle, Spear Thistle, Variegated Thistle, Paterson's Curse, Boxthorn, Hawthorn, Bridal Creeper, Willow, Poplar, Blue Periwinkle and Cape Ivy.

The Bruthen flats export nutrient and sediment to local waterways and the Gippsland Lakes. The levels of nutrients exported will need to be quantified.

6.5 Strategic Context and Summary of Issues

The use of freehold land for agricultural production makes an important contribution to the economic and social well-being of East Gippsland and the state. It is estimated that the gross value of agricultural production in East Gippsland for 2001 was $142 million.

The profitability of agricultural industries fluctuates from year to year depending on prices, costs and climatic conditions. The profitability of any one farming enterprise will rely, not only market and weather conditions, but on the ability of the enterprise to manage its costs and business risks.

The profitability of agriculture can affect the natural resource base in a number of ways. In some cases the pursuit of short-term profits can lead to the use of land beyond its capability, in other cases, enterprise managers simply do not have the financial resources to carry out the works required to maintain the condition of the resource base.

Ideally, enterprise managers should have an opportunity to derive and maintain a reasonable standard of living from the use of the land, while ensuring that the condition of the natural resource base, including soils, vegetation and water quality, are maintained for use by future generations.

In some areas, important remnants of the natural environment are located within farming systems, and there is increasing pressure from the wider community (i.e. the state) to preserve those natural assets for the longer term. Considerable funds and resources are expended annually by government and communities to meet this need. Landcare and other community-based groups make an important contribution to the preservation of the natural environment. However, there are still areas where there are unresolved conflicts between the state and local farmers: vegetation management is a good example.

More work is required to develop options for the conservation of natural ecosystems (including high conservation status EVCs) on private land to ensure biodiversity is conserved and that ecosystems are maintained in the agricultural landscape. The full cost should be assessed, and then equitably shared between the main beneficiaries. The State Government is conducting the Bush Tender trials on the Red Gum Plains and in the Buchan Valley management units to further this goal. Bush Tender will in future be applied to the Gippsland Plains Bioregion (the Red Gum Plains).

The completion of the East Gippsland Vegetation Management Plan guides and prioritises this investment and is therefore a high priority for the region.

Pest plant and animal control is a key priority. Poor management of weeds and pest animals can lead to their rapid spread. The spread of weeds and pest animals can lead to significant economic losses to agriculture and damage to the natural environment. Enterprise shifts (e.g. from sheep to cattle) can bring substantially increased weed problems, particularly Blackberry[27]. The CALP Act is a useful tool in managing weeds across the region. However, it has some inherent weaknesses in eradicating weeds at the sub-regional level. Local area plans make a useful contribution to managing weeds and pest animals. These plans can be strengthened by more rigorous benefit-cost analysis and the development of agreed cost sharing arrangements.

All management units have soil erosion; some more than others. The incidence of soil erosion is a clear sign that land is being used beyond its capability and that land use is not ecologically sustainable. Soil erosion can reduce productivity and lower land resale values. Moreover, sediment loss creates major offsite impacts on waterways, lakes and estuaries. The science of soil conservation is well advanced, and the region has successfully treated many eroded areas, nevertheless, there are no documented strategies for soil conservation for the region. Action plans should be developed to quantify the levels at greatest risk of soil erosion and sediment loss from each management unit. The plans should assess the benefits and costs of various soil conservation options. They should also include agreed cost sharing arrangements which have been developed in consultation with key stakeholders. The catchments of the Gippsland Lakes are high priority for sediment control.

In some cases, traditional resource based enterprises can no longer provide a reasonable standard of living for their owners. This may be due to permanent changes in market conditions, poor condition of the resource base, or exceptional weather and other conditions. In these circumstances, market forces will inevitably lead to enterprise restructuring with smaller farms becoming aggregated into larger enterprises, and whole industries may disappear. The process of market driven restructuring can be slow, and often creates undesirable social and environmental impacts.

Enterprises with low profitability do not have the financial resources to maintain the condition of the natural resource base. For example, soil erosion and weed infestations may remain untreated, thereby degrading the natural resource base on the farm that maintains its viability. This can then begin to impact on other offsite assets. Where the current use of land and water generates poor returns, or creates unacceptable offsite impacts, we should encourage the adoption of more profitable and ecologically sustainable management practices. Where it is not economically viable to increase the profitability of an existing land use, or mitigate its offsite impacts, the region should encourage the development of new and more profitable and environmentally sound alternatives.

Freehold land includes sites which are important to the local Indigenous people and the cultural heritage of all Victorians. Some of these sites can inadvertently be damaged through earthworks and other activities. Some landowners are fearful of the implications of finding artefacts on their properties, believing that their rights to use their land will be restricted. The rights of freehold land managers to use their land, and the needs of the local Indigenous community require reconciliation. Greater cultural awareness and greater communication between Indigenous people and local land managers will be useful first steps in balancing the needs of all parties.

Fire is an ever-present threat to freehold land. Fire management must balance the need to protect life and property with the need to maintain East Gippsland's ecosystems. It is essential that government agencies and the community develop a clear and common understanding of the risks involved in different fire management strategies and agree on a preferred approach. In the meantime, existing fire management strategies should be continued.

6.6 Broad Objectives for Management of the Assets within the Freehold Land Asset Class.

Ideally, the use of freehold land within each management unit should:

- provide an opportunity for the local community to engage in profit making activities that are ecologically and socially sustainable;
- be the most profitable and efficient use of the natural resource given market conditions and land capability;
- contribute net wealth to the region and the state;
- maintain the health of high conservation status EVCs and rare or threatened biodiversity

[27] L. Hamilton. Pers. comm..

- ensure that the region's cultural heritage is protected
- ensure that the use of land and water is ecologically sustainable and does not adversely impact of the value or condition of other assets—particularly water bodies.

6.7 Strategic Directions for the Freehold Land Asset Class

There are numerous plans related to natural resource management on freehold land in the region. However, there is no overall strategic framework which pulls all of these plans together. Moreover, many of the existing plans have numerous targets, little benefit-cost analysis, and often, no agreed cost sharing arrangements. Analytical data is generally collected for specific projects, and, is consequently, difficult to use for other purposes. There are significant gaps in our knowledge which leads to the development of unrealistic targets, which have little ownership by the agencies or by the regional community.

There are four steps to achieving the broad objectives for Freehold Land management units. Planning to map out a specific course of action, implementation of the course of action, monitoring, and evaluation.

A set of strategic actions, which fall into the above tactical areas, have been developed to assist the region meet the objectives identified for Freehold Land management units. The strategic actions are as follows:

Develop an assets inventory for key assets in Freehold Land Management Units

All relevant agencies should work in partnership to develop a GIS based inventory of all natural resource based assets within each Freehold Land management unit. The inventory should include natural biodiversity assets; cultural assets; productive land used for agriculture and other commercial purposes; and land used for domestic and recreational. Much of this information already exists in a number of databases and meeting this objective may only require integration of existing databases. The database should be available to the local community, resource managers and planners.

Develop consistent systems to assess the condition of the natural and social resource base

All relevant agencies should work in partnership to develop cost effective systems to assess and monitor the condition of assets listed within the Freehold Land management unit inventory. Systems should include baseline levels for soil erosion, soil structure, soil acidity, watertable levels, the health of natural ecosystems, the presence of weeds and pest animals and the condition of cultural assets.

Develop systems to monitor trends in the profitability of production based assets in each management unit

All relevant state and industry based organisations should work in partnership to develop a cost effective system to monitor the trend in profitability and productivity of the region's natural resource based industries within each management unit. The information should be used to benchmark the performance of the region's natural resource based industries within Freehold Land management units to assess the likely impacts of market and climatic trends on the social, economic and environmental well-being of the region.

Develop a system to monitor the export of sediments, salts and phosphorus from each management unit

Monitoring systems are required to monitor the export of sediments, nutrients and other pollutants to waterways. These systems should be developed for all management units across all asset classes. In the long term all management units should be monitored. Management units in the Gippsland Lakes Catchment are a priority.

Develop action plans to assess options to improve the current condition of assets

Develop soil conservation, sediment and nutrient management plans for all management units. Plans should identify the benefits and costs of options for the reduction of exports of sediments and nutrients to key assets, and should include agreed cost sharing arrangements between local land managers and the state and federal governments.

Revise and update pest plant and pest animal action plans within each management unit. Revamped plans should include benefit-cost analysis for the control of pest plants and animals. Plans should include agreed cost sharing arrangements between land managers, the state and federal governments

A number of actions need to be taken in order that the Freehold Land management units move towards a more ecological sustainable footing and that ability of natural biodiversity to maintain ecosystems services to the agricultural landscape is enhanced,. These include the implementation of existing Biodiversity Action Plans (Gippsland Plains (Red Gum Plains, East Gippsland Lowlands) and continuation of the development of the balance of the Biodiversity Action Plans for the maintenance of natural ecosystems on private land in the remainder of the region. Plans should include an assessment of the benefits and costs of a range of options, as well as developing agreed cost sharing arrangements between landowners and the state and federal governments. In line with these aims, the completion of the East Gippsland Native Vegetation Plan that will prioritise such works and guide regional investment is also a priority.

Align land use with land capability

Assess the capability of land within in each management unit, and align its use with its capability. Identify areas of land which have the potential for further development, or where land should be considered for retirement.

Ensure that land managers adopt Best Management Practices

Develop action plans to encourage the adoption of management practices and land uses which will create greater returns from the current use of land and water within each management unit.

Protect known sites of cultural significance

Develop action plans for the maintenance of all high-value sites of cultural significance. Plans should be developed in partnership with the local Indigenous community and landowners and managers. All plans should include agreed cost sharing arrangements.

Guide the direction of future development

Review local planning schemes to ensure that planning overlays are updated to minimise friction between competing land uses within a management unit, and, where possible regulate development to reduce the offsite impacts on other valued assets in other units.

Continue to implement the Tambo Valley 'Restoring the Balance' program, and carry out similar studies in the other Freehold Land management units. Priorities should include the more remote units of the Buchan, Snowy Mountain Basin and Far East Catchments.

Assess the strategic investment of public funds in Freehold Land Management Units

Every five years develop a set of 'Whole of Government Accounts' which itemise public investment in each management unit and the public benefits generated by it. The accounts should be used to guide future investment.

Ensure the community is engaged in local and regional decision making process

All members of the community who have a stake in the management of the land within the Freehold Land asset class should be provided with an opportunity to participate in the decision making processes. Community consultation and engagement processes should be reviewed. The regional community and state agencies should collectively develop new ways for the community to share in the decision making processes which have an impact on freehold land.

Maintain existing projects until action planning indicates a need to change direction.

There are a wide range of Freehold Land projects which are currently underway. Where possible these projects should be maintained until action planning, monitoring and evaluation programs indicate better investments elsewhere.

6.8 Management Action Priorities

Priorities for intervention to maintain or improve the condition of assets within management units of the Freehold Land asset class are set out in Table 6-2. Management actions and targets to address identified high priorities are set out in Tables 6-3 to 6-9.

Table 6-2: Priority 'Need for Intervention' ratings for assets of the Freehold Land Asset Class
(See Chapter 5 for explanation of priority setting process.)

Management Unit and Associated Assets	'Need for Intervention' Priority Rating										
	Soil erosion and soil structure decline	**Export of nutrients and/ or sediment**	**Loss of soil fertility**	**High watertable**	**Increasing numbers of Pest Plants and Animals**	**Soil Acidity**	**Loss of biodiversity and ecosystem function from grazing, altered fire regimes or clearing**	**Acid Sulphate soils**	**Damage to sites of cultural heritage**	**Flood or fire damage**	**Efficient use and development of resources**
Red Gum Plains											
Conservation Assets	Low	Low	Low	High	High	Low	High	Low	Low	N/A	N/A
Land used for agricultural production	High	High	High	High	High	High	High	Low	High	High	**High**
Towns	Low	High	Low	Low	High	Low	Low	High	Med	High	**High**
Bairnsdale Foothills											
Conservation Assets	Low	Low	Low	Low	High	Low	High	Low	Low	High	N/A
Land used for agricultural production	High	High	High	Low	High	High	High	Low	High	High	**High**
Towns	Low	High	Low	Low	High	Low	Low	Low	Med	High	**High**
Dargo Mountain Basin											
Conservation Assets	Low	Low	Low	Low	High	Low	High	Low	Low	High	Low
Land used for agricultural production	High	High	High	Low	High	High	Low	Low	High	High	**High**
Towns	Low	High	Low	Low	High	Low	Low	Low	Med	High	**High**
Snowy Mountain Basin											
Conservation Assets	Low	Low	Low	Low	High	Low	High	Low	Low	High ( )	Low
Land used for agricultural production	High	High	High	Low	High	High	Low	Low	High	High	**High**
Towns	Low	High	Low	Low	High	Low	Low	Low	Med	High	**High**
Far East											
Conservation Assets	Low	Low	Low	Low	High	Low	High	Low	Low	High	Medium
Land used for agricultural production	High	High	High	Low	High	High	Low	Low	High	High	**High**
Towns	Low	High	Low	Low	High	Low	High	Low	Med	High	**High**

(continued)

TABLE 6-2 (continued)

Management Unit and Associated Assets	'Need for Intervention' Priority Rating										
	Soil erosion and soil structure decline	**Export of nutrients and/ or sediment**	**Loss of soil fertility**	**High watertable**	**Increasing numbers of Pest Plants and Animals**	**Soil Acidity**	**Loss of biodiversity and ecosystem function from grazing, altered fire regimes or clearing**	**Acid Sulphate soils**	**Damage to sites of cultural heritage**	**Flood or fire damage**	**Efficient use and development of resources**
Coastal Hills											
Conservation Assets	**High**	**High**	Low	Low	**High**	Low	**High**	Low	Low	**High**	Low
Land used for agricultural production	**High**	**High**	High	Low	**High**	High	Low	Low	**High**	**High**	High
Towns	High	High	Low	Low	High	Low	High	Low	Med	High	High
Buchan Valley											
Conservation Assets	High	Low	Low	Low	High	Low	High	Low	Low	High	Low
Land used for agricultural production	High	High	High	Low	High	High	High	Low	High	High	High
Towns	Low	High	Low	Low	High	Low	Low	Low	High	High	High
Tambo Mountain Basin											
Conservation Assets	High	Low	Low	Low	High	Low	High	Low	Low	High	Low
Land used for agricultural production	High	High	High	Low	High	High	Low	Low	High	High	High
Towns	Low	High	Low	Low	High	Low	Low	Low	Med	High	High
Snowy Flats											
Conservation Assets	High	Low	Low	High	High	Low	High	Low	Low	High	Low
Land used for agricultural production	High	High	High	High	High	High	Low	Low	High	High	High
Towns	Low	High	Low	Low	High	Low	Low	Low	Med	High	High
Lindenow Flats											
Conservation Assets	Med	Low	Low	Low	High	Low	High	Low	Low	High	Low
Land used for agricultural production	Med	High	Low	Low	High	High	Low	Low	High	High	High
Towns	Low	High	Low	Low	Med	Low	Low	Low	High	High	High
Bruthen Flats											
Conservation Assets	Low	Low	Low	High	High	Low	High	Low	Low	High	High
Land used for agricultural production	Med	High	High	High	High	High	Low	Low	High	High	High
Towns	Low	High	Low	Low	Med	Low	Low	Low	High	High	High

Table 6-3: Agricultural Development Action Plan. Freehold Land Asset Class.

Action Plan Objectives: (a) To ensure land is used profitably (b) To ensure land is used within its capability (c) To ensure land is developed in an orderly manner		**Priority condition loss addressed by Action Plan** Efficient use and development of resources within Freehold Land management units *(See high priorities in table 6-2)*	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
East Gippsland's agricultural industries will be profitable and will use land within the land's capabilities	By 2015: • 70% of existing natural resource based enterprises, will be efficient and profitable, and will apply sustainable land management practices	**Planning Actions and Targets**	
		F1	Develop and implement a GIS based inventory of all production based freehold land in each management unit (2009 DSE and EGCMA).
		F2	Assess the overall profitability of agricultural enterprises in each management unit. Benchmark the performance of agricultural industries in each unit against the performance across the state (2007 DPI)
		F3	Implement business planning programs supported by one on one assistance designed to increase profitability from suitable land. (DPI CMA 2006)
		F4	Assess the viability of the traditional industries in each management unit and consider the need for industry restructuring (2007 DPI)
		F5	Gain baseline information on the adoption of Best Management Practices in each management unit (2007, DPI). Develop (2007 DPI), set targets (2007 DPI), and implement methods to encourage the adoption of more profitable management practices and land uses within each unit. (2008 DPI)
		F6	Develop (2008 DPI), and implement methods to increase the risk management skills of enterprises managers to ensure that they have the ability to effectively manage the risks associated with markets and climatic variability (2009 DPI)
		F7	Review local planning schemes to ensure that planning overlays are (a) updated to minimise friction between competing land uses within a management unit and (b) are designed to regulate development to ensure that offsite impacts are reduced. Priorities include the Bairnsdale, Dargo and Coastal management units; and (c) are updated to incorporate the directions in the EGNVP (2008 EGCMA, DSE and local government)
		F8	Every five years develop and implement a set of 'Whole of Government Accounts' which itemise public investment in each management unit and the public benefits generated it. The accounts should be used to guide future investment (2007 EGCMA and DSE)
		F9	Assess the impact of climate change on ggriculture in each management unit (2008 EGCMA, DSE)
		Interim implementation targets	
		F10	Implement recommendations from the evaluation of the 'Restoring the Balance Programs' in the former Omeo Shire and Tambo Valley, and complete the Bushfire Environmental Recovery Program in bushfire affected regions of East Gippsland. Extend this project concept to other management units (2009 local government, DPI, DSE and EGCMA)

(continued)

Table 6-3 (continued)

Action Plan Objectives: (a) To ensure land is used profitably (b) To ensure land is used within its capability (c) To ensure land is developed in an orderly manner		**Priority condition loss addressed by Action Plan** Efficient use and development of resources within Freehold Land management units *(See high priorities in table 6-2)*	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
		Monitoring and evaluation targets	
		F11	Develop and implement a cost effective system to monitor the trend in profitability and productivity of the region's agricultural based industries within each management unit (2007 DPI and EGCMA)

Table 6-4: Ecosystem Management Action Plan. Freehold Land Asset Class.

Action Plan Objectives: To maintain and improve the condition of high-value natural ecosystems within the Freehold land Management Units		**Priority condition loss addressed by Action Plan** Action plan addresses high priority need to intervene to (a) Increasing the numbers of pest plants and animals in natural ecosystems (b) Loss of biodiversity within natural ecosystems due to grazing, altered fire regimes and clearing (See high priorities in Table 6-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
Ensure native vegetation is maintained in good condition • There will be an overall net gain in the extent of native tree cover on freehold land. The area of high conservation status ecological vegetation classes (threatened EVCs) will increase to 15% of their pre-1750 areas. • There will be no further decline in the size and distribution of populations of regionally occurring species listed under the *Environmental Protection and Biodiversity Conservation Act* and the *Flora and Fauna Guarantee Act* and the populations of these species will increase**.**	• By 2015, 80% of high conservation status EVCs in all Freehold Land management units will be in the following condition: ◊ Key pest plants and animals will be reduced to ecologically sustainable levels; ◊ Grazing in these EVCs will be occurring at ecologically sustainable levels; ◊ Protected from the offsite impacts of other assets e.g. spray drift, high watertables, soil erosion, salt importation, altered water balances and algal blooms. ◊ Will be burnt according to their ecological burning requirements. • For all EVCs, threatening plant and animal diseases will be identified and managed to reduce their impacts;	**Planning Targets**	
		F12	Develop and operate a GIS based inventory of all high-value remnant ecosystems on freehold land (2007 DSE and EGCMA).
		F13	Complete biodiversity action plans to maintain high-value EVCs listed in the inventory. Plans to include all actions required to maintain the ecological functions of the remnants including the need for ecological burning, pest plants and animal control, the development of vegetation corridors between remnants, disease identification and management. Plans should include an assessment of the costs and benefits of various options and agreed cost-sharing arrangements between landowners, the state and the federal governments (2009 DSE). Finalise and implement the East Gippsland Native Vegetation Management Plan. (2005 EGCMA).
		F14	Address potential climate change threats to biodiversity on freehold land, and model impacts to prepare an appropriate strategic response (Ongoing DSE)
		Research Targets	
		F15	Establish baseline information on the status of native fauna, and threats to that status. Where necessary, establish priorities for management intervention to maintain or improve the status of identified native fauna (DSE 2010).
		F16	Support research that will clarify our understanding of the management of 'threatened' species (DSE 2010)

(continued)

Table 6-4 (continued)

Action Plan Objectives: To maintain and improve the condition of high-value natural ecosystems within the Freehold land Management Units		**Priority condition loss addressed by Action Plan** Action plan addresses high priority need to intervene to (a) Increasing the numbers of pest plants and animals in natural ecosystems (b) Loss of biodiversity within natural ecosystems due to grazing, altered fire regimes and clearing (See high priorities in Table 6-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
		Interim implementation targets	
		F17	Continue existing on-ground projects until planning indicates otherwise. (Ongoing EGCMA, DPI and DSE)
		F18	Implement actions of the East Gippsland Native Vegetation Plan. (Ongoing EGCMA, DPI and DSE)
		F19	Build partnerships between private landowners, conservation groups, agencies, universities and museums and build the capacity and knowledge of industry, local government to maintain biodiversity (Ongoing, EGCMA, DPI and DSE)
		F20	Implement the Red Gum Plains Biodiversity Action Plan (DSE, TFN, GA, EGCMA, EGSC, PV landholders, EGLN 2010).
		F21	Continue ecological restoration trials and data acquisition (Ongoing EGCMA, DSE, TFN and GA)
		F22	Undertake systematic surveys to identify native grassland communities (DSE 2007). Develop cost sharing mechanisms to improve their management for conservation. (DSE, 2008)
		Monitoring and evaluation targets	
		F23	Implement the use of Habitat Hectares as the region-wide standard for the assessment and monitoring of the condition of high-value and other EVCs as required (2007 DPI, DSE, PV, EGSC, TFN, VicRoads, and EGCMA)
		F24	Develop (2007 DSE), and implement a landscape-scale biodiversity monitoring program with the aim of understanding trends in ecosystem structure and composition and responses to disturbances and threatening processes (2008 DSE)
		F25	Develop (2007 DPI, DSE and EGCMA), and implement systems to evaluate success and effectiveness for leading EVC maintenance projects (2007 DPI, DSE and EGCMA)

Table 6-5: Soils Action Plan for Agricultural Land. Freehold Land Asset Class.

Action Plan Objectives: To maintain the condition of soils used for agriculture for future generations		**Priority condition loss addressed by Action Plan** (a) Soil erosion and soil structure decline and (b) High watertables (See high priorities in Table 6-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
Improvement in the condition of land within each management unit • Soil erosion, soil structure decline, acidity, soil salinity will be at a rate which is economically and environmentally sustainable.	By 2015, changes relative to 2005 levels will be: • The area of active tunnel erosion in priority areas will be reduced by 40%; • The area of active gully erosion in priority areas will be reduced by 40%; • There will be a 40% reduction in the area affected by wind erosion during declared droughts; • There will be 40 % reduction in the area affected by management induced soil acidity; • 40% of agricultural soils will not suffer significant soil structure decline; • There will be no increase in the area affected by high watertables in all management units; • 10% of severely degraded land will be retired from production; and, • 80% of all land will be used and managed within its capability.	**Planning targets**	
		F26	Assess the extent of soil erosion, soil structure decline and soil acidity on all land used for agricultural production in all management units (2009 DPI)
		F27	Develop a Soil Health Plan for East Gippsland (2007 DPI) Incorporating recommendations to reduce soil erosion, soil structure decline and soil acidity, with priority given to the Red Gum Plains and Mountain Basin units. (2009 DPI)
		F28	Complete Bengworden Salinity Management Plan, to include benefit-cost analysis of various options and the development of agreed cost sharing arrangements (2006 DPI).
		F29	Complete salinity risk assessments for all freehold land management units, other than for the Bengworden area (2008 DPI). If required, complete comprehensive salinity plans for these areas (2010 DPI).
		F30	Carry out land capability assessments of land within in all freehold management units. Start with Red Gum Plains as pilot area (2007 DPI, DSE)
		F31	On the basis of land capability studies, amend statutory planning processes to ensure that new developments are in line with land capability (2009 DPI and EGCMA). Use land capability studies to identify land which should be considered for retirement from production (2010 DSE, local government)
		F32	Assess the likely impacts of market conditions and climatic trends on the condition of soils in all management units (2006 DPI)
		Interim implementation targets	
		F33	Continue to support existing soil conservation activities until planning indicates otherwise (ongoing, DPI, EGCMA)
		F34	Continue to promote the use of alternative enterprises (e.g. private forestry) on land presently used beyond the land's capability (2007 DPI, and EGCMA)
		F35	Increase community knowledge and awareness of land degradation issues, in particular, salinity and tunnel erosion (2007 DPI, and EGCMA)

(continued)

Table 6-5 (continued)

Action Plan Objectives: To maintain the condition of soils used for agriculture for future generations		**Priority condition loss addressed by Action Plan** (a) Soil erosion and soil structure decline and (b) High watertables (See high priorities in Table 6-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
		Interim implementation targets (continued)	
		F36	Ensure landholders in 80% of areas with fragile soil structures are aware of Soil Best Management Practices (2007, DPI) Encourage the adoption of these practices, with priority given to cropping practices on the Red Gum Plains not damaging soil structure.
		F37	Ensure that 80% of relevant land managers are (a) aware of their land management responsibilities; and (b) can define best land management practice on their properties. (2009 DPI, and EGCMA)
		Monitoring and evaluation targets	
		F38	Develop (2007 DPI, and EGCMA), and implement cost effective systems to assess and monitor the impact of land management practices on agricultural soils within each management units. Monitoring to include soil erosion and soil acidity assessments (2007 DPI,)
		F39	Develop and implement evaluation systems for all land management projects (2007 DPI, DSE and EGCMA)

Table 6-6: Pest Animal and Plants Action Plan for Agricultural Land. Freehold Land Asset Class.

Action Plan Objectives: To reduce condition loss on agricultural land, which is associated with increased numbers of pest plants and animals		**Priority condition loss addressed by Action Plan** Increasing numbers of pest plant and animals on agricultural land (See high priorities in Table 6-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
Reduce the impact of pest plants and animals on agricultural production and native biodiversity • The impact of pest plants and animals on agricultural production and biodiversity will be significantly reduced.	• English Broom, Cape Broom, Spanish Heath, Large-leaf Privet will not set seed beyond 2005; • There will be a significant downward trend in Rabbit populations, by 2010; • There will be a significant downward trend in the number of sheep and native animals killed by wild dogs by 2007	**Planning targets**	
		F40	Assess the extent and impact of pest plants and animals on agricultural production and biodiversity within each management unit. (2007 DPI, DSE and EGCMA)
		F41	Revise existing pest plant and pest animal action plans within each management unit, to include benefit-cost analysis for the control of existing and emerging pest plants and animals, and agreed cost sharing arrangements between land managers, the state and federal governments (2008 DPI and EGCMA).
		F42	Review and modify mechanisms to enable more efficient, local management of native animals that are pests. (2007, DPI)
		F43	Pursue amendments to the CALP Act to assist with eradication of weeds at the local level (2006 EGCMA).
		F44	Map ecologically invasive weeds in high conservation status EVCs (2007 DPI, DSE and EGCMA). For those with very high or high conservation significance, develop (2008 DPI, DSE and EGCMA), and implement (2010 DPI, DSE and EGCMA) action plans for management of priority weeds.
		Interim implementation targets	
		F45	Monitor and report on compliance and enforce legislation with regard to pest plant and animal control. (2006 DPI)
		Monitoring and evaluation targets	
		F46	Develop (2006, DPI), and implement cost effective systems to assess and monitor the impact and extent infestations of priority pest plant and animals within each management unit. (2007 DPI).
		F47	Develop (2006 DPI), and implement evaluation systems for all pest plant and animal projects (2007 DPI).

Table 6-7: Agriculture and Urban Sediment and Nutrient Export Reduction Action Plan. Freehold Land Asset Class.

Action Plan Objectives: To reduce the export of sediment and nutrients from Urban and Agricultural sources to local water bodies.		**Priority condition loss addressed by Action Plan** Export of nutrients and sediment from agricultural land and from towns (See high priorities in Table 6-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
Reducing the offsite impacts of land use within a management unit Changes in the land, water and nutrient management practices in each freehold management unit will have led to significant reductions in the damaging exports of sediment and nutrients to other management units	By 2025: • Sediment and nutrient exports to rivers, streams, lakes and wetlands will be reduced by 40%, relative to export levels in 2000.	**Planning targets**	
		F48	Complete the Sediment Sourcing Investigations in the Gippsland Lakes basin, and implement its priority recommendations. (2007 GCB, EGCMA)
		F49	Develop agreed targets for reducing nutrient loads to the Gippsland Lakes (2005 EGCMA , WGCMA and DSE)
		F50	Develop and implement mechanisms to identify equitable shares of sediment load reductions to the Gippsland Lakes (2006 EGCMA, WGCMA and DSE)
		F51	Develop and implement systems to model and monitor sediment and nutrient to rivers, lakes, streams, wetlands and marine waters (2006 EGCMA, WGCMA and GCB)
		F52	Develop and implement stormwater management plans for key towns. Priorities include towns in the Gippsland Lakes Catchment (2006 EGCMA, EGSC))
		F53	Review planning scheme provisions controlling development in the Gippsland lakes hinterland. (2007 EGCMA, WGCMA, local government)
		Interim priorities	
		F54	100% of all dairy farms in East Gippsland to install effective effluent management systems (2008 DPI)
		F55	Ensure all mining and extractive operations have current work authorities and current work plans (2008 DPI)

(continued)

Table 6-7 (continued)

Action Plan Objectives: To reduce the export of sediment and nutrients from Urban and Agricultural sources to local water bodies.		**Priority condition loss addressed by Action Plan** Export of nutrients and sediment from agricultural land and from towns (See high priorities in Table 6-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
		Interim priorities (continued)	
		F56	Best Practice Guidelines developed (2006 DPI), and 50% of farmers made aware of the need to optimise the use of fertilisers for economic return (2008 DPI)
		F57	Prevent tunnel erosion in 20% of currently active areas, in the Bairnsdale Foothills (2009 DPI)
		Monitoring and evaluation targets	
		F58	Develop and implement a system to monitor the export of sediments and nutrients from each management unit (2006, EGCMA)
		F59	Develop and implement a system to model and monitor exports of sediment and nutrients to the Gippsland Lakes (2006 EGCMA , WGCMA).

Table 6-8: Fire Management Plan. Freehold Land Asset Class.

Action Plan Objectives: To minimise the impact of fire and flood on assets within the Freehold Land management units		**Priority condition loss addressed by Action Plan** Flood or fire damage to agricultural land and towns (See high priorities in Table 6-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
Fire will be managed to minimise the risk to life and property while ensuring that the fire regimes meet the needs of the natural ecosystems	Reduced risk of loss of life and property damage from both fire and flood, relative to levels occurring in 2005	F60	Develop and maintain adequate emergency flood-warning and community safety management arrangements in the region. (Ongoing EGCMA, DSE, local government)
		F61	Continue current fire management activities and ensure integration of public and private land fire management plans. (Ongoing DSE, local government)

Table 6-9: Cultural Assets Action Plan. Freehold Land Asset Class.

Action Plan Objectives: To reduce damage to sites of cultural significance within Freehold Management Units		**Priority condition loss addressed by Action Plan** Damage to cultural heritage sites on both urban and agricultural land (See high priorities in Table 6-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
Protection of Indigenous and non Indigenous Cultural Heritage on Freehold land • Most freehold land managers will be aware of the Indigenous cultural heritage values on their properties and many will be working in partnership with Indigenous people and the state to protect those values.	By 2010: • 100% of high value Indigenous cultural assets will be protected in each management unit • 70 % of freehold land managers will be aware of Indigenous cultural heritage.	**Planning targets**	
		F62	Develop and implement a GIS inventory of cultural assets within each management unit. (2009 DSE and AAV)
		F63	Develop and implement cultural asset protection plans for cultural assets in each management unit. Plans to include agreed cost sharing arrangements between key interest groups (2008, DSE and AAV)
		F64	Develop and implement a plan to increase the capacity of Indigenous people to participate in the planning and management of cultural heritage assets in each freehold land management unit (2006 EGCMA, DSE)
		Interim implementation targets	
		F65	Facilitate greater communication between freehold land managers and traditional landowners (2006 EGCMA, DPI and DSE)
		Monitoring and evaluation targets	
		F66	Develop and implement cost effective systems to assess and monitor the condition of cultural assets within each management unit (By 2006)

7 PARKS ASSET CLASS

7.1 Overview

The Parks Asset Class (Figure 7-1) covers an area of approximately 472,500 ha. It includes National and State Parks, Flora and Fauna Reserves, Wildlife Reserves, and other smaller reserves, all managed by Parks Victoria. The main management objective for this class is to maintain and enhance conservation values. These provide the basis for a variety of valuable tourism, recreational and conservation pursuits. There are nine management units within this class.

Park usage is some 993,000 visitor days per year, with each visitor spending between $13 and $45 per day. The economic return to the state is calculated as 'Recreational Value', which is defined as 'the visitor's willingness to pay over and above the costs they have incurred in travelling to the Park'. Recreational Value then represents the net contribution to the state economy[28]. This is estimated at $23 million for the Parks Asset in East Gippsland

7.2 Assets within the Parks Asset Class

Production assets

As the Parks asset class is fundamentally for conservation of the region's natural resources, commercial production is limited.

Apiary

Bee-keeping is a small but important industry in East Gippsland. Many parks have allocated sites for seasonal use by bee-keepers.

Mining

With the current high gold prices there is renewed interest in reworking old gold mining areas. Developments are being undertaken at Cassilis (within the Cassilis Historic Area), for reworking mullock heaps to extract gold as well as re-opening the old adit. A Works Authority has been approved for this project. Conditions of any works permit require that control of the site minimises off-site impacts of any works including seepage of fuel, track maintenance and seepage of chemical pollutants from worked mullock heaps.

28 Economic Assessment of the Recreational Values of Victorian Parks – April 1999.

Environmental assets

The Parks Asset is managed for its environmental and conservation attributes. These attributes are maintained by the various Park Management Plans and by allocation of land into designated Management Zones. The Parks Asset Class includes the following Management Zones:

- 147,500 ha of Wilderness Area;
- 10,790 ha of Reference Area;
- 4770 ha of Heritage River;
- 70,870 ha of Natural Catchment;
- 65,110 ha of Remote and Natural Area;
- 134,007 ha of Conservation Area;
- 560 ha of Historic Area;
- 10,397 ha set aside for Recreational Development and Educational Development; and,
- in excess of 230 Cultural Heritage Sites.

In allocating land to the appropriate zone the following characteristics are considered:

- conservation significance
- recreational uses and potential
- productive uses
- natural, historic and cultural features
- government land use decisions
- other factors such as remoteness, degree of modification and existing facilities.

Management Zones provide a broad guide to the uses and management activities which are appropriate in certain areas and indicate the priority of management objectives.

The naturalness and conservation values include:

- the richness and diversity of the region's ecosystems and species;
- the meeting of outstanding terrestrial, estuarine and marine ecosystems within one region;
- the value of the region for rare and threatened species;
- the large number of both terrestrial and aquatic species and ecosystems found only in the region;
- large proportion of ecosystems in which the self-sustaining processes remain in good condition and effectively self-maintaining.

Some of the benefits of these are:

- providing habitat for predators (e.g. native birds, bats, wasps) for control of pests such as caterpillars and beetles;
- maintaining water quality of dams and streams;
- improving soil condition through build-up of organic matter and improvement of structure, water-holding capacity and nutrients;
- maintenance of soil and stream banks from erosion, salinity, waterlogging and other forms of degradation;
- moderating of temperature, rainfall and humidity;
- maintaining genetic diversity as a reservoir for adaptation to change;
- control of pests, weeds and diseases;
- detoxification of soils and waters and conversion of waste to nutrients;
- tourism, based on landscape character, and nature-based tourism;
- sequestering carbon and reducing greenhouse gasses in the atmosphere.

Native biodiversity is also likely to provide new economic benefits in the future. The exploitation of the genetic and chemical potential of our diverse biota is in its infancy. New products including medical treatments, foods, fibres, ornamental plants and innovative processes may be developed from the reservoir of genetic material in parks.

The diverse biota of the region and its good condition contribute greatly to one of the main attractions of East Gippsland—its natural beauty.

Many forms of tourism and recreation depend on environmental values. Nature study is an important recreational activity in Victoria where the focus is often on species found in or near water bodies—particularly birds. The Field Naturalists Club, Birds Australia, The Bird Observers Club of Australia and school and university students are amongst the community groups that take advantage of the asset values within this asset class. The emerging recognition of nature conservation as a land use reflects the cultural and spiritual values of biodiversity to society.

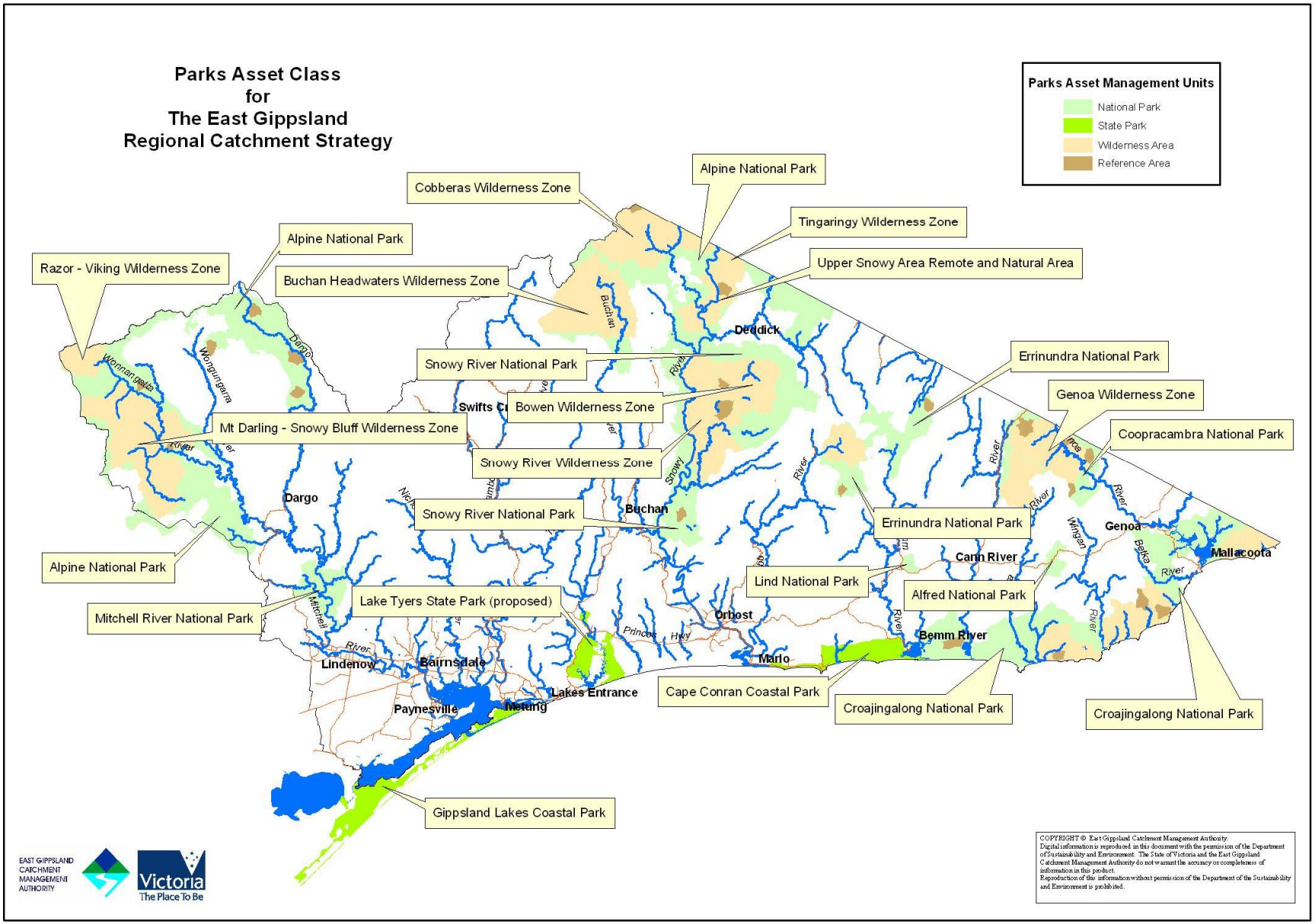


Figure 7-1. Map of the Parks Asset Class in East Gippsland

Cultural assets

There a number of cultural heritage assets within the Parks asset class, including significant Aboriginal and European cultural sites.

Indigenous Culture

There is a valuable and significant history of Aboriginal presence dating back at least 30,000 years. Over 230 Indigenous Cultural Heritage sites have been identified. Evidence of Aboriginal occupation includes stone tools, flakes, grinding tools, open occupation sites, rock shelters, and scarred trees. There are numerous sites of significant value to the Indigenous community that have been recorded on a register established and managed by Aboriginal Affairs Victoria.

The protection of Aboriginal sites is provided for under the Archaeological and Aboriginal Relics Preservation Act 1972 and the Aboriginal and Torres Strait Islander Heritage Protection Act 1984. Each National Parks Management Plan has special reference to Aboriginal cultural sites and has recorded Management Strategies for their protection and maintenance.

European Culture

There are several sites of historical interest, relating to themes of grazing, settlement and mining. Few artefacts are visible; name and location are generally all that remain. Historic sites are a valuable scientific, educational and cultural resource because they reveal past land use activities, which fosters an understanding of our cultural heritage and the impact of these activities.

Point Hicks was named for Lieutenant Hicks, aboard the *Endeavour* in 1770, who was the first European to sight the south-eastern Australian mainland. The first Europeans to travel the south-east coast were survivors of the wreck of the *Sydney Cove* in Bass Strait in 1797 on their long walk to Sydney. Settlements were established when early cattlemen moved in, looking for new grazing areas.

Important areas of interest in or adjacent to the area include MacKillop Bridge, one of only two bridge crossings of the Snowy River in Victoria and a site of state significance, and the Mt Deddick Mining area which was worked as a silver and lead mine in the 1890s.

Mountain Huts provide an historical perspective of early graziers' life on cattle runs. Many of these remain today for use by current cattlemen and visitors to the area.

Because of the significance of Indigenous and European cultural sites, the Management Plans for each unit include recommendations for appropriate controls for their protection.

7.3 Condition of and Threats to Assets

The natural resource base contains valuable vegetation, sites of cultural significance, significant habitats and important water supply catchments. These form the major assets of this asset class. Any activity or process that may have an impact on these values is highlighted for action in the Management Plans. The management of threats in this asset class will be greatly assisted by creating a good working and cooperative partnership with all groups involved, including adjoining government agencies, adjoining private landholders and visitors to the Parks. There are real benefits from having a 'good neighbour' approach. Threats are described in the following sections.

Erosion

Some erosion processes occur naturally in the environment. However, human activity can accelerate natural processes and create new ones. Erosion occurs where vegetation has been disturbed for infrastructure and other developments, such as access tracks, campsites and roads. Erosion can also be the result of intensive forests fires. The major effect of erosion is to lower water quality and increase sedimentation in streams. The offsite effects of erosion include nutrient build up and algal blooms in waterways and coastal estuaries, damage to roads and other infrastructure, reduced water quality for town water supplies, and damage to native aquatic flora and fauna through increased turbidity and decreased light intensity in rivers and streams.

Pest Plants

Pest plants threaten natural ecosystems. Once established, pest plants are superior competitors for nutrients and water and may provide harbour for pest animals. A potentially dangerous pest to native vegetation is the Cinnamon Fungus disease. This disease has been recorded throughout the asset class. Constant monitoring will be needed to assess its impact on vegetation communities.

Pest plants can be transferred within the region, or be brought in from areas outside the region, by animals and people. The approach identified in Management Plans is to develop a Pest Plant Management Plan to prevent major degradation by invasion and dominance of weeds and disease.

Surveillance for new and emerging weeds species is an ongoing activity. Parks managers need to remain vigilant to identify and deal with any likely future weed introductions. Vigilance by responsible agencies, visitors and adjoining neighbours in controlling new pests before they become established is one of the keys to successful weed management. Some significant weeds such as Boneseed are small in area and limited in their distribution, and it may be possible to eradicate them.

At the local area level, the partnership between the regional community, DPI and local government continues to support cooperative local weed initiatives. These groups have developed Local Area Weed Plans for specific areas in Gippsland which describe the requirements for noxious weed management under the Catchment and Land Protection Act 1994 (CALP Act). They identify the noxious weeds present in the area and provide policies, actions and priorities for weed management in that area. In addition to these plans, there is a Weed Management Strategy in the Management Plan for each management unit.

Weed management options should identify the economic and environmental costs of the presence and spread of the weed. When the benefit of weed control is shown, action should be taken to contain the weed for the maintenance of the natural asset.

Pest Animals

Wild dogs, foxes, cats, rabbits, goats, deer and wild pigs pose a threat to fauna, birds and vegetation communities in natural ecosystems. All of the proclaimed pest animals under the CALP Act, except the dingo, are exotic species. The presence of pest animals is a major problem along the boundaries with private land.

Rabbits, deer, goats and pigs contribute to soil erosion and loss of vegetation, and prevent regeneration of native vegetation communities. Rabbits in coastal areas create nuisance and cause structural damage to infrastructure. Cooperative control measures, involving local communities, have resulted in significant reductions in rabbit densities across the region. These should be continued as they have been successful so far.

Wild dogs have long been an acknowledged threat to agriculture. The focus of investment on electric fencing, poisoning and concerted trapping through the Gippsland Wild Dog Management Group continues to see progress in reducing their impact.

Pigs and goats threaten vegetation and hence soil stability. They are vectors for disease and, in localised circumstances, they have contributed to the decline of specific species. The small populations of pigs and goats on public land should be eradicated to maintain both public and freehold land values. Foxes are present throughout the region and affect biodiversity and agriculture, from coastal islands to alpine environments. A landscape-scale fox eradication project is underway in East Gippsland. Feral cats contribute to the decline of native species and are widespread. Many land managers understand that deer species and wild horses can be a significant threat to environmental values. Important decisions must be made to address the threats of these two pest animals to high-value ecosystems.

Altered Fire Regimes

The National Parks Act requires the Director of National Parks to ensure that appropriate and sufficient measures are taken to protect Parks from damage by fire.

Current fire protection measures are in accordance with the Gippsland and North East Regional Fire Protection Plans. These Plans include provision for the maintenance of a system of fire protection tracks; liaison with private landholders for the common purpose of fire management within the Park and on adjacent land; and information including the location of reference areas of ecological and cultural significance. The Parks' fire protection strategy will be reviewed in association with reviews of Fire Protection Plans or as new information becomes available, ensuring that Park values are considered in the preparation of fire pre-suppression strategies.

Research is required into the effects of fire on flora and fauna communities. This is particularly important in planning controlled fires for the protection of those species or communities identified as threatened in the Park Management Plans.

There is strong evidence to support the need for ecological burning in some parts of the Park system for vegetation and habitat management. Areas which will not be burned are also designated in each Park Management Plan. Fuel reduction burning will be avoided in, and adjacent to, areas sensitive to fire. These are designated in each Park Management Plan.

Fire management within Parks aims to:

- protect life, property and Park values from injury by fire
- minimise adverse effects of fires and fire suppression methods
- maintain fire regimes appropriate to the conservation of native flora and fauna.

Management Strategies include using the following suppression methods whenever practicable, particularly in wilderness areas, reference areas and special protection areas:

- use of hand tools and aerial suppression
- use of existing helipads or, if needed, creating new ones where already proposed
- use of existing roads and tracks and natural features as control lines
- back-burning

Wildfires could be allowed to burn out to appropriate control lines, outside the main fire danger periods and where conditions allow.

Rehabilitation of fire control lines, temporary helipads and other disturbances resulting from fire suppression activities should start as soon as possible.

Fire must be managed to maintain natural resource and productive assets whilst providing for the needs of East Gippsland's ecosystems. This is an issue where government agencies and the community need to develop a clear common understanding of the risks involved in different fire management strategies and to agree on a preferred approach. In the meantime, existing fire management strategies should be implemented. State government agencies have long recognised the need for a holistic and scientifically based approach to the management of fire, and have preliminary prescriptions in place for fire in most Ecological Vegetation Classes.

Table 7-1: Overview of Management Units in the Parks Asset Class

Unit	Area ha	Visitor Nos	Natural Resource Use	Gross Recreational Value ($ million)	Regionally Significant EVCs	Natural Resource Condition
Alpine National Park Cobberas-Tingaringy Unit (CTU)	178 400		Wilderness, Reference Area, Conservation Area, Remote and Natural Area, Historic Area and Recreational Development Area. Mining for gold, grazing of cattle to a limited extent.	6 (for the whole Alpine NP – individual contribution of CTU unknown)	Alpine Wet Heathlands, Snow Gum Woodlands, Rain Shadow Woodlands, Alpine Ash Forests, Montane Sclerophyll Woodlands, Rocky outcrop Open Scrubland, Riparian Forest, Wet Sclerophyll Forests, Dry Sclerophyll Forests.	Weeds and pests including: Blackberry, Sweet Briar, Hemlock, Fennel, Willows, Poplars and English Broom. Pest Animals include brumbies, wild dogs, rabbits, pigs, deer, foxes, cats and goats. Small areas of erosion along tracks on steep erodible soils.
Cape Conran Coastal Park	11 700	200 000	Conservation Area, Recreation and Education Area.	4.100	11 EVCs with 23 sub communities most related to Banksia Woodland and Wet or Sand Heathland EVCs	Dogs, Fox, cat and pigs have an impact on natural values. Spread of Cinnamon Fungus has potential.
Snowy River National Park	98 700	27 300	Wilderness Area, Reference Area, Heritage River, Natural Catchment Area, Cultural Heritage Sites, water supply.	1.000	13 vegetation communities have been recorded. Including Snow Gum Woodlands, rocky outcrop scrubland, ancient stands of multi-aged ash forests, old growth Alpine Ash, Manna Gum forests rainshadow woodlands and heath lands and native grasslands.	Highest concentration of weeds occurs along the Snowy River adjoining settled areas. Blackberry and Willow are the major weeds. Stream bank erosion and catchment erosion, particularly from NSW impose the major threat to in-stream habitat quality. Flooding on the Snowy River flats is frequently an issue. Presence of pest animals including dogs, cats, pigs, goats, foxes and deer have significant impact on critically Endangered native species.
Errinundra National Park	25 600	6 600	Reference Area, Natural Catchment Area, Remote and Natural Area, Conservation Are.	0.210	15 EVCs recognised supporting 60 fungi, 46 lichens and 600 higher plants. A substantial proportion of the vegetation is Wet Forest and Cool Temperate Rainforest	Erosion along tracks with landslip and land slide on the Errinundra and Greens Road. Blackberry, the only serious weed. Wild dogs, cats and foxes prey on native animals and compete for food with the Spot-tailed Quoll.
Croajingalong National Park	87 500		Wilderness Area, Reference Area, Heritage Rivers, Natural Catchment, Remote and Natural Area.	5.000	Vegetation varies from Cool Temperate and Warm Temperate Rainforest with 10% occupied by Coastal Heathland	Bridal Creeper, Cape Ivy, and Dolichus Pea are the major weed species. Foxes, cats and dogs are major problem with pigs and goats having potential. Soil erosion is confined to minor wind erosion along coastal sands.

(continued)

Table 7-1 (continued)

Unit	Area ha	Visitor Nos	Natural Resource Use	Gross Recreational Value ($ million)	Regionally Significant EVCs	Natural Resource Condition
Coopracambra National Park	38 800	800	Wilderness Area, Reference Area, Heritage Rivers, Natural Catchment Area, Remote and Natural Area, Cultural Sites.	0.013	13 EVCs have been defined with Damp Forest, Lowland Forest and Shrubby Dry Forest being the most widespread.	Weed infestations along the Cann and Genoa Rivers include Blackberry, Willow spp, Morning Glory, Sweet Briar and Poplar. Pest animals include pigs, wild dogs and foxes. Cats pose a major threat to native animals.
Mitchell River National Park	11 900	50 000	Conservation Area, Conservation and Recreation Area and Recreational Development, Water Supply catchment for towns from Bairnsdale to Lakes Entrance and Paynesville.	1.140	5 major vegetation communities recorded; Closed Forests are of National biogeographical significance, Dry Rainforests, Open Forest, Closed Scrub and Open pastures.	Major weed infestations include Blackberry, Blue Periwinkle, Willows spp, Wandering Creeper, Ox-eye Daisy and Ragwort.. Pest Animals include feral goats, rabbits, foxes and cats. Feral goat population is of major concern in the dry rainforest areas. The highly erodible red earths at Glenaladale are the major soil erosion problems. These are highly dispersible and tunnel prone.
Gippsland Lakes National Park	19 900	232 000	Conservation and Recreational Area	4.900	Deep Freshwater Marsh, Swamp Scrub, Estuarine Wetland, Floodplain Reed Bed, Coastal Salt Marsh, Damp Sands Herb Rich Woodland, Valley Grassy Forest Swamp Scrub Mosaic.	Foxes, cats and domestic dogs pose a threat to the native birds and in particular Little Tern nesting sites, Hooded Plover and the declining New Holland Mouse.
Lind and Alfred National Park	4 425	4 000	Recreational and conservation use		Warm Temperate Rainforest, Damp Forest, Lowland Forest, Wet Forest and Shrubby Dry Forest EVCs	Alfred is recovering from major vegetation loss from the wildfire of 1983 that almost completely burnt out the native vegetation communities.
Totals	476 920	>997 300		23.000		

The above figures are obtained from: (1) Parks Management Plans; (2) Economic Assessment of the Recreational Values of Victorian Parks – April 1999.
Recreation Value is defined in Section 7.1

7.4 Snapshot of each Management Unit in the Parks Asset Class

Mitchell River National Park Management Unit

The Mitchell River National Park management unit covers an area of 14,000 ha on the western boundary of the region. There are five major vegetation communities within it. These are: Closed Forests, which are of national biogeographical significance; Dry Rainforests in the Mitchell River Gorge; Open Forest which is the most widespread community; Closed Scrub Forest, most prevalent around Glenaladale; and Open Pastures, containing a variety of introduced grasses mixed with native Wallaby and Brown Grass, at Angusvale and Horseshoe Bend. Dry Grassy Woodland on ridge tops is a significant Ecological Vegetation Class.

The Mitchell River runs close to populated areas such as Bairnsdale and Sale and is seen as an accessible and enjoyable day trip. Activities include canoeing and rafting, and hiking on the Mitchell River Walking Track and the circuit walking track to Bluff Lookout. The Den of Nargun is popular for day visitors. Hunting is permitted in accordance with regulations.

Businesses in Bairnsdale, Maffra, Sale and adjoining small towns all benefit from the visitors to this area.

Major weed infestations are a serious problem. Blackberry, Blue Periwinkle, Willows, Ox-eye Daisy, Ragwort and Wandering Creeper are particularly bad along the river. This increases the risk of them spreading to neighbouring private land. Feral goat populations have caused concern in the past. A focused control program has assisted in controlling goat numbers. This should be maintained to ensure numbers remain at low levels, at least in priority areas.

The red soils at Glenaladale are highly dispersive and prone to tunnel erosion. Special care is required in managing these soils as they have a high potential for causing turbidity in the Mitchell River.

Management of the Mitchell River National Park is important, as the Mitchell River is a water supply for Bairnsdale, Paynesville, Lakes Entrance, Nicholson and Sarsfield. The Mitchell River National Park is significant for its contribution to the state and national natural resource estate. Protection and enhancement of the assets is the responsibility of Parks Victoria in consultation and partnership with adjoining private landholders, government organisations and visitors to the area.

The economic contribution to the State of Victoria is estimated at $1.14 million, measured as Recreational Value (Section 7-1).

Cape Conran National Park Management Unit

The Cape Conran management unit covers an area of 11,700 ha along the coast east of Orbost. It includes 4550 ha of Conservation. Zone, 6080 ha of Conservation and Recreation Zone, 95 ha of Recreation Development Zone and 975 ha of Education Zone.

Cape Conran is a valuable camping and recreational area. Its usage is about 200,000 visitor days per year. Visitors engage in a variety of tourism and recreational activities. There are 11 vegetation communities in this unit, with 23 sub communities, mostly related to Banksia Woodland and Wet Sand Heathland. There is a 995 ha Education Zone adjacent to the Camping Ground. This is used by primary, secondary and tertiary students to undertake studies in conservation and natural resource management.

Major threats to the management unit include the spread of Cinnamon fungus, introduced species, especially foxes and inappropriate fire regimes. Wildfire is a potential threat in any area that has large areas of vegetation and limited access.

The unit supports 40 fauna species considered as threatened, with 10 of these listed as vulnerable in Australia, 5 species listed as endangered in Australia and 14 listed as endangered in Victoria.

There are 40 species of threatened flora, with two species listed as rare in Australia and 33 listed as rare in Victoria, two species listed as vulnerable in Australia and seven listed as vulnerable in Victoria.

Management of this unit is the responsibility of Parks Victoria, who work in partnership with the visitors, adjoining government organisations and Indigenous communities to maintain the integrity of the conservation values that benefit the community and the nation.

The Cape Conran management unit provides an economic contribution to the State of Victoria of $4.1M.

Snowy River National Park Management Unit

The Snowy River National Park management unit covers an area of 98,700 ha including 45,000 ha of Wilderness Area, three Reference areas totalling 2550 ha, 70 km of Heritage River, and 44,760 ha of Natural Catchment area. This unit has a usage of some 27,300 visitor days per year.

Tourism and recreation are the primary activities in this unit. The area has 61 threatened plant species. The habitat supports 250 species of native fauna, 22 of which are listed as threatened; including the Long-footed Potoroo, Rare Tiger Quoll and critically Endangered Brush-tailed Rock Wallaby. There are 133 sites listed on the Aboriginal Affairs register. One, of archaeological significance, dates back 21,000 years.

About 80 introduced plants have been recorded. Whilst none are invasive, some have a high potential to spread through the unit. Blackberries and willows are the greatest threat, particularly along rivers where water is a major vector for seeds and cuttings from settled areas.

The threat from the effects of soil erosion is high. The main concern is sediment discharge from the NSW part of the catchment. Sedimentation of the Snowy River has a major impact on stream habitat by filling valuable pools with sand. Off site effects include deposition of sediment and deposition of debris on the valuable low lying agricultural flats downstream of Orbost following major floods.

To maintain the integrity of this unit, it is essential to develop good working relationships—with adjoining private landholders and the NSW Government to minimise soil erosion in the catchment, with Indigenous communities to maintain the valuable Indigenous sites, and with visitors to minimise their impacts.

The Snowy River management unit provides an economic contribution to the State of Victoria of $1 million in Recreational Value.

Errinundra National Park Management Unit

The Errinundra National Park management unit covers 25,600 ha. This includes 7700 ha of Remote and Natural Area, 1450 ha of Reference Area and 10,900 ha of Natural Catchment. The major use of the Errinundra unit is for conservation to maintain the Park in essentially its natural state. Because of this, activities are restricted to walking and two and four wheel drive access tracks.

The unit has a usage of about 6600 visitor days per year, delivering a Recreational Value of $210,000 to the State of Victoria.

The unit contains Victoria's largest stand of Cool Temperate Rainforest. Over 700 native plants are recorded including 25 rare or threatened species, and 59 species identified as significant, uncommon or of botanical significance in East Gippsland.

The unit has important cultural heritage significance for both European and Indigenous communities. The Errinundra Plateau linked ancestral trails and was a meeting place for neighbouring tribes.

The natural condition of this area ensures high quality water.

Croajingalong National Park Management Unit

The Croajingalong National Park management unit covers 87,500 ha including 22,670 ha of Sandpatch and Cape Howe Wilderness Area, four Reference Areas totalling 3,665 ha, a Remote Zone of 9,800 ha, 49 ha of Education Area, 340 ha of Heritage River Area and 13,630 ha of Natural Catchment Area. This unit forms part of the Croajingalong National Park Biosphere Reserve which has been designated under the 'Man and Biosphere Program' of UNESCO. It is one of only three such reserves in the state.

This unit provides habitat for over 1,000 native plants, 87 of which are listed as threatened in Victoria and which have their primary occurrence in the unit. There are 90 species of orchid, including 5 of Australia's lithophytic and epiphytic orchids.

The Coastal Heathland vegetation community, covering about 10% of the unit, is particularly rich in fauna. It supports 43 species of threatened native fauna, including the Little Tern, Ground Parrot, Eastern Bristle Bird, Eastern Broad Nosed Bat and Australian Fur Seal. This unit contains one-third of Victoria's and one-quarter of Australia's recorded bird species. It contains highly significant coastal streams and catchments which are relatively undisturbed, with an absence of introduced fish species and good populations of native fish.

This unit includes Point Hicks, where the first European sighting of the eastern Australian Mainland took place in 1770.

Together with Cape Conran Coastal Park, this unit forms the largest continuous coastal reserve on the south-eastern Australian mainland, encompassing more than 115,000 ha of land and 150 km of coastline.

The abundance of artefacts and middens indicates a history of a reasonably large population of Indigenous people.

Over 100 species of introduced plants have been recorded. The majority are restricted in distribution and occur in association with localised disturbances such as campsites and tracks. Bridal Creeper, Cape Ivy and Dolichos Pea are the main problem plants.

Seventeen introduced vertebrates have been recorded. Major problem species include foxes, cats and dogs because of their impact on native fauna. Pigs and goats have the potential to have a degrading impact on vegetation communities if their numbers rise.

This unit provides an economic contribution of $5 million in Recreational Value to the state.

Coopracambra National Park Management Unit

The Coopracambra National Park management unit covers 38,800 ha including 19,400 ha of Wilderness Area, 1,235 ha of Reference Area, 8,100 ha of Remote and Naturalness Area, 1,300 ha and 27 km of Heritage River Area and 2,400 ha of Natural Catchment Area. This unit is essentially undisturbed. The Genoa River Gorge is of international and national significance for its palaeontological, geological and geomorphological features, especially the tetrapod track. This is about 393 million years old which places it among the oldest known in the world.

There are 29 rare flora species and 11 vulnerable species. The unit contains 8 Endangered fauna species and 6 vulnerable fauna species including the Southern Barred Frog which is a critically Endangered species.

The unit is to remain essentially in its natural state. Only about 800 visitor days are recorded each year. It is appreciated for its wilderness values, natural condition and its remoteness.

Major threats include weed invasion by Blackberry, Morning Glory, Willow, Sweet Briar, Blue Periwinkle and Poplar which are thought to have originated from settlements upstream. Pest animals include rabbits, dogs, foxes, black rats, cats, house mice, goats and pigs. Some of these will have an impact on vegetation communities and some will prey on native animals. Wildfire is also a serious threat. Heavy rain has the potential to cause damage to tracks and amenities if they are left in a vulnerable state by visitors. However, due to the small numbers of visitors to the area, this threat is minor.

The accumulation of sand within the Genoa Gorge has changed the river's habitat markedly since the 1971 flood. New sandbanks provide ideal sites for willow invasion along the river corridor. Deep rock pools have filled with silt. The effect of this sediment on the biota has probably been to reduce diversity and to change species composition. Stream erosion during high rainfall periods is of concern in the Wangarabell area.

Major floods on the Cann River and Genoa River after heavy rain have moved sediment progressively downstream, causing problems in Tamboon Inlet and on floodplain agricultural land near Genoa.

Visitors are attracted to this unit by the scenery associated with the Genoa sandstone gorge and the granite peaks of Mt Kaye, Mt Denmarsh and Mt Coopracambra. There are excellent opportunities for high quality wilderness experiences and recreation in a remote setting.

This unit provides an economic contribution estimated to be $13,000 in Recreational Value to the state.

Gippsland Lakes National Park Management Unit

The Gippsland Lakes National Park management unit covers 19,900 ha and is zoned for Conservation and Recreation. This unit is adjacent to the Gippsland Lakes so it provides an excellent recreational and tourism focus for visitors to the area as well as for the local town populations of Bairnsdale, Paynesville, Lakes Entrance and Loch Sport. The usage is some 232,000 visitor days per year.

The Gippsland Lakes are listed as an internationally significant Ramsar wetland for the many thousands of migratory wading birds that make their home there every summer. Since European settlement increased sediments and nutrients entering the Lakes along with changes caused by the establishment of a permanent opening to the sea at Lakes Entrance and clearing of the hinterland and shorelines has resulted in changes in water quality. Major government and community efforts are being directed to improve the ecological health of the Lakes system.

The unit provides suitable habitat for the Endangered Little Tern but it also provides habitat for the Little Tern's main predator, the fox. The major threat to the unit is the impact of the high concentration of visitors.

There are minimal pest plant and animal threats. There is minor wind erosion on the dune fronts where vegetation is absent or scarce.

This unit provides an economic contribution of $4.9 million in Recreational Value to the state.

Lind and Alfred National Park Management Unit

The Lind National Park covers 1,370 ha and Alfred National Park covers 3,050 ha. These parks are adjacent to each other and are situated on the Princes Highway. Little is known about the fauna of either park. No surveys have been undertaken in the last 30 years. Both parks are among the earliest Parks established in Victoria. Alfred National Park is recovering from wildfires in 1983. Full recovery is expected to take some decades. Protection of the Rainforest and Eucalypt areas is critical during this recovery period.

There is minimal impact from either pest animals or plants, apart from Blackberry which poses the most significant threat.

There are two Aboriginal artefact sites in Lind National Park but there has been no survey work undertaken.

Alpine National Park Management Unit

Victoria's Alpine National Park is the state's largest, covering 646,000 ha. Of this, the Cobberas–Tingaringy and Wonnangatta–Moroka Park Units are situated in the East Gippsland region, covering 178,400 ha. The East Gippsland units include 1,890 ha of Reference Area, 60,400 ha of Wilderness Area in the Cobberas–Tingaringy Park Unit and 55,700 ha in the Wonnangatta–Moroka Park Unit. There are also 39,510 ha of Remote and Natural Area, 75,890 ha of Conservation Area, 560 ha of Historic Area and 150 ha of Recreation Development Area in this management unit.

This unit supports 16 nationally significant rare flora species and one nationally significant endangered species, Bent Grass (*Deyeuxia pungens).*

Threatened fauna species that find habitat in the unit include Tiger Quoll, Alpine Water Skink (vulnerable) and Broad Toothed Rat (rare).

The unit has a history of European settlement with cattle grazing dating back to the 1840s. Exploration of the area by MacKillop in 1835 and McMillan in 1839 is an important part of Victoria's history. Indigenous culture is also important, with 45 sites listed on the Aboriginal Affairs Victoria Register as being of significant Indigenous value.

Dominant features include the Cobberas Range, Mount Pinnibar, Davies Plain Ridge, Mount Tingaringy, Mt Razor, Mt Darling and the rugged valleys of the Buchan Headwaters and Suggan Buggan Rivers.

Pest animals within in the area include wild dogs, wild horses, cats, foxes, goats, pigs and deer. Most prey on native animals or threaten their habitat. Pest plants include Sweet Briar, Hemlock, Fennel, Willows and Blackberry.

Soil erosion can cause sediment problems and disrupt access where it occurs on tracks. The unit is subject to high intensity summer thunderstorms which can create problems on soils that have been disturbed for road and track works or where fire has removed vegetation.

Fire is a major issue for the unit. Between 1974 and 1985, 53 fires started within it. Thirty-five were caused by lightning and 15 by human activity. The cause of the other three is unknown. These fires burnt out 7,300 ha of native vegetation. The recent 2003 fires burnt a high percentage of this unit, with devastating impact on vegetation and habitat, as well as on adjoining private land. Many of the Alpine vegetation communities are very susceptible to fire because of their slow regeneration.

Major offsite impacts on adjoining areas include the threat of wildfire spread and, for private landholders, the threat from wild dogs, pigs and pest plants.

The Buchan Catchment Special Protection Area (Proclaimed Catchment) is in this unit. Good quality water is a valuable product from this unit. However, the 2003 wildfires have created substantial water quality problems.

7.5 Strategic Context and Summary of Issues

The Parks Asset Class includes unique landscapes and pristine environments, which are of national significance. Large areas of ancient eucalypt forest, valuable old growth forest, scenic coastal landscapes and habitats for a number of State and National threatened flora and fauna species are found here.

A number of the Parks Assets are of international significance. Croajingalong National Park is recognised by the UNESCO as a Biosphere Reserve due to its outstanding conservation, recreation and wilderness values. The Gippsland Lakes are listed as an internationally important Ramsar wetland for their migratory wader habitat.

Within our parks and reserves are opportunities for a wide variety of experiences, ranging from passive enjoyment of remote wilderness, coastal and mountain walks through to more active pursuits including white water rafting in some of the rivers and hunting during proclaimed open seasons.

The National Parks system also provides valuable historical information for both early European settlement and more particularly a valuable insight into the history of Aboriginal occupation dating back some 30,000 years.

The local community benefits substantially from tourism through the provision of food, accommodation, fuel and other services to Parks visitors. An economic assessment of the Recreational Value of Victorian Parks undertaken in 1999 (Economic Assessment of the Recreational Values of National Parks, DNRE, April 1999) estimated that parks and conservation reserves within the region make a net contribution to the state's economy of at least $23M. Individual contributions to this total range from an estimated $13,000 for Coopracambra National Park to $4.96 million for the Croajingalong National Park.

The parks and reserves system is in relatively good condition. Management Plans have been developed for each of the key conservation reserves. Some of these Plans are now in need of review and updating to recognise changing management objectives.

Community participation in the planning process and in implementation of management actions is essential. It has historically provided opportunities for various interest groups to participate in determining management objectives and to assist in implementing appropriate actions which may include such activities as threatened species monitoring or control of pest plants and animals. Effective engagement of local Indigenous communities is also essential for the long-term protection of cultural heritage sites in conservation reserves and is required under existing government policy, and state and Commonwealth legislation.. Park managers also need to be aware of the threat of incremental degradation of natural values and the need to manage accordingly.

To ensure maintenance of Park and reserve values, visitors should be encouraged to use Parks through development of appropriate infrastructure outside the Parks. Planning processes should facilitate appropriate development on nearby freehold land to provide extra visitor infrastructure while having an overall minimal impact on natural values.

Fire is a natural phenomenon that has shaped our ecosystems and biodiversity. It occurs seasonally across the natural landscape. Fire suppression and management on Crown land is the responsibility of DSE and is addressed in the Gippsland Fire Protection Plan (NRE 1999), and for the surrounding private land in the East Gippsland Municipal Fire Prevention Plan (EGSC 2001). These are compiled following appropriate community and stakeholder consultation. Fire management and the escape of wildfire are considered major concerns by communities adjoining Crown land. Existing fire management strategies should continue to be implemented as per approved Fire Protection Plans

Our parks and reserves are a valuable regional and national asset. Balancing the desire to use them, for recreation and for economic return, with the need to maintain them is a major challenge for the region.

7.6 Broad Objectives for Management of the Assets within the Parks Asset Class

The management of East Gippsland parks and conservation reserves should:

- provide for park and reserve visitors to benefit from the amenity without compromising the asset's natural and cultural values; and
- ensure that the Parks assets are managed appropriately to ensure that values are sustained in the long term.

7.7 Strategic Directions for the Parks Asset Class

Each Park has a Management Plan which outlines the strategic management requirements to maintain its assets. In many cases these plans refer to adjoining parks and use the same formal template for plan development. Many of these plans are ready for review and updating, particularly following the 2003 fires. There is a need to review the current status of the assets and their condition. This provides an excellent opportunity to increase the involvement of the community and increase their sense of ownership of the asset. A benefit-cost analysis would establish a basis for prioritisation. There are still gaps in areas such as fire management regimes for ecological purposes, pest plant and animal control techniques in isolated areas and erosion control techniques to reduce off-site impact.

There are four general steps to achieving the broad objectives: planning to map out a course of action, implementation of the course of action, monitoring and evaluation. These apply to all the strategic directions.

The strategic directions outlined below provide an integrated approach to natural resource management planning for National Parks across the region. Their adoption will help overcome some of the current difficulties discussed above.

For each Management Unit:

Develop an assets inventory

The inventory should include high-value remnant natural ecosystems, communities and species of high conservation status, cultural assets; land used for conservation and recreational purposes. Much of this information may be available in various forms, meeting this objective may only require integration of existing databases. The information should be made available to resource managers and the community.

Develop a system to monitor trends in profitability

All relevant agencies should work in partnership to develop a cost effective system to monitor the trend in profitability and productivity of the Park's natural resources within each management unit. The information could be used to benchmark the performance of industry utilising the Park's natural resources and assess the likely impacts of the trends on the social, economic and environmental well-being of the region

Develop a system to monitor the export of sediments, and escape of weeds and fire

A monitoring system should be developed to assist the Park Managers to monitor the impact of the export sediment, pest plants and animals and especially fire from each management unit. This will allow prioritisation of management actions to concentrate on those of higher community benefit and in locations of most value to the community.

Protect sites of known cultural significance

Action Plans should be developed, or where existing, reviewed, to ensure all cultural heritage sites of significance are protected.

Assess options to improve the condition of assets

All of the Management Units have Management Plans that outline actions to be taken to manage the parks. It is now appropriate to revamp pest plant and pest animal action plans, soil erosion control plans, fire management plans and cultural heritage management plans within each management unit. These revamped plans should include benefit-cost analysis for each of the activities within the asset class. Plans should also include agreed cost sharing arrangements between land managers the state and federal governments, particularly along boundaries between Park and private land. Review current Management Plans to ensure they remain relevant to the current condition of the assets.

For the whole Asset Class:

Develop consistent systems to assess the condition of the resource base.

All relevant agencies should cooperate to develop a consistent system to assess and monitor the condition of assets listed in the Management Units inventory. This system should be consistent with those developed for all management units across the region to enable development of a regional assets inventory. National Parks systems should include benchmarks for extent and rate of soil erosion, the health of natural ecosystems, presence of weeds and pest animals, location and extent of plant disease and the condition of cultural assets.

Ensure the community is engaged in the decision making process

Develop a Communication Plan to improve awareness of management unit assets and how the community can participate in their management to maintain and enhance their conservation, recreation and cultural heritage values.

Assess the strategic value of investing public funds in Parks

Every five years develop a set of accounts which itemise public investment in each management unit against the public benefits generated. These accounts should be used to guide future investment.

Maintain existing projects until action planning indicates a need to change direction

There is an expectation that current plans and Park directions will continue to be implemented. These plans should continue until planning, monitoring and evaluation programs indicate a change in direction due to better investment elsewhere.

7.8 Management Action Priorities

Priorities for intervention to maintain or improve the condition of assets within management units of the Parks Asset Class are set out in Table 7-2. Management actions and targets to address identified high priorities are set out in Tables 7-3 to 7-8.

Table 7-2: Priority 'Need for Intervention' ratings for assets of the Parks Asset Class
(See Chapter 5 for explanation of priority setting process.)

Management Unit and Associated Assets	'Need for Intervention' Priority Rating										
	Soil erosion and soil structure decline	**Export of nutrients and/ or sediment**	**Loss of soil fertility**	**High watertable**	**Increasing numbers of Pest Plants and Animals**	**Soil Acidity**	**Loss of biodiversity ecosystem function from grazing, inappropriate fire regimes, tourism or clearing**	**Acid Sulphate soils**	**Damage to sites of cultural heritage**	**Flood or fire damage**	**Efficient use and development of resources**
Alpine NP Cobberas-Tingaringy Unit											
Biodiversity/ecosystem function	Low	Low	Low	Low	High	Low	High	Low	Low	High	Low
Grazed areas	Medium	Low	Low	Low	High	Low	Low	Low	Low	Low	Low
Mines	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Tourist sites	Medium	Low	Low	Low	Medium	Low	Low	Low	Low	Low	Low
Cultural heritage sites	Low	Low	Low	Low	Low	Low	Low	Low	High	Low	Low
Cape Conran CP											
Biodiversity/ecosystem function	Low	Low	Low	Low	High	Low	High	Medium	Low	Low	Low
Grazed areas	Low	Low	Low	Low	High	Low	Low	Low	Low	Low	Low
Mines	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Tourist sites	Medium	Low	Low	Low	Medium	Low	Medium	Low	Low	Low	Low
Cultural heritage sites	Low	Low	Low	Low	Low	Low	Low	Low	High	Low	Low
Snowy River NP											
Biodiversity/ecosystem function	Low	Low	Low	Low	High	Low	High	Low	Low	Low	Low
Grazed areas	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Mines	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Tourist sites	Low	Low	Low	Low	Medium	Low	Low	Low	Low	Low	Low
Cultural heritage sites	Low	Low	Low	Low	Low	Low	Low	Low	High	Low	Low

(continued)

TABLE 7-2 (continued)

Management Unit and Associated Assets	'Need for Intervention' Priority Rating										
	Soil erosion and soil structure decline	**Export of nutrients and/ or sediment**	**Loss of soil fertility**	**High watertable**	**Increasing numbers of Pest Plants and Animals**	**Soil Acidity**	**Loss of biodiversity ecosystem function from grazing, inappropriate fire regimes, tourism or clearing**	**Acid Sulphate soils**	**Damage to sites of cultural heritage**	**Flood or fire damage**	**Efficient use and development of resources**
Errinundra NP											
Biodiversity/ecosystem function	Low	Low	Low	Low	High	Low	High	Low	Low	Low	Low
Grazed areas	Low	Low	Low	Low	N/A	Low	Low	Low	Low	Low	Low
Mines	Low	Low	Low	Low	N/A	Low	Low	Low	Low	Low	Low
Tourist sites	Low	Low	Low	Low	High	Low	Low	Low	Low	Low	Low
Cultural heritage sites	Low	Low	Low	Low	N/A	Low	Low	Low	High	Low	Low
Croajingalong NP											
Biodiversity/ecosystem function	Low	Low	Low	Low	High	Low	High	Low	Low	Low	Low
Grazed areas	Low	Low	Low	Low	N/A	Low	Low	Low	Low	Low	Low
Mines	Low	Low	Low	Low	N/A	Low	Low	Low	Low	Low	Low
Tourist sites	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Cultural heritage sites	Low	Low	Low	Low	Low	Low	Low	Low	High	Low	Low
Coopracambra NP											
Biodiversity/ecosystem function	Low	Low	Low	Low	High	Low	High	Low	Low	Low	Low
Grazed areas	Low	Low	Low	Low	High	Low	Low	Low	Low	Low	Low
Mines	Low	Low	Low	Low	Medium	Low	Low	Low	Low	Low	Low
Tourist sites	Low	Low	Low	Low	High	Low	Low	Low	Low	Low	Low
Cultural heritage sites	Low	Low	Low	Low	High	Low	Low	Low	High	Low	Low

(continued)

TABLE 7-2 (continued)

Management Unit and Associated Assets	'Need for Intervention' Priority Rating										
	Soil erosion and soil structure decline	**Export of nutrients and/ or sediment**	**Loss of soil fertility**	**High watertable**	**Increasing numbers of Pest Plants and Animals**	**Soil Acidity**	**Loss of biodiversity ecosystem function from grazing, altered fire regimes, tourism or clearing**	**Acid Sulphate soils**	**Damage to sites of cultural heritage**	**Flood or fire damage**	**Efficient use and development of resources**
Mitchell River NP											
Biodiversity/ecosystem function	Low	Low	Low	Low	High	Low	High	Low	Low	Low	Low
Grazed areas	Low	Low	Low	Low	High	Low	Low	Low	Low	Low	Low
Mines	Low	Low	Low	Low	Medium	Low	Low	Low	Low	Low	Low
Tourist sites	Low	Low	Low	Low	High	Low	Low	Low	Low	Low	Low
Cultural heritage sites	Low	Low	Low	Low	Low	Low	Low	Low	High	Low	Low
Gippsland Lakes NP											
Biodiversity/ecosystem function	Low	Low	Low	Medium	High	Low	High	Medium	Low	Low	Low
Grazed areas	Low	Low	Low	Medium	High	Low	High	Medium	Low	Medium	Low
Mines	Low	Low	Low	Low	N/A	Low	Low	Low	Low	Low	Low
Tourist sites	Medium	Low	Low	Medium	High	Low	Low	Medium	Low	Low	Low
Cultural heritage sites	Low	Low	Low	Medium	Medium	Low	Low	High	Low	Low	Low
Lind and Alfred NP											
Biodiversity/ecosystem function	Low	Low	Low	Low	Medium	Low	High	Low	Low	Low	Low
Grazed areas	Low	Low	Low	Low	N/A	Low	Low	Low	Low	Low	Low
Mines	Low	Low	Low	Low	N/A	Low	Low	Low	Low	Low	Low
Tourist sites	Low	Low	Low	Low	High	Low	Low	Low	Low	Low	Low
Cultural heritage sites	Low	Low	Low	Low	High	Low	Low	High	High	Low	Low

Table 7-3: Parks Resource Development Action Plan. Parks Asset Class.

Action Plan Objectives: To ensure that the region gets the best economic, environmental and social return possible, from the use of its National Parks		**Priority condition loss addressed by Action Plan** Efficient use and development of resources. (See high priorities in Table 7-2)	
Aspirational Targets	**Relevant regional Resource Condition Targets**	**Management Actions and Targets**	
Ensuring that the region gets the best economic, environmental and social return possible, from the use of its National Parks: • The regions natural resources will provide a sustainable social, environmental and economic return while minimising environmental impacts;	By 2015: • 70 % of the existing National Park based activities are efficient and will be adopting best business and land management practices.	**Planning targets**	
		P1	Develop and implement a GIS inventory of Park based resources within each management unit. (2009 National Parks)
		P2	Assess the overall effectiveness of Parks based activities in each management unit. Benchmark the performance of activities in each management unit against the performance across the state (2008 Parks Victoria)
		P3	Assess the viability of the commercial operations in each management unit and consider the need for restructuring (2008 Parks Victoria)
		P4	Develop and implement methods to encourage the adoption of improved management practices and natural resource uses within each management unit (2006 Parks Victoria)
		P5	Develop and implement methods to increase the risk management skills of resource managers to ensure they have the ability to effectively manage the risks associated with activities and climatic variability (2008 Parks Victoria).
		P6	Review existing or develop new Community Communications Plans for each management unit to incorporate community involvement in planning and implementation of projects. (Parks Victoria and regional community).
		Interim implementation targets	
		P7	Continue current Parks based activity programs unless planning indicates otherwise (ongoing Parks Victoria)
		Monitoring and evaluation targets	
		P8	Develop and implement a cost effective system to monitor the trend in profitability and resource use of the region's Parks based activities within each management unit (2007 DSE)

(continued)

Table 7-3: (continued)

Action Plan Objectives: To ensure that the region gets the best economic, environmental and social return possible, from the use of its National Parks		**Priority condition loss addressed by Action Plan** Efficient use and development of resources. (See high priorities in Table 7-2)	
Aspirational Targets	**Relevant regional Resource Condition Targets**	**Management Actions and Targets**	
		Planning targets	
		P9	Assess the extent of soil erosion and soil structure decline in National Parks areas used for commercial purposes (2009 National Parks)
		P10	Where required complete comprehensive plans to reduce soil erosion at high use areas including camp sites, tracks and utility sites. (2006 Parks Victoria)
		P11	Assess the likely climatic trends on the condition of Parks assets in all management units (2007 Parks Victoria)
		P12	Develop and implement best practice management plans to reduce the impact of mining on soil condition in priority areas. (Parks Victoria)
		Interim implementation targets	
		P13	Continue existing management of Parks resources until planning indicates otherwise (Parks Victoria)
		Monitoring and evaluation targets	
		P14	Develop and implement cost effective systems to assess and monitor the impact that Parks based commercial activities have on overall asset condition (2007 Parks Victoria)

Table 7-4: Parks Ecosystem Management Action Plan. Parks Asset Class.

Action Plan Objectives: To maintain high-value natural ecosystems within the Parks management units		**Priority condition loss addressed by Action Plan** Loss of biodiversity ecosystem function from grazing, altered fire regimes, tourism or clearing (See high priorities in Table A2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
Maintenance of high-value natural assets • The high-value natural assets in National Parks will be in good condition and will be capable of sustaining their environmental values over the long term; • There will be no further decline in the size and distribution of populations of regionally occurring species listed under the Flora and Fauna Guarantee Act	By 2015: • 100% of high-value EVCs in all management units will be in the following condition: • Key pest plants and animals will be reduced to ecologically sustainable levels. • Grazing will be occurring at ecologically sustainable levels. • 80 % of high-value EVCs will be burnt according to their ecological burning requirements. • Threatening native plant and animal diseases will be identified and managed to reduce their impacts	**Planning targets**	
		P15	Develop and implement and GIS based inventory of all high-value EVCs in national parks. (2009 Parks Victoria).
		P16	Complete comprehensive action plans to maintain high conservation status EVCs and rare, threatened or listed species. Plans to include all actions required to maintain the ecological processes of high-value natural assets including ecological burning, pest plants and animal control, disease identification and management. Plans should include an assessment of the costs and benefits of various options and cost include sharing arrangements between the state and the federal governments (2009 Parks Victoria).
		P17	Identify and implement research projects to clarify our understanding of the management of 'threatened' species. (PV, 2008)
		P18	Establish baseline information on the status of native fauna, and threats to that status. Where necessary, establish priorities for management intervention to maintain or improve the status of identified native fauna (DSE 2010).
		P19	Identify potential climate change threats to biodiversity through modelling undertaken by the Bureau of Meteorology (BoM) and prepare an appropriate strategic response (2008 Parks Victoria, BoM)
		Interim implementation targets	
		P20	Continue burning cycles as defined in DNRE Gippsland Fire Protection Plan and North East Fire Protection Plan) until planning indicates otherwise (ParksVictoria, DSE)
		P21	Continue existing on-ground projects until planning indicates otherwise. (Ongoing Parks Victoria, DPI))
		P22	Build partnerships between private landowners, conservation groups, agencies, universities and museums and build the capacity and knowledge of industry, local government to maintain biodiversity (Ongoing EGCMA, Parks Victoria)

(continued)

Table 7-4: (continued)

Action Plan Objectives: To maintain high-value natural ecosystems within the Parks management units		**Priority condition loss addressed by Action Plan** Loss of biodiversity ecosystem function from grazing, altered fire regimes, tourism or clearing (See high priorities in Table A2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
		Monitoring and evaluation targets	
		P23	Develop and implement cost effective systems to assess and monitor the condition of high-value natural ecosystems in national parks. (2007 Parks Victoria)
		P24	Develop and implement a landscape-scale biodiversity monitoring program with the aim of understanding trends in ecosystem structure and composition and responses to disturbances and threatening processes (2007 Parks Victoria, DSE)
		P25	Develop and implement evaluation systems for all natural ecosystem protection projects within the Parks estate (Complete by 2007 Parks Victoria)

Table 7-5: Parks Pest Plant and Animal Action Plan. Parks Asset Class.

Action Plan Objectives: To reduce the impact of pest plants and animals within the Parks Estate and to minimise the export of pest plants and animals to neighbouring land		**Priority condition loss addressed by Action Plan** Increasing numbers of pest plants and animals (See high priorities in Table 7-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
The impact of pest plants and animals will be reduced both within National Parks and on adjoining management units.	In all National Park management units • English Broom, Cape Broom, Spanish Heath, Large-leaf Privet will not seed beyond 2005; • There will be a significant downward trend in Rabbit populations in critical areas by 2010; • There will be a significant downward trend in the number of sheep killed by foxes and dogs by 2010; • The migration of pest plants and animals from freehold land to critical areas of National Park will be minimal by 2015; • The migration of pest plants and animals from National Parks to freehold land will be minimal by 2015.	**Planning targets**	
		P26	Assess the effectiveness, extent and cost of pest plant and animal control programs within each management unit. (2007 DPI, Parks Victoria)
		P27	Develop and implement National Park pest plant and pest animal action plans for each management unit. Plans to include benefit-cost analysis for the control of pest plants and animals within each management unit and to include agreed cost sharing arrangements between land managers the state and federal governments Plans to be developed in partnership with adjoining freehold land managers and other stakeholders (2006 Parks Victoria).
		P28	Review and modify mechanisms to enable more efficient, local management of native animals that are pests. (2006 Parks Victoria)
		P29	Develop (2007 Parks Victoria, EGCMA), and implement (Ongoing Parks Victoria, EGCMA), Willow Control Plan for all high-value streams.
		Interim implementation targets	
		P30	Continue to work with communities to manage pest plants and pest animals, especially wild dog programs (2010 Parks Victoria, DPI, and community).
		P31	Increase scale of pest plant and animal projects in priority areas particularly along boundaries with Private landholders and control of willows along rivers and streams, including existing landscape scale pest animal projects. (Ongoing, Parks Victoria)
		P32	Implement Action Statements, Recovery Plans, Threat Abatement plans required under the FFG Act or EPBC Act for all relevant priority species and threatening processes (Ongoing, DSE, Parks Victoria)
		Monitoring and evaluation targets	
		P33	Develop (2006 DPI, Parks Victoria) and implement (2009, DPI, Parks Victoria) cost effective systems to assess and monitor infestations of priority pest plant and animals in management units (2006 DPI)
		P34	Develop and implement evaluation systems for all pest plant and animal projects (2006 DPI)

Table 7-6: Parks Sediment and Nutrient Export Reduction Plan. Parks Asset Class.

Action Plan Objectives: To reduce the offsite impacts of Nutrient and sediment export from National Parks		**Priority condition loss addressed by action plan** Loss of sediment and nutrients from Parks management units. (See high priorities in Table 7-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
Reducing nutrient and sediment loss from National Parks • Changes in National Parks management practices will have led to significant reductions in damaging exports of sediment, and other pollutants to high value waterways.	By 2015, • Sediment and nutrient exports to all high value rivers, streams, lakes and wetlands will be reduced by 40%; and, • 80% of roads will be constructed to best practice standards	**Planning targets**	
		P35	Assess all road management, maintenance and drainage structures in each management unit, particularly stream crossings (2006 Parks Victoria)
		P36	Develop and implement a plan to reconstruct 50% of roads to industry best standard (2007 Parks Victoria)
		P37	Develop options to reduce the export of pollutants from National Parks to the Gippsland Lakes and other high value water bodies (2005 EGCMA, WGCMA and Parks Victoria)
		Interim priorities	
		P38	Continue with all other existing Parks programs until planning indicates otherwise (Ongoing Parks Victoria)
		Monitoring and evaluation targets	
		P39	Develop and implement a system to monitor the export of sediments and other pollutants from each management unit (2006 EGCMA)
		P40	Develop and implement evaluation systems for all pollutant export reduction projects (2006 EGCMA and Parks Victoria)

Table 7-7: Parks Fire Management Plan. Parks Asset Class.

Action Plan Objectives: To reduce the offsite impacts of fire within National Parks		**Priority condition loss addressed by Action Plan** Fire damage (See high priorities in Table 7-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
Reducing the offsite impacts of fire within National Parks • Fire management will balance the need to minimise the threat of fire to assets beyond the National Park, with the ecological processes required to maintain the Park's natural assets.	By 2015 • 80% of priority areas will be receiving appropriate ecological fire regimes • the average Parks fuel load will be reduced by 20 %	**Planning targets**	
		P41	Review, and where necessary upgrade and implement effective fire protection and management planning for both management units which balance ecological and fire protection objectives within the unit and the social, economic and environmental values of adjoining land (2007 Parks Victoria and DSE)
		Interim priorities	
		P42	Continue to develop and implement safe and ecologically sustainable park management and wildfire suppression activities that address implementation of codes of practice, safety issues, ecosystem protection and the maintenance of water quality (Ongoing Parks Victoria, DSE)
		P43	Continue with all other existing Parks programs until planning indicates otherwise (Ongoing, Parks Victoria)
		Monitoring and evaluation targets	
		P44	Develop and implement a system to monitor fuel loads in Parks forested areas (Parks Victoria and DSE)

Table 7-8: Parks Cultural Assets Action Plan . Parks Asset Class.

Action Plan Objectives: To protect Indigenous and non Indigenous cultural heritage sites within Parks management units		**Priority condition loss addressed by action plan** Damage to sites of cultural heritage (See high priorities in Table 7-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
Protection of Indigenous and non Indigenous cultural heritage sites within parks • All sites of Indigenous and non Indigenous cultural heritage will be mapped and protected from threatening processes. • Local Indigenous people will have a critical role in the protection and management of Indigenous cultural heritage sites	By 2010: • 80% of parks will have been surveyed for sites of Indigenous cultural significance;. • 90% of known, high-value, Indigenous cultural assets will be protected in each management unit • 70 % of National Parks managers will be aware of the regions Indigenous cultural heritage	**Planning targets**	
		P45	Develop and implement a GIS inventory of cultural assets within each management unit. (2009, DSE, AAV and Parks Victoria)
		P46	Develop and implement cultural asset protection plans for cultural assets in each management unit (2008 Parks Victoria and AVV)
		P47	Develop and implement a plan to increase the capacity of Indigenous people to participate in the planning and management of cultural heritage assets in National Park management units. (2006 Parks Victoria)
		Interim implementation targets	
		P48	Develop and implement an Indigenous cultural heritage awareness plan for all communities within each management unit (2007 PV)
		P49	Facilitate greater communication between Park managers and traditional landowners. (2006 Parks Victoria, DSE and AAV)
		Monitoring and evaluation targets	
		P50	Develop and implement cost effective systems to assess and monitor the condition of cultural assets within each management unit. (2006 AAV and Parks Victoria)

8 STATE FOREST ASSET CLASS

8.1 Overview

The State Forest Asset Class consists of the public land containing the region's State Forests (Figure 8-1). State Forests are managed by DSE. The asset class has been divided into the Tambo Forest Management Unit and the East Gippsland Management Unit, which correspond to the Department of Sustainability and Environment's Tambo and East Gippsland Forest Management Areas.

The total area of State Forest in the class is around 1,045,600 ha. Forest Management Area boundaries differ from the EGCMA boundaries in some areas.

State Forests are used for a number of purposes including: catchment areas for water supply, hardwood timber and pulpwood production, conservation of cultural values, biodiversity and other natural, recreation and tourism, honey production, grazing, mineral exploration and mining.

The Region's Forest Management plans [29] reflect Regional Forest Agreements between the State and the Commonwealth governments. The plans establish a strategic land use framework which divides the area into three management zones. The zoning determines the activities permitted in different parts of the forest. The three management zones are described below.

The Special Protection Zone is managed for biodiversity conservation with no timber harvesting permitted. This zone is designed to supplement the protection of natural values in national parks and reserves. It also helps to create an interlinked reserve system.

The Special Management Zone is managed to conserve specific features, but timber harvesting is permitted under certain conditions.

The General Management Zone is managed for a number of uses, but timber production is the dominant one.

8.2 Assets within the State Forests Asset Class

Production assets

The area available for timber harvesting in the region is about 292,700 ha, and the sustainable yield is estimated to be some 214,900 m³ of sawlog timber.

Timber harvesting in Victoria has an annual turnover of $540 million and generates direct employment of over 4,000 people. The Tambo and East Gippsland Forest Management Areas account for about 33% of the area harvested in Victoria annually.

Timber production makes an important contribution to the economy of many towns in East Gippsland. Bairnsdale, Swifts Creek, Orbost, Nowa Nowa, Bendoc and Cann River are all heavily dependent on income from timber.

The smaller forest based industries also make an important contribution to the economies of the small towns in the region. For example, the apiary industry generates income through the production of honey, beeswax and related products, and there is also an emerging local contract pollination service which is used by the almond growing industry in the far north-west of the state. Local native forests contribute to the establishment of the hives used to provide this service.

The State Forests are also a major source of domestic firewood, which is the main source of fuel for home heating in most of the region. Some larger commercial firewood businesses also supply urban centres outside the region.

Extractive industries (gravel and rock) within the forest area contribute to infrastructure development and provide resources of raw material not available from freehold land.

Grazing in native forests is important to some sectors of the local beef industry.

29 CNR 1995, DSE 2004

Environmental assets

State Forests in East Gippsland occupy a large and contiguous area within the region. They contain a diverse range of ecosystems and provide a backdrop of forested hills which is highly valued by local residents and visitors to the region.

State Forests are major reservoirs of native biodiversity. Over 2000 species of vascular plants and 300 species of vertebrate animals have been recorded in the area's State Forests. Notable species with significant populations in State Forest include Betka Bottlebrush, Slender Treefern, Rock Orchid, Rough Eyebright, Leafy Greenhood, Spot-tailed Quoll, Long-footed Potoroo, Glossy Black-cockatoo, Masked, Sooty and Powerful Owls, Giant Burrowing Frog and the Eastern She-oak Skink. Places of especially high species richness tend to be along the lower reaches of rivers and in coastal areas where a diverse range of Ecological Vegetation Classes are juxtaposed. The most extensive vegetation types are Lowland Forest, Damp Forest, Wet Forest and Shrubby Dry Forest. Other significant vegetation types include Warm and Cool Temperate Rainforest, Coastal Heathland and Riparian Forest.

Cultural assets

Forests provide protection to heritage values as well as containing sites and places of particular significance to the Indigenous community. Cultural resource data is only available for a small percentage of this management unit. State Forests contain burial sites, ceremonial sites, historic meeting places, shield and canoe bark trees, middens, food harvesting sites, sharpening stones, sites of massacres and transport routes along rivers. It is highly likely that many more sites of significance will be discovered over time.

8.3 Condition of and Threats to Assets

Soil erosion and sediment loss

Intense and extensive fires, such as the 2003 Alpine wildfire, create hydrophobic soils and remove ground storey vegetation. This increases the risk of erosion and sediment export from State Forests to streams and watercourses. Other sources of sediment include the forest road and track networks, snig tracks and log landings.

Much of the forest road network was established before the development of appropriate codes of practice. Part of the network was constructed by the timber industry in the 1960s when forest road construction techniques were poor by today's standards. Old log fill crossings are now in poor condition and are failing.

The deteriorating road network is causing a lowering of the quality of water in rivers and streams, and is creating access problems for forest based industries.

Extreme weather events, such as the violent storms in June 1998, increase the erosion of forest roads. These events raise the cost of maintaining the road network and damage valuable timber resources.

Improving the standard of the road network to minimise its impact on water quality will require significant changes in current management practices, and additional resources. A comprehensive survey of road and drainage structures is currently underway. The survey will identify priorities for works.

Some soil erosion has been attributed to soil disturbance through the construction of landings and access roads. Since the adoption of the Code of Forest Practice, the off-site impacts of these activities have been significantly reduced through careful design and siting of landings and the establishment of buffers and filter strips.

Loss of sediment to waterways and to the coastal and marine environments has not been quantified. Loss of sediment and nutrients from State Forest areas should be assessed as part of a catchment based study on the impacts of nutrients and sediment loss across all management units. A Water Quality Action Plan for East Gippsland is currently under development. One of the main priorities for the plan will be to assess the impact of the management of forest areas on the Gippsland Lakes.

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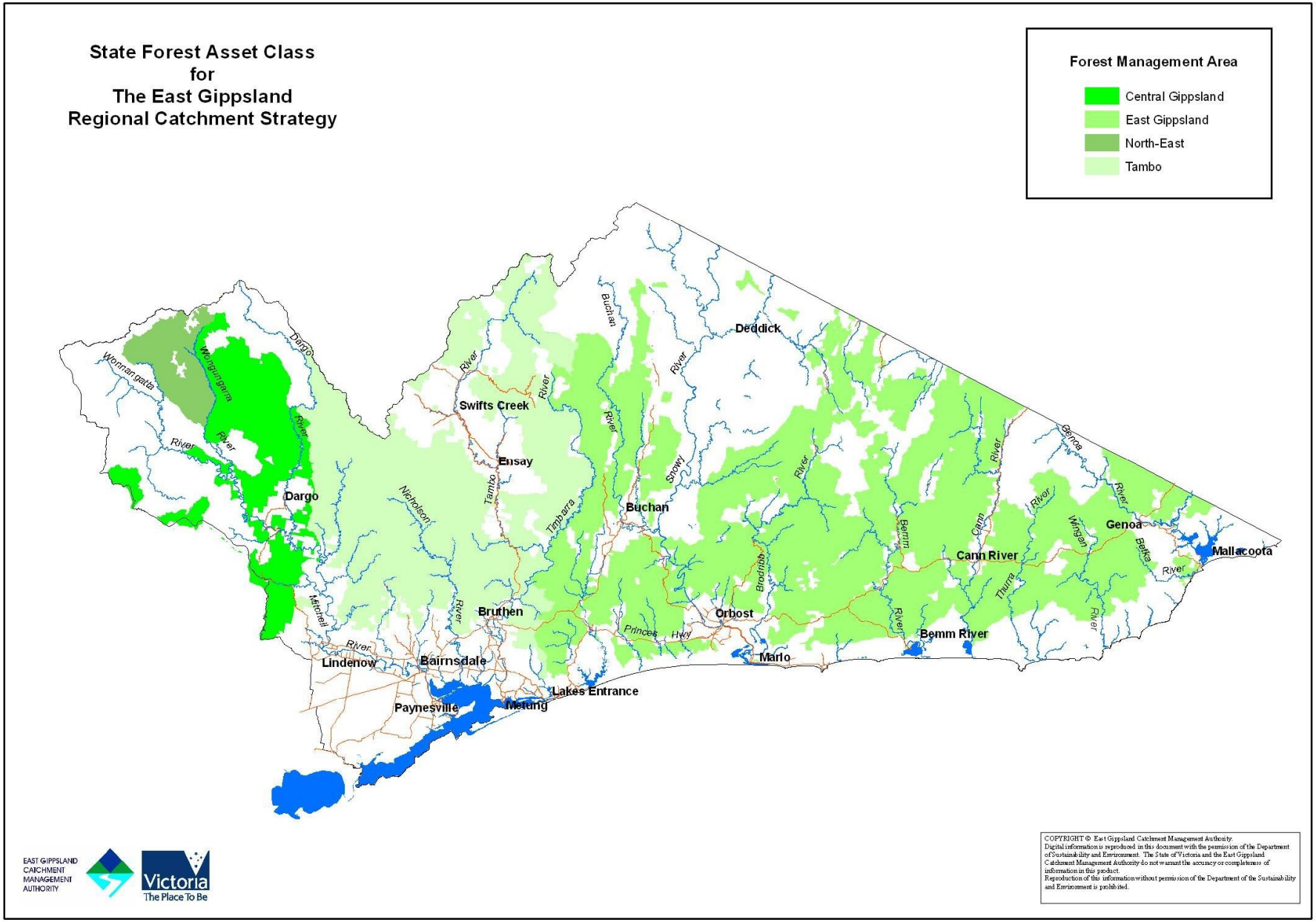

Figure 8-1. Map of the State Forest Asset Class for East Gippsland

Pest plants and animals

In general, forested areas have limited weed infestations. However, there are established populations of weed species in localised areas that have the potential to spread more widely. The main weed species in State Forests include Blackberry, Willows, Spanish Heath, Pampas Grass, Kikuyu, Blue Periwinkle, English Broom, Ragwort and Paterson's Curse. These species have the potential to invade areas used for agricultural production and also to degrade the forests' native vegetation. Important pest animals include wild dogs, foxes, and rabbits. Wild dogs create particular problems for the agricultural communities abutting the forests, whilst foxes are a major threat to ground dwelling native wildlife. Goats, pigs and deer, in some instances escapees from freehold land, can cause localised problems within the area.

Impact of altered fire regimes

Fire is an important element of the landscape. Most of the flora and fauna are adapted to fire at certain frequencies, intensity and seasonality. Fire outside these parameters can lead to decline or loss of some species and the increase of others. The changes which have occurred in fire regimes since European occupation have the potential to alter species abundance and distribution. Too infrequent fire in some coastal heathlands has led to their invasion by Coast Tea-tree and Giant Honey-myrtle with associated structural changes and loss of species diversity. In contrast rainforest is fire sensitive and too frequent burning can cause a loss or diminution of stands. Some plant species that are obligate seed regenerators following fire may die out if fire is excluded for long periods.

Disturbance of cultural assets

Forest management practices have the potential to damage cultural sites. Knowledge of the location of these sites and incorporation into planning is critical.

Table 8-1: Overview of State Forest Management Units

Unit	Area ha	Production Based Natural Resource Use	Regionally Significant Natural Environment	Natural Resource Condition
Tambo Forest	418,908	Hardwood sawlog industry and residual log production, post, pole and commercial firewood operations, apiary industry, nectar and pollen resources, bush grazing, extractive industries and minor and incidental forest produce. The management unit forms a major part of Special Water Supply Catchments.	Significant natural landscapes. Significant native vegetation communities. Old growth forests Many significant plant and animals species.	• Soil erosion due to deteriorating roads and river and stream crossings • High loss of soils and sediment from Bogong Fires. Soil erosion on log landings and snig tracks • High fuel loads in many areas • Feral animals (foxes, cats, deer, wild dogs) • Invasive weeds (Blackberry) • Changes in proportions of over-storey species mix due to historic harvesting and regeneration practices • Altered age class and structure of forest with increased proportion of even-aged regrowth forest due to historic harvesting and regeneration practices and their extent • Diminution of old growth character and fragmentation of forests due to intensive harvesting and road networks
East Gippsland	636,700	Hardwood sawlog industry and residual log production, post, pole and commercial firewood operations, apiary industry, nectar and pollen resources, bush grazing, extractive industries and minor and incidental forest produce. The management unit forms a major part of Special Water Supply Catchments.	Significant natural landscapes. Significant native vegetation communities (e.g. Warm and Cool Temperate Rainforests). Old growth forests. Many significant plant and animals species.	• Soil erosion due to deteriorating roads and river and stream crossings • High loss of soils and sediment from Bogong Fires. Soil erosion on log landings and snig tracks • High Fuel loads in many areas • Feral animals (e.g. foxes, cats, deer, wild dogs) • Invasive weeds (e.g. Blackberry) • Changes in proportions of over-storey species mix due to historic harvesting and regeneration practices • Altered age class and structure of forest with increased proportion of even-aged regrowth forest due to historic harvesting and regeneration practices and their extent • Loss of integrity and fragmentation of forests due to intensive harvesting and road networks

8.4 Snapshot of each Management Unit in the State Forest Asset Class

Tambo Forest Management Unit

The Tambo unit covers an area of 418,908 ha. It has 136,375 ha set aside for conservation of the natural environment and 134,579 ha are available for a range of productive uses. These include sawlog harvesting (71,900 m^3 /yr), and pulpwood harvesting, post and pole harvesting, commercial firewood operations, apiaries, bush grazing and extractive mineral industries.

Environmental assets in the unit include extensive natural landscapes, large areas of Wet, Damp, Montane, Lowland and Shrubby Dry Forest, habitat for species considered to be threatened, such as large forest owls and Spot-tailed Quolls, and the community of plants and other animals that live in these forests.

The unit forms a major part of the Mitchell River Special Water Supply Catchment Area. Activities in it have a major effect on the quality and quantity of water supplied to Bairnsdale and a number of smaller coastal towns, and to the Gippsland Lakes.

The recent alpine fires burnt more than one-quarter of the urban water supply catchment in the Mitchell River Basin and almost one-fifth in the Tambo River Catchment. The impact of the export of nutrients and sediment to the Gippsland Lakes is being assessed by the Gippsland Lakes Task Force.

Forest based industries in the Tambo Forest unit make an important contribution to the wealth of Bairnsdale, Bruthen and Swifts Creek.

East Gippsland Management Unit

The East Gippsland unit covers an area of 636,700 ha. It has 164,300 ha set aside for conservation of the natural environment and 310,029 ha set aside for a range of productive uses. These include sawlogs (143,000 m^3/yr residual logs). The estimated sustainable yield for East Gippsland is 2,360 ha/yr harvested from 210,509 ha of economically accessible resource for sawlog and pulpwood.

Environmental assets in the unit include extensive natural landscapes, large areas of Wet, Damp, Montane, Lowland and Shrubby Dry Forest, habitat for species considered to be threatened, such as large forest owls and Spot-tailed Quolls, and the community of plants and other animals that live in these forests.

The unit forms a major part of the Buchan, Orbost, Bemm River, Cann River and Mallacoota Special Water Supply Catchments and therefore activities in it have a major effect on the quality and quantity of water supplied to these towns. The recent alpine fires burnt most of the Buchan and a large proportion of the Snowy River catchment (including extensive areas in New South Wales). An investigation has commenced to estimate the export of nutrients and sediment to the Snowy River estuary.

Forest based industries in the unit make an important contribution to the wealth of Orbost, Bendoc and Cann River districts.

8.5 Strategic Context and Summary of Issues

The productive use of the region's State Forests makes an important contribution to the economic well-being of the region's smaller towns and localities. While timber harvesting provides the largest direct economic benefit from the State Forest management unit to the region, forests also support apiaries, tourism, mineral extraction, bush grazing, commercial and domestic firewood harvesting and a range of recreational activities. The forests also contain important cultural heritage sites and are one of the most extensive areas of natural landscapes in Victoria. Both are of great value and interest to the region, the state and the nation.

Forest uses are sometimes mutually exclusive and there is conflict over timber harvesting, especially in old growth forests. Forest management plans have been developed to provide for the multiple use of the forest, while attempting to minimise conflicts between competing demands.

The region should continue to work towards increasing the value of forest production. However, this should not be done at the expense of the natural environment. Progressive improvement in the timber industry, through alternative harvesting techniques, silvicultural operations and value adding for wood products, has led to significant increases in productivity. Improved harvesting prescriptions have also assisted in reducing the impacts of harvesting on the natural environment.

The natural ecosystems in the region's State Forests are of state and regional importance, and, without careful management, could be degraded by the invasion of pest plant and animals, grazing or inappropriate fire regimes. In some cases, forest areas export pests to neighbouring agricultural land and vice versa. Targeted investment in pest plant and animal control will maintain both the forests' biodiversity and neighbouring agricultural communities.

State Forests also occupy important catchments which provide water to towns and other high-value assets such as the Gippsland Lakes. Forest uses should be managed to ensure that the export of sediment and nutrients are kept to economically and environmentally sustainable levels. Addressing the historically poor forest road designs of the 1960s and before, and the introduction of more modern road standards, and the adherence of forest industries to appropriate codes of practice, will ensure that unwanted exports will be reduced.

Fire is a natural occurrence in State Forests and significant outbreaks are unavoidable. However, the cost and effectiveness of fire management can be improved through targeted burning, which should be carried out in consultation with the local communities. Ecologically based burning regimes should be developed.

In order that fire management operations are based firmly on good science, there is need for appropriate scientific research into fire ecology of native ecosystems. Soundly based prescriptions are particularly important in planning controlled burns to maintain those species or communities that are 'threatened'.

Indigenous heritage protection should be incorporated into regional forest planning processes. Effective engagement with Indigenous communities will make an important contribution to identifying and protecting the Indigenous cultural heritage in State Forest areas.

State Forests are public assets and are highly valued by a range of interest groups. Community participation in the planning and management of forests is essential in reducing the friction between competing interest groups. The Community Forest Model used to involve the community in the management of the Colquhoun State Forest is a good example of community participation in forest management.

The challenges for the region and the state will be to manage the multiple uses of forests to provide economic returns to the region, to ensure the maintenance of the forest's natural values, to minimise potential conflicts between competing interests and to reduce the exports of fire, sediment and nutrients to other assets. The completion of a comprehensive inventory of forest resources and greater participation of the community in forest planning and management will be important steps to successfully meeting these challenges.

8.6 Broad Objectives for the Management of the Assets within the State Forests Asset Class

The management of East Gippsland's State Forests should meet the following objectives:

- Use of the State Forest should provide an opportunity for the local community to derive an income from forest based industries;
- Best practice management methods should be implemented to maintain environmental values and ensure that forests regenerate fully following harvesting;
- Where State Forest resources are used for productive purposes, they be should be used efficiently and profitably;
- The use of the State Forest resource should provide a net benefit to the region and the state;
- High-value natural ecosystems and high conservation status Ecological Vegetation Classes and the habitat of rare and threatened species should be identified and protected;
- Significant sites of cultural heritage should be identified and protected;
- The use and management of the forest resource should not adversely affect the value or condition of other assets including neighbouring freehold land, downstream lakes and other water bodies.

8.7 Strategic Directions for the State Forest Asset Class

There are four general steps to achieving the broad objectives: planning to map out a course of action, implementation of the course of action, monitoring and evaluation. These apply to all the strategic directions.

For each Management Unit:

Ensure ecologically sustainable use

Management of forests should align with the *National Strategy for Ecologically Sustainable Development*[30]. This strategy defines Ecologically Sustainable Development (ESD) as 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'.

Develop an assets inventory

Careful management of the forests' resources requires a comprehensive knowledge of the location and attributes of its numerous ecosystems. If adequate resource data exists, it can help to ensure that threats to rare or threatened flora and fauna species can be managed.

Whilst the inventory data is reasonably good for vertebrates and vascular plants, there are large gaps in knowledge for other groups and the ecology of most species. Gaps in knowledge about timber resources continue to impede the productive use of the forests.

Geographical Information System inventories, that can be accessed regionally, should continue to be developed. These should include high-value natural ecosystems, including significant species and communities, cultural assets, land used for apiaries and other commercial purposes and land used for domestic and recreational purposes.

Develop an approach for dealing with fire issues

Developing and implementing fire regimes that strike the right balance is a major challenge for forest managers. Fuel reduction and ecological burning reduces the risks to public and private assets. Fuel reduction burning aims to strike a balance between the need to protect infrastructure and meeting fire needs of the natural environment. Fire cannot be stopped altogether, but it can be managed in a cost effective manner through more targeted burning. Developments along the boundary of cleared (private) land and forested (public) land need to be planned and managed in a manner that facilitates both the development of the land and the natural functioning of the environment. Development plans need to recognise the risk of fire and mitigate its impact where possible. Fire management should be carried out on a whole of region basis and fire planning and implementation should continue to be carried out in consultation with the regional community. As mentioned above, there is a need to actively support applied scientific research that will contribute to knowledge of the ecological fire requirements of ecosystems and the species they support. The information arising from such targeted research can then be incorporated into management burning prescriptions.

Develop a system to monitor the export of sediment and nutrients

Develop cost effective monitoring systems to assess the trends in the export of sediment and nutrients from forest areas to waterways, and marine and coastal environments. Monitoring systems should provide a basis to assess the effectiveness of prescriptions and practices controlling forest use on the export of sediment and nutrient from each Management unit.

Align forest resource use with the forests capability

Assess the capability of forest to support timber production, fishing, recreation, tourism, conservation goals and other uses. Monitor resource use to assess its alignment with resource capability. Identify areas of the forest where there could be further development, or areas which should be retired from use.

[30] *National Strategy for Ecologically Sustainable Development, (1992*). Australian Government Publishing Service, Canberra.

For the whole Asset Class:

Develop consistent systems to assess the condition of the resource base

All relevant agencies should work in partnership to develop cost effective systems to assess and monitor the condition of assets. These systems must include benchmarks for the health of the forests and their associated species. Benchmarks should be established to monitor the extent and severity of pest plants and pest animals, extent of fuel reduction burning, standard of forest roads and the condition of cultural assets.

Consistent with the Statewide Framework for Victoria's Native Vegetation Management, the contribution of State Forest to the target of Net Gain of native vegetation quality and quantity should be measured.

Management of processes threatening to biodiversity is a major responsibility of public land managers in the region. Establishing procedures to monitor and assess the presence of threatening processes, especially in habitat of significant species or communities is an essential precursor to good management. Some of the processes which have the most serious potential to threaten Victoria's biodiversity are listed under the Flora and Fauna Guarantee Act.

Develop plans to improve and maintain the condition of State Forests

A strategic approach to pest plant and animal management should be developed to ensure that resources are allocated appropriately. Pest plant and animal priorities should include the forest areas where there are high environmental values, and areas adjacent to private land. Long-term maintenance of biodiversity and high-value, currently intact ecosystems will require vigilant management. It will require the establishment of a comprehensive monitoring system for our high quality catchments. Detection of seriously invasive weeds and animals at an early stage is an economic and pragmatic imperative. Costs of eradication escalate with expansion of the invasive population. Indeed, apart from the greater costs, total eradication can become virtually impossible if the pest has spread too widely. This directly relates to a key strategic approach of this RCS—that it is best to protect the best first.

State Action statements, Commonwealth threat abatement plans and species and community recovery plans for potentially threatening processes, threatened species and communities that occur in the management unit need to be implemented. Completion of these for all listed species and communities in the management unit is essential to facilitate proper management.

An action plan should also be developed to rehabilitate forest roads that are in poor condition. All these plans should include a benefit-cost analysis and be developed in consultation with community and other stakeholders.

Ensure that users of State Forest resources adopt 'Best Forest Management Practices'

Continue to ensure that timber production is carried out according to the *Code of Forest Practices for Timber Production – Revision No. 2* [31] and required prescriptions.

Continue to survey for sites of cultural significance and protect known sites from damage

Develop action plans for sites of cultural significance in forest areas. Plans should be developed in partnership with the Indigenous community, landowners, and managers. All plans should include costs and agreed cost sharing arrangements. Continue to survey areas to ascertain the existence of new sites.

[31] DNRE 1996

Guide direction of future development

Revise the East Gippsland Forest Management Plan as the blueprint for the future management and development of East Gippsland State Forests. By implication this will guide the location and scale of forest industries.

Assess the strategic investment of public funds

Every five years develop a set of accounts that itemise public investment in each management unit and the public benefits generated by it. The accounts should be used to guide future investment.

Ensure the community is engaged in the decision making process

All members of the community who have a stake in forest management should be provided with an opportunity to participate in the decision making processes. Community consultation and engagement processes should be reviewed. The regional community and state agencies should collectively develop new ways for the community to share in the decision making processes which impact on State Forest areas.

Maintain existing projects until action planning indicates a need to change direction.

There is a wide range of forest projects currently underway. Where possible these projects should be maintained until action planning, monitoring and evaluation programs indicate better investments elsewhere.

8.8 Management Action Priorities

Priorities for intervention to maintain or improve the condition of assets within management units of the State Forest Asset Class are set out in Table 8-2. Management actions and targets to address identified high priorities are set out in Tables 8-3 to 8-8.

Table 8-2: Priority 'Need for Intervention' ratings for assets of the Forests Asset Class
(See Chapter 5 for explanation of priority setting process.)

Management Unit and Associated Assets	'Need for Intervention' Priority Rating										
	Soil erosion and soil structure decline	**Export of nutrients and/ or sediment**	**Loss of soil fertility**	**High watertable**	**Increasing numbers of Pest Plants and Animals**	**Soil Acidity**	**Loss of biodiversity ecosystem function from grazing, altered fire regimes, tourism or clearing**	**Acid Sulphate soils**	**Damage to sites of cultural heritage**	**Flood or fire damage**	**Efficient use and development of resources**
Tambo Unit											
Biodiversity/ecosystem function	Low	Low	Low	Low	High	Low	High	Low	High	High	Low
Timber harvesting areas	High	High	Low	Low	High	Low	High	Low	High	High	Med
Tourist sites	High	High	Low	Low	High	low	Low	Low	High	High	low
Roads	High	High	NA	Low	High	Low	Low	Low	High	High	Low
East Gippsland Unit											
Biodiversity/ecosystem function	Low	Low	Low	Low	High	Low	High	Low	High	High	Low
Timber harvesting areas	High	High	Low	Low	Med	Low	High	Low	High	High	Med
Tourist sites	High	Low	Low	Low	High	low	Low	Low	High	High	low
Roads	High	High	NA	Low	High	Low	Low	Low	High	High	Low

Table 8-3: Forest Resource Use and Resource Development Action Plan. Forests Asset Class.

Action Plan Objectives: (a) To ensure that forests use can be sustained in the longer term **(b)** Forest based industries are efficient and profitable		**Priority condition loss addressed by Action Plan** Efficient use and development of forest resources. (See high priorities in Table 8-2)	
Aspirational Targets	**Relevant Regional Resource condition Targets**	**Management Actions and Targets**	
The Region's production based forest uses are sustainable over the long term	By 2015, all of the following production based forest industries will be managed to ensure their sustainable use of forest based resources: • Hardwood sawlog industry and residual log production • Post, pole harvesting • Commercial firewood operations; • Apiary industry • Bush grazing; • Extractive industries • Recreation and Tourism	**Planning targets**	
		SF1	Identify and map all areas used for production in State Forests. All areas to be incorporated into an integrated State Forest GIS inventory. (2009 DSE).
		SF2	Assess the extent of soil erosion and soil structure decline in forest areas used for productive purposes (2009 DSE)
		SF3	Where required complete action plans to reduce soil erosion and soil structure decline. Plans to include an analysis of the benefits and costs of various options and the development of agreed cost sharing with forest users and the state and federal governments (2006 DSE)
		SF4	Assess the likely impacts of market conditions and climatic trends on the condition of forest based industries in all management unit s (2007 DSE)
		Interim implementation targets	
		SF5	Revise Sustainable Yield figure post Alpine Fire and salvage operations. (2007 DSE)
		Monitoring and evaluation targets	
		SF6	Develop and implement cost effective systems to assess and monitor the impact that forest based industries have on overall forest condition (2010 DSE)
The region's forest based industries will be productive, while minimising environmental impacts	By 2015: • 70 % of the existing forest based industries enterprises are efficient and productive, and will be adopting best business and land management practices.	**Planning targets**	
		SF7	Assess the overall profitability of forest based enterprises and the performance of industries in each management unit against performance across the state (2008 DSE)
		SF8	Assess the viability of the traditional industries in each management unit and consider the need for industry restructuring (2008 DSE)
		SF9	Assess the adoption of Best Management Practices in each management unit (2008 DSE)
		SF10	Complete and implement Gippsland Forest Apiary Plan (2007 DSE)
		SF11	Develop and implement a landscape protection model to assess the visual impacts on of forest operations on Landscape Values (2007 DSE)
		Monitoring and evaluation targets	
		SF12	Develop and implement a cost effective system to monitor trends in profitability and productivity of forest based industries within each management unit (2007 DSE)
		SF13	Develop and implement evaluation systems to assess the success of all projects aiming to increase the productivity of forest based industries (2006 DSE)

Table 8-4: Forest Ecosystem Management Action Plan. Forests Asset Class.

Action Plan Objectives: To ensure that high-value natural assets in State Forests will be maintained in good condition and protected in the long term		**Priority condition loss addressed by action plan** Damage to ecosystems from pest plant and animals, grazing, inappropriate fire regimes and clearing (See high priorities in Table 8-2)	
Aspirational Targets	**Relevant Regional Resource condition Targets**	**Management Actions and Targets**	
• **High-value natural assets in State Forests will be protected and in good condition;** • **The Region's production based forest uses are ecologically sustainable over the long term**	By 2015 State Forest will be in the following condition: • The status of threatened species will be measured and understood, and the status of critically endangered species will have improved through active management; • Grazing will be occurring at ecologically sustainable levels. • 80 % of high-value EVCs will be burnt according to their ecological burning requirements. • The size and distribution of populations of regionally occurring species listed under the Flora and Fauna Guarantee Act will have increased • The management of State Forests will ensure that visual landscape values will be preserved	**Planning targets**	
		SF14	Continue to identify and list all high-value natural assets within State Forests in an integrated GIS inventory. (2009 DSE).
		SF15	Complete or revise action plans to maintain high-value sites and other natural assets listed in department databases. Plans to include all actions required to maintain the ecological processes of high-value natural assets including ecological burning, pest plants and animal control, disease identification and management. (2009 DSE).
		SF16	Implement highest priority actions of Action Statements for FFG listed threatened species and communities. Priority should be given to critically endangered and endangered species, vulnerable species should receive at least habitat protection and systematic monitoring, and species in other threat categories should receive at least habitat protection and occasional monitoring. (Ongoing DSE)
		SF17	Identify and implement research projects to clarify the region's understanding of the management of 'threatened' species and communities and threatening processes. (Ongoing, DSE)
		SF18	Identify potential climate change threats to biodiversity through modelling. Prepare an appropriate strategic response to climate change impacts on biodiversity (2008 DSE)
		SF19	Establish baseline information on the status of native fauna, and threats to that status. Where necessary, establish priorities for management intervention to maintain or improve the status of identified native fauna (DSE 2010).

Table 8-4 (continued)

Action Plan Objectives: To ensure that high-value natural assets in State Forests will be maintained in good condition and protected in the long term		**Priority condition loss addressed by action plan** Damage to ecosystems from pest plant and animals, grazing, inappropriate fire regimes and clearing (See high priorities in Table 8-2)	
Aspirational Targets	**Relevant Regional Resource condition Targets**	**Management Actions and Targets**	
		Interim implementation targets	
		SF20	Until planning indicates otherwise, continue burning cycles as defined in DNRE Gippsland Fire Protection Plan, (June 1999)
		SF21	Revise, as required, the Forest Management Plans, with priority objectives being the protection of rare or threatened EVCs on public land in accordance with State and Commonwealth agreed Gippsland and East Gippsland Regional Forest Agreements. (Ongoing DSE)
		SF22	Build partnerships between private landowners, conservation groups, agencies, universities and museums and build the capacity and knowledge of industry and local government to maintain biodiversity (Ongoing DSE)
		Monitoring and evaluation targets	
		SF23	Develop and implement cost effective systems to assess and monitor the condition of high-value natural ecosystems in State Forests. (2007 DSE)
		SF24	Develop and implement a landscape-scale biodiversity monitoring program with the aim of understanding trends in ecosystem structure and composition and responses to disturbances and threatening processes (2007 DSE)
		SF25	Develop and implement evaluation systems to assess the success of all natural ecosystem protection projects (Complete by 2007 DSE)

Table 8-5: State Forest Pest Plant and Animal Action Plan. Forests Asset Class.

<table>
<tr><td colspan="2">Action Plan Objectives
To reduce the impact of pest plants and animals within State Forests and to reduce the spread of pests and weeds to neighbouring land</td><td colspan="2">Priority condition loss addressed by action plan
Increasing numbers of pest plants and animals
(See priorities in Table 8-2)</td></tr>
<tr><td>Aspirational Targets</td><td>Relevant Regional Resource Condition Targets</td><td colspan="2">Management Actions and Targets</td></tr>
<tr><td rowspan="11">The impact of pest plants and animals in State Forest will be reduced both within the Forest and on adjoining management units</td><td rowspan="11">By 2010, in all State Forest management units:
• Strategic pest plant and animal control will be undertaken on public land within the region, which will target species which have the greatest ecological and economic impact
• Key pest plants and animals will be reduced to ecologically sustainable levels:
◊ English Broom, Cape Broom, Spanish Heath, Large-leaf Privet will not seed;
◊ There will be a significant downward trend in rabbit populations in critical areas.
◊ There will be a significant downward trend in the number of sheep killed by wild dogs and foxes.
◊ Fox reductions will lead to a significant increase in native animal populations.
By 2015:
• the impact of pest plants and animals on forest based industries and high-value natural systems will be negligible
• the migration of pest plants and animals from State Forest to critical areas of freehold land will be minimal.
• the migration of pest plants and animals from freehold land to critical areas of State Forest will be minimal</td><td colspan="2">Planning targets</td></tr>
<tr><td>SF26</td><td>Assess the extent and cost of pest of plants and animals within each management unit (2007 DPI, DSE and EGCMA)</td></tr>
<tr><td>SF27</td><td>Develop and implement State Forest pest plant and pest animal action plans for each management unit. Plans to be developed in partnership with adjoining freehold land managers and other stakeholders (2006, DSE).</td></tr>
<tr><td colspan="2">Interim implementation targets</td></tr>
<tr><td>SF28</td><td>Continue to work with communities to manage pest plants and pest animals, where possible on a landscape scale (2010 DSE).</td></tr>
<tr><td>SF29</td><td>Continue with existing pest plant and animal projects in priority areas (Ongoing, DSE)</td></tr>
<tr><td colspan="2">Monitoring and evaluation targets</td></tr>
<tr><td>SF30</td><td>Develop and implement cost effective systems to assess and monitor the infestations of priority pest plant and animals within each management unit. (2006, DPI)</td></tr>
<tr><td>SF31</td><td>Develop and implement evaluation systems to assess the success of forest based pest plant and animal projects (2006, DSE, DPI)</td></tr>
</table>

Table 8-6: Forest Sediment and Nutrient Export Reduction Action Plan. Forests Asset Class.

Action Plan Objectives: To reduce the export of sediment of nutrients from State Forests		**Priority condition loss addressed by Action Plan** Export of nutrients and sediment from State Forests (See high priorities in Table 8-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
Export of sediment of nutrients from State Forests will be reduced to optimum levels.	By 2015: • Sediment and nutrient exports to all high-value rivers, streams, lakes and wetlands attributable to forest roads, logging and associated activities will be reduced by 40%; • 50% of roads will be maintained to best practice standards and all new roads will be constructed to that standard	**Planning targets**	
		SF32	Assess all road drainage structures (2006 DSE)
		SF33	Develop plan to reconstruct high priority roads to industry best standard (2007 DSE)
		SF34	Develop and implement options to reduce the export of sediment and nutrients from State Forest to the Gippsland Lakes and other high-value water bodies (2005 EGCMA)
		Monitoring and evaluation targets	
		SF35	Develop and implement a system to monitor the export of sediment and nutrients from each management unit (2006 EGCMA)
		SF36	Develop and implement evaluation systems to assess the success of all forest based projects aiming to reduce exports of sediment and nutrients (2006 DSE)

Table 8-7: State Forest Fire Management Plan. Forests Asset Class.

Action Plan Objectives: To manage fire to balance the needs of the forests' ecology with the need to protect life, infrastructure and forest based industries		**Priority condition loss addressed by action plan** Fire damage (See high priorities in Table 8-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
In the long term fire management will balance the needs of the forests ecology with the need to protect life, infrastructure and forest based industries	By 2015: • the average State Forest fuel load will be reduced by 20 %, relative to levels in 2002 By 2025, • burning regimes will balance the need to minimise the threat of fire to assets beyond the State Forest, with the ecological needs of the forests natural assets.	**Planning targets**	
		SF37	Review fire protection and management planning for both management units. Fire management plans will balance ecological and fire protection objectives for the forest. (2007 DSE)
		Interim priorities	
		SF38	Continue to develop and implement safe and environmentally sustainable fire management and wildfire suppression activities that address implementation of codes of practise, safety issues and the maintenance of ecosystems and water quality (Ongoing DSE)
		Monitoring and evaluation targets	
		SF39	Develop and implement a system to monitor fuel loads in State Forest areas (DSE)

Table 8-8: State Forest Cultural Assets Protection Action Plan . Forests Asset Class.

Action Plan Objectives: To protect cultural assets within the region's State Forests.		**Priority condition loss addressed by action plan** Damage to sites of cultural significance within State Forests (See high priorities in Table 8-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
Indigenous and non Indigenous cultural heritage sites within State Forests will be protected and in good condition	By 2010 • 100% of known, high-value, Indigenous cultural assets will be protected in each management unit • All State Forest managers will be aware of the regions Indigenous cultural heritage	**Planning targets**	
		SF40	Develop and implement a GIS inventory of cultural assets within each management unit. (2009 DSE and AAV)
		SF41	Develop and implement cultural asset protection plans for cultural assets in each management unit (2008 DSE)
		SF42	Develop and implement a plan to increase the capacity of Indigenous people to participate in the planning and management of cultural heritage assets in State Forest management units. (2006 DSE)
		SF43	Develop and implement an Indigenous cultural heritage awareness plan for all forest workers and managers (2007 DSE)
		Interim implementation targets	
		SF44	Facilitate greater communication between freehold land managers and traditional landowners. (2006 EGCMA, DPI and DSE)
		SF45	Implement the Indigenous Partnership Framework for Victoria being developed by DSE. This framework incorporates and links to a number of other Indigenous cultural heritage strategies for the state and region. (2008 DSE)
		Monitoring and evaluation targets	
		SF46	Develop and implement cost effective systems to assess and monitor the condition of cultural assets in each management unit. (To be completed by 2006)
		SF47	Develop and implement evaluation systems to assess the success of all projects aiming to protect cultural assets in State Forests (2006 DSE)

9 CATCHMENTS CLASS—RIVERS, LAKES, WETLANDS, FLOODPLAINS, ESTUARIES

9.1 Overview

The Catchments class includes the rivers, streams, wetlands, and estuaries in the region's drainage basins (Figure 9-1). The class is divided into six management units. These are the Mitchell River catchment, the Tambo–Nicholson catchment, the Snowy River catchment, the Far East Gippsland Rivers catchment, the Gippsland Lakes catchment and the Far East Gippsland Estuaries and Wetlands. The dominant commercial uses for water include irrigation, stock and domestic and town water supplies.

Town water supplies are protected by designated catchments which cover 10,724 km^2 of the region. Of these areas, 474 km^2 have been included in Special Area Plans. Special area plans can determine how land is used through land use determinations which are established under the CALP Act. The Special Area Plans are a tool to ensure that land use does not degrade the quality of water in protected catchments. Land use determinations apply to all land uses including agriculture and forestry activities.

Compared to the remainder of Victoria, consumptive use of surface water is low. Few of the major rivers in East Gippsland are regulated except for:

- The upper Snowy River above Lake Jindabyne (in NSW) where currently 93% of its mean annual flow is diverted through the Snowy Mountains Hydro Scheme and for irrigation in the Murray Darling Basin;[32] and,
- The Nicholson River, where East Gippsland Water operates a small 620 Ml 'drought reserve' water storage.

Irrigation is the biggest consumptive use of water from these rivers[33]. Within the region, 7400ha of land is irrigated, while further water extractions support stock water for 244,300ha of dryland grazing.

Water for urban use is extracted at 10 sites, and water for domestic and stock use is obtained from waterways throughout the region. Consumptive use of water is regulated under the Water Act 1989, through a system of Bulk Entitlements, Licences and Permits.
The management units within this asset class include the Mitchell, Tambo–Nicholson, Snowy and (Far) East Gippsland River Basins. These rivers total approximately 60,000 kilometres in-stream length, requiring approximately 120,000km of river frontage management.

Heritage River status has been conferred on sections of the Mitchell, Snowy, Bemm, Goolengook, Errinundra, Arte and Genoa Rivers.

Assets within this class include the scenic and ecological values of the eastern coastal lakes and estuaries, and the expanses of tranquil water between native forests and coastal scrublands. These areas are favoured as tourism and recreation destinations often by those seeking fishing opportunities and nature-based pursuits.
Major estuaries of the region listed as Ramsar Wetlands are the Gippsland Lakes, Lake Bunga and Lake Tyers. Several of these inlets and adjoining wetlands, such as Mallacoota Inlet, Sydenham Inlet, Tamboon Inlet and the Lower Snowy River wetland system, are recognised as nationally important wetlands through a 'Directory of Important Wetlands in Australia'.

The Gippsland Lakes is a major tourism and commercial asset. Regional assets in this class include six out of the eighteen 'Heritage River' listed river reaches in Victoria[34], 18% of nationally significant wetlands in Victoria[35] and the internationally significant Mitchell River Silt Jetties[36].

[32] The water sharing agreement of 28 August 2002 between NSW and Victoria pledges that flows downstream of Lake Jindabyne will increase from the current 6% of mean annual flow to 21% by 2012.
[33] Geo-Eng Pty Ltd (2002) Water Resource and Allocation, Stage 1. Gippsland Water for Growth Committee.
[34] Natural Resources and Environment (1997) Heritage Rivers and Natural Catchment Areas Draft Management Plans. State Government Victoria.
[35] Environment Australia (2001) A Directory of Important wetlands in Australia, Third Edition. Environment Australia, Canberra.
[36] Bird, E.C.F. (1972) The Silt Jetties of the Mitchell River. Gippsland Studies No.1.

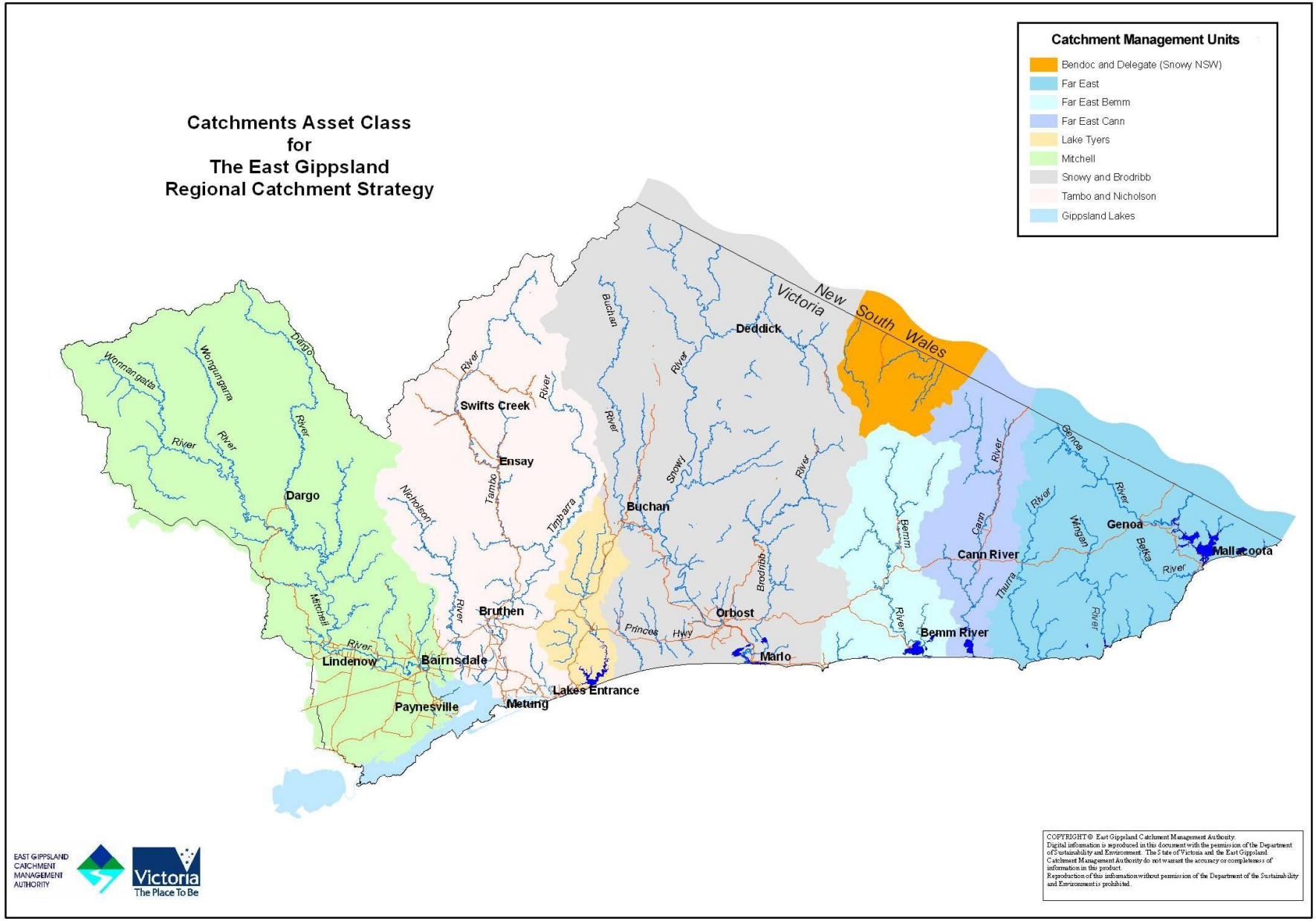

Figure 9-1. Map of the Catchment Asset Class for East Gippsland

The general condition of water quality across the region is relatively good, although there are water quality issues in the lower reaches of some basins[37]. Assessments of the effects of catchment use and pollutant discharge has shown that water quality and environmental assets in the region are threatened by a number of factors including land management practices, waste discharges and alteration to natural flow regimes. It is likely that pollutant loads have increased substantially since European settlement, particularly in the Mitchell, Tambo, Nicholson and Snowy basins[38].

9.2 Assets within the Catchment Asset Class

Economic, environmental and social values of rivers and streams

East Gippsland Rivers have high tourism and recreational values including:

- fishing, particularly good bream fishing in the lower Mitchell, Tambo and Nicholson Rivers;
- white water rafting in the Snowy and Mitchell Rivers; and,
- tranquil and passive recreation activities particularly on the picturesque Far East Rivers.

Each of the management units is important for its ability to supply valuable high quality water for use in irrigation, stock and domestic, urban and industry development as well as for environmental flows to sustain and enhance the aquatic ecosystems associated with each basin.

The mean annual flow of major streams in the region is 3,415,000 ML which forms about 12% of the state's total annual discharge. There is 2,310,000 ML of divertible surface water of which 524,000 ML is developed. The remainder about 1,786,000 ML flows to the ocean via the various lakes, inlets and wetlands along the coast.

Markets put commercial values on surface and sub-surface water resources, at least in those areas where water trade is established. The main non-market value of surface water in East Gippsland is value that water provides as the foundation for river and wetland health. Recreation and tourism industries are also dependent on the health of rivers and wetlands.

The Mitchell Basin supplies irrigation to the highly productive Lindenow Flats. The value of this industry is covered in the Freehold Land Asset Class. The Mitchell Basin also supplies water to the urban areas of Lindenow, Bairnsdale, Paynesville, Eagle Point, Nicholson, Swan Reach and Lakes Entrance. The Mitchell provides important flows to maintain the environmental values of the Gippsland Lakes.

The rivers and streams of this asset class, as well as having important economic and social values, have significant environmental and cultural values. For example:

- The Mitchell River, nominated as one of the two 'iconic' heritage river systems, due to its relatively high conservation value, naturalness of flows and size[39];
- The iconic Snowy River, currently the subject of a major government initiative for rehabilitation;
- The (Far) East Gippsland Basin estuaries, classified as either in 'near pristine' or 'largely unmodified' condition[40];
- Species of aquatic fauna and riparian plants classified as vulnerable under the Environmental Protection and Biodiversity Conservation Act 1999;
- Remnants of the significant 'chain of ponds' geomorphology in the Toms Creek system, now rare due to land use changes following European settlement[41].
- The region contains 30% of Victoria's 'Heritage River' listed river reaches[42]— six in number, 18% of the nationally significant wetlands in Victoria[43], and the internationally significant Mitchell River silt jetties at the mouth of the Mitchell River as it enters Lake King.
- Heritage River status has also been conferred on sections of the Mitchell River, Snowy River, Buchan River, Suggan Buggan and Berrima Rivers, Bemm River, and Genoa River.

[37] Department of Sustainability and Environment (2002) Victorian River Health Strategy. Victorian Government, Melbourne.
[38] Department of Natural Resources and Environment (2001) East Gippsland Water Quality Management Plan, Stage 1 – Water Quality Audit, Volume 1, Final Report. Victorian Government, Melbourne.
[39] Department of Natural Resources and Environment (2002) Victorian River Health Strategy. Victorian Government, Melbourne.
[40] National Land and Water Resources Audit, *Estuary Assessment 2000* – Land and Water Australia - Canberra
[41] I.D&A Pty Ltd (1997) Future Management of Toms Creek. Discussion Paper. Mitchell River Management Board, Bairnsdale.
[42] Natural Resources and Environment (1997) Heritage Rivers and Natural Catchment Areas Draft Management Plans. State Government Victoria.
[43] Environment Australia (2001) A Directory of Important wetlands in Australia, Third Edition. Environment Australia, Canberra.

The flow of a river is one of its most valuable characteristics. River flows support industry as well as the river's ecological health. Across the region, the water discharged from rivers plays a vital role in maintaining the health of wetlands and estuaries, including the Gippsland Lakes. In the case of the Gippsland Lakes, this occurs within a 'whole of basin' context, and flows from the East and West Gippsland both contribute to the lakes' ecological health.

The Region's rivers are the source of valuable water adjoining lakes, estuaries and wetlands along the coast. Many of these systems have JAMBA, CAMBA and Ramsar nominations and are habitat and nesting sites for a variety of national and internationally significant bird species

A regional Water Quality Action Plan[44] is currently in preparation. The plan will identify and set priorities for actions to address pressures on water quality.

The rivers also provide significant cultural values for the Indigenous populations of the region.

Economic, environmental and social values of Lakes and Estuaries

The Gippsland Lakes and eastern estuaries are highly valued as places of great beauty and desirability for tourism, recreation and residential development. The Gippsland Lakes are Victoria's major boating destination outside Port Phillip Bay. The Gippsland Lakes provide significant economic value to the region, including:

- Focus for urban and rural residential development;
- Opportunities for many forms of recreation and tourism;
- Commercial fishing in the Gippsland Lakes;
- Extensive recreational fishing;
- Social, cultural and spiritual values—places of great beauty that provide spiritual and mental refreshment and have been of cultural and spiritual significance to the Indigenous people of East Gippsland for millennia;
- Opportunities for aquaculture;
- Provide navigational access for all forms of watercraft.

Commercial fishing in the lakes generates $1.5 million of fish catch annually. Licenses to take fish from the lakes include 18 licensed commercial fishermen, 10 bait licences, 3 mussel dive licences and 3 eel fishing licences. Recreational fishing expenditure is estimated at an average of $721 per year per fisher.

Many of these values are enhanced by the development of assets and infrastructure, including port, boating and foreshore assets such as buildings, toilets, car parks, pathways, bridges, jetties, sea walls, and navigation aids, whilst others such as fringing wetlands may be destroyed by infrastructures such as sea walls.

The Gippsland Lakes, including Jones Bay and McLeod Morass, provide habitat for 21 threatened fauna species, over 100 bird species including 53 water birds including 2 species listed as critically endangered and 5 species listed as endangered in Victoria.

The region has many wetlands, including freshwater lakes, saline lakes estuaries, salt marsh, salt flats, freshwater marshes, freshwater meadows, riverine wetlands, alpine bogs and farm dams. The Directory of Important Wetlands lists some areas as nationally significant and the Gippsland Lakes are Ramsar listed. The Gippsland Lakes, the eastern estuaries and the rivers that feed them also provide important habitat and spawning systems for the region's fishery as well as supporting many ocean fish species that require estuarine conditions as part of their spawning and breeding cycle.

The key values of the Gippsland Lakes and eastern estuaries include:

- Sites of national and international geomorphological significance such as Mitchell River silt jetties;
- Ramsar Wetland status;
- Intrinsic values—high quality and wide diversity of aquatic and fringing ecosystems and species and recognised through international agreements for their importance to migratory species such as waders;
- Visual amenity; and,
- UNESCO 'Biosphere Reserve' status for the Croajingalong National Park.

[44] Department of Sustainability and Environment (in prep.) East Gippsland Water Quality Monitoring Plan. Victorian Government, Melbourne.

9.3 Condition of and Threats to Assets

Condition of rivers and streams

As described in Section 9.1 except for the Snowy and the Nicholson catchments, all of East Gippsland's rivers are unregulated and have essentially natural flow regimes. This low level of modification is a major factor in the health of the region's rivers. The Victorian Government's Index of Stream Condition assessment demonstrates that there is a higher proportion of rivers and streams of East Gippsland in excellent or good condition, than in the rest of Victoria[45].

More than 80% of the region is under native vegetation managed by DSE. The eastern catchments are regarded as near pristine with good to high quality condition particularly for water production.

The Health of the Catchments Victorian Report Card identifies that the East Gippsland Rivers are in 'Good Condition' The Mitchell and Far East Rivers Catchments has more than 70% of stream length in 'Excellent or Good Condition', whilst the Snowy and Tambo–Nicholson Catchments have 51-70% of stream length in 'Excellent to Good Condition'. The East Gippsland Regional River Health Strategy is currently in preparation and will identify and set priorities to improve the health of rivers and streams in the region.

Condition of lakes and estuaries

The Gippsland Lakes

CSIRO[46] found that the Gippsland Lakes system was poised on the edge of significant and possibly irreversible degradation, and that[47] increased nutrient loads and reduced flows are major threatening processes that precipitate algal blooms in the lakes system. Under normal conditions about 80% of nutrient input occurs with flood flows in rivers that flow into the Lakes. Despite the value of such studies the understanding of 'normal' conditions will be tested in the aftermath of major events such as the 2003 Alpine fires.

The condition of the water in the Gippsland Lakes has changed over the last 100 years, but it remains ecologically diverse. The artificial opening to the ocean at Lakes Entrance led to large increases in the salinity of the Lakes and less variation in water depth. These changes altered the ecology and fisheries of the Lakes, killing salt-intolerant emergent and terrestrial fringing vegetation, and contributing to erosion of the shoreline of the Lakes. With the passage of time, plants that are more salt-tolerant are colonising the shoreline, but shore erosion remains a problem, principally in those areas bare of fringing vegetation that are still grazed. This threatening process continues along the lower reaches of most rivers and the shores of the Gippsland Lakes (particularly around Lake King).

Periodic problems of water quality occur in the Lakes due to excessive nutrient inputs, predominantly nutrients attached to sediment. Major inputs of sediment and nutrients to waterways are episodic and follow major flood events. Water flowing into the Lakes from undisturbed forested catchment areas is usually of good quality, although sediment and nutrient loads can be high after major disturbances such as fire and flood. Between these major events, nutrient inputs are still significant and come from sources in agricultural, forest and urban areas.

DSE is currently implementing a project aimed at defining the 'Index of Wetland Condition' for the Gippsland Lakes and surrounding wetlands. This project aims to establish a long-term biological monitoring program for all wetland types of the Gippsland Lakes by collecting data on flora and birds. It is proposed to initially develop an index of wetland condition benchmark for reference sites, which are quasi-natural areas, and for selected study sites that have different levels of disturbance.

The Eastern Coastal Lakes and Estuaries

Water quality and the general condition of these estuaries are mostly good to excellent except for:

- Lake Tyers, in the centre of the region, which experiences infrequent algal blooms; and,
- Tamboon Inlet, which has suffered large scale sediment inputs from the Cann River.

[45] Environment and Natural Resources Committee (2000) State Government Victoria.

[46] Harris, G., Batley, G., Webster, I., Molloy, R., and Fox, D. (1998) Gippsland Lakes Environmental Audit: Review of Water Quality and Status of the Aquatic Ecosystems of the Gippsland Lakes. Prepared for the Gippsland Lakes Coastal Board, CSIRO.

[47] Webster, I.T., Parslow, J.S., Grayson, R.B. Molloy, R.P., Andrewartha, J., Sakov, P., Kim, S.T., Walker, S.J. and Wallace, B.B. (2001) Gippsland Lakes environmental study assessing options for improving water quality and ecological function. Prepared for the Gippsland Lakes Coastal Board, CSIRO.

The scenic and ecological values of the eastern coastal lakes and estuaries are very high, with expanses of tranquil water between native forests and coastal forests and woodlands. These areas are favoured as tourism and recreation destinations often by those seeking fishing opportunities and nature-based pursuits.

Many of these estuaries of the Far East lie within the Croajingalong National Park, which is a UNESCO Biosphere Reserve. The wetlands contain a wide diversity of estuaries and wetlands in close to undisturbed natural condition. Croajingalong is linked to Nadgee Nature Reserve in NSW. The major rivers flowing into Mallacoota Inlet rise in NSW. Some of the associated wetlands are unique in their composition and are the only known localities for specific ecological vegetation classes such as Wet Swale Herbland at Ewings Marsh and the Brackish Sedgelands of Howe Flat between Mallacoota Inlet and Lake Barracouta.

Several of these inlets and adjoining wetlands, such as Mallacoota Inlet, Sydenham Inlet, Tamboon Inlet and the Lower Snowy River wetland system, are recognised as high-value wetlands through the 'Directory of Important Wetlands'.

Most of these systems are subject to periodic closure of their entrances. The largely unregulated nature of these catchments causes periodic opening and closing of entrances as part of a natural cycle linked to climatic patterns. This has implications for salinity levels, flushing and water quality as well as for people living along the estuarine reaches of rivers or reliant on infrastructure in close proximity to estuaries. Diversions on the Snowy River have altered entrance closure regimes.

Threats to the condition of rivers, streams, lakes and estuaries

Water Extraction for Commercial Purposes

Over extraction of water for commercial and domestic purposes threatens the sustainability use of water resources and is not ecologically sustainable is already a threatening process for the Snowy River where the spring snow melt flows have been lost. The Victorian Government's White Paper on water outlines the following actions to ensure an orderly allocation of water for commercial and domestic purposes:

- the development of Regional Sustainable Water Strategies;
- capping of diversions from rivers in the Gippsland Lakes basin; and,
- applications for further allocations from other East Gippsland streams should be considered only in the context of winter extractions within their sustainable diversion limits.

Increases in the area of irrigated agriculture in East Gippsland will be evaluated within this context, both to increase the value of irrigation in the region and to reduce the risk of over-allocation.

Altered Fire Regimes

Vigorous regrowth following the major fires alters the hydrological cycle. Regrowth transpires more water per hectare than mature forests. This means less water is available to run-off into streams or to seep down into groundwater systems.
Where some flows in streams like the Snowy River are already significantly reduced by water extraction, altered fire regimes over large areas of the catchment have the potential to make this problem worse. Risk of fire in State Forest and Parks Asset Classes is addressed in these sections of the RCS.

Land Use Change

The ecological health of water bodies in the region depend on good management and can be threatened by pressures including land use and land use change. Land use change can also provide opportunities to maintain the environment. Four major foreseeable changes in land use in East Gippsland are:

- Population growth with associated rural and residential development;
- Development for tourism;
- Increased irrigated agriculture;
- Changes in grazing and other farming practices;
- Farm amalgamations.

The scenic value of the lakes and coast and their high recreational value are resulting in increased demand for residential development around the Lakes and coastal areas. Increased development will increase the potential for the export of sediment and nutrients to waterways.

Poorly planned or inappropriate subdivisions and associated infrastructure development will place additional pressures on the Lakes, estuaries and wetlands. Containing potential offsite impacts must continue to be a significant focus when considering developments by ensuring that stormwater flows are managed appropriately, including treatment of the nutrients they contain before they reach the lakes.

The development and infrastructure required to support increased levels of recreation and tourism activities will affect natural resource assets in much the same way as rural residential development. Threats that may impact on the Catchment Asset Class from the land based management units are addressed within the Freehold Land Asset Class (Chapter 6).

Climate Change

Climate change as a threatening process is as yet poorly understood, especially the regional and local effects. Climate change may affect East Gippsland's water resources through changes in rainfall. However, since a significant part of East Gippsland's rain is provided by low-pressure systems originating in the sub-tropics, the region may avoid the reductions in average total rainfall that is thought likely to affect other parts of Victoria. The main impact of climate change in East Gippsland may well be to increase the variability of rainfall, and thereby affect the reliability of water resources[48].

Climate change could cause sea levels to rise. Estuaries of East Gippsland characteristically go through a cycle of closing and opening to the sea, depending on the volume of flows in streams. The long-term impact of rises of sea level on estuaries is unknown. Currently the Gippsland Lakes are cut off from the sea by a sandy barrier except at the artificial entrance at Lakes Entrance. With rising sea levels it is possible that the barrier separating the Gippsland Lakes would be breached and the result could be more seawater entering the Lakes and further changes to the ecosystem. A similar scenario is possible for the other estuaries.

At this stage there is limited understanding of, or capacity to influence, climate change. The major actions planned are to assess its probable consequences and then to develop appropriate risk management strategies. Because the amelioration of climate change is a national and international level issue, the regional response is to develop appropriate risk management strategies to manage possible sea level rises are proposed and will be incorporated into Zones and Permissible Uses in Shire Planning Schemes.

Stormwater

Management of urban stormwater quality through the implementation of Stormwater Management Plans is critical if urban developments are to become ecologically sustainable and the threatening processes associated with untreated stormwater runoff are to be ameliorated. Sewering of all local towns along the Gippsland Lakes foreshore (e.g. Paynesville, Metung) will address seepage issues from septic tank systems into the Lake water environment. The impact of un-sewered areas is unknown, but is thought to be important at localised sites around the Lakes.

Soil Erosion

Erosion is a threatening process because it reduces water quality, both in terms of the physical changes imposed on the receiving water from the entrained sediment, and from the impact of the nutrients bound to sediment particles. In East Gippsland, the main sources of sediment inputs are from erosion of the beds and banks of rivers and streams (55%), especially during floods, and from erosion within gullies (34%) and hill slope erosion (12%)[49].

Both episodic and cumulative inputs of sediment loss need to be reduced in the longer term. Sediment loss is addressed in the Land based management units. Major mobilisation of sediment occurs when floods follow major fires or drought. But even average rains can be a problem after large bushfires such as occurred in 2003 when the fire induced high, sustained hydrophobic behaviour in the soil. Sediment inputs between these major disturbances can also be substantial, particularly when soils, through either cultivation or heavy grazing, lose their protective plant cover.

[48] Australian Bureau of Meteorology (2003), Climate Glossary http://www.bom.gov.au/climate/glossary, *and* Barrie Pittock, ed. (2003) Climate Change: An Australian Guide to the Science and Potential Impacts. Australian Greenhouse Office.

[49] CSIRO (2002) National Land and Water Audit (http://audit.ea.gov.au/anra/land/soil).

Development (such as levees) to reduce the effective area of the floodplains as receivers of floodwater can further contribute to sediment transport in waterways by denying access to potential sinks or deposition areas for sediment transported during floods. In East Gippsland, where floodplains often accommodate the river channel, agriculture and infrastructure, balanced planning for floodplain use is essential. Major levee systems are present on the floodplain and estuarine reaches of the lower Snowy River.

Nutrients

Nutrient inputs are a major threatening process, affecting the quality of water for consumptive use, and for the health of aquatic ecosystems. The main sources of nutrients in waterways in East Gippsland are:

- Nutrient bound to eroded sediment
- Burnt material following fires;
- Soluble nutrients from intensive agriculture;
- Stock accessing waterways; and
- Urban stormwater runoff, including inadequately treated waste.

The table shows the annual inputs of nutrients to some of the management units.

Management Unit	Total Soluble Salts (tonne)	Total Phosphorus (tonne)	Total Nitrogen (tonne)
Tambo–Nicholson	13 770	17	215
Mitchell	22 730	40	418
Gippsland Lakes, including Lakes King and Victoria but excluding Lake Wellington	43 770	66	768
Gippsland Lakes, including Lake Wellington	172 430	252	2 394

Improved land management practices in adjoining management units are required to reduce these nutrient load figures.[50]

The Freehold Land management units that pose the greatest threat to water quality include, Lindenow Flats, Bruthen Flats, Red Gum Plains and Cann River Flats.

Recreation Pressures

Recreational pressures on the lakes, estuaries and wetlands are likely to increase with projected growth in levels of boating activity. To ensure the ecologically sustainable use of the resource, effective management of these pressures will include development of appropriate boating infrastructure, (marinas, jetties, boat ramps, waste disposal etc.), and management of the associated impacts of recreational fishing.

Waste disposal from recreational boating is an important source of pollution. Boat pump-out stations have been provided at Paynesville, Metung and Loch Sport and eight other sites within the Gippsland Lakes. Additional pump-out stations and hopper facilities are provided in other estuaries. Ongoing development, management and maintenance of these facilities is of high importance.

Pest Plants and Animals

Lakes, estuaries and wetlands are subject to invasion by pest plant and animals. These include European Carp and possible marine pests entering from the marine environment into estuaries. Noxious aquatic species declared under the Fisheries Act 1995 are: Ricegrass, *Spartina anglica*, and Wakame (Japanese) Seaweed, *Undaria pinnatifida*. Pest plants invading fringing vegetation include Spiny Rush and Bridal Creeper.

The greatest potential for impact of pest plants and animals will come from adjoining State Forest, Parks and Freehold Land Asset Class and their adjoining management units.

[50] Estimated Sediment and Nutrient Loads in the Gippsland Lakes, Gippsland Coastal Board Technical Series 2001

Drainage of wetlands

Most of the riverine wetlands are either drained or significantly modified due to their proximity to or presence in valuable freehold land. Levees, drains and pumping also either remove water completely or prevent continuity of the original water cycle, or connection with associated river systems. However, some deeper billabongs retain native aquatic species of plant and animal despite having no native fringing vegetation, and are valuable reserves of wetland biodiversity. Their loss to the riverine system is a threatening process for the plants and animals dependent on them for food, shelter and breeding.

Table 9-1: Overview of Catchments Management Units

Unit	Area ha	Natural Resource Use	High conservation status biodiversity assets by Management Unit*	Natural Resource Condition
Mitchell River Catchment	544 900	Annual flow of 1 100 000 ML with 12,000 ML developed for irrigation and town water supply. Provides irrigation water for the valuable horticultural production on Lindenow Flats as well as town water for major towns from Bairnsdale to Paynesville to Lakes Entrance.	High conservation status EVCs in areas above 1200 m Alpine Shrublands and Grasslands, Sub-alpine Woodlands; between 1000-1200 m: Montane Grassy Woodlands; below 1000 m: Grassy Woodland, Dry Valley Forest, Riparian Forest, Dry Rainforest and Warm Temperate Rainforest, Limestone Pomaderris Shrubland and various wetlands, particularly Billabong Wetlands. There is 24,500 ha of water body.	Weeds including willows and poplars and Blackberry are major issues. Carp have been contained to below the Barrier. Escape of carp past the Barrier is to be controlled. Recognised as having >70% of stream length in Excellent to Good Condition. There is 3,900 km^2 designated as Special Area. Total pollutant input should be reduced to maintain water quality values.
Tambo–Nicholson Catchment	425 600	Annual flow of 329 000 ML, 100 000 ML divertible with 2960 ML developed. Irrigation provided for Bruthen Flats. Drought storage on Nicholson (the old Lakes Entrance Supply dam)	High conservation status EVCs in areas above 1200 m: Alpine Grasslands, Sub-alpine Woodlands; beteeen 1000-1200 m: Montane Grassy Woodlands; below 1000 m: Dry Valley Forest, Rainshadow Grassy Woodland, Silurian Limestone Pomaderris Shrubland, Riparian Forest, Warm Temperate Rainforest, Gallery Rainforest, Blackthorn Scrub and various wetlands, particularly Billabong Wetland, Floodplain Reedbed and Swamp Scrub.There is 1,100 ha of water body.	Has 51-70% of stream length in Excellent to Good Condition. Nicholson River has Special Area Plan status., 3,440km^2 designated as Special Area. Lower sections of river are highly erodible. Carp are a high priority for management in the lower reaches of both rivers. Total pollutant loads received in the management unit need to be reduced to improve the asset quality.
Snowy and Brodribb including Bendoc and Delegate Catchment	647 000 in Victoria	Total catchment is 1 580 000 ha. Half of total annual flow is diverted to the Snowy Hydro Scheme and irrigators on the Murray. Irrigation along the valuable agricultural Snowy River flats.	High conservation status EVCs in areas beteeen 1000-1200 m: Montane Grassy Woodlands; below 1000 m: Rainshadow Grassy Woodland, Blackthorn Scrub, Devonian Limestone Pomaderris Shrubland, Riparian Forest, Dry Rainforest, Warm Temperate Rainforest, Gallery Rainforest and Littoral Rainforest, and various wetlands, particularly Billabong Wetland, Floodplain Reedbed and Swamp Scrub. There is 200 ha of water body.	Willows and poplars invasion is a major threat. Trout are seen as a threat to native fish. Soil erosion in the NSW catchment area has supplied significant sediment to the Victorian River. Recognised as having 51-70% of stream length in excellent to good condition. 1,719 km^2 designated as Special Protection Areas and 23 km^2 for water supply.

(continued)

Table 9-1 (continued)

Unit	Area ha	Natural Resource Use	High conservation status biodiversity assets by Management Unit[1]	Natural Resource Condition
Far East Rivers Catchment	457 000	Limited irrigation use	High conservation status EVCs in between 1000-1200 m: Tableland Damp Forest; below 1000m: Wet Forest, Cool Temperate Rainforest, Riparian Forest, Warm Temperate Rainforest, Gallery Rainforest, Littoral Rainforest, Floodplain Reedbed and Swamp Scrub. There is 5,100 ha of water body.	Willows and poplars invasion and trout as seen as the major nuisance species. 90% of the catchment is Native Vegetation so spread of wildfire may become an issue if not contained. More than 70% of stream length has Excellent to Good Condition. 1,665 km^2 is designated as a Special Area for Water Supply.
Gippsland Lakes	400 km^2	Valuable habitat and breeding grounds for estuarine and some ocean fish species. Produces $1.5m annual income for commercial fishermen. Has in excess of 200 000 visitors per year.	High conservation status EVCs Plains Grassy Woodland, Plains Grassy Forest, Damp Sands Herb-rich Woodland, Tertiary Limestone Pomaderris Shrubland, Warm Temperate Rainforest and Littoral Rainforest and various wetlands, particularly Billabong Wetland, Floodplain Reedbed and Swamp Scrub. Listed as Ramsar site, has JAMBA and CAMBA recognition. Provides habitat for 21 threatened fauna species, has over 100 bird species 2 species listed as critically endangered and 5 listed as endangered in Victoria.	Algal blooms have become almost an annual event that threatens to health of the Lakes system. Degradation of the fringing vegetation exacerbates shoreline erosion. Reduced flow regimes or high flood levels also impact on sediment and nutrient inputs. Gippsland Lakes currently considered to be in poor health. Total pollutants received in this management unit require attention from both within East Gippsland region and the neighbouring West Gippsland Region.
Far East Gippsland Lakes and Estuaries.		Valuable habitat for birds, fauna and fish species. Lake Tyers and Mallacoota Inlet are now Recreational fishing only with the recent purchase on the Commercial Fishing Licences.	High conservation status EVCs in areas above 1200m: Alpine Grasslands, Sub-alpine Woodlands; between 1000-1200 m: Montane Grassy Woodlands; below 1000 m: Dry Valley Forest, Rainshadow Grassy Woodland, Silurian Limestone Pomaderris Shrubland, Riparian Forest, Warm Temperate Rainforest, Gallery Rainforest, Blackthorn Scrub and various wetlands, particularly Billabong Wetland, Floodplain Reedbed and Swamp Scrub.Valuable sea grass spawning and fish breeding waters. Adjoin Coopracambra and Croajingalong National Parks.	Sediment and nutrient inputs and closing of sand bars causing local flooding of infrastructure. Occasional algal blooms particularly on Lake Tyers.

Notes: 1.There are too many high conservation status biodiversity assets by management units to list in this table and the reader is referred to the relevant appendices of Bioregional Action Plans or the Native Vegetation Plan when published.

9.4 Snapshot of each Management Unit in the Catchments Class

Mitchell River Catchment Management Unit

The Mitchell River management unit covers an area of 544,900 ha in the western boundary of the region. The unit has an annual flow of 960,000 ML of which 640,000 ML is a divertible surface resource. Only 18,000 ML is developed with most used for irrigation of 5900 ha of irrigated agricultural product on the Lindenow Flats upstream of Bairnsdale.

- The Mitchell River has 3900 km^2 of Proclaimed water supply catchment. It is recognised as being in Excellent to good Condition with more than 70% of its stream length in this category.
- The mouth of the Mitchell River forms the internationally listed Mitchell River Silt Jetties prior to flowing into Lake King.
- The Mitchell River supplies urban water to Bairnsdale, Lindenow, Paynesville, Swan Reach and Lakes Entrance.
- Weed infestations represent major threats and include many species, in particular, Blackberry, willows and poplars, Blue Periwinkle Ox-eye daisy, Ragwort, Wandering Jew, Bridal Creeper, English Ivy and Hawthorn as these weeds are particularly established in riparian zones which increases the opportunity to spread offsite to neighbouring private land.
- The Mitchell River is the last major Victorian river that has not been dammed, despite plans having been developed in the past for a Mitchell River Dam.
- The Mitchell River has an area of 60 km^2 prone to major floods. The duration of a major flood is 3 to 4 days, and affects a population of 14,000 people.
- The unit has Heritage River status.
- Quality of the asset is highly dependent on the land management practices in the adjoining asset classes.

Tambo–Nicholson Rivers Catchment Management Unit

The Tambo–Nicholson River Catchment management unit covers an area of 425,600 ha. It has an annual flow of 325,000 ML, and of the 100,000 ML of divertible surface resource only 5000 ML have been developed. Irrigation occurs on small and isolated areas of river flats, as well as on the Bruthen Flats downstream of Bruthen Township.

- The unit is considered to be in good condition with 51-78% of the stream length in excellent to good condition.
- The 15 km sand slug downstream of Bruthen is steadily moving further downstream. This is thought to have been a legacy of early mining activity and the major rabbit plague in the early 1900s in the Tambo Valley that caused serious soil erosion resulting in large sediment deposits in the Tambo. The sand slug is also seen as inhibiting the upstream movement of the salt wedge thereby maintaining more fresh flow upstream.
- Weed infestations represent major threats and include Blackberry, willows and poplars, Blue Periwinkle, Bridal Creeper, Kikuyu, Cape Ivy, Boxthorn, Wandering Jew as these weeds are particularly established in riparian zones which increases the opportunity to spread offsite to neighbouring private land.
- The Nicholson River Dam is the backup water supply for Lakes Entrance. This has Land Use Determination status which provides direction on what land use is appropriate within the catchment. There is 3440 km^2 with Designated Special Areas status.
- The Tambo–Nicholson river systems are prone to major flooding. An area of 8 km^2 of the Nicholson River is affected by major flooding, which has a flood duration of up to 2 days and affects approximately 100 people. Major floods in the Tambo River system affect approximately 15 km^2 of the Bruthen Flats, last approximately 3 days, and affect an estimated 600 people; Swifts Creek area is 3.4 km^2 affecting 250 people; Lower Tambo Floodplain covers 12 km^2 with an estimated flood duration of 3 days.
- The Tambo and Nicholson Rivers flow into the Gippsland Lakes via Lake King.
- Major water quality problems occur in the lower Tambo River with regular algal blooms occurring in the Tambo Backwater at Bruthen causing disruption to farming whilst the bloom is in progress.
- Carp, willows and poplars have been identified as high priority threats in the Tambo River.
- Quality of the Tambo–Nicholson asset values is dependent to a large extent on the management practices of the adjoining asset classes.

Snowy River Catchment Management Unit (including Bendoc and Delegate catchments)

The Snowy River catchment covers an area of 647,000 ha of Victoria. The total catchment area however is 1,580,000 ha, the majority being in NSW.

- The mean annual flow is 2,490,000 ML of which 1,130,000 ML is diverted out of the management unit for the Snowy Mountains Hydro Scheme.
- The 1,360,000 ML that could be regulated by storage works provides a divertible storage of at least 500,000 ML. The developed surface resource is only 2200 ML. Groundwater resources are estimated at 10,600 ML per year.
- Weed infestations represent major threats and include Blackberry, willows and poplars, Blue Periwinkle, Tutsan, Cape Ivy, Bridal Creeper, Kikuyu, Wandering Jew as these weeds are particularly established in riparian zones which increases the opportunity to spread offsite to neighbouring private land.
- The unit has Heritage river status, and contains valuable wetlands in the Lower Snowy Wetland Complex and includes Ewings Marsh.
- Tourism and recreation are the primary utilisation activities in this management unit. The area has 61 threatened plant species. The habitat supports 250 recorded native fauna, 22 of which are listed as threatened including the Long-footed Potoroo, rare Tiger Quoll and Brush-tailed Rock Wallaby. There are 133 sites listed on the Aboriginal Affairs register. One, of archaeological significance, dates back 21,000 years.
- The threat from the impact of soil erosion is high, particularly from sediment discharge from upper catchment areas in NSW. Sediment loads in the Snowy River, together with the altered flow regime have a major impact on stream habitat values. Off site impacts include deposition of sediment and deposition of debris on low lying valuable agricultural flats downstream of Orbost following major floods.
- The management unit has 1719 km^2 with Proclaimed Water Supply status and a further 23 km^2 for Town Water supply.
- The Snowy River floodplain is prone to major floods. The duration of a major flood is 3 to 5 days. The Buchan River floodplain covers 2.9 km^2 with major floods having a duration of up to 3 days.
- The quality of the Snowy River management unit is highly dependent upon the management practices in the adjoining asset classes.

Far East Gippsland Rivers Catchment Management Unit

This management unit covers an area of 640,000 ha of which 457,000 ha is in Victoria. The mean annual flow is 770,000 ML which is 3.5% of the state's annual flow. Of the surface water resource 210,000 ML are divertible with 1,000 ML developed. Only 800 ML is used each year for irrigation of pastures.

- 90% of the unit is covered in native forest which is considered to be in near pristine condition with the result that its condition is considered to be excellent. More than 70% of the stream length is in excellent to good condition.
- The Genoa River and the Bemm River with its tributaries the Goolengook, Errinundra and Arte Rivers all have Heritage River status

Gippsland Lakes Catchment Management Unit

- The Gippsland Lakes management unit covers 400 km^2. This unit is a high-value recreational and tourism focus in the region, as well as for the local town populations of Bairnsdale, Paynesville and Lakes Entrance.
- The management unit provides suitable habitat for the Endangered Little Tern but also provides suitable habitat for the Little Tern's major predator, the fox.
- There are several major threatening processes to the unit. There is ongoing export of nutrients that lead to algal blooms and continued grazing of the lake shore. There is a high concentration of visitors and continuing urban expansion causing habitat loss. The loss of restoration opportunities for threatened ecological vegetation classes such as Warm Temperate Rainforest, Littoral Rainforest, Swamp Scrub and Estuarine Scrub, as a result of urban subdivision, is a problem. Untreated stormwater effluent causes

pollution. Draining and filling of wetlands causes habitat loss. Weed infestations that include Blackberry, Blue Periwinkle, Cape Ivy, Bridal Creeper, Kikuyu, English Ivy, Pampas Grass, Wandering Jew are particularly established in riparian zones which increases the opportunity to spread offsite to neighbouring private land.

- The major concern for the management unit is the now apparent annual occurrence of algal blooms with the Gippsland Lakes considered to be in poor condition.
- The unit supports 18 commercial fishing licences, 10 bait Licences, 3 mussel dive licences and 3 eel Licences. It provides an annual income of $1.5 million to the commercial fishermen. In addition there are in excess of 232,000 visitors expend on average $721 per visitor per year.
- The unit is a valuable habitat area for 21 threatened fauna species, 100 bird species, including 53 water birds with 2 listed as critically endangered and 5 listed as endangered in Victoria. The Gippsland Lakes are an important spawning and breeding habitat for a wide variety of estuarine and ocean fish species.
- The Mitchell River Silt Jetties have international geomorphological significance.
- The unit has Ramsar listing as well as CAMBA and JAMBA listing for migratory birds.
- The Gippsland Lakes is the sink for the river systems entering from West Gippsland CMA region and the Mitchell and Tambo–Nicholson management units within East Gippsland. The continued health of the Gippsland Lakes is highly dependent on reducing pollutant loads from these external systems as well as managing the existing sediment loads in the Lakes.

Far East Gippsland Estuaries and Wetlands Management Unit

This management unit provides valuable habitat for birds, fauna and fish species. Lake Tyers and Mallacoota Inlet are now recreational fishing only with the recent purchase of the commercial fishing licences by the State Government.

- The unit provides valuable sea grass spawning and fish breeding waters. It also adjoins the Coopracambra and Croajingalong National Parks which provide a valuable near pristine catchment.
- Major issues facing this management unit are threatening processes that include weed invasion by Kikuyu and Arum Lily, and adjacent to urban areas, Japanese Honeysuckle and Privet. There are nutrient inputs associated with local camping and recreational facilities and from catchment erosion and runoff following high intensity rainfall. Closing of sand bars causing local flooding of infrastructure and preventing fish movement is also of concern at various times throughout the year.
- Although not as frequent in the Western Lakes, the occasional algal blooms, particularly on Lake Tyers are considered to be an issue that requires management when they occur.

9.5 Strategic Context and Summary of Issues

The rivers, wetlands, lakes and estuaries of East Gippsland are highly valued by the region, the state and internationally. In general, they are in good to excellent condition with the notable exception of the Gippsland Lakes. These are being degraded by the reduction of flow and increased imports of sediment and nutrients, by urban expansion with its associated stormwater impact and weed invasion, by loss of biodiversity from habitat loss, by disruption to and loss of critical resources, such as food and shelter, for migratory species and inconsistent lakeshore management that still allows grazing to the lake edge. The region's water bodies provide sites for a wide range of high-value aquatic ecosystems, and the extraction of water from these systems makes an important contribution to the economy of East Gippsland. Many of the region's water bodies also have high cultural value to local Indigenous people.

The lakes, rivers and streams of the region provide a valuable source of income for the region. Water is used for irrigation and town water supplies and the region's lakes and streams are used for commercial fishing, tourism and recreation. For example the Gippsland Lakes Commercial fishery provides an income to the fishermen of $1.5 million annually and the average expenditure by a lakes visitor averages $721 per visitor per year. Visitors to the Gippsland Lakes area have spent an estimated $160 million over a four year period with an annual increase in expenditure each year. The port at Lakes Entrance provides support for a $150 million fishing industry.

The use of the water resource for irrigation purposes could be increased, given the current level of allocation. However, this will need to be carefully managed to ensure that such allocations are ecologically sustainable so that the social and environmental values of the region are not compromised and maintained in perpetuity. Existing and new irrigation systems will need to meet 'Best Management Practice' standards: for example the use of drip irrigation systems can save water and improve production.

Damming of the Mitchell River is controversial and has been proposed from time to time over a number decades. A new dam on the Mitchell would increase the capacity to irrigate the Red Gum Plains management unit. However, any consideration of damming the Mitchell must include an assessment of the environmental impacts on the Red Gum Plains and the Gippsland Lakes.

Ecologically sustainable maintenance of water quality is the key to maintaining the region's aquatic ecosystems and economy. Loss of water quality is generally driven by either unsustainable levels of extraction of flows from the river systems for industrial or urban purposes or through the import of pollutants from land and water use. The activities in the Freehold, Parks and State Forests management units will need to be monitored and managed to ensure that water quality is maintained.

The East Gippsland CMA is currently preparing the East Gippsland Water Quality Action Plan that will set in place recommendations for the long-term maintenance of assets but allows for their ecologically sustainable use. CSIRO is also involved in extensive research into the quality of the Gippsland Lakes and environs.

The East Gippsland River Health Strategy has identified priority areas of the East Gippsland Rivers for attention to address threatening processes such as weed invasion, pest animal threats and soil erosion.

Balancing the need to protect the high environmental and cultural values of the region's water bodies with the ecologically sustainable use of water for commercial purposes will be a major challenge for the region. The Victorian Government's White Paper, the Regional River Health Strategy and Water Quality Action Plan will be key instruments used to meet this challenge.

All planning processes to maintain and enhance the natural assets of the management units have been undertaken with a large amount of community involvement. Ongoing community consultation and participation in the decision making processes associated with the management of the region's lakes, rivers and streams will be essential.

9.6 Broad Objectives and Approach

The management for East Gippsland Catchments Class should:

- ensure that where the assets are used for a productive purpose they are used efficiently and effectively at ecologically sustainable levels;
- contribute to the net wealth of the region and the state;
- ensure that natural biodiversity is at least maintained and preferably increased;

- ensure that high conservation status EVCs and rare and threatened biodiversity are maintained and enhanced;
- ensure the protection of significant sites of cultural heritage,
- ensure that the use of the natural resources is ecologically sustainable and does not adversely affect the value or condition of other assets

9.7 Strategic Directions for the Catchments Class

There are a substantial number of plans either underway or completed which relate to the management of the region's lakes streams and estuaries. Plans include the East Gippsland River Health Strategy, the Gippsland Lakes Future Direction and Actions Plan, the East Gippsland Shire Planning Scheme, Gippsland Lakes Ramsar Site Draft Management Plan, Gippsland Lakes Shore Erosion and Revegetation Strategy, East Gippsland Water Quality Plan, East Gippsland Native Vegetation Plan, the East Gippsland Weed Action Plan as well as current research and works undertaken through the Gippsland Lakes Recovery Plan. All of these Plans provide direction on best practice to manage the resources of the management unit. In addition the Parks and Forests Asset Classes have specific management plans to address their particular management requirements that should also impact on the Catchment Asset Class values.

Implementation of the above plans should be integrated and the following strategies should assist with this.

Develop an assets inventory for key assets in the catchments class

All relevant agencies should work in partnership to develop a GIS based inventory of all high-value water bodies within the region. The inventory should include all high-value aquatic ecosystems, high-value cultural assets and water allocations for environmental, commercial and domestic purposes. Much of this information already exists in a number of databases and meeting this objective may only require integration of existing databases. The database should be readily available to the local community, resource managers and planners.

Develop consistent systems to assess and monitor the condition of the resource base

All relevant agencies should work in partnership to develop consistent and cost effective systems to measure and monitor the condition of assets listed in the asset inventory. Systems should include baseline levels for the ecological health of high-value aquatic ecosystems, base line data on imported pollutant loads to water bodies, parameters for water quality required to ensure the ecologically sustainable use of the resource and a current list of water allocations to environmental and other purposes. Benchmarks should also be set against the State Environmental Protection Policy requirements for water quality.

Develop systems to monitor the export of sediments and nutrients

Monitoring systems are required to monitor the export of sediment and nutrients to waterways. Initial priorities for establishment of these monitoring systems include the management units listed as priorities in the East Gippsland Water Quality Action Plan (in preparation), and in management units in the Gippsland Lakes basin. In the long term all management units should be monitored.

Due to the complexity of the catchment systems, it will be important to ensure that monitoring programs capture data during different weather and catchment conditions including major flood and storm events. Monitoring data will complement and potentially direct future research, planning and works programs.

Develop a strategy to ensure coordination of research needs

The issues facing the Gippsland Lakes and other catchments are complex. A research strategy should be developed to identify the priority areas for future research. The strategy should identify key information gaps which will need to be filled to make informed decisions on the health of water bodies within the region. Research should focus on the relationship between catchment management and water quality and on options for catchment management which will improve the health of water bodies.

Identify options for improving the quality and condition of water based assets

Action plans should be developed to protect or maintain the condition of assets listed in the asset inventory. Action plans should be based on the best research available and include benefit-cost analysis and agreed cost sharing arrangements.

Current management plans including the Gippsland Lakes Future Directions and Actions Plan should be reviewed to ensure that they remain relevant to the current conditions. Cost sharing arrangements need to be finalised for the River Health Strategy as a priority.

Water management planning for the region should be undertaken, including a regional Sustainable Water Strategy. This strategic planning should be supported by flow studies in catchments known to be flow stressed, with top priority being given to the Mitchell Catchment management unit. Investigations will be required to set and confirm Sustainable Diversion Limits and Environmental Reserves for both surface and groundwater.

Water management plans should be developed in consultation with the state and the local community and identify the best allocation of water resources which balance the economic, social and environmental needs of the regional with those of the state.

Pest plant and pest animal action plans should be developed for all key water bodies in the region. Existing plans should be reviewed to include benefit-cost analysis and cost sharing arrangements.

Sediment and nutrient management plans will need to be developed for management units identified as high priorities in the East Gippsland Water Quality Action Plan. The plans should identify the benefits and costs of options for the reduction of exports of sediment and nutrients, and should include comprehensive and agreed cost sharing arrangements between local land managers, the state and federal governments.

Ensure that resources are managed according to best practice

The water resources of the management unit will be allocated to a variety of users including irrigators, industry, towns and the environment. It is essential that water is used in line with 'Best Management' practices to ensure that water resources are used efficiently and to the greatest benefit of the state and the region based on ecological sustainability principles. A cost effective system should be developed to monitor the efficient use of water by both industry and urban uses.

Guide the direction of future development

Local government planning scheme overlays should be reviewed and updated to ensure that new industrial and urban developments minimise both their onsite and offsite impacts on key water bodies.

Engage the Indigenous community in planning and implementation activities

The Indigenous community have strong links with rivers, lakes and estuaries in the region. It is essential that they are given the opportunity to become involved in planning and implementation activities to ensure minimal impact on their cultural sites.

Ensure the community is engaged in the decision making process

Develop a Communication Plan to improve awareness of the value of regional water bodies and encourage the local community to participate in the management of the catchments, rivers and lakes to maintain and improve their conservation and production.

Maintain existing projects until action planning indicates a need to change direction.

There are a wide range of projects being implemented. Where possible these projects should continue to be implemented until action planning or monitoring and evaluation programs indicate better investment elsewhere.

9.8 Management Action Priorities

Priorities for intervention to maintain or improve the condition of assets within management units of the Catchments Asset Class are set out in Table 9-2. Management actions and targets to address identified high priorities are set out in Tables 9-3 to 9-8.

Table 9-2. Priority 'Need for Intervention' ratings for assets of the Catchments Asset Class

(See Chapter 5 for explanation of priority setting process.)

Management Unit and Associated Assets	'Need for Intervention' Priority Rating									
	Soil erosion and soil structure decline	**Export of nutrients and/ or sediment**	**Sediment and nutrient build up**	**Increased pollutants including salts**	**Increasing numbers of Pest Plants and Animals**	**Inappropriate water balances or water allocations**	**Damage to sites of cultural heritage**	**Flood or fire damage**	**Loss of biodiversity ecosystem function from grazing, altered fire regimes, tourism or clearing**	**Efficient use and development of resources**
Mitchell River Catchment										
Rivers and streams	High	High	High	Low	High	High	Med	High	High	High
Lakes and estuaries	High	Low	High	High	High	High	Low	Low	High	Medium
Wetlands	High	Low	High	High	High	High	High	Low	High	Low
Water set aside for production	NA	NA	High	Medium	NA	High	Low	N/A	Low	High
Tambo–Nicholson Catchment										
Rivers and streams	High	High	High	Low	High	High	Medium	High	High	High
Lakes and estuaries	High	High	High	High	Low	High	Low	Low	High	Medium
Wetlands	High	Low	High	High	High	High	High	Low	High	Low
Water for production	NA	NA	Low	Medium	Low	High	Low	N/A	Low	High
Snowy River Catchment										
Rivers and streams	High	High	High	Low	High	High	Medium	Medium	High	Medium
Lakes and estuaries	High	High	Low	High	Medium	Medium	Medium	Medium	High	Low
Wetlands	High	Low	Low	High	High	Medium	Medium	Low	Medium	Medium
Water for production	NA	NA	Low	Medium	Low	Medium	Low	N/A	Low	High

(continued)

Table 9-2 (continued)

Management Unit and Associated Assets	'Need for Intervention' Priority Rating									
	Soil erosion and soil structure decline	**Export of nutrients and/ or sediment**	**Sediment and nutrient build up**	**Increased pollutants including salts**	**Increasing numbers of Pest Plants and Animals**	**Inappropriate water balances or water allocations**	**Damage to sites of cultural heritage**	**Flood or fire damage**	**Loss of biodiversity ecosystem function from grazing, altered fire regimes, tourism or clearing**	**Efficient use and development of resources**
Far East Rivers Catchment										
Rivers and streams	High	Low	Low	Low	Low	Medium	Low	Medium	Low	Low
Lakes and estuaries	High	Low	Low	Low	Low	Low	Low	Low	Low	Low
Wetlands	High	Low	Low	Low	Low	Low	Low	Low	Low	Low
Water for production	NA	Low	Low	Low	Low	Low	Low	Low	Low	Low
Gippsland Lakes										
Rivers and streams	High	High	High	Low	Medium	Medium	Low	Low	High	Low
Lakes and estuaries	High	Medium	High	Low	Medium	Medium	Low	Low	High	Low
Wetlands	High	High	High	Medium	High	Medium	Medium	Low	High	Low
Water for production	NA	High	High	Low	Low	Low	Low	Low	Low	Low
Far East Gippsland Lakes and Estuaries										
Rivers and streams	High	Medium	Medium	Medium	Low	Low	Low	Low	Low	Low
Lakes and estuaries	High	High	High	Medium	Low	Low	Medium	Low	Low	Low
Wetlands	High	Medium	High	Medium	Medium	Low	High	Low	Medium	Low
Water for production	NA	High	High	Low	Low	Low	Low	Low	Low	Low

Table 9-3: Rivers and Floodplains Action Plan. Catchments Asset Class

Action Plan Objectives: To improve the overall condition of the region's rivers and flood plains and riparian vegetation.		**Priority condition loss addressed by Action Plan** (a) Sediment and nutrient build up (b) Increasing pollutants (c) Inappropriate water balances (d) Soil erosion and structural decline (e) Increasing pest plants and animals (f) Minimise flood damage and maintain biodiversity (See high priorities in Table 9-2)	
Aspirational Targets	**Relevant Regional Resource condition targets**	**Management Actions and Targets**	
All high-value rivers and floodplains will be in good condition.	By 2020 there will be • An increase in the number of rivers in excellent or good condition, as assessed by the Index of Stream Condition • Index of Stream Condition ratings improved for 80% of non-Heritage or non- Representative River reaches, and maintained for all other reaches, compared with 2004. • Index of Stream Condition ratings improved for 90% of reaches classified as 'Heritage Rivers' or 'Representative Rivers' and maintained for all other reaches, compared with 2004.	**Planning Targets**	
		LSE1	Develop and implement a GIS based River Health Data Management System, to systematically record ecological condition, issues, works, data and information, to complement the RiVERS database. (2006 EGCMA)
		LSE2	Finalise the Regional River Health Strategy (EGCMA 2005) and develop specific works plans for high priority Heritage Rivers such as the Mitchell, Bemm, Snowy and Genoa (EGCMA 2008).
		LSE3	Quantify targets for stream condition using index of Stream Condition data (CMA 2008)
		LSE4	Complete recovery plans for priority species and set up population monitoring systems (DSE 2008)
		LSE5	Ensure new developments and land use are compatible with water environmental, cultural and scenic values. Ensure municipal strategic statements align with the Regional River Health Strategy. (CMA EGSC 2008)
		Riparian vegetation	
		LSE6	Implement priority actions to improve riparian, floodplain and waterway health in accordance with the Regional River Health Strategy, EG Floodplain Management Plan, and Regional Water Quality Action Plan. (2007, EGCMA, DPI, DSE)
		LSE7	Develop and implement cooperative management agreements for 20% length of priority reaches as identified in the Regional River Health Strategy (CMA, community 2008)
		LSE8	Develop frontage management arrangements and implement cooperative management agreements (DSE Land Victoria, CMA 2008)
		LSE9	In cooperation with Land Victoria, ensure that priorities for rehabilitation of degraded Crown Frontages are identified, and that the identified 10% top priority Crown Frontages are rehabilitated (DSE Land Victoria, CMA 2008)
		LSE10	Based on the recommendations of the Sediment Source Investigations Project in the Gippsland Lakes basin, identify high risk stream and gully erosion sites for priority action. (CMA 2008)

(continued)

Table 9-3 (continued)

Action Plan Objectives: To improve the overall condition of the region's rivers and flood plains and riparian vegetation.		**Priority condition loss addressed by Action Plan** (a) Sediment and nutrient build up (b) Increasing pollutants (c) Inappropriate water balances (d) Soil erosion and structural decline (e) Increasing pest plants and animals (f) Minimise flood damage and maintain biodiversity (See high priorities in Table 9-2)	
Aspirational Targets	**Relevant Regional Resource condition targets**	**Management Actions and Targets**	
		LSE11	Stabilise erosion and maintain and restore riparian vegetation in the highest 10% priority sites identified in action LSE 9, to prevent further export of sediment and nutrients. (CMA, DSE Land Victoria, DPI 2010).
		LSE12	Identify and prioritise major sources of nutrient and sediment mobilisation throughout all land based management units (EGCMA)
		LSE13	Implement the Sewage and Stormwater Management Plans for all urban areas to reduce the impact of stormwater runoff (2009 EGW, local government)
		Reduced impacts from pest plants and animals	
		LSE14	Develop and implement actions plans to map and manage priority riparian weeds and take steps to prevent new weed species establishing. Management actions should include comprehensive benefit-cost analysis and agreed cost sharing arrangements. (DPI 2008)
		LSE15	Develop and implement action plans for the management of carp and noxious aquatic animal pests. Action plans should include comprehensive benefit-cost analysis and agreed cost sharing arrangements. (DPI 2008)
		Minimise flood damage	
		LSE16	Implement recommended high priority actions from the Regional Floodplain Management Plan (in preparation), to reduce damage caused by floods (EGCMA 2007)
		Research	
		LSE17	Undertake monitoring, evaluation and research programs to support adaptive management of river health, and to improve understanding of natural flooding processes, ecological flooding requirements in East Gippsland (CMA, DPI, DSE 2008)
		LSE18	Improve knowledge of river ecology and ecological processes to guide regional decision making and will assist in setting targets for improvements in the condition of streams and riparian zones (CMA, DPI, EGSC 2008)
		LSE19	Establish baseline information on the status of native fauna, and threats to that status. Where necessary, establish priorities for management intervention to maintain or improve the status of identified native fauna (DSE 2010).

(continued)

Table 9-3 (continued)

Action Plan Objectives: To improve the overall condition of the region's rivers and flood plains and riparian vegetation.		**Priority condition loss addressed by Action Plan** (a) Sediment and nutrient build up (b) Increasing pollutants (c) Inappropriate water balances (d) Soil erosion and structural decline (e) Increasing pest plants and animals (f) Minimise flood damage and maintain biodiversity (See high priorities in Table 9-2)	
Aspirational Targets	**Relevant Regional Resource condition targets**	**Management Actions and Targets**	
		Monitoring and evaluation	
		LSE20	Develop and implement a cost effective system to assess and monitor condition of high-value river and stream ecosystems including monitoring the ISC condition for the region's streams (CMA 2008)
		LSE21	Develop and implement a monitoring program for algal bloom outbreaks in rivers (CMA, DSE 2009)

Table 9-4: Estuaries, Wetlands and Lakes Action Plan. Catchments Asset Class

Action Plan Objectives: To improve the overall condition of the region's wetlands and lakes		**Priority condition loss addressed by Action Plan** (a) Sediment and nutrient build up (b) Increasing pollutants (c) Inappropriate water balances (d) Soil erosion and structural decline (e) Increasing pest plants and animals (See high priorities in Table 9-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
All high-value lakes, wetlands and estuaries will be in good condition	By 2015: • The IWC score for wetlands and estuaries in the region will improve by a yet to be determined amount, (to be determined after development of the IWC) • The IEC score for wetlands and estuaries in the region will improve by a yet to be determined amount, (to be determined after development of the IEC) • The extent and distribution of internationally and nationally significant wetlands in the region is maintained or improved.	**Planning targets**	
		LSE22	Develop (2007 DSE, GCB, EGCMA), and implement (Ongoing DSE, GCB, EGCMA), a GIS based inventory of all high-value wetland and estuary ecosystems within the region
		LSE23	Using the inventory developed in LSE 21, develop (2009, DSE GCB EGCMA), and implement (Ongoing DSE, GCB, EGCMA), a Regional Wetland Audit and Prioritisation Framework to guide future investment and to identify further sites for national or international recognition.
		LSE24	Develop and implement action plans to meet obligations for nationally and internationally recognised wetland sites, including Ramsar sites and nationally important wetlands listed in 'A Directory of Important Wetlands in Australia'. All action plans to include comprehensive benefit-cost analysis and agreed cost sharing arrangements (DSE, CMA 2008)
		Reduce the impact of boating on lakes and estuaries	
		LSE25	For all key lakes and estuaries, develop Boat Pump-out Station Management Plans. Plans to include preferred locations for additional stations, management and maintenance responsibilities and community awareness programs to ensure adoption of the facilities. (GCB 2007)
		LSE26	Develop and implement a monitoring program to evaluate the adoption and use of Pump-out Stations. (GCB 2007)
		LSE27	Determine the wet berthing capacity at identified activity nodes throughout the Gippsland Lakes (Lakes Entrance, Metung and Paynesville). (2008 GCB, EGSC , Gippsland Port Authority)
		LSE28	Develop and implement an action plan to reduce the impact of (land and boat-based) effluent and pollution on lake and estuarine environments. (GCB 2008)

(continued)

Table 9-4 (continued)

Action Plan Objectives: To improve the overall condition of the region's wetlands and lakes		**Priority condition loss addressed by Action Plan** (a) Sediment and nutrient build up (b) Increasing pollutants (c) Inappropriate water balances (d) Soil erosion and structural decline (e) Increasing pest plants and animals (See high priorities in Table 9-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
		Maintenance of lake frontages	
		LSE29	Restore public frontages to lake shores. (Ongoing DSE Lands Victoria, GCB)
		LSE30	Ensure the location and size of recreational infrastructure, particularly boating related facilities, are sensitive to lake and estuarine environments. (2009 GCB, EGSC , Gippsland Port Authority)
		LSE31	Increase visitor access to wetlands through development of boardwalks and interpretation material at three wetlands throughout the region. (2008 EGSC, GCB, EGCMA).
		Research	
		LSE32	Improve knowledge of wetland and estuary ecology to guide regional decision making. (2008, GCB, EGCMA, DPI, EGSC)
		Interim implementation targets	
		LSE33	Implement priority actions from the Regional River Health Strategy, Floodplain Management Plan and Regional Water Quality Action Plan.(Ongoing, EGCMA, DPI, DSE)
		LSE34	Continue to implement priorities outlined in the Gippsland Lakes Future Directions and Action Plan (Ongoing WGCMA,GCB, DSE, DPI, EGSC, EGCMA)
		LSE35	Implement the Gippsland Lakes Shoreline Revegetation Strategy. (Ongoing GCB, DSE, DPI, EGSC, EGCMA)
		Monitoring and evaluation	
		LSE36	Develop (2007 DSE, GCB, EGCMA), and implement (Ongoing DSE, GCB, EGCMA), an 'Index of Wetland Condition' (2007 DSE, GCB, EGCMA)
		LSE37	Develop (2007 DSE, GCB, EGCMA), and implement (Ongoing DSE, GCB, EGCMA), an 'Index of Estuary Condition' (2007 DSE, GCB, EGCMA)
		LSE38	Develop and implement a monitoring program for algal bloom outbreaks in lakes wetlands and estuaries. (2009 DSE, EGCMA, WGCMA)

Table 9-5: Water Quality Action Plan for Estuaries, Wetlands and Lakes. Catchments Asset Class

Action Plan Objectives: To reduce the importation of pollutants from catchment sources		**Priority condition loss addressed by Action Plan** (a) Sediment and nutrient build up (b) Increasing pollutants (c) Inappropriate water balances (See high priorities in Table 9-2) *Note: Each relevant management unit also has an individual action plan which focuses on reducing nutrient and sediment loss to regional water bodies.*	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
The importation of sediment and nutrients to the region's waterways will be reduced to levels which minimise environmental impacts	By 2015, • Imports of sediment and nutrients to water bodies will be reduced by 40% • A significant reduction, by a yet to be determined amount, in the number of blue-green algal blooms in East Gippsland.	**Planning Targets**	
		LSE39	Implement the priority actions from the East Gippsland Water Quality Action Plan (in prep.) (2009 EGW, EGCMA)
		LSE40	Develop a conceptual model for the Gippsland Lakes basin which effectively links all modelling (2006 GCB Project RT1).
		Research	
		LSE41	Support research that will assist in setting targets for the adoption of Best Management Practices on farms (CMA 2007)
		Interim implementation targets	
		LSE42	Increase the use of efficient dairy effluent systems to reduce nutrient input to rivers and streams (2006 EPA, DPI)
		Monitoring and evaluation	
		LSE43	Monitor and evaluate the effectiveness of Stormwater Management Plans. (2009 EGSC, EGCMA)

Table 9-6: Water Balance Action Plan. Catchments Asset Class

Action Plan Objectives: To establish environmentally sound water allocations, which balance the needs of the natural environment and industry		**Priority condition loss addressed by Action Plan** Inappropriate water balances and water allocations (See high priorities in Table 9-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
• **All Lakes, wetlands, rivers, streams and estuaries will receive an environmentally sustainable share of the region's water resources;** • **An 'Environmental Water Reserve' will be in place across the region**	By 2015, all high-value lakes, wetlands, estuaries, rivers and streams will receive adequate environmental flow allocations.	**Planning Targets**	
		LSE 44	Establish an 'Environmental Reserve' for all streams, supported by adequate data, information and management arrangements (2007 EGCMA)
		LSE 45	Develop and implement plans to reconnect rivers and floodplain wetlands for 20% of high priority reaches identified in the Regional River Health Strategy and Regional Floodplain Management Plan (in preparation) (2009 EGCMA)
		LSE 46	Monitor flow allocations annually in all streams to assess compliance with 'Environmental Reserve', Sustainable Diversion Limits and determine streams which are becoming flow-stressed. (Ongoing SRW, CMA)
		LSE 47	Complete a Regional 'Sustainable Water Strategy' for Gippsland (2008 DSE, EGCMA, WGCMA)
		LSE 48	Provide for equitable water sharing by facilitating regional implementation of Farm Dams Act. (SRW Ongoing)
		LSE 49	Complete an inventory of available water resources in major streams in the region (2006 EGCMA)
		LSE 50	Develop guidelines for future irrigation development (2006, EGCMA)
		LSE 51	Support research that will assist in setting targets for the adoption of Best Management Practices on farms (Ongoing, EGCMA, SRW, DPI)
		Research	
		LSE 52	Undertake flow studies to identify environmental flow requirements for all streams which are approaching 'flow stressed' status. Ensure that flow studies account for the flow requirements of receiving waters. (2008 EGCMA)
		Monitoring and evaluation	
		LSE 53	Develop and implement systems to monitor environmental flows and water extractions (2009 EGCMA, SRW)
		LSE 54	Meter all water extractions from water bodies (2008 SRW)

Table 9-7: Cultural Heritage Protection Action Plan. Catchments Asset Class

Action Plan Objectives: To protect all known high-value cultural heritage sites		**Priority condition loss addressed by Action Plan** Damage to sites of cultural heritage (See high priorities Table 9-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
All known high-value Indigenous and non Indigenous cultural heritages sites will be protected	By 2015: • 100% of high-value Indigenous cultural assets will be protected in each management unit.	**Planning targets**	
		LSE55	Develop and implement a GIS inventory of high-value cultural assets within each catchment's water bodies (AAV, DPI EGCMA 2008)
		LSE56	Develop and implement action plans to protect high-value cultural assets in the region's water bodies (AAV, CMA, DSE 2008)
		LSE57	Develop and implement a plan to increase the organisational and skills capacity of the Indigenous community (CMA, 2007)
		Interim Implementation targets	
		LSE58	Develop and implement an Indigenous cultural awareness plan for all communities within the management unit (CMA, 2007)
		LSE59	Facilitate greater communication between the Indigenous community and the management unit resource managers and users. (CMA, DPI, DSE 2007)
		Monitoring and evaluation targets	
		LSE60	Develop and implement cost effective systems to assess and monitor the condition of cultural assets within each management unit (2007 DSE and AAV)

Table 9-8: Community Awareness Action Plan. Catchments Asset Class

Action Plan Objectives: To increase community awareness of the value of regional water bodies		**Priority condition loss addressed by Action Plan** Action plan addresses high priority need to intervene across a range of condition losses (See high priorities Table 9-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
The Regional community will be aware of the value of the region's water bodies and will be aware of the programs developed for their protection	By 2008, 50 % of the regional community will be aware of the value of the region's water bodies and will be aware of the programs developed for their protection	**Planning targets**	
		LSE61	Continue to develop and implement a community awareness programs such as Waterwatch (2008 EGCMA DSE, DPI GCB)

10 GROUNDWATER ASSET CLASS

10.1 Overview

East Gippsland has considerable supplies of good quality groundwater stored in the sands and gravels of its sedimentary basins which underlie the southern part of the region and to a lesser extent the fractured rock in the highlands to the north. Aquifers are water bearing strata such as sands, gravel and fractured rock which recharge from either rainfall or through interactions with surface water streams. The aquifers discharge groundwater to rivers, wetlands and other water bodies. Groundwater is also pumped from these systems for town water supplies, stock and domestic, and irrigation purposes.

Groundwater needs to be managed to ensure that the combined loss of water from the system, through natural discharges and extractions for commercial purposes, do not exceed rainfall recharge to the system. A prolonged imbalance between recharge and discharge can lead to lowered groundwater pressures and lowered watertables. Falling aquifer pressures and watertables will lead to a loss of flows to river systems and wetlands and a loss of water available for commercial purposes.

In the last decade, the demand for groundwater for irrigation, particularly in the lower Mitchell River and on the Red Gum Plains in the western end of the region, has been steadily increasing.

East Gippsland has four groundwater management areas; the Wy Yung Water Supply Protection Area, parts of the Sale Water Supply Protection Area, parts of the Stratford Groundwater Management Area and the Orbost Groundwater Management Area. Each of the four groundwater management areas forms a Management Unit within the Groundwater Asset Class (Figure 10-1).

Table 10-1: Groundwater in East Gippsland[51]

Groundwater Management Unit	Groundwater Estimated Sustainable yield (ML/yr)	Ground Water allocated (ML/yr)	Depth (m)
Wy Yung Ground Water Management Areas	9 070	7 176	0–25
Sale Ground Water Management Areas (parts of)	13 000	2 022	25–200
Stratford Ground Water Management Areas (parts of)		479	> 100
Orbost Ground Water Management Areas	1 200	1 200	20–45
Within East Gippsland but outside of a designated GMA (known as unincorporated areas)		1 296	
Whole of EAST GIPPSLAND		12 173	
Whole of VICTORIA	3 660 000	622 000	

Both the Sale and Wy Yung Groundwater Management Areas have more water allocated for commercial, urban and stock and domestic use than can be replenished by rainfall recharge. If all the water allocated is consumed, the water stored in the aquifer system will eventually be reduced to a level where the economic and environmental value of the system is eroded. Both areas are 'Water Supply Protection Areas' and Groundwater Management plans are being prepared to improve their management.

10.2 Assets within the Groundwater Asset Class

Production assets

Groundwater provides a useful supply of irrigation water for horticulture, stock and domestic supplies and for the provision of potable water for communities, for example, Mallacoota and Sale.

[51] National Land and Water Audit 2000 and Southern Rural Water unpublished data 2004.

The largest current use of groundwater in the region is for the irrigation of horticultural crops. The major horticultural production districts in the region are the Mitchell River and Snowy River flats. These areas rely on groundwater resources to derive their income. Use of groundwater for irrigation is on the increase, particularly on the Red Gum Plains area.

Two drought bores have recently been developed to provide Mallacoota with water in drought periods when the Betka River, which is the town's general water supply, stops flowing. Drought bores have been installed by the state, primarily to relieve the effort of water carting during drought, but they are also used by Shires for road making and by the CFA. East Gippsland has a surprisingly large number of drought bores. Some of the bores are over 50 m deep and are probably nearing the end of their lifespan and will need refurbishing or decommissioning.

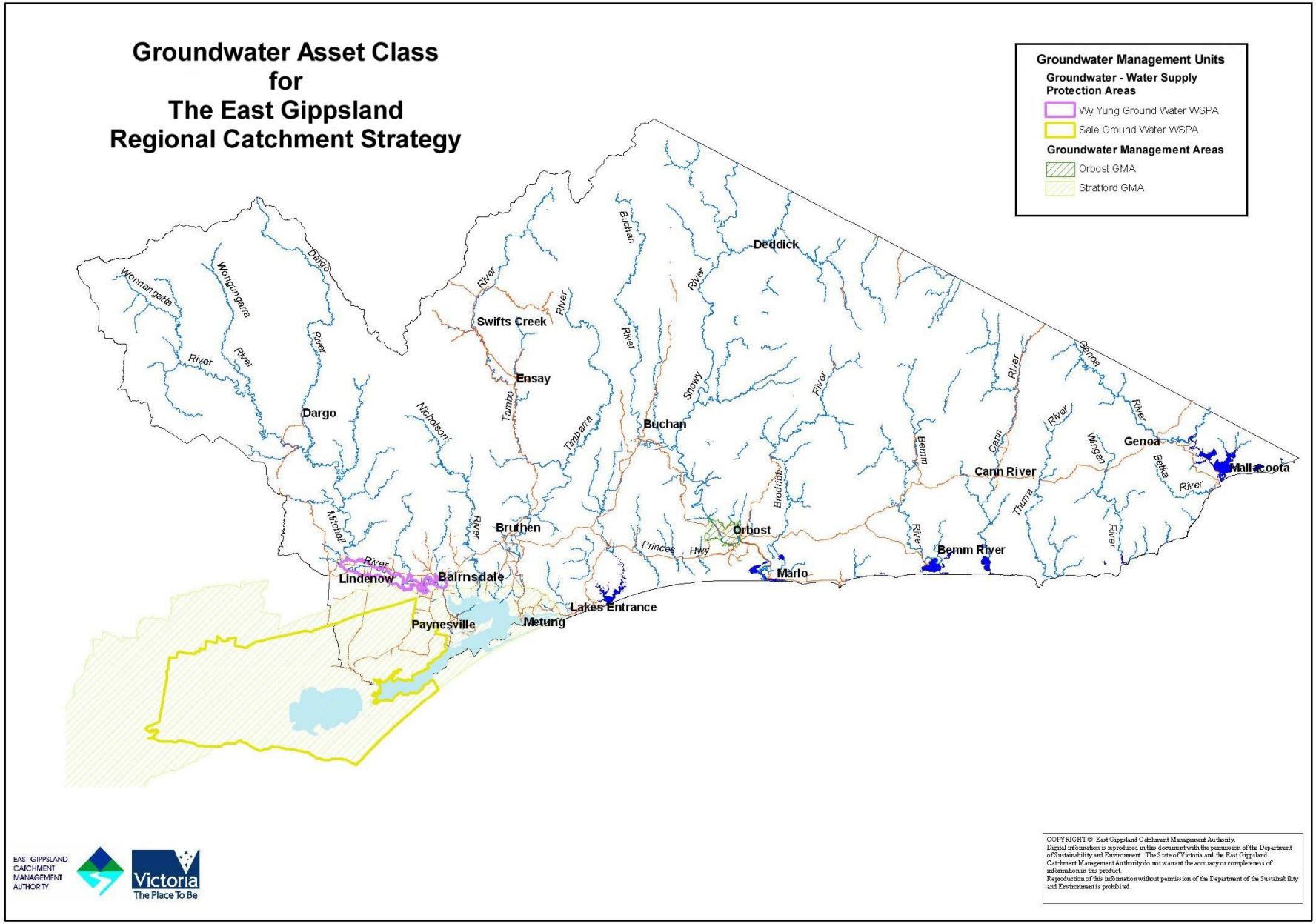

Figure 10-1. Map of the Groundwater Asset Class in East Gippsland

Environmental assets

East Gippsland has many ecosystems that are dependent upon the maintenance of stable groundwater inputs. The ecosystems contained within numerous freshwater lakes, marshes, swamps, bogs and morasses can be affected by rising or lowering watertable levels. Intrusion of saline waters can have a catastrophic effect on fresh-water biota. Most rivers are continually recharged by groundwater. This permits the survival of many ecosystems that would otherwise perish during dry seasons. Types of ecosystems that have been identified as directly dependent on groundwater[52] are:

- wetlands and 'damplands' where groundwater is at or close to the surface;
- woodlands and bush that rely on shallow groundwater as their basic water supply;
- stream ecosystems where the 'base flow' is supplied by groundwater;
- wildlife in arid areas where animals are dependent on groundwater that intersects the surface as pools, springs or streams.

There are large knowledge gaps regarding the connections of between ecosystems and groundwater. The lack of knowledge limits the identification of potential threats to ecosystems associated with changes to ground water resources.

10.3 Condition of and Threats to Assets

Unsustainable Extractions
Exploitation of groundwater for consumptive use can only be sustained if the groundwater removed does not exceed recharge to the system.[53] While this concept of sustainability is reasonably clear it does not take account of potential impacts of extraction on groundwater dependent ecosystems nor throughflow required to mitigate saline intrusion from receiving water bodies (e.g. Gippsland Lakes). Furthermore, estimates of 'sustainable yield' are very approximate and unreliable.

If extraction exceeds recharge rates, pressures in aquifers will drop and users dependent on groundwater supplies will have reduced access to this source of water, which may lead to conflicts between users and reduced economic returns.

Impacts on Groundwater Dependent Ecosystems
Ecosystems dependent on groundwater can be affected by the lowering of watertables. Vulnerable ecosystems include wetlands connected to groundwater, and vegetation which taps groundwater directly. Examples of the latter are riparian communities and communities dominated by paperbark (*Melaleuca spp.)* and river Red Gum (*Eucalyptus camaldulensis*).

The level of knowledge regarding the water balance needs of 'groundwater dependent' ecosystems is poor. Therefore more information will be required to make an accurate assessment of the 'sustainable yield' for most groundwater systems.

Increased salinisation of the groundwater system
At present there is no evidence that saline water from the sea or the Gippsland Lakes has intruded into East Gippsland's ground water reserves. However, saline intrusions still remain a threat.

Sale Water Supply Protection Area is at risk of saline intrusion from the Gippsland Lakes as its levels have declined below sea level at some locations adjacent to the lakes. Some restrictions have been placed by Southern Rural Water on transfer of entitlement to diminish this threat. The Orbost Groundwater Management Area is the area most at risk from seawater intrusion because of its proximity to the sea. The Permissible Annual Volume for the Orbost aquifer is less than 70% allocated and consequently there is no ground Water Management Plan being prepared. There is also potential that off shore extractions could result in seawater entering the Stratford Groundwater Management Area.

[52] Evans, R. (1999), *Environmental Water*, River Basin News, volume 79, p. 7.
[53] Department of Water Resources Victoria (1989), Water Victoria: a Resource Handbook, Victorian Government printer, North Melbourne, Australia, p. 68.

Increased watertable levels in other aquifers
Irrigation, using groundwater water from the deeper Boisdale Formation (Sale Groundwater Management Area), is increasing, particularly in the Red Gum Plains area. Care needs to be taken to ensure that irrigation practices do not raise watertable levels in shallow aquifers where soil salinity is a potential problem.

Variable climate and climate Change

Recharge of groundwater depends on inputs from rainfall and streamflows. East Gippsland, in common with much of the rest of Southern Australia, appears to be entering a drier weather cycle than has prevailed over the last few decades. Added to this are possible impacts of global warming, including greater uptake of water by plants. These factors could lead to decreased recharge to the groundwater system and an increase in demand placing stress on the aquifer.

Land subsidence from dewatering
In the Latrobe Valley pumping of groundwater from the brown coal mines has lead to lowered groundwater pressures and land subsidence. This applies particularly in areas around Yarram. Groundwater monitoring of the Latrobe System since 1975 indicates a 30 m to 40 m drop in the watertable (i.e. a decline of approximately one metre per year). The main dewatering activities of the Latrobe System are associated with offshore petroleum and gas activities, mining activities in the Latrobe Valley and a small amount of local agricultural irrigation.

The impact from local irrigation in EGCMA on the Latrobe System would be negligible, and the impact from Latrobe Valley mines on the East Gippsland Region would also be small.[54]. At present there is no similar evidence of land subsidence or loss of pressure in aquifers in East Gippsland, but extraction of oil and gas from Bass Strait might lead to a similar effect. Recently two gas fields have been developed near Orbost.

10.4 Snapshot of each Management Unit in the Groundwater Class

Sale Groundwater Management Unit
The Sale Groundwater Management Area is located within the Boisdale Geological Formation and covers an area of approximately 1400 km^2. The aquifer is located at a depth between 25m and 200m below the natural surface. Groundwater extracted from the Sale Groundwater Management Area is used for Sale's town water supply (Sale is in the West Gippsland CMA Region) and for irrigation and stock and domestic supplies in both the East and West Gippsland CMA Regions.

The main recharge areas for the system are along the northern parts of the aquifer, between the alluvial plain of the Macalister and Thomson Rivers, and along the northern flank of the Baragwanath Anticline to the south of Sale. Currently the natural discharge area for the Sale Water Supply Protection Area is unknown. It is assumed that the Boisdale Formation discharges into the Gippsland Lakes.[55]

The GMA has an estimated sustainable yield of 13,000 ML per year and the current allocations are 20,964 ML per year. For this reason the region has been declared a Water Supply Protection Area. There is a lack of long-term monitoring data for the area and better data is required to improve the management of the system in the future.

Groundwater in the area provides an important source of water for the horticultural production in the Lindenow Flats.

Wy Yung Ground Water Management Unit
The Wy Yung Groundwater Management Area occupies an area of 54.5 km^2. It is located along the valley of the Mitchell River in the Lindenow and Bairnsdale areas. The area is on average 2 km wide and is approximately 25 km in length. The area is divided into three zones based on aquifer recharge and discharge characteristics and different levels of groundwater use.

The Wy Yung aquifer interacts with the Mitchell River both discharging to and recharging from the river depending on river flow events. Water levels within the aquifer naturally decline even when no groundwater is extracted, particularly in dry periods when river flows are low. The volume of water recharging the aquifer in the Ground Water Management Area is estimated to be less than current licensed allocations. For this reason the area

[54] Gordon Walker, Department of Sustainability and Environment, East Melbourne, 2003, personal communication, 2003.
[55] Sale GMP Explanatory Paper, 2002, Southern Rural Water**,** Maffra, Victoria, Australia

has been declared a Water Supply Protection Area. There is a lack of long-term monitoring data for the area and more data is required to improve the management of the resource.

Orbost Ground Water Management Areas

The Orbost aquifer system is less understood than its Mitchell River neighbour. It is thought to be confined, but there is little knowledge of its recharge and discharge characteristics in particular its relationship with the Snowy River. Further work is required to gain a better understanding of the system. Monitoring bores were installed in 2001 and data are still being collected.

The Ground Water Management Area has only two groundwater licences and the aquifer is used for irrigation and stock and domestic purposes.

Stratford Groundwater Management Area

The Stratford Ground Water Management Area was formerly known as the Seacombe Ground Water Management Area, but this was excised into the Yarram and Stratford Ground Water Management Areas to simplify management of the system. The Stratford Ground Water Management Area has only nine groundwater licences including the Latrobe Valley power stations which possess most of the entitlement, while other licenses have been issued for irrigation and geothermal purposes. Due to its depth, stock and domestic usage is only likely along the fringe of the basin. Recharge is believed to occur around the basins margin in the Latrobe Valley and north of Stratford as well as the Baragwanath anticline where the aquifer occurs near the ground surface.

10.5 Strategic Context and Summary of Issues

The region has four groundwater management areas. The groundwater systems in these areas provide groundwater for productive purposes and to support groundwater dependent ecosystems.

Groundwater has been used on the Lindenow and Orbost Flats for horticultural purposes and there is growing use of groundwater on the Red Gum Plains for horticulture and some dairy production.

The aquifers in the Sale and Lindenow Flats are over allocated. If all the groundwater allocated for productive use is used annually, groundwater pressures and watertables will fall, resulting in unreliable supplies of water for productive purposes or to support groundwater dependent wetlands and other vegetation.

There are considerable knowledge gaps which will need to be filled to improve the management of the groundwater systems in the region. More information is required to set sustainable extraction rates and groundwater levels. Additional data will be needed to analyse recharge and discharge rates of the aquifers, and to gain a greater understanding of their interconnections with other ground water dependent assets.

All groundwater extraction should be monitored so that sound information on the resource can be obtained and its use can be contained within the sustainable limits of the resource.

Completing Groundwater Management Plans for all major groundwater reserves in the region will be the key to the sustainable development of the groundwater resource.

10.6 Broad Objectives and Approach

Ideally, the use of the region's groundwater systems should:

- provide an opportunity for the community to use groundwater for productive and profit making activities
- be used efficiently and for the most profitable use given market conditions;
- contribute the net wealth to the region and the state;
- ensure that high-value wetlands and other groundwater dependent remnants of the natural environment are maintained;
- ensure that the region's cultural heritage is protected
- ensure that the use of groundwater does not adversely affect the value or condition of other assets by, for example, creating high watertables.

10.7 Strategic Directions for the Groundwater Asset Class

The actions needed to achieve the broad objectives for Groundwater Management fall into four natural areas: planning to map out a specific course of action, implementation of the course of action, monitoring, and evaluation.

A set of strategic actions to address the above tactical areas, have been developed to assist the region meet the objectives identified for groundwater systems. The strategic actions are as follows:

Develop an assets inventory for groundwater management areas
All relevant agencies should work in partnership to develop a GIS based inventory of (a) all the groundwater resources within the region (b) the natural ecosystems dependent on groundwater including ecosystems with high cultural values (c) the sites of all production bores used for irrigation, stock and domestic. Much of this information already exists in a number of databases; therefore meeting this objective may only require integration of existing databases. The database should be available to the community and resource managers and planners.

Develop consistent systems to assess the condition of the resource base
All relevant agencies should work in partnership to develop cost effective systems to assess and monitor the condition of assets listed within the Groundwater Management Areas inventory. Monitoring systems should include benchmarks for watertable levels and groundwater flows to high-value groundwater dependent ecosystems; annual groundwater usage for productive purposes; watertable levels and groundwater pressures; and the presence of salts and pollutants.

Develop systems to monitor trends in the profitability of production based assets
All relevant state and industry based organisations should work in partnership to develop a cost effective system to ensure that groundwater is used efficiently and maximises profits.

Develop a system to monitor the impact of groundwater use on rising watertables
Monitoring systems are required to monitor the impact that the use of groundwater from deeper aquifer systems may have on driving high watertables in shallow aquifer systems. Assessment of the impacts of irrigation induced salinity from the use of ground water is a priority in the Red Gum Plains management unit.

Align groundwater use with land capability
Where groundwater is to be used for irrigation, ensure that the land is capable of sustaining long-term irrigation practices.

Ensure that land managers adopt Best Management Practices
Develop action plans to encourage the adoption of groundwater irrigation practices which will create greater returns from the current use of land and water while limiting offsite impacts on the natural environment.

Protect known sites of cultural significance
Develop action plans to protect all groundwater dependent ecosystems which have cultural significance. Plans to be developed in partnership with the Indigenous community and landowners and managers. All plans should include agreed cost sharing arrangements.

Ensure the community is engaged in the decision making process
All members of the community who have a stake in the management of groundwater within the region should be provided with an opportunity to participate in the groundwater management decision making processes.

Develop action plans to improve the current condition of the groundwater resource
Completion of the existing groundwater management plans currently under development should be continued and should be integrated with the other strategies above.

10.8 Management Action Priorities

Priorities for intervention to maintain or improve the condition of assets within management units of the Groundwater Asset Class are set out in Table 10-2. Management actions and targets to address identified high priorities are set out in Table 10-3.

Table 10-2: Priority 'Need for Intervention' ratings for assets of the Groundwater Asset Class
(See Chapter 5 for explanation of priority setting process.)

Management Unit and Associated Assets	'Need for Intervention' Priority Rating		
	Inappropriate water balances or water allocations	**Increased pollutants including salts.**	**Efficient use and development of resources**
Wy Yung GMA			
Stored groundwater, and groundwater outflows	High	Med	High
Part of Sale GMA			
Stored groundwater, and groundwater outflows	High	Med	High
Orbost GMA			
Stored groundwater, and groundwater outflows	High	Med	High
Part of Stratford GMA			
Stored groundwater, and groundwater outflows	High	Med	High

Table 10-3: Groundwater Management Action Plan. Groundwater Asset Class

Action Plan Objectives: To ensure that groundwater resources use balances the need to generate wealth with the need to maintain the natural environment		**Priority condition loss addressed by Action Plan** (a) Inappropriate aquifer water balances (b) Efficient use and development of resources (See high priorities Table 10-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
• **The groundwater resource will be used to generate wealth for the region while maintaining high value groundwater dependent ecosystems;** • **The groundwater system will maintain its water quality over time.**	By 2015: • Groundwater use in all management areas will match long-term estimated aquifer recharge rates. • All groundwater dependent ecosystems will be provided with the groundwater inputs required to support their long-term health and survival.	**Planning Activities**	
		GW1	Complete an inventory of groundwater supplies within the region (2009 EGCMA, DPI, SRW)
		GW2	Complete inventory of all high-value groundwater dependent ecosystems in the region (2009 EGCMA, DPI, SRW)
		GW3	Complete existing groundwater management plans being developed for the Wy Yung and Sale Areas and then complete them for the Stratford and Orbost areas. Plans to ensure that long-term use matches recharge rates to the groundwater system (2006 SRW, DPI)
		GW4	Develop and implement an action plan to ensure irrigators use 'Best Irrigation Practice' when irrigating with groundwater (2006 DPI, SRW)
		GW5	Assess the salinity risks associated with greater use of groundwater. (2006, DPI)
		GW6	Monitor the results of ongoing investigations into offshore oil and gas extraction impacts in Gippsland, and assess the risk of land subsidence (2009, DSE)
		Monitoring and evaluation targets	
		GW7	Develop and implement cost effective systems to assess and monitor the groundwater inputs to high-value natural ecosystems. (2007 SRW, DSE)
		GW8	Develop (2008, SRW) and implement groundwater quantity and quality monitoring program. Results of groundwater trends to be made public annually (Ongoing SRW)
		GW9	All groundwater bores to be metered and the total annual extractions to be monitored and made public (2008, SRW)
		GW10	Develop (2007 DPI, SRW), and implement (Ongoing DPI, SRW) a system to monitor compliance with 'Best Irrigation Practice'
		GW11	Develop (2007 DPI, DSE and EGCMA), and implement (Ongoing DPI, DSE and EGCMA), systems to evaluate the success of the Groundwater Management Plans

11 COASTAL AND MARINE ASSET CLASS

11.1 Overview

The Coastal and Marine Assets Class (Figure 11-1) includes the coastline of the CMA region and the marine waters from the high water mark out to 5.5 km offshore. Australia's southern coastline is the southern hemisphere's only major south-facing coastline. The region's relative isolation for the past 65 million years has allowed the evolution of a diverse and unique range of plants and animals in the area.

The East Gippsland coastline includes some of Victoria's most picturesque landscapes including the system of dunes, rocky headlands, cliffs, marshes and sandy beaches and a variety of fringing vegetation communities and systems. The coastal systems include four different floristic communities of Warm Temperate Rainforest, Littoral Rainforest, many forms of coastal woodlands, shrub lands, wetlands and dunal vegetation. Much of the coastline is formed from mobile sand dunes shifting gradually eastward. However, in the far east the coastline is punctuated by rocky headlands and outcrops. Croajingalong National Park, together with Victoria's Cape Howe Marine National Park and NSW Nadgee Nature Reserve, is part of the largest coastal conservation reserve on the south-eastern Australian mainland, protecting much of this wild and largely untouched wilderness.

The coastal landscapes continue under the marine waters including large sand-beds, associated with the Gippsland Basin, a large region on the south-east margin of Australia's continental shelf, and spectacular rocky reefs of granite and sandstone. The underwater terrain is largely shallower than 200 m. However, it drops off rapidly in the east at the point where the continental shelf plunges into the Bass Canyon, reaching depths of over 3,000 m.

This marine environment is a mixing point for tropical waters of the East Australian current, temperate southern waters that wash over Bass Strait and cool waters from deepsea upwellings. The region therefore contains a rich diversity of plant and animal species that are found separately in southern and northern waters of Australia.

Marine waters are systematically linked to both oceanic conditions and to freshwater and estuarine systems. Many species rely on freshwater inputs and are therefore affected by catchment based activities. While the estuarine and freshwater systems are discussed in other areas of this strategy, the natural systematic linkages to marine waters which ultimately receive the catchment drainage should always be acknowledged.

Because of its unique oceanographic features, this region is biologically productive and supports a number of important recreational and commercial fisheries from which a significant income is derived. The natural and largely 'untouched' features of much of the region also provide considerable tourism opportunities and it is little wonder that it is one of the state's most popular holiday spots.

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11.2 Assets within the Coastal and Marine Asset Class

Environmental assets

The coast supports a diverse range of terrestrial flora and fauna. Coastal communities represented include cliffs/slopes, dunes, mangroves and marshes. Locations such as the Gippsland Lakes and parts of Croajingalong are rated of national or international biological significance. The Skerries, parts of Mallacoota Inlet and Gabo Island Harbour have been set aside as Special Management Areas. A number of other areas have been defined as Coastal Recreation and Coastal Protection Zones.

The catchment, estuarine and marine environments of the region may be seen as forming parts of a single system. Each is highly influenced by conditions and activities upstream. Each has significant intrinsic value and provides critical nursery habitats for juvenile fish. These environments and the species they support also play an essential role in the food chain of the regions ecosystems, providing a large and diverse food source for other valued species higher in the food chain, particularly birds and fish.

Because of the mixing of large water currents, this region supports a rich diversity of plant and animal species. Remarkably, 90-95% of the marine species in the region are endemic to southern Australia.

The soft sediments of Victoria's open coast, including those of East Gippsland, contain the greatest diversity of marine benthic invertebrates reported in the world. Low profile reefs also support dense forest communities of red and brown seaweeds, providing habitat for sea-tulips, sponges, and a large range of invertebrates. These habitats

support a variety of fish such as Purple Wrasse, Blue-Throated Wrasse and Herring Cale, and the region provides a passage way for pelagic species such as sunfish, tuna and jellyfish.

The marine ecosystem in the region is unique and areas of environmental and scientific significance have been recognised with the establishment of representative marine national parks including Point Hicks and Cape Howe, and marine sanctuaries including Beware Reef

While there is a healthy research interest in East Gippsland's marine environment that has led to the accumulation of considerable knowledge of the area, there are still many important gaps in our understanding of the impacts and sources of threats in the region and their interaction with linked ecosystems.

Commercial Assets

Victoria's tourism industry has aptly named the East Gippsland coast as the 'Wilderness Coast'. The natural landscapes and seascapes and unspoilt wild beauty of the region's coasts and marine environments provide many recreational opportunities and tourism is growing at a modest rate[56]. Recreational pursuits include sightseeing, beach going, swimming, camping and bushwalking. Recreational fishing also continues to grow, with commercially operated recreational fishing and offshore diving trips becoming increasingly popular. Recreational boating is a significant activity at these locations and the demand for infrastructure is steadily increasing.

The region also caters for a number of industries that are of significant economic importance. Gippsland's commercial fishing catch contributes significantly to the state-wide catch and is of significant economic importance, particularly considering the degree of value-adding undertaken in the region. Victoria's largest offshore commercial fishing fleet is based at Lakes Entrance. In the year 2002–03, 1523 tonnes of scalefish, 546 tonnes of scallops, 15 tonnes of sharks and 141 tonnes of other species were landed at Lakes Entrance from state-managed fisheries. The value of these landings was over $8 million. In addition, commercial fishing in the Commonwealth-managed fishery[57] has landed an annual average catch of $10 million at Lakes Entrance for the last three years.

Abalone and rock lobster fisheries are also important, bringing in considerable economic returns to the region. In the Eastern Zone of the Victorian abalone fishery, licence holders target reefs between Marlo and Cape Howe. The total available catch for license holders from this fishery is 488 tonnes per year. In the financial year 2002–03, 456 tonnes of abalone were landed in East Gippsland[58].

Significant oil and gas reserves are located outside Victorian coastal waters. The development and servicing of these fields provide employment in the region. Whilst some facilities currently exist, the progressive development of this industry may increase the need for pipelines and onshore processing.

[56] (Gippsland Integrated Coastal Planning Project - Technical Papers. GCB, 2000a).
[57] Australian Fisheries Management Authority records.
[58] Fisheries Victoria (2003) Commercial Fish Production Information Bulletin 2003. Primary Industry Research Victoria, Queenscliff, Victoria.

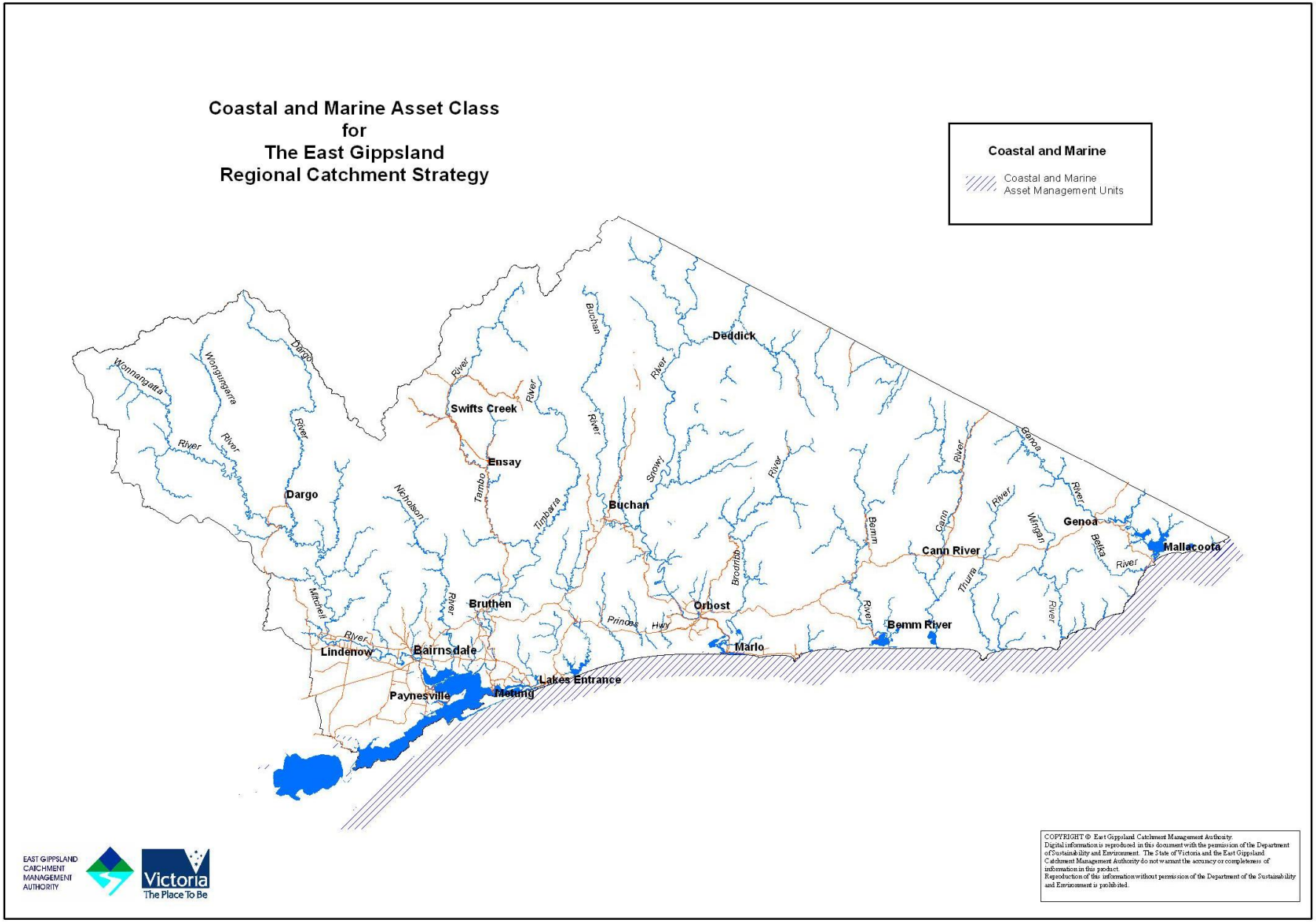


Figure 11-1. Map of the Coastal and Marine Asset Class for East Gippsland

Cultural and social assets
The area is of major significance and importance to Victoria's Indigenous population. There is an abundance of artefacts and middens, which confirms a long history of occupation by the Gunnai Kurnai and Bidawal people, are well known to have frequented the ocean, estuaries and inlets to gather food.

The coast off Croajingalong National Park has quite significant cultural importance to Australia. Point Hicks was the first European sighting of the south-east Australian mainland in 1770. In 1887 the light station at Point Hicks was built to warn mariners of the hazardous sections of the coast. In the last 200 years numerous ships have been wrecked on the coast and many lives have been lost.

11.3 Condition of and Threats to Assets

Overall Condition
Of East Gippsland's estuarine and marine environments, most are in excellent condition. Significant environmental changes have occurred within the Gippsland Lakes since the permanent opening of the entrance and following major changes in land use in its catchment. These changes have resulted in changes in marine and estuarine fish species composition within the estuary and major changes in salinity. In Far East Gippsland, water quality remains high due to the extensive coverage of vegetation native to the region.

The extent of the National and Coastal Parks and the limited development along the coastal strip has ensured that much of the coast is still in near natural condition. The majority of coastal strip has been contained within conservation reserves for many years. The area includes the important Gippsland Lakes Coastal Park, Cape Conran Coastal Park and Croajingalong National Park. The Croajingalong Park links to Nadgee Nature Reserve in NSW. A number of Marine Protected areas also provide protection for significant coastal areas. These include the 90 Mile Beach Marine National Park, Beware Reef Marine Sanctuary and Point Hicks and Cape Howe Marine National Parks.

Land clearing for urban development and for agriculture around the Gippsland Lakes has significantly affected the natural values of the coastal fringe. Urban expansion and the periurban interface are a major threatening process for biodiversity in the coastal zone as a result of ongoing habitat loss and weed invasion.

Water quality
Land management and activities since European settlement have altered water quality. In comparison to other areas of Australia, water quality in the region is good. However, land based catchment activities have the potential for detrimental impacts on both estuarine and marine environments. Nutrient inputs draining from the catchment into coastal waters remain a major threat. Diffuse imports of sediment and toxins from catchments pose a significant threat to water quality. Other sources of pollutants include industrial effluent, sewage, fertiliser rich agricultural runoff and urban stormwater.

Alterations to natural freshwater flows
Natural flows of freshwater including the natural pulses after estuarine mouth openings are important to estuarine and marine ecosystems as they trigger breeding and recruitment in marine species. These natural flows also provide fish passages for species passing both from fresh to marine waters, but also from marine to freshwater environments. Alterations to this natural flow pose a threat to the habitats and species that rely on these environments.

Aquatic and terrestrial introduced species
The introduction of marine pests is a significant threat to the estuarine and marine environments. They are a threat to biosecurity and can adversely affect biodiversity, commercial industries and recreational activities. Exotic aquatic species are generally introduced into Australia through international shipping (including yachts and commercial vessels) and may then be spread around through many domestic craft. While there are no significant trading ports in the region, small boats including recreational and commercial craft are regularly present and travel from interstate. The increasing number of these craft increases the risk of an aquatic pest being introduced into the region. Preventing their introduction and subsequent spread is the key to reducing the risks.

Weed and pest animals have the potential to invade the coastal strip. Pest plants already present in the Coastal and Marine asset class include Bridal Creeper, Pampas Grass, Arum Lily, Sea Spurge, Kikuyu, Cape Ivy and Boneseed. The main pest animals are foxes, deer and rabbits.

Harvesting activities
The continued viability of commercial and recreational fisheries is dependent upon not only fish habitat protection but also sustainable harvesting. Fishing at a rate higher than sustainable yield, and lack of detailed information about reproductive requirements is a threat to sustaining fish stocks.

Oil spills
Although rare, oil spills have the potential for significant impacts on plants and animals in marine, estuarine and foreshore environments. Oil covers the water surface inhibiting access to air for marine mammals and can cover many species.

Physical disturbance of foreshore habitat
Coastal plants and animals are adapted to cope with a harsh environment which is dominated by salt, strong winds and sandy soils. However, they are poorly adapted to additional stresses such as trampling.

Coastal Development
Most of the coast is managed within state run parks and reserves, and, as a consequence, development has been restricted to small areas on the coastal strip. Poorly planned or inappropriate developments can place additional pressures on infrastructure and the local environment as well as impacting on the coastal and marine environment.

Land uses that impact directly or indirectly on coastal areas, such as the inappropriate siting of developments and infrastructure, can lead to pollution, wind and water erosion and the disturbance of wildlife. Inappropriate recreational use can also damage coastal vegetation and destabilise coastal soils, dunes and disturb wildlife.

The high residential, recreational and tourism value of the coast will increase the demand for more development along the coastal strip. Managing this demand will be a challenge for local government, the Gippsland Coastal Board, DSE and Parks Victoria who will need to ensure that the inherent natural values of the generally undeveloped coast are not diminished.

Coastal Subsidence
The extraction of water, oil and natural gas from underground aquifers can result in the compaction of the aquifers and a consequent lowering of the land surface. There is a risk that groundwater pumping from the Latrobe aquifer for off-shore oil and gas extraction, the mining of brown coal in the Latrobe Valley, and irrigation in the Yarram area, may result in subsidence of the coast line. Subsidence could lead to breaching of the dune barrier between the Gippsland Lakes and Bass Strait.

Climate change
Climate change may have a myriad of impacts on the coast and ocean. Climate change is likely to affect rainfall, temperatures, salinities, sea temperatures and sea levels. The indirect impacts of possible catchment changes, and the more direct sea level rise are largely unknown, but pose a threat to the coastal and marine environment of East Gippsland.

Table 11-1: Overview of Management Units in the Coastal and Marine Asset Class

Unit	Production Based Natural Resource	Regionally Significant Remnants of the Natural Environment *	Natural Resource Condition
Coast	Habitation and associated infrastructure and service industries, recreational fishing, sight seeing, tourism including recreational fishing, sightseeing.	The coastline includes the system of dunes, rocky headlands, cliffs, marshes and sandy beaches and a variety of fringing vegetation communities and systems. The coastal systems include four different types of Warm Temperate Rainforest, Littoral Rainforest, many forms of coastal woodlands, shrub lands, wetlands and dunal vegetation. The coastal lagoon systems and the river estuaries along the coast are discussed in the strategy's Catchments Asset Class section. The Skerries, parts of Mallacoota Inlet and Gabo Island Harbour have been set aside as Special Management Areas.	Generally in good condition east of Marlo, but in severe decline westwards to and including the Gippsland Lakes. Key threatening processes include weed invasion, (Bridal Creeper, Cape Ivy, English Ivy, Pampas Grass, Blue Periwinkle, Wandering Jew and Boneseed; pest animals including foxes, deer (Sambar and Hog Deer[1]) and rabbits.
Marine	Tourism including recreational fishing, and sightseeing. Commercial fishing in state fisheries grossed $8 million in 2002–03. Commercial fishing in the Commonwealth-managed fishery[59] has landed an annual average catch of $10 million for the last three years.	The regions marine environment is largely 'untouched' and of high value. The importance of this environment is discussed in the asset class section. Localised areas have been established as representative areas including the Marine National Parks of Point Hicks and Cape Howe and Marine Sanctuary of Beware Reef.	Generally in good condition

*Notes: 1. *There are too many high conservation status biodiversity assets by management unit to list in this table and the reader is referred to the relevant appendices of the the Bioregional Action Plans or the Native Vegetation Plan when published.*

[1] Peel, B., Bilney, R. and Bilney R. Submission to the Scientific Advisory Committee on the nomination of Feral Deer as a threatening process under the Flora and Fauna Guarantee Act (1988).
[59] Australian Fisheries Management Authority records.

11.4 Strategic Context and Summary of issues

The coastal and marine assets of East Gippsland are highly valued by the regional community, the state and the Nation. The Gippsland coastal and marine natural environments are outstanding for their biodiversity, beauty and generally good condition.

The coast and oceans also provide East Gippsland with important wealth producing industries based on fishing and tourism. The major coastal towns such as Lakes Entrance and Mallacoota, along with smaller centres such as Marlo, Lake Tyers and Bemm River, are dependent upon their coastal environs as a backdrop for increasing tourism opportunities.

Significant areas of the coastal and marine areas are set aside in parks and reserves to maintain their natural values. While there are some current and potential threats to their values, these threats can be reduced with reasonable attention to sustainable resource management principles and good management. Community engagement, planning and regulations should ensure that the marine and coastal assets are not exploited.

The coastal areas are highly prized locations for residential and commercial development. The close proximity of the region's coastline, lakes, estuaries and mountains, provide a diversity of opportunities not found elsewhere in Victoria. The high residential, recreational and tourism value of the coast will increase the demand for more development along the coastal strip

Agencies involved in the development and management of the coast and ocean will need to continue to improve the region's planning and regulatory frameworks. Effective integration of planning and management at the boundaries with other regions, and at the public–private interface, should be further developed. A 'Whole of Coast' planning framework should be considered.

By world standards, a lot is known about East Gippsland's marine diversity. Nevertheless, there are still many knowledge gaps about threats.

A greater understanding is required on linkages between catchment management and the well-being of the marine and coastal environments and the natural communities that inhabit them. The impacts of the regions major catchments should be assessed, action plans should be developed to reduce these impacts and plans should link with other arrangements related to the management of individual management units within each catchment. Where appropriate, monitoring programs should also be implemented to determine the effectiveness of management actions.

The area is of major significance and importance to Victoria's Indigenous population, and steps should be taken to ensure that Indigenous people have every opportunity to participate in protecting sites of significance

There is considerable interest, goodwill and support in the community for the maintenance, enhancement and sustainable use of marine and coastal environments. Appropriate activities already being undertaken should continue to be supported. Building community commitment and capacity to support improved coastal and marine management is vitally important.

11.5 Broad Objectives for management of the assets within the Coastal and Marine Asset Class

The management of East Gippsland's coastal and marine assets should meet the following objectives:

- use of the coastal and marine environment should provide an opportunity for the regional community to derive an income from coastal and marine based industries;
- where the ocean or coastal resource is used for a productive purposes, it be should be used efficiently, profitably and sustainably;
- the use of the coast or marine resources should provide a net benefit to the region and the state;
- high-value coastal and marine-based natural ecosystems should be identified and maintained;
- significant sites of cultural heritage on the coast or offshore should be identified and protected

11.6 Strategic Directions for the Coastal and Marine Asset Class

Strategic directions to deliver the objectives above fit into four areas: planning to map out a specific course of action, implementation of the course of action, monitoring and evaluation.

A set of strategic actions to address these objectives have been developed to assist the region meet the objectives identified for the Coastal and Marine management units. The strategic actions are as follows:

Manage risks to marine and estuarine environments in the region
Risks include a consideration of both threats and consequence. The significance of each of the threats in the region should be considered to improve on the effectiveness of risk management arrangements. This will involve assessing the impacts of catchment use and on the coastal and marine environments, and where necessary prepare catchment plans for priority catchments and where appropriate, develop action plans for each catchment to minimise their impact.

Develop an assets inventory for resource based assets
All relevant agencies should work in partnership to develop a GIS based inventory of all natural resource based assets within the coasts management units. The inventory should include high-value remnant natural ecosystems; cultural assets; land and water used for commercial purposes; and coastal land used for domestic and recreational purposes. Some of this data already exists in a number of databases and meeting this objective may require integration of existing databases. The database should be available to the community and resource managers and planners.

Develop consistent systems to assess the condition of the resource base
All relevant agencies should work in partnership to develop cost effective and consistent arrangements to manage and measure the effectiveness of management actions to address risks to marine and estuarine and foreshore environments.

Minimise risks posed by the export of sediment and nutrients to Coastal and Marine Areas
Develop Action Plans, in accordance with the findings of the East Gippsland Water Quality Action Plan (in preparation) to manage sediment and other imports to the marine and coastal environments. Where appropriate, monitoring systems should provide a basis to assess the effectiveness of catchment based action plans.

Align resource use with the resources capability
Assess the capability of marine and coastal resources to support fishing, recreation and tourism. Monitor resource use to assess its alignment with resource capability. Identify areas of the coast or marine environment that have the potential for further development, or where the existing use should be modified.

Ensure that coastal and marine resource managers adopt 'Best Management Practices'
Develop Action Plans to encourage the adoption of management practices that will produce greater returns from the current use of marine and coastal resources while ensuring the maintenance of the resource for future generations.

Protect known sites of cultural significance
Develop action plans for all marine and coastal sites of cultural significance. Plans to be developed in partnership with Indigenous community, landowners and managers. All plans to include costs and agreed cost sharing arrangements.

Guide the direction of future development
Develop a 'Whole of Coast' blueprint for the future management and development of the East Gippsland coast. The plan should guide the location and scale of coastal use and development, particularly expanding urban growth areas and ensure that the Municipal Strategic Statement aligns with the Victorian Coastal Strategy and Gippsland Coastal Board Coastal Action Plans.

Assess the strategic investment of public funds
Every five years develop a set of 'Whole of Government Accounts' which itemise public investment in each management unit and the public benefits generated by it. The accounts should be used to guide future investment.

Ensure the community is engaged in the decision making process
All members of the community who have a stake in the management of the coastal and marine environment should be provided with an opportunity to participate in the decision making processes. Community consultation and engagement processes should be reviewed and the regional community and state agencies should collectively develop new ways for the community to share in the decision making processes that impact on marine and coastal environments.

Maintain existing projects until action planning indicates a need to change direction.
There are a wide range of coastal projects which are currently underway. Where possible, these existing projects should be maintained until action planning or monitoring and evaluation, indicate better outcomes from investment to address threats.

11.7 Management Action Priorities

Priorities for intervention to maintain or improve the condition of assets within management units of the Coastal and Marine Asset Class are set out in Table 11-2. Management actions and targets to address identified high priorities are set out in Tables 11-3 to 11-8.

Table 11-2: Priority 'Need for Intervention' ratings for assets in Management Units of the Coastal and Marine Asset Class
(See Chapter 5 for explanation of priority setting process.)

Management Unit and Associated Assets	**'Need for Intervention' Priority Rating**										
	Soil erosion and soil structure decline	**Export of nutrients and/ or sediment**	**Sediment and nutrient build up**	**Increased pollutants including salts.**	**High watertable**	**Increasing numbers of Pest Plants and Animals**	**Loss of biodiversity ecosystem function from grazing, altered fire regimes, tourism or clearing**	**Acid Sulphate soils**	**Damage to sites of cultural heritage**	**Flood or fire damage**	**Efficient use and development of resources**
Coastal strip											
Coastal ecosystems	High	High	Low	High	Low	High	High	N/A	High	Low	High
Settlements	High	Low	Low	Low	Low	High	Low	N/A	High	High	High
Tourist sites	High	Low	Low	Low	Low	High	High	N/A	High	High	Low
Marine											
Marine ecosystems including fisheries	NA	High	High	High	NA	High	NA	NA	High	NA	high

Table 11-3: Marine Resources Development Action Plan. Coastal and Marine Asset Class

Action Plan Objectives: (a) Ensure that the productive use of marine resources is sustainable and is balanced with the need to maintain the natural environment		**Priority condition loss addressed by action plan** Action plan addresses high priority need to intervene to ensure the efficient use and development of resources (See high priorities Table 11-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
• The region's users of marine natural resources will maximise use of the resource, while minimising environmental impacts	By 2015, • 70 % of marine based enterprises, will have adopted 'Best Management Practices'	**Planning targets**	
		CM1	Assess the capability of marine and coastal resources to support fishing, recreation and tourism and monitor resource use to assess its alignment with resource capability. Identify areas of the coast or marine environment which have the potential for further development. (2008 GCB, DSE, DPI)
		CM2	Assess the performance of marine based industries against the performance across the state. (2007 DPI)
		CM3	Assess the adoption of 'Best Management Practices' in marine industries (2007 DPI) As necessary, develop and implement methods to encourage the adoption of these practices within marine industries (2007 DPI and DSE)
		CM4	Develop and Implement fisheries management plans. (2009 DPI)
		CM5	Implement Policy Options and Decision framework 'Sharing/Allocation of wild fish resources among competing interest/user groups'. (*FCC July 2004*) (DPI 2007)
		CM6	Review regulatory arrangements to ensure that resource management provides for sustainable use of marine resources (2007 DPI)
		CM7	Facilitate regional implementation of the Victorian Coastal Strategy (Ongoing GCB)
		CM8	Ensure the East Gippsland Municipal Strategic Statement aligns with the Victorian Coastal Strategy and Gippsland Coastal Board Coastal Action Plans (2006 EGSC, GCB)
		CM9	Build partnerships between private landowners, conservation groups, agencies, universities and museums and build the capacity and knowledge of industry and local government to protect the coast.
		CM10	Provide the community with information, knowledge, interpretation, and opportunities for involvement in protection of the marine environment, for example, through Coastcare (2007 DSE, DPI)
		CM11	Review regulatory schemes to ensure that resource management provides for sustainable use of marine resources (2007 DPI, DSE)

(continued)

Table 11-3 (continued)

Aspirational Targets	Relevant Regional Resource Condition Targets	Management Actions and Targets	
		Interim implementation targets	
		CM12	Develop and implement methods to increase the risk management skills of enterprise managers to ensure they have the ability to effectively manage the risks associated with markets and climatic variability (2007 DPI and DSE)
		CM13	Where appropriate, develop and implement cost effective systems to assess the effectiveness of risk management strategies across the region and for high-value marine natural ecosystems. (2007 DSE and Parks Victoria)
		Monitoring and evaluation targets	
		CM14	Develop and implement a cost effective system to monitor the trend in profitability and productivity of the region's marine based industries. (2007 DPI, GCB)

Table 11-4: Marine Ecosystem Protection Action Plan. Coastal and Marine Asset Class

Action Plan Objectives: To ensure that high-value marine ecosystems remain in good condition**.**		**Priority condition loss addressed by Action Plan** Action plan addresses high priority need to intervene to (a) protect the marine environment from pest plant and animal increases (b) protect the marine environment from sediment and nutrient build up (c) protect the marine environment from litter and other pollutants (See high priorities Table 11-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
High-value marine ecosystems will be in good condition and will be capable of sustaining their environmental values over the long term.	By 2015, 100% of high-value marine ecosystems will be in the following condition: • Key pest plants and animals reduced to ecologically sustainable levels. • No new threatening marine pest plants or animals. • The importation of litter, toxins and nutrients are at levels that do not cause significant ecological impacts By 2015 100% of natural marine ecosystems will: • Have threatening plant and animal diseases identified and managed to reduce their impacts • Be used for commercial fishing, recreation and tourism within their capability	**Planning targets**	
		CM15	Identify and map high-value marine ecosystems and key threatening processes in a GIS based inventory. (2009 Parks Vic, DSE).
		CM16	Complete comprehensive action plans to maintain ecosystems listed in the inventory. Plans should include all actions required to maintain the ecological processes of these ecosystems, and include an assessment of the costs and benefits of various options and agreed cost-sharing arrangements between the private sector, the State, and the Federal governments (2009 DSE and EGCMA).
		CM17	Develop and implement strategies to prevent the translocation of marine species through vectors such as recreational boating (2008 Port Authority, GCB)
		CM18	Establish baseline information on the status of native fauna, and threats to that status. Where necessary, establish priorities for management intervention to maintain or improve the status of identified native fauna (DSE 2010).
		Research Targets	
		CM19	Support research into the impacts on the marine environment of drainage from catchments. Where necessary, prepare action plans to ameliorate the effects of sediment, nutrient and other pollutant loads entering the marine and coastal environment. (2009 DSE, GCB, EGCMA)
		CM20	Support research that will clarify our understanding of the management of coastal and marine species considered to be 'threatened'. (2006 GCB)
		CM21	Assess potential climate change threats to marine ecosystems through modelling, and prepare an appropriate strategic response (Ongoing DSE)
		Interim implementation targets	
		CM22	Build partnerships between private landowners, conservation groups, agencies, universities and museums, and build the capacity and knowledge of industry and, local government to maintain marine biodiversity (Ongoing EGCMA, DPI and DSE)
		CM23	Increase regional skills in the management of marine ecosystems through training and education programs (Ongoing DPI and DSE)
		CM24	Maintain and implement regional response plans for marine emergencies such as oil spills, and exotic marine incursions (Ongoing: Marine Safety Victoria, Gippsland Ports DSE)

(continued)

Table 11-4 (continued)

Action Plan Objectives: To ensure that high-value marine ecosystems remain in good condition**.**		**Priority condition loss addressed by Action Plan** Action plan addresses high priority need to intervene to (d) protect the marine environment from pest plant and animal increases (e) protect the marine environment from sediment and nutrient build up (f) protect the marine environment from litter and other pollutants (See high priorities Table 11-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
		Monitoring and evaluation targets	
		CM25	Develop and implement cost effective systems to assess and monitor the condition of high-value marine natural ecosystems. (2007 DSE and Parks Victoria)
		CM26	Develop and implement a bioregional scale monitoring program with the aim of understanding trends in ecosystem structure and composition and responses to disturbances and threatening processes (2007 DSE)
		CM27	Develop and implement evaluation systems for all marine ecosystem protection projects (2007 DPI, DSE and EGCMA)

Table 11-5: Marine Cultural Heritage Action Plan. Coastal and Marine Asset Class

Action Plan Objectives: To protect all high-value cultural heritage sites within the marine environment		**Priority condition loss addressed by action plan** Action plan addresses high priority need to intervene to protect cultural heritage sites from damage (See high priorities Table 11-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
All known cultural heritage values in the marine environment will be protected for the long term	By 2010 • 100% of high-value Indigenous cultural assets will be protected in each management unit • Marine resource users and managers will be aware of the Indigenous cultural heritage values in the marine environments, and will be working in partnership with Indigenous people to protect those values	**Planning targets**	
		CM28	Develop and implement a GIS inventory of cultural assets (2009 Parks Victoria, DSE and AAV)
		CM29	Develop and implement cultural asset protection plans for cultural assets. Plans should include agreed cost sharing arrangements between interest groups (2008 DSE)
		CM30	Develop and implement a plan to increase the capacity of Indigenous people to participate in the planning and management of cultural heritage assets in the marine environment (2006, EGCMA)
		Interim implementation targets	
		CM31	Facilitate greater communication between marine resource users, managers and Indigenous people (2005, DSE, and EGCMA)
		Monitoring and evaluation targets	
		CM32	Develop and implement cost effective systems to assess and monitor the condition of cultural assets within each management unit (2006 DSE and AAV)
		CM33	Develop and implement evaluation systems for all marine cultural asset protection projects (2007 DSE EGCMA and GCB)

Table 11-6: Coastal Strip Ecosystem Action Plan. Coastal and Marine Asset Class

Action Plan Objectives: To maintain the ecological condition of the coastal strip while allowing environmentally sensitive development.		**Priority condition loss addressed by Action Plan** Action plan addresses high priority need to intervene to protect the coastal strip from increased numbers of pest plants and animals; increased litter and other pollutants and; soil erosion (See high priorities Table 11-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Action Targets**	
Natural foreshore ecosystems will maintain their natural values, while supporting a range of diverse and sustainable industries	By 2025, 100% of high-value coastal ecosystems will be in the following condition: • Key pest plants and animals will be reduced to ecologically sustainable levels. • There will be no new threatening pest plants or animals within the key eco-systems • All coastal ecosystems threatening plant and animal diseases will be identified and managed to reduce their impacts • All areas of the coastal strip used for commercial fishing, recreation and tourism will be used within their capability	**Planning targets**	
		CM34	Identify and map all production based assets along the coast (2009 DSE, Parks Victoria, local government)
		CM35	Develop and implement soil conservation plans for high risk coastal areas (2009 DSE, Parks Victoria)
		Research Targets	
		CM36	Support research to improve understanding of the management of 'threatened' species on the coast (Ongoing DSE and Coastal Board)
		CM37	Assess potential climate change threats to coastal ecosystems through modelling, and prepare an appropriate strategic response (Ongoing DSE and Coastal Board)
		Interim implementation targets	
		CM38	Facilitate ongoing regional implementation of the Coast Action Coastcare program (DSE, GCB)
		CM39	Build partnerships between private landowners, conservation groups, agencies, universities and museums and build the capacity and knowledge of industry and local government to maintain the coast (2007 DSE and Coastal Board)
		CM40	Increase regional skills in the management of coastal ecosystems through training and education programs (2009 Coastal Board, DPI and DSE)
		CM41	Provide the community with information, knowledge, interpretation, and opportunities for involvement, for example, through Coastcare (2009 Parks Victoria, Coastal Board DPI and DSE)
		Monitoring and evaluation targets	
		CM42	Develop and implement cost effective systems to assess and monitor the condition of high-value coastal ecosystems. (2007 DSE, GCB and Parks Victoria)
		CM43	Develop and implement a bioregional scale monitoring program to understand trends in ecosystem composition and responses to disturbances and threatening processes (2007 DSE)
		CM44	Develop and implement evaluation systems for all coastal ecosystem protection projects (2007 DPI, GCB and DSE)

Table 11-7: Coastal Strip Resource Development Action Plan. Coastal and Marine Asset Class

Action Plan Objectives: To ensure that development along the coastal strip is environmentally sensitive, and that the use of coastal resources is in line with best practice		**Priority condition loss addressed by Action Plan** Action plan addresses high priority need to intervene to protect cultural heritage sites along the coastal strip (See high priorities Table 11-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
Use of coastal resources will sustainably generate wealth for the region and the state Any further development of the coast will not damage the natural environment	By 2015: • 70 % of coastal based enterprises, will be efficient and profitable, and will be adopting best business and environmental management practices. • coastal resources will be developed in a sustainable and orderly manner to minimise friction between competing uses, while allowing the most profitable use to occur.	**Planning targets**	
		CM45	Identify and map high-value coastal foreshore ecosystems within East Gippsland. List all identified ecosystems in a GIS based inventory (2009 Parks Victoria and DSE).
		CM46	Complete comprehensive action plans to maintain coastal foreshore ecosystems listed in the inventory. Plans to include all actions required to maintain the ecological processes of coastal ecosystems including the need for litter control, terrestrial pest plant and animal control, disease identification and management, and actions that reduce the importation of nutrient, sediment and toxins from coastal foreshore sources. Plans should include an assessment of the costs and benefits of various options and agreed cost-sharing arrangements between the private sector, the State and the Federal governments (2009 DSE, GCB and Parks Victoria).
		CM47	Develop and implement a 'Whole of coast' blueprint to guide the location and scale of coastal use and development, particularly expanding urban growth areas, and to maintain coastal values. The plan should ensure the Municipal Strategic Statement aligns with the Victorian Coastal Strategy and the Gippsland Coastal Board Coastal Action Plans. (2009 DSE, GCB, Parks Victoria, local government)
		CM48	Assess the overall profitability of coastal enterprises. Benchmark the performance of coastal industries against the performance across the state, and consider the need for industry restructuring (2007 DPI, DSE). As required, develop and implement methods to encourage the adoption of more profitable management practices within coastal industries (2008 DPI, DSE)
		CM49	Assess potential climate change threats to coastal foreshore ecosystems through modelling, and prepare an appropriate strategic response (Ongoing DSE and Coastal Board)
		Interim implementation targets	
		CM50	Ensure Municipal Strategic Statements align with the Victorian Coastal Strategy and Gippsland Coastal Board Coastal Action Plans (2006 EGSC, GCB)
		Monitoring and evaluation targets	
		CM51	Develop and implement a cost effective system to monitor the impact of coastal development on supporting ecosystems (2007 DPI, DSE, EGSC)
		CM52	Develop and implement a cost effective system of monitoring the compliance of coastal based industries to sustainable practices (2007 DPI, DSE).

Table 11-8: Coastal Strip Cultural Heritage Action Plan. Coastal and Marine Asset Class

Action Plan Objectives: To protect cultural heritage sites on the coastal strip		**Priority condition loss addressed by action plan** Action plan addresses high priority need to intervene to protect cultural heritage sites along the coastal strip (See high priorities Table 11-2)	
Aspirational Targets	**Relevant Regional Resource Condition Targets**	**Management Actions and Targets**	
Coastal resource managers will be aware of Indigenous cultural heritage and will be working in partnership with the Indigenous people on their protection.	By 2010 • 100% of known high-value Indigenous cultural assets will be protected in each management unit	**Planning targets**	
		CM53	Develop and implement a GIS inventory of all Indigenous and non Indigenous cultural assets along the cost (2009 Parks Victoria, DSE and AAV)
		CM54	Develop and implement cultural asset protection plans for cultural assets along the coast. Plans to include agreed cost sharing arrangements between key interest groups (2007 DPI, DSE, Parks Victoria)
		CM55	Develop and implement a plan to increase the capacity of Indigenous people to participate in the planning and management of cultural heritage assets in the coastal environment (2006 Coastal Board, DSE and Parks Victoria)
		CM56	Continue to survey to identify new heritage sites along the coast
		Interim implementation targets	
		CM57	Facilitate greater communication between marine resource users and managers and Indigenous people (2005, DSE, Parks Victoria, DPI)
		Monitoring and evaluation targets	
		CM58	Develop and implement cost effective systems to assess and monitor the condition of cultural assets within each management unit. (2006 DSE, Parks Victoria and AAV)
		CM59	Develop and implement evaluation systems for all coastal cultural asset protection projects (2007 DSE, DPI, DSE and Coastal Board)

12 COMMUNITY PARTICIPATION IN NATURAL RESOURCE MANAGEMENT

12.1 The role of the community in improving natural resource management

The nation, all Victorians, the regional community and local community groups all have an interest in the management of the region's natural resources and their ecologically sustainable use. Community interest in natural resource management may come in different forms. The regional community owns roughly 20% of the land in the region and uses the natural resource base to generate wealth, jobs and social well-being; many local people also derive meaning, comfort and pleasure from the region's natural values.

The state community—represented by all Victorians, the state government and its public agencies—owns 80% of the region's land. Some of this land is used by the region to generate wealth, but most it is managed by the state to maintain the region's considerable natural values and to provide clean water, clean air and carbon sequestration.

The national government, as the representative of the national community, makes a large investment in activities which meet its national resource management objectives. The East Gippsland Region has many environmental assets which are of national significance.

As this is a regional strategy, the focus of attention will be on the regional community. However, the need for a sound partnership between the state, the nation and the people of the region should not be overlooked.

The regional community can be broken up into a number of sections: people who own and manage natural resources; people who don't directly own natural resources but volunteer their time and energy to maintaining the environment; regional citizens, ratepayers and taxpayers who have a less direct interest in natural resource management activities.

Each section of the regional community has a different role in the delivery of the Regional Catchment Strategy. Resource owners and managers—including the state agencies and local industries—will be encouraged to change their practices to become more ecologically sustainable through an increase in the efficiency of resource use and to reduce the offsite impacts of their industries. Volunteer groups will be supported and encouraged to continue to participate in small scale environmental projects, many of which (such as wetland and rainforest recovery for nutrient sequestration) can have impacts on a much larger scale both regionally (the Gippsland Lakes) and nationally (in the case of migratory species that use these sites). All interest groups will be encouraged to become more aware of the natural resource management issues in the region and to participate in future decision making processes.

Confusion in the regional community regarding natural resource management roles and responsibilities has been a source of frustration and may have reduced the level of enthusiasm for participation in some community groups. Roles and responsibilities for natural resource management will need to be more clearly spelt out as the strategy is implemented. The development of agreed and comprehensive cost sharing arrangements for regional and local projects may go some way towards clarifying responsibilities for all parties.

12.2 Strategies for increasing community participation in natural resource management

Successful implementation of the Regional Catchment Strategy depends on supporting and strengthening the role of the region's communities in achieving the vision for the region. Community capacity can be separated into the following main areas: knowledge and awareness of natural resource management issues; communal consensus on directions for natural resource management; having the time and financial resources available to meet objectives; and having strong networks and partnerships which allow integrated and collective action.

Encouraging the community to undertake the priorities and actions of the East Gippsland Native Vegetation Plan will be important to the success of native vegetation conservation on freehold land, because it is the major vehicle for guiding investment for this natural resource management activity within the region.

Creating Community Awareness

Awareness of natural resource management issues will be critical to the success of the strategy. Community awareness programs should be incorporated at all levels of planning. At the regional level all leading natural

resource based agencies should work in partnership to develop a 'know your region' community awareness campaign. The roll out of the strategy should form the basis of the region-wide community awareness campaign. The objectives of the campaign should be to ensure that the general community gains a basic understanding of:

- the role that the region's natural ecosystems, and the services they provide in supporting the region's economic, social and environmental well-being;
- the condition of the region's key natural resource based assets;
- the main threats to the region's assets;
- the need to adjust priorities for management as the conditions of natural assets change and as threats are identified and actions are taken to mitigate them;
- the trends and implications of the region's changing demographics; and
- how each section of the community can participate in the development and implementation of natural resource base projects and programs in their area.

Sharing the costs of implementation

Ongoing ecologically sustainable management, rehabilitation and protection of natural resource base assets will inevitably come at a cost. Some of the costs of maintaining the natural resource base include:

- planning costs e.g. the development of the RCS and associated Regional Catchment Investment Plans
- the costs of rehabilitation or preventive works on private and public land e.g. tree planting and erosion works;
- the costs of regulation e.g. enforcement of the CALP Act
- the costs of research;
- the costs of monitoring and evaluation;
- the costs of administration, leadership and management of community groups;
- the costs of volunteer time and resources; and
- the costs of community consultation and engagement including support for community based advisory groups.

These costs must be shared across the federal, state and local governments, and appropriate sections of the regional community. Ensuring that the regional community can meet its share of the costs goes to the heart of the community's capacity to deliver desired natural resource based outcomes.

The East Gippsland farming community—the major freehold land manager in East Gippsland—has a limited ability to share the costs of improved natural resource management. Exceptional circumstances including the floods of 1998, declared droughts in 1997 and 2003 and the Alpine bushfires in 2003 have all reduced the ability of sections of the farming community to share the costs of natural resource management. The regional community as a whole is are also under considerable economic and social pressure from a range of long-term forces, including amalgamation of farms, cuts to the timber industry, Ovine Johnes disease, deteriorating terms of trade and consequent reductions of young people in the local population. Stakeholder groups consistently rank social themes as high priorities. Concerns such as employment opportunities for young people, decline of small communities and people's capacity to undertake natural resource management works often dominate discussions.

The Omeo Region flood and drought response (1997 to 2003) indicated that successful environmental outcomes will not be achieved without addressing the other economic and social issues affecting rural and regional communities.

Trend data indicates that people may continue to leave the region's more economically marginal agricultural and forest industries. This will leave a smaller population to maintain large tracts of more remote land. In the future, the region and other stakeholders may need to develop new ways to ensure that the region manages its natural assets in line with the economic, social and environmental interests of the state and nation. New cost sharing arrangements might include payments to landowners to maintain native plant and animal communities. These arrangements might include expansion of the current Bush Tender Trial projects or voluntary land acquisition and aggregation schemes, as well as an increase in the resources available for public land stewardship.

In future, all projects which require increased participation of the community in natural resource management, should include well developed, comprehensive and agreed cost sharing arrangements between all groups. The arrangements should be fair and in line with the ability to pay. Well formulated and agreed cost sharing

arrangements will ensure that all stakeholders have the capacity to participate in natural resource management activities.

Support for community groups— encouraging community participation

In many parts of East Gippsland, volunteer groups provide services often taken for granted in cities or larger rural areas. In many cases, the region's fire and emergency services, ambulance, cemeteries, sporting facilities, and parks and gardens are totally reliant on volunteer effort. Landcare, Waterwatch, Fishcare, CoastAction and Coastcare groups provide an ideal mechanism for the community to participate in natural resource management programs. These organisations have significant community membership and provide an opportunity for local community members to learn more about natural resource management and to lobby and work together on community based projects. The Snowy River Alliance demonstrated the lobbying power of a community group when it drove the decision of the NSW and Victorian Governments to return environmental flows to the Snowy River.

Landcare has evolved to become the largest community-based movement for natural resource management in Victoria, and has been active in East Gippsland since the mid 1980s. It currently encompasses 35 Landcare groups. The Landcare movement helps raise awareness of ecologically sustainable resource management among rural communities. The community Waterwatch program has monitored water quality since 1995. It currently involves 40 schools and about 3,500 students from preparatory to tertiary levels. Waterwatch participates in about twenty community education activities each year. The Fishcare volunteer program, supported by Fisheries Victoria, has been operating in East Gippsland for over seven years. The objective of the program is to promote responsible attitudes and practices amongst recreational anglers, and the broader community, towards fish and the aquatic environment. Other volunteer land stewardship networks include Trust for Nature properties, Land for Wildlife, Coast Action, Friends groups and Field Naturalists.

As well as the groups mentioned above, many other local issue-specific groups such as Greening Australia, Victorian Farmers Federation, Gippsland Private Forestry Inc. and the Gippsland Angling Clubs Association have an influence on natural resource management decisions

It is through community organisations that people will be able to increase their involvement in catchment management. They help raise awareness of sustainable resource management issues through direct community involvement and engagement and they promote education and learning in both school age and adult interactions. Joint initiatives with interest groups provide efficiencies of scale and more effective project outcomes.

However, as elsewhere in Australia, there are signs that the ability of volunteer community groups to participate in natural resource management is declining. Many of the groups are reliant on a core of individuals who are 'burning out'. The major motivator for many groups is the successful completion of on-ground works. Increased levels of reporting and administration often discourage members of these groups. Community burnout and the uncertainty surrounding funding for capacity-building initiatives also threatens the effectiveness of some community groups.

The need for strong networks and partnerships which allow for integrated and collective action

The maintenance of the East Gippsland Region's natural resources requires a coordinated and collective approach by all land managers in the region. Both public and private land managers will be required to collectively manage their land and water resources more sustainably for the greater benefit of the region. Maintenance of the Gippsland Lakes is a good example of the need for collective action. Activities on both public and private land in the Mitchell, Tambo–Nicholson, and Lake Wellington catchments in West Gippsland all export pollutants to the Gippsland Lakes which promote algal blooms. All land managers will be required to reduce their exports of pollutants to maintain the lakes over time—no one land manager or industry can fix the problem on their own.

Effective leadership at the regional level will be required to ensure that the whole community aligns its efforts to the common good of the region and the state. Gippsland has made some progress in this area with the development of the Gippsland Integrated Natural Resources Forum.

Community consultation and engagement

Community ownership—or at the least acceptance—of natural resource management objectives and initiatives will be a critical step in the ongoing adoption of improved natural resource management practices. Effective community consultation and engagement processes will be the key to making this step.

Community engagement or consultation has a number of dimensions. Community members and groups can be engaged or consulted for a number of reasons including:

- To seek their views and opinions
- To communicate information
- To be involved in decision making processes
- To share decision making power

It is vital that agencies who engage the community, ensure that the community has a clear sense of why they are being engaged. Poor engagement processes often confuse community members and lead to disillusionment with the process. All natural resource management projects should include clear community consultation and engagement processes.

Changing demographics

The East Gippsland community is rapidly changing. The region's demographics indicate that the regional community is growing older, and that net migration to the region is increasing while the natural population growth within existing communities is falling.

People from the city are moving into the region to retire and for other lifestyle reasons. The region offers cheaper residential land with more space, opportunities for nature and water-based leisure activities and a peaceful and attractive environment. Migration to the region has driven strong population growth in the Paynesville, Bairnsdale and Lakes Entrance areas. The recent significant increase in self-funded retirees moving to centres based around the lakes and coasts region will change the cultural norms within in these areas, and these cultural changes will need to be reflected in the region's community consultation and engagement processes.

Indigenous people

The local Indigenous population has a strong cultural association with the natural resource base in the region. Traditional ownership of the land over thousands of years brings unique and valuable insights into resource management within the region. Indigenous people need support in the development of their capacity to:

- participate in, and have real influence on natural resource decision making;
- derive material benefits from the use of the resource base including Indigenous based industries and other forms of wealth generation;
- benefit from their cultural heritage: and,
- protect their cultural heritage.

It is vital that agencies who engage the community, ensure that the community has a clear sense of why they are being engaged. Poor engagement processes often confuse community members and lead to disillusionment with the process. All natural resource management projects should include clear community consultation and engagement processes.

12.3 Management Action Priorities

Priorities for community participation in natural resource management are set out in Table 12-1.

Table 12-1: Community Development and Support Action Plan

Action Plan Objectives: (a) To ensure that the region community has the capacity to manage the region's natural resource base (b) To encourage the community to participate in regional natural resource management activities		**Priority condition loss addressed by Action Plan** Action plan addresses the need to ensure that the regional community has the capacity and motivation to effectively manage the region's natural resource base	
Aspirational Target	**Condition Target**	**Management Actions and Targets**	
The East Gippsland Community, including the public and private sectors, will have the social and financial capacity to deliver agreed natural resource outcomes	By 2008, 60% of the regional community will have a basic understanding of the region's natural resource management issues, and know what actions are taking place to manage those issues.	CA1	All state agencies to work in partnership to develop and implement a regionally based community awareness campaign. The campaign should include: • the role that the region's natural resources play in supporting the region's economic, social and environmental well-being ; • the condition of the region's key natural resource based assets; the key threats to the region's assets; • the trends and implications of the region's changing demographics and information on how each section of the community can participate in the development and implementation of natural resource base projects and programs in their area (2006 EGCMA, DSE, DPI and local government)
		CA2	Develop and implement community education programs that focus on schools e.g. Waterwatch (2006 EGCMA, DSE, DPI and local government)
		CA3	Fully implement the Gippsland Lakes Communications Strategy and, review, finalise and implement the EGCMA Communications Strategy (2006 Coastal Board and DSE)
		CA4	Develop and implement visitor education programs jointly with the tourism industry (EGCMA, Coastal Board, DSE, DPI and local government)
		CA5	Improve community access to relevant local information regarding catchment health, NRM etc. via local nodes, websites and points of personal contact (2006 EGCMA).
	By 2010, the number of people actively participating in improving natural resource management will increase by 30%.	CA6	All agencies and existing community groups to work in partnership to develop and implement an action plan to increase the participation of people in management of the region's natural resources. The plan will focus on: increasing the number of urban based volunteer groups; actions required to maintain programs and facilitators required to support community conservation efforts such as Land for Wildlife, Conservation Management Networks, BushCare, Fishcare, Landcare and CoastAction/ Coastcare; and revitalisation of the network of Friends Groups (2006 EGCMA, DSE, DPI and local government).
		CA7	Increase the level of support to groups to relieve them of their administrative burdens (2006 EGCMA and DSE)

(continued)

Table 12-1 (continued)

Aspirational Target	Condition Target	Management Actions and Targets	
	By 2007, all agreed natural resource management targets will be affordable.	CA8	Ensure that all new natural resource based projects have comprehensive cost sharing arrangements which take into account the capacity of all stakeholders to meet their share of the costs (2007 EGCMA)
		CA9	Develop and implement market-based incentives for the provision of environmental services on private land which benefit the broader community (ongoing EGCMA, DPI, DSE)
	By 2007, representatives of the local Indigenous community will directly participate in key natural resource management decisions.	CA10	Develop and implement mechanisms to ensure that Indigenous people have improved opportunities to participate in natural resource management decision making processes, and have increased opportunities to benefit from the use of the region's natural resources (2007 EGCMA, DSE)
	By 2007, all natural resource management initiatives will include comprehensive community consultation and engagement processes	CA11	Ensure that all natural resource management projects include effective community consultation and engagement processes. (2006 EGCMA, DPI, DSE)
	By 2009, there will be a measurable increase in the organisational skills of community based groups	CA12	Invest in 'professional development' for community representatives (2007 EGCMA and DSE)
		CA13	Develop and implement natural resource management training for community organisations and school groups, incorporating extensive consultation with community members (2007 EGCMA)
		CA14	Develop and implement volunteer and community involvement plans that provide practical and skill-based outcomes to a broad spectrum of the community and interest groups (2007 EGCMA)
		CA15	Develop and implement a plan to increase the organisational and skills capacity of the Indigenous community
	By 2009, the level of community participation and effectiveness in improving the management of natural resources will be increased	CA16	Establish benchmarks and evaluation process for community participation in natural resource management improvements (2007 EGCMA)
		CA17	Establish and maintain a database on community capacity and extent of landowner engagement in current programs (2006 EGCMA)
	By 2007, both agencies and the community will be working within a whole of community and whole of government framework	CA18	Develop and implement an action plan to for a 'whole of government' and 'whole of regional community' framework to ensure an integrated approach to the development and implementation of natural resource plans.

13 IMPLEMENTATION OF THE RCS

13.1 Overview

This section of the RCS establishes a framework for the implementation of management actions discussed in previous sections. The implementation framework has been designed to ensure that, where possible, implementation of the RCS will:

- Provide focused, timely and collective effort on regional priorities;
- Provide a mechanism to integrate projects and promote partnerships;
- Ensure the transparent allocation of resources;
- Assist in defining responsibilities for tasks.

Integrated effort is particularly important where long-term results require the coordinated investment from a range of asset owners, managers and local, state and federal agencies. Key areas in East Gippsland which require cooperative and integrated approaches are:

- reducing sediment and nutrient export from land based management units to key water based ones;
- reducing the spread of pest plant and animal populations within and between management units;
- management of fire to balance the need to protect life and infrastructure with the needs of the region's ecological systems;
- ensuring that the development of the region's land, water and biological resources sensibly balances the economic, social and environmental welfare of the region and the state;
- balancing ecological and production objectives for dual purpose assets such as timber resources within a State Forest;
- ensuring the orderly development of the region's infrastructure and natural resource base;
- coastal development which generates wealth, contributes to the region's lifestyle but maintains the integrity of the coastal and marine ecosystems; and,
- ensuring that the costs of changes in natural resource use or management are equitably distributed between individuals, the region and the state.

13.2 The RCS Implementation Framework

Broadly the RCS implementation framework provides for a hierarchy of programs, action plans and multiple outcome projects.

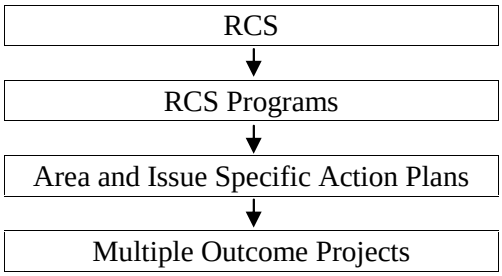
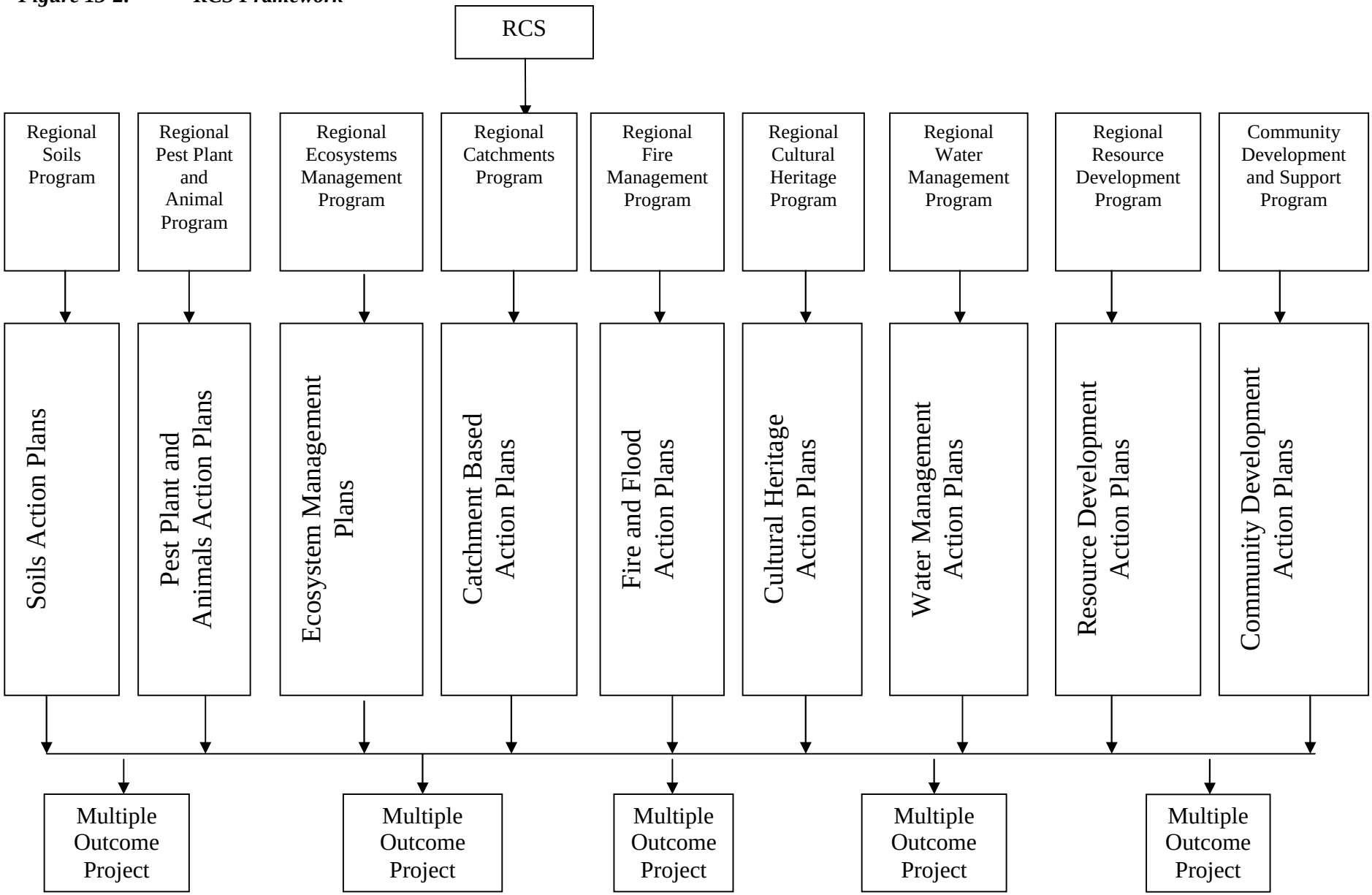


Figure 13-1. RCS Program Logic

The RCS establishes the overall strategic rationale and framework for regional investment. The RCS programs provide a framework to aggregate location and issue specific action plans. The action plans provide specific guidance on managing the condition loss of particular assets in particular management units. Multiple outcome projects provide a mechanism to link actions in plans to ensure integrated delivery and to maximise the value of investment. Figure 13-2 shows the proposed flow of implementation from the RCS through its programs and action plans to multiple outcome projects.

Each layer of the hierarchy will require evaluation. The RCS programs and action plans should be reviewed every five years. Multiple outcome projects should be evaluated every three years.

Figure 13-2: RCS Framework



13.3 Outline of the function and scope of programs, action plans and multiple outcome projects

Regional Programs and Action Plans

Regional programs provide a convenient framework for grouping local action plans which address common forms of asset condition loss. For example, the regional pest plant and animal program will provide a link between specific action plans which will be developed to address pest plant and animal issues within the Parks, Forests, Coastal and Marine, and Freehold Land management units.

Action plans have been recommended throughout the RCS (Tables 6-2 to 6-8, 7-2 to 7-8, 8-2 to 8-8, 9-2 to 9-8, 10-2 and 10-3, 11-2 to 11-8 and 12-1). The strategy lists action plans to address the loss of condition of assets where not doing so will result in regionally significant economic, social or environmental impacts.

An indicative listing of Programs and Action Plans associated with the RCS is provided in Table 13-1.

Table 13-1: Indicative List of Programs, Action Plans and Priority Actions associated with the RCS

Regional Soils Program

Action Plans
Agricultural Land Soils Action Plan
Forests Soils Action Plan
Coastal Soils Action Plan
Parks Soils Action Plan
Lakes and Estuaries Frontage Action Plan

Regional Pest Plant and Animal Program

Action Plans
State Forest Pest Plant and Animal Action Plan
Parks Pest Plant and Animal Action Plan
Freehold Pest Animal and Plants Action Plan
Regional River Pest Plant and Animal Action Plan
Lakes Estuaries and Rivers Pest Plants and Animal Plan Action Plan
Marine Pest Plant and Animal Action Plan
Coast Pest Plant and Animal Action Plan

Regional Ecosystems Management Program

Action Plans
Freehold management unit Ecosystem Management Action Plan
Forest Ecosystem Management Action Plan
Parks Ecosystem Management Action Plan
Marine Ecosystems Action Plan
Wetlands Management Action Plan
Coastal Ecosystems Management Action Plan

(continued)

Table 13-1: (continued)

Regional Catchments Program

Action Plans
Forest Sediment and Nutrient Export Reduction Action Plan
Parks Sediment and Nutrient Export Reduction Action Plan
Agricultural and Urban Land Sediment and Nutrient Export Reduction Action Plan
Groundwater Management Action Plan
River Health Strategy
East Gippsland Regional Water Quality Strategy
Gippsland Lakes Future Directions and Actions Plan
Rivers and Floodplain Management Action Plan
Estuaries, Wetlands and Lakes Action Plan
Estuaries, Lakes, Rivers and Wetlands Water Quality Action Plan
Estuaries, Lakes, Rivers and Wetlands Water Balance Action Plan

Regional Fire Management Program

Action Plans
State Forest Fire Management Plan
Parks Fire Management Plan
Freehold Land Fire Management Plan

Regional Cultural Heritage Program

Action Plans
Freehold Land Cultural Assets Action Plan
Parks Cultural Assets Action Plan
Forests Cultural Assets Action Plan
Coastal Strip Cultural Heritage Action Plan
Lakes Streams and Estuaries Cultural Assets Action Plan
Marine Cultural Heritage Action Plan

Regional Natural Resource Development Program

Action Plan
Agriculture Development Action Plan
Marine Resources Development Action Plan
Parks Resource Development Action Plan
Forest Resource Use Development Action Plan
Coastal Strip Resource Development Action Plan

Community Development and Support Plans

Action Plan
Community Development and Support Action Plan
Estuaries, Lakes, Rivers and Wetlands Community Awareness Plan

RCS Implementation Action Plan

Action Plan
RCS Implementation Action Plan

Multiple Outcome Projects

Multiple outcome projects will be developed to integrate the delivery of actions listed within action plans. For example soil erosion, acid sulphate soils, soil acidity, loss of fertility, vegetation programs and pest plant and animal programs on private land should be delivered through locally based and integrated projects. These projects could also include sediment and nutrient management activities required to maintain the region's water bodies such as the Gippsland Lakes. Identification of multiple outcome projects will be a priority in the first year of implementation.

13.4 Mechanisms to ensure an integrated and systematic approach to implementation

Ensuring consistent and systematic approaches to developing action plans

The development of action plans provides an opportunity to analyse options for intervention and to provide and opportunity for stakeholders to develop agreed priorities for action, partnerships and cooperative approaches. Action plans should be developed using consistent frameworks to ensure that they can be compared within a regional context.

In particular, action plans should have consistent:

- formats;
- methods of assessing the benefits and costs of considered options for intervention;
- approaches for the development of cost sharing arrangements;
- evaluation processes (use of the MERGe process is recommended); and
- methods for collecting and maintaining data.

Adopting the above approach for action plans will:

- assist the region to compare the relative merits of one proposed plan or action with another;
- ensure equitable and consistent cost sharing across the region;
- provide a mechanism to provide comparative evaluations for a range of action plans; and
- ensure that data derived from the implementation of a plan is efficiently managed and stored for:
  - ready access by a range of stakeholders;
  - monitoring, evaluation and review

Ensuring integration of works

Integration of effort will be greatly enhanced where action plans are developed in a consistent manner (as above), and multiple outcome projects are developed with regard to multiple action plans and other multiple outcome projects. This is by no means an easy task. However, the strategy recommends the introduction of a regional *Action Plan and Project* accreditation system to ensure greater integration of on-ground activity.

It is envisaged that *Program Working Groups* will be appointed to lead the implementation of each of the nine RCS Programs (Figure 13-2). These *Working Groups* could be made up of agency and community representatives, and would be charged with focused implementation of their programs over the life of the RCS. Each working Group would bring forward action plans and associated projects to implement their programs. This would include developing and advocating programs and projects through the annual Regional Catchment Investment Plan process.

The activities of the nine *Program Working Groups* would be coordinated and appropriate standards would be set by a regional multi agency committee, such as an enhanced *East Gippsland Technical and Regional Assessment Panel (EGTRAP).* This regional committee would be responsible to the EGCMA Board for:

- coordination of activities across the nine RCS Programs, in particular resolving competing priorities or demands on resources;
- developing a draft list of priority action plans and associated multiple outcome projects;
- developing guidelines, setting minimum standards, and accrediting action plans and multiple outcome projects; and,
- providing advice on areas where action plans or projects could integrate with other plans or projects

Completed action plans or projects will require accreditation from this panel. In the longer term Regional Catchment Investment Plan funding will only flow to activities which are clearly linked to accredited action plans or multiple outcome projects.

13.5 Roll out of the framework

Numerous high-value activities associated with improving the condition of the region's natural resources are currently underway and many have been underway for some time. The introduction of the framework described in Section 13.4 should be introduced over time through a staged process to ensure that existing works continue without interruption.

13.6 Linking Sub-strategies and Action Plans

As the RCS ages, the carriage of the latest knowledge and information will be increasingly borne by plans and strategies linked to it. A good example is the East Gippsland River Health Strategy due for completion this year. The renewed River Health Strategy will be guided by this RCS, and subsequent information contained in it may help guide the next RCS.

Sub-strategies and action plans are a more specific link to asset threats and play an important role in delivering existing RCS objectives on the ground. Assessing the performance of these actions will inform the next RCS.

13.7 The Regional Catchment Investment Plan

The Regional Catchment Investment Plan is a three-year business plan that translates the objectives and targets in the East Gippsland RCS into funded programs, delivered through engagement of nominated groups and communities. It will help focus discussion on achieving RCS goals and targets in a collaborative manner.

The Regional Catchment Investment Plan must, therefore, provide adequate information to allow potential investors to make informed decisions about the particular natural resource management outcomes they wish to support. Those investors will need confidence that:

- The programs represent the real priorities for the region;
- The projects are clearly linked to the objectives and targets in the East Gippsland RCS;
- The projects will deliver demonstrable and measurable benefits; and
- The programs have clear accountabilities and reporting frameworks to ensure delivery of agreed outcomes.

13.8 Monitoring, Evaluation and Reporting

A regional partnership between East and West Gippsland natural resource management agencies will deliver a monitoring, evaluation and reporting framework for the whole Gippsland region (MERGe), supported by the Gippsland Integrated Natural Resources Forum. This framework will inform the Monitoring, Evaluation and Reporting Plans for both the East and West Gippsland Regional Catchment Strategies. Monitoring, evaluation and reporting will be placed in the strategic context of Regional Catchment Strategies and Regional Catchment Investment Plans, providing both accountability and adaptive management functions for natural resource management in Gippsland.

The East Gippsland Monitoring, Evaluation and Reporting Plan will be informed by this broader framework. A robust monitoring, evaluation and reporting plan will provide information to the region and investors regarding the effectiveness of management actions funded, measure our progress towards resource condition targets and provide a rigorous information base for future strategy development
The regional Monitoring, Evaluation and Reporting Framework draws strongly from the National Monitoring and Evaluation guidelines, ensuring that it:

- Is useful for all partners in natural resource management;
- Is simple, cost effective, affordable and practical;
- Recognises that natural resource management interventions encompass a range of time-scales;
- Supports meaningful interpretation of data over time by establishing standard national indicators, protocols for their sampling, measurement and interpretation, and data quality and management requirements; and
- Specifies the assumptions on which monitoring and evaluation activities are undertaken in a consistent manner which is open to all stakeholders.[60]

60 National Natural Resource Management Monitoring and Evaluation Framework, Natural Resource Ministerial Council, April 2003.

The East Gippsland Monitoring, Evaluation and Reporting plan will describe the processes for monitoring, evaluation and reporting as follows:

(a) Monitoring

- Monitoring activity will gather baseline data. Additional indicators may be required for local conditions and the combination of asset classes making up the East Gippsland RCS.
- The existing monitoring programs already in place across East Gippsland need to be strengthened and coordinated to support delivery of the targets in the renewed RCS.

The aims of a coordinated monitoring program will be to:

- Measure progress towards resource condition targets and other desired outcomes as set out in, or in accordance with the RCS;
- Develop data into a source of information for on-ground and management based decision support;
- Ensure information is readily available and that land managers have ready access to good quality data; and
- Strengthen cross regional monitoring strategies with the West Gippsland and North East Regions as well as with south-eastern New South Wales.

It is envisaged that development of a coordinated monitoring program will require significant investment in the next five years.

(b) Evaluation:

While collecting the data is a critical first step, it is of little value unless it is used to inform decision making. Evaluation is the step of analysing the data to determine:

- Whether resource condition targets and other desired outcomes are being, or are likely to be achieved;
- The effectiveness and appropriateness of actions being taken to achieve targets and other outcomes; and
- The validity of assumptions underpinning target setting.

(c) Reporting:

Monitoring data that has been analysed, and management actions that have been evaluated, will be reported to regional natural resource managers, investors and the community as appropriate. In particular, the Monitoring, Evaluation and Reporting plan will outline:

- The basis for the State of the Catchment reporting that supports RCS renewal and implementation;
- Reporting required by regional decision makers to adaptively manage natural resources in the East Gippsland region;
- Reporting required by investors to ensure accountability; and
- Communication of natural resource management progress to the wider community.

13.9 State of The Region Reporting

Reporting on the state of the region will occur as part of a rolling review of the efficacy of programs associated with the RCS and, as a basis for Risk Management, also inform government and the community of emerging or declining threats to our natural assets.

Performance against targets cannot be adequately measured by reporting of actions alone. The region must instead attempt to benchmark achievements against changes in the resource condition. Development and use of State of the Region Reporting will provide information to determine effectiveness of existing programs and actions, assess resource needs based on environmental condition improvement or decline.

In collecting new information and making this widely available for improved management, the region will make use of some of the latest technology in data gathering, storage and retrieval. This will include smarter use of remote sensing (satellite and airborne), ground-based systems that utilise advances in communication technology and advanced data storage and retrieval systems. Government agencies and community will gather information in a collaborative and coordinated way, to reduce the burden on each organisation and improve our collective understanding of natural resource management issues in East Gippsland.

Table 13-2: RCS Implementation Action Plan

Broad Objectives

- Focus private and public investment in priority areas
- Integrate regional, state and federal effort
- Efficiently deliver on-ground works in priority areas
- Increase the level of agency and community cooperation in the development of action plans and the delivery of on-ground works
- Effectively evaluate the success of investment
- Rapidly adapt and modify programs and projects in response to evaluation feedback
- Develop a high degree of regional agency and community consensus on natural resource issues and approaches
- Develop a sense of the regional interest and a greater collective understanding of the region's economic, social and environmental systems
- Develop a greater commitment to agreed regional natural resource management goals

Targets	**Management Actions and Targets**	
• Ensure integrated delivery of works and planning across the region • Ensure the transparent allocation of resources • Provide a mechanism to integrate projects and promote partnerships • Ensure that adaptive management systems are put in place • Ensure that effective action plan evaluation systems are put in place • Ensure integrated data management systems are in place • Ensure agencies develop consistent project development frameworks • Ensure agencies develop integrated asset condition monitoring systems	R1	Appoint *Program Working Groups* to lead the implementation of each of the RCS Programs (EGCMA and DSE 2005)
	R2	Enhance skills, knowledge and experience of the *East Gippsland Regional and Technical Assessment Panel* (EGTRAP) to form a regional committee to coordinate implementation of the RCS. (EGCMA 2005)
	R3	Develop a draft outline of multiple outcome projects (EGCMA and DSE 2006)
	R4	Ensure that monitoring, evaluation and reporting (MER) activities are undertaken for all RCS management programs and projects, across all asset classes, and that the resulting data and information is managed and stored efficiently and effectively. (EGCMA and DSE 2006 and ongoing)
	R5	Prepare and publish as required, updates of the RCS, issues papers or discussion papers, to ensure that the East Gippsland RCS remains current and relevant (EGCMA 2006 and ongoing)

14 RIGHTS, ROLES AND RESPONSIBILITIES

Many groups, agencies and communities use and manage our natural resources and implement the priorities and programs agreed in the East Gippsland RCS. This section helps identify some of the main rights, roles and responsibilities of those groups. It also confirms the partnerships that have been established to help deliver our common goals.

14.1 Landowners and Land Managers

Landowners have the right of gainful use of natural resources under their control, subject to law. Duty of Care under Common Law applies for the protection of personal property rights, not the environment per se; the tests are the torts of nuisance and negligence[61]. Implied here is the proscription of activities, or lack of preventative activities, of a landowner that might lead to foreseeable, adverse, off-site effects on another's property.

As an extension of this Common Law duty of care, under the duties prescribed in Section 20 of the Catchment and Land Protection Act 1994, a landowner, which includes both those with freehold title and Departments responsible for the management of Crown Land, '…must take all reasonable steps to—

(a) avoid causing or contributing to land degradation which causes or may cause damage to land of another landowner;
(b) conserve soil;
(c) maintain water resources;
(d) eradicate regionally prohibited weeds;
(e) prevent the growth and spread of regionally controlled weeds; and,
(f) prevent the spread of, and as far as possible eradicate, established pest animals.'

Both the Native Vegetation Retention regulations of the Shire Planning Scheme and the Environment Protection and Biodiversity Conservation Act 1999 go further than requiring minimisation of off-site effects. They proscribe activities, usually with a proposed change of land use, that might reduce or threaten specified biodiversity values on a landowner's land.

In addition to these statutory responsibilities, individual landowners carry the primary responsibility for implementing natural resource management programs on private land. Any natural resource management initiative that relies on the engagement of landowners needs to be realistic about the drivers of that engagement and the constraints upon it.

14.2 East Gippsland Catchment Management Authority

The East Gippsland CMA acts as a broker to establish a framework to ensure that natural resource management programs in the region reflect the expectations and priorities of the community and engage their commitment. In this role, the East Gippsland CMA acts as a statutory body under the Catchment and Land Protection Act 1994.

The East Gippsland CMA has a skills-based Board with members drawn from across the community. The Board delegates the day-to-day running of the organisation to expert professional staff. The CMA has the main responsibility for the preparation of the RCS. It takes the lead in prompting, coordinating and seeking funding for the programs and projects that will be promoted by the RCS. The East Gippsland CMA also monitors and reports on the success of those projects and programs. The East Gippsland CMA plays a more direct role in the management of waterways and advises on developments within floodplains under the Water Act 1989.

In its strategic plan 2005 to 2010, the authority undertook to improve partnerships with a range of key agencies and community groups in the region, as the basis for a collaborative approach to achieving goals of the RCS.

[61] Bates, G. (2001) *A Duty of Care for the Protection of Biodiversity on Land*, Consultancy Report, Report to the Productivity Commission, AusInfo, Canberra.

14.3 Department of Sustainability and Environment

At the state level, the Department of Sustainability and Environment has the primary role in setting policies for natural resource management in Victoria. This includes the policy development, support and implementation of the Victorian Catchment Management Framework and the implementation of natural resource management policies, through government investment, in regional catchment strategies.

Regional DSE is the manager of State Forest and other public land outside the Park system and has a range of responsibilities across all land. On public land DSE manages all timber harvesting and other uses of State Forest, fire and licensed occupancies such as grazing. DSE is also the lead agency for biodiversity management across all land.

14.4 Department of Primary Industries

The Department of Primary Industries is the lead government agency for support, regulation and extension to agriculture and fisheries. It undertakes policy development and research relating to agricultural production, soil management, fisheries and pest plant and animal management.

DPI also acts as a primary agency to implement those projects through its field workforce. This work involves extension to raise awareness and provide technical advice, coordination and access to incentives and enforcement Within DPI, Fisheries Victoria facilitates the sustainable development of Victoria's commercial and recreational fishing and aquaculture industries. Through regionally-based staff, Fisheries Victoria manages East Gippsland's marine and freshwater fish resources. This work is undertaken through a range of compliance measures including enforcement, education and extension and support of volunteer organisations such as Fishcare East Gippsland.

14.5 Local Government

There are three local government councils engaged in natural resource management in East Gippsland. Local government is an important partner in the RCS and in natural resource management more widely across the region. Local government plays a number of different roles:

- Local government helps achieve natural resource management aims and outcomes through the implementation of planning controls. In this context it is important to ensure consistency between the RCS and the Municipal Strategic Statements, which set local government planning frameworks and policies;
- Local government is also the responsible agency for the implementation of the Native Vegetation Clearing Controls on freehold land, guided by the East Gippsland Native Vegetation Plan;
- Local government is a natural resource manager in its own right and is the owner and delegated manager of large areas of land. Local Government is responsible for infrastructure that can affect the environment such as roads and stormwater systems;
- Local government is an important conduit to wider government for the concerns and priorities of individuals and communities; and
- Local government has been actively engaged in the development of the renewed RCS.

To implement those aspects of the RCS that relate to land use and development, it will be necessary to build on the strong relationships that already exist between the Shires and other government agencies. This includes ensuring that information is shared and common approaches are developed and carried through.

14.6 Parks Victoria

Parks Victoria is a service provider to the Department of Sustainability and Environment. Its primary role is the management of the natural and cultural values of Victoria's terrestrial and marine parks and reserves. Parks Victoria therefore carries a major responsibility for future overall catchment health and maintenance of biodiversity in East Gippsland.

14.7 West Gippsland CMA

West Gippsland CMA and East Gippsland CMA are neighbours. They are both conscious of the need to deal with Gippsland as a single entity for many natural resource management issues. The major asset in common is the Gippsland Lakes. To assist in developing a common approach we have joined together to form the Water Quality Plan for Gippsland. We are committed partners in integrated groups such as the Gippsland Integrated Natural Resources Forum and the Gippsland Lakes Taskforce and its coordinating committees.
Our commitment to collaboration will ensure that the West and East Gippsland Regional Catchment Strategies can serve as the umbrella natural resource management framework for all agencies and organisations in Gippsland.

14.8 North East CMA

East Gippsland natural resource management agencies and North East CMA work closely with each other in managing natural resources at the top of the Great Dividing Range. Communities in some parts of the North East Region (such as Omeo and Benambra) are in the North East catchment. However, socially and economically the communities are part of East Gippsland.
Effective cooperation with the North East CMA is essential to ensure objectives of each RCS can be met without causing confusion within these communities.

14.9 Gippsland Lakes and Coast Regional Coastal Board

The Gippsland Lakes and Coast Regional Coastal Board is one of three regional boards formed under the Coastal Management Act 1995. The Boards sit on the statewide Victorian Coastal Council. The regional boards report to the Minister for the Environment, but must have the endorsement of the Victorian Coastal Council for Business Plans, Annual Reports and Coastal Action Plans.
The Board has no core works budget but seeks funding for specific projects and will support other organisations with complementary objectives. The East and West Gippsland CMAs are important partners in the management of the Gippsland Lakes. These three organisations strongly cooperate with each other through a variety of forums including the 'Gippsland Lakes and Catchment Taskforce.' Collectively they are implementing the 'Gippsland Lakes Future Directions and Action Plan,' which aims to reduce nutrient inflows to the Lakes by 40% by 2022
One of the Board's main objectives is to ensure that Municipal Strategic Statements cover all coastal land and incorporate the Board's coastal planning policies. This will ensure a consistent development and conservation framework.

14.10 Indigenous Organisations

Five main Aboriginal organisations operate in East Gippsland:

- The Ramahyuck District Aboriginal Corporation based at Sale;
- Gippsland and East Gippsland Aboriginal Co-operative (GEGAC) at Bairnsdale;
- East Gippsland Aboriginal Community Development Employment Programs (EGACDEP) at Bairnsdale;
- Lake Tyers Aboriginal Trust (CDEP) at Lake Tyers; and
- Moogji Aboriginal Council (CDEP) at Orbost.

These organisations are the main advocates for cultural protection and community development for local Indigenous communities of East Gippsland. They also provide a range of social support services including health, employment, and education. They teach and exchange knowledge about aspects of environmental studies including traditional knowledge of bush foods and bush medicines. Recognition of the importance of such knowledge by western society is increasing and it is likely to provide a stimulus for protecting natural biodiversity from degradation and extinction.

The organisations listed above are responsible for managing land that includes the:

- Lake Tyers Aboriginal Trust Settlement;
- Ramahyuck Settlement;
- Boole Poole Settlement; and
- Windarra Camp and Kurnai Park.

Aboriginal people are slowly regaining access to parts of their traditional country and taking increasing responsibility for managing it.

14.11 Community and Industry Associations

Many landowners, producers and processors are members of industry or trade associations. These bodies play an important role in developing and promoting best practice in natural resource management. Significant industry bodies in East Gippsland are the Victorian Farmers Federation and the Victorian Association of Forest Industries.
Increasingly, market forces will be an important incentive to drive improved practice as industries seek to win market share through the development of more clean and green products.

Landcare Groups play a major role in harnessing and promoting the interests of local communities in natural resource management issues. Landowners have the primary responsibility for managing their own land. Landcare provides a connection between the individual managers of separate private properties, government agencies and wider community and public benefits. Landcare groups contribute through a number of important roles:

- They increase awareness of sound land management and conservation practices;
- They promote and encourage community participation in environmental activities; and
- They develop expertise and provide access to shared resources.

Landcare can play a vital role in promoting the adoption of improved ways of doing things that will benefit the environment. But it is important to recognise Landcare has limits to its capacity to deliver natural resource management outcomes. Landcare groups are often small and vulnerable to wider changes affecting the region.

14.12 Water Authorities

Water Authorities are also important partners in the renewed RCS. Southern Rural Water is responsible for managing the central infrastructure for capturing and delivering water for irrigation and stock and domestic purposes. Southern Rural Water supplies water to dryland farms and towns, and manages groundwater resources and disposes of irrigation drainage flows. The way that these functions are carried out has a significant impact on waterlogging and salinity in the local area. Southern Rural Water also manages licences, water rights, diversion licences, and authorises all water trades.

East Gippsland Water is responsible for the collection, transfer and treatment of domestic sewage and the discharge of treated effluent to receiving waters or for reuse in irrigation. The Authority also delivers potable water to urban users. Water Authorities play a major role in promoting the adoption of greater water use efficiency by irrigators and wise water use by domestic users. This reduces local problems and should also allow aggregate river diversions to be reduced.

14.13 Environment Protection Authority

The Environment Protection Authority has the primary responsibility for setting policies for certain specified pollutants at a state wide level. This responsibility covers air, land and groundwater, litter, noise, waste and water. The EPA oversees compliance with the State Environment Protection Policy ‘Waters of Victoria’ which is one of the main tools for implementing the RCS.
The EPA also has roles in providing guidance and tools to reduce costs to the environment and to make progress towards sustainable land management practices. Finally, it plays an enforcement role by ensuring adequate compliance with these policies at a local level.

GLOSSARY OF BIOLOGICAL TERMS

AROTs	Australian rare or threatened species, includes X – extinct in Australia, E – endangered in Australia, V- vulnerable in Australia and R – rare in Australia
Background weeds	Weeds that are ubiquitous but low in cover and rarely become rampant to the point of displacing native species e.g. Mouse-ear Chickweed.
BAP	Biodiversity Action Plans summarise the key assets of a bioregion and the actions and tools that are required to achieve statewide biodiversity goals. They aim to protect viable remnant habitats, and the flora and fauna populations they contain, to enhance the condition of these habitats and populations and restore at least some of the former extent of these habitats by revegetation, species re-introduction or restoring water regimes and other ecosystem processes.
Biodiversity	'The natural diversity of all life: the sum of all species (both exotic and native) of flora and fauna, the genetic variation within them, their habitats, and the ecosystems of which they are an integral part.' C.f. with natural biodiversity.
Bioregion	Bioregions are the patterns of ecological characteristics in the landscape providing a natural framework for recognising and responding to biodiversity values. They are territories defined by a combination of biological, social and geographic criteria rather than by geopolitical considerations; generally, a system of related, interconnected ecosystems.
Biosecurity	Protection from unwanted organisms that pose significant risks to indigenous biodiversity. www.doc.govt.nz/Publications/001~Corporate/Statement-of-Intent-(2004-2007)/055~Appendix-5-Glossary.asp
Conservation status	Conservation status provides an assessment of the relative degree of imperilment of species and EVCs. For plant and animal species, their conservation status rank provides an estimate of extinction risk, while for ecological communities it provides an estimate of the risk of elimination. Threatened taxa and EVCs are either endangered or vulnerable. Conservation status rankings used in Australia and Victoria are denoted by lower case (Victorian conservation status), upper case (Australian conservation status). The rankings for threatened taxa or EVCs are: extinct (X or x), endangered (E or e), vulnerable (V or v). The rankings for rare taxa or EVCs is rare (R or r).
Ecological vegetation class (EVC)	A term developed and used in Victoria (but with equivalents in other states. An ecological vegetation class is a vegetation type which consists of one or a number of floristic communities whose composition is dependent upon a consistent set of habitat variables that may occur across a number of biogeographic zones. The floristic composition may therefore not be closely related in communities that are widely dispersed. Those floristic communities that comprise an EVC are determined through the consideration of a range of habitat variables, life-form composition and life history profiles as well as floristic composition. Together, these attributes are thought to relate the ecological processes operating in a particular habitat to its floristics, irrespective of the biogeographic zone (Natural Resources and Environment and Commonwealth of Australia 1996). The equivalent term in New South Wales (Environment and Conservation 2004) is ecological community.
Ecologically sustainable	Australia's National Strategy for Ecologically Sustainable Development 1992 (NSESD) defines ecologically sustainable development (ESD) as: 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'. : http://www.deh.gov.au/esd/
Ecosystem	A dynamic complex of plant, animal. Fungal, and microorganism communities and the associated non-living environment interacting as an ecological unit.
El Niño	This term translates from Spanish as 'the boy-child'. Peruvian fisherman originally used the term—a reference to the Christ child —to describe the appearance, around Christmas, of a warm ocean current off the South American

	coast. Nowadays, the term El Niño refers to the extensive warming of equatorial waters of the central and eastern Pacific that leads to a major shift in weather patterns across the Pacific. In Australia (particularly eastern Australia), El Niño events are associated with an increased probability of drier conditions and a significant abatement of prevailing trade winds This leads to droughts which are often associated with increased incidence of wildfire. (http://www.bom.gov.au/climate/glossary/elnino.shtml).
Endemic	Species of plants or animals, which are restricted to a defined geographic region.
EPBC Act (1999)	The Commonwealth Environmental Protection and Biodiversity Conservation Act (1999) (EPBC Act) promotes the conservation of biodiversity by the identification of key threatening processes; the protection of critical habitat; the preparation of recovery plans; threat abatement plans; wildlife conservation plans; bioregional plans; conservation agreements; the issuing of conservation orders and the regulation of exports and imports of live animals and plants, wildlife specimens, and products made or derived from wildlife. It protects the environment, particularly matters of National Environmental Significance. It streamlines national environmental assessment and approvals process, protects Australian biodiversity and integrates management of important natural and cultural places.
Exotic	A species occurring in an area outside its historically known natural range as a result of intentional or accidental dispersal by human activities.
FFG Act (1988)	The primary overarching legislation dealing with biodiversity conservation and sustainable use of native flora and fauna in Victoria is the Flora and Fauna Guarantee Act 1988. The flora and fauna conservation and management objectives of the Act are: to guarantee that all taxa of Victoria's flora and fauna can survive, flourish and retain their potential for evolutionary development in the wild; to conserve Victoria's communities of flora and fauna; to manage potentially threatening processes; to ensure that any use of flora or fauna by humans is sustainable; to ensure that the genetic diversity of flora and fauna is maintained; to provide programs; of community education in the conservation of flora and fauna; to encourage cooperative management of flora and fauna through, amongst other things, the entering into of land management cooperative agreements under the Conservation, Forests and Lands Act 1987; of assisting and giving incentives to people, including landholders, to enable flora and fauna to be conserved; to encourage the conserving of flora and fauna through cooperative community endeavours. The Act seeks to put in place preventative management mechanisms to ensure no biota or ecological communities become extinct and that the processes that threaten biodiversity are identified and addressed. The Act is far broader than 'endangered species' legislation, covering ecological communities; potentially threatening processes; community involvement in conservation; a strategic approach to biodiversity conservation and sustainable use. http://www.dse.vic.gov.au/dse/nrence.nsf/childdocs
Floristic community	A group of species which consistently occur together in a particular niche within a biogeographic region, their co-existence being interpreted as indicative of a range of characteristic habitat variables for that niche.
Habitat	The place where a species or population of an organism lives, characterised by a particular range of temperature, humidity, soil or vegetation structure, food types, physical shelter and breeding opportunities, competitors, predators and other factors.
Hinterland	The district lying behind the coast
Indicator species	A species whose presence or absence is indicative of a particular habitat, community or set of environmental conditions
Indigenous	Originating in and characterising a particular region or country.

Keystone species	A species upon which several other species depend. Removal of the keystone species leads to the death or disappearance of the dependent species. Reference: www.mhhe.com/biosci/pae/glossary/glossaryk.mhtml
Littoral	From the latin word 'litoralis' meaning of the seashore. Used as an adjective with reference to rainforest stands that occur on the coast and some the species that constitute these stands.
Native Vegetation Retention regulations (1989)	The Victoria Native Vegetation Retention Controls were introduced in 1989 as Regulations under the Planning and Environment Act (1987) 62. All Victorian municipal planning schemes require land managers to obtain a planning permit to remove, destroy or lop native vegetation. Clause 52.17 outlines the requirement of a permit and also lists some situations where a permit is not required.
Natural biodiversity	Definition from Victoria's Biodiversity Strategy (1997: 'The natural diversity of all life: the sum of all our (indigenous) native species of flora and fauna, the genetic variation within them, their habitats, and the ecosystems of which they are an integral part.'.
Naturalised species	An exotic plant species that freely reproduces and has developed self-sustaining populations in the study area.
NRS	National Reserve System
Rainforest restoration	The process of restoring rainforest sites through weed control and supplementary or enrichment plantings
Rare or threatened	See conservation status
SEPP	State Environment Protection Policies (SEPPs) are subordinate policies made under the provisions of the Environment Protection Act 1970 to provide more detailed requirements and guidance for the application of the Act to Victoria. SEPPs aim to safeguard the environmental values and human activities (beneficial uses) that need protection in the State of Victoria from the effect of waste, such as: Human health and well-being Ecosystem protection Visibility Useful life and aesthetic appearance of buildings, structures, property and materials Aesthetic enjoyment and Local amenity.
Sp.	Abbreviation of species (singular)
Spp.	Abbreviation of species (plural)
Taxa (plural) *Taxon (singular)*	A general term to describe plants or animals that may be of any taxonomic rank (subspecies, variety etc.) as apposed to the more specific term of species which does not accommodate other taxonomic ranks.
Threatened	Species or EVCs that are: vulnerable, endangered, critically endangered or extinct.
Threatening processes	Actions, either human induced or otherwise biotically or abiotically induced, such as habitat disturbance or destruction or pollution that threaten the survival, abundance or evolutionary development of a species, population or ecological community. (www.malleecma.vic.gov.au)
VROTs	Victorian rare or threatened species, ranked as e – endangered in Victoria, v – vulnerable in Victoria and r – rare in Victoria

[62] http://www.deh.gov.au/land/publications/veg-management/vic.html