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**Lake Colac Management Plan**  
**Management Plan**  
*Colac Otway Shire Council*  
**July 2002**

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## 1.0 EXECUTIVE SUMMARY

MacroPlan Australia, in association with Earthtech was commissioned by the Colac Otway Shire to prepare the Lake Colac Management Plan. The purpose of the plan was to provide an ongoing framework for the community, Local and State agencies to manage and promote ecologically sustainable development and land use practices for Lake Colac and its catchment (in line with major issues identified through stakeholder involvement).

The project has included bringing together relevant local and state agencies, local communities, industry and commerce, to agree on future strategies on a catchment basis, in which more detailed planning could occur for the main study area. Importantly, this included taking into account economic, social and physical factors in determining appropriate strategies.

### 1. Vision

The natural environment of Lake Colac will be an inspirational place for the local community and visitors to enjoy.

### 2. Mission

To rejuvenate Lake Colac as a foundation for environmental, social, cultural, recreational, economic and tourism development within the Colac Otway Shire.

### 3. Key Objectives

To combat environmental degradation, the Management Plan aims to meet the following objectives for Lake Colac. Of particular importance is the need to reflect the values of the community, to accommodate a wide range of activities and create a window into the natural and cultural environment of Western Victoria. The following objectives have driven the development of the Management Plan.

#### **Biodiversity and the Natural Environment**

- Improve water quality
- Reduce catchment and lake shore erosion and sedimentation
- Improve the management of the natural environment and habitat diversity for existing, fauna (both indigenous and non-indigenous)
- Manage existing, flora and habitat diversity (both indigenous and non-indigenous)

- Address the impact of fluctuating water levels
- Improve the management of waste (litter)
- Manage the contents of stormwater both as it enters the lake and at the source
- Reduce the levels of discharge/ leachate

#### **Economic and Tourism Development**

- Increase visitation from the local community
- Increase visitation by the non-local community (day/ overnight)
- Encourage expenditure/ jobs created by increased visitation
- Increase levels of visitor satisfaction
- Increase accessibility to all areas of the lake and its environs.

#### **Cultural, Social and Recreational Development**

- Making activity nodes and the linkages, including signage, to activity nodes accessible and inclusive to community members of all abilities.
- Acknowledging and celebrating Lake Colac's heritage, both Indigenous and post European.
- Providing cultural opportunities to recognize and celebrate Lake Colac and its community's identity.
- New developments to incorporate consideration of mobility issues, circulation and linkages hence ensuring accessibility for all levels of ability, wherever possible.

#### 4. Environmental Management

While the major objectives for the project are identified above, the overall objectives for *environmental management* of Lake Colac can be summarised in three major areas:

- Maintain the natural environment of the catchment, including the diversity of habitat of flora and fauna species (terrestrial and aquatic), remnant vegetation representative of the western basalt plains and habitat for endangered species.
- Manage the lake and its foreshore for recreational uses such as fishing, rowing, sailing and passive pursuits such as walking.
- Manage the lake for utilitarian purposes such as watering stock, irrigation for crops, fish/ eel harvesting and water supply.

In order to achieve the above key areas of environmental management, extensive research into the current status of Lake Colac has delivered a set of areas to be addressed to improve the status of Lake Colac as an environmental resource. These include:

- Water quality is one of the most significant issues facing the health of the lake and is contributing to an overall negative perception of the lake.
- Catchment erosion and sedimentation is also a significant issue, mostly caused by the clearing of vegetation in the catchment.
- Lake shore erosion has been caused by the controlled water levels of the lake through the Lough Calvert system, native vegetation decline and foreshore trampling from stock. Flooding has caused much of this destruction of the lake shore.
- There is a need to protect the native flora and fauna in the catchment from higher levels of salinity and discharge into the lake.
- Litter management is also an issue and has been addressed to a certain extent through the introduction of the gross pollutant trap, but requires further consideration.

It is important to note that while improvements have been identified including Barwon Water’s upgrade in the quality of treatment and effluent quality from class C to class B and the development of the Stormwater Management Plan, the factors identified above impinge on the environmental sustainability of Lake Colac and are therefore, addressed in the plan.

These points cover a broad range of issues and addressing them can achieve many of the study’s objectives both for the use and the operation of Lake Colac as a community and natural resource. In particular, the study has identified a lake that has, to varying degrees, experienced degradation of its foreshore and water quality, which has correspondingly affected its relationship with its community. Some of the practical outcomes are:

- To improve water quality opportunities exist to:
  - Establish wetlands
  - Manage the tributaries at Dean’s and Barongarook Creeks
  - Encourage community input and education
  - Manage the current stormwater system and inputs into the lake
  - Identify point source pollution and leaching

- To improve catchment erosion, sedimentation, lakeshore erosion and protection of native flora and fauna including:
  - Areas of the foreshore and catchment, particularly creek beds and banks can be revegetated and conserved
  - Eastern foreshore erosion works
- Opportunities for managing salinity including:
  - planting and fencing of tributaries
- Fence post removal
- Carp management

## 5. Land Use

The major issues relating to the land use surrounding Lake Colac included:

- Physical Link with Town: There is a lack of physical and perceptual links between the Central Activities Area and Lake Colac and the Botanic Gardens Precinct, including the playground.
- Foreshore Cohesiveness: Development, activities and landscaping along the urban foreshore lack focus.
- Access and inclusion is also an issue with respect to the general access between activity areas such as the Botanical Gardens, the town and landmarks around the Lake.
- Several sites are under-utilised, or in transition and are considered as opportunities for the plan. These include:
  - The Yacht Club
  - The Botanical Gardens precinct
  - The former tips at Colac
  - The Bonlac Pondages
  - Delaney's Point
  - Ross' Point.

## 6. Cultural, Social and Recreation Development

The research identified that with regard to recreation and local culture at Lake Colac its potential success as a community resource is in understanding the local

community's needs as well as those of the visiting public. Extensive surveys undertaken with the community and stakeholder consultation identified some important directions and issues regarding the community's relationship with the lake. In particular the following issues were identified as needing to be addressed:

- accessibility
- enhancement of community involvement for all persons
- provision of a wide range of facilities and open space experiences
- management of facilities

The Lake is host to a range of structured and unstructured activity including:

- structured (fishing, rowing and sailing club activity)
- unstructured (walking, picnicking, jogging, cycling, fishing, recreational angling)

Significant needs identified were:

- access to the lake for walking, jogging, cycling.
- provision of infrastructure for family based activity such as BBQs and an Access for All Abilities Playground
- sensory pathways and gardens at key activity nodes around the Lake ensuring people of all abilities can access a variety of experiences
- for visitors to the lake to feel safe (both individuals and groups)
- an area to house most community activities
- a need for facilities with ancillary services that are well maintained such as toilets with showers, lighting and picnic and eating areas with car parking close by and shelter
- improvements to existing buildings/facilities

## 7. Concept Plan

As a result of these key issues, the concept plan is based on the following considerations:

- Environmental Management
  - The concept plan must deliver a quality environment resource
  - The concept plan must deliver a sustainable management framework to oversee the rejuvenation of the lake, foreshore and catchment



- 
- The concept plan should improve water quality – erosion control, discharge and input management
  - The concept plan must maintain the lake and its foreshore as a habitat for indigenous and non-indigenous flora and fauna
  - The concept plan should seek to facilitate community input and enhance education
  - Infrastructure Requirements
    - The concept plan should provide a new gateway to the lake that provides a ‘sense of arrival’ for visitors and a focal point the local community
    - The concept plan should provide a pedestrian link that integrates both passive and active recreation and links the major assets and attractions on the foreshore with the Colac township
    - The concept plan should ensure development of the public access areas on the foreshore including buildings and facilities
    - The concept plan should ensure all capital works to consider access and inclusion.
  - Economic and Tourism Development
    - There is a desire to invest in infrastructure, meet environmental objectives and create stimulus into the local economy through the generation of employment and expenditure
    - A wide range of economic benefits can be delivered from a quality environmental outcome including:
    - facilitating local economic development opportunities such as:
      - Festivals/ events (water and foreshore based)
      - Restaurant/ café
      - Aquaculture
      - Accommodation (range of types e.g. permanent,) at various locations
      - Better linkages to the Central Activities Area and providing a basis to increase length the of stay in Colac
8. Implementation

The principles for project selection were based on the following criteria:

- The need to create a management framework which can implement this plan
- The primary importance of environmental rejuvenation.
- The need to ‘make good’ some facilities and infrastructure in the short term.
- The importance of providing projects on the ground early in the process to maintain momentum.
- The need to have regard to likely financial constraints and funding timeframes.

To facilitate implementation the actions have been prioritised as follows:

- **Short Term**
  - Erosion control and water quality improvement works
  - Create a committee of management of Colac Otway Shire to implement the Management Plan
  - Create a Special Rate to partly pay for the development and leverage funding from other agencies (e.g Community Development Fund)
  - Planning Scheme Amendment to facilitate land uses
  - Initiate Colac Common facility development to create confidence and generate community input
  - Prepare detailed design for foreshore which includes identified facilities and integrates the Botanic Gardens/foreshore experience
  - All developments to pursue access and inclusion
  - Develop an Access for All Abilities Playground
  - Develop linkages/ shared pathways with arts/ heritage projects
- **Medium Term**
  - Re-establishment of foreshore habitats for flora to assist in development of catchment and reduce erosion
  - Address litter management within the water cycle
  - Development of a combined watersports facility
  - Improve accessibility to the lake e.g. jetty upgrade
  - Construct shared trail to Delaneys Point
  - Develop walking/cycling track by extending the existing path with appropriate cultural and heritage interpretive arts projects and signage at designated points

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- Develop sensory pathways and gardens at key activity nodes around the Lake ensuring people of all abilities can access a variety of experiences
  - Develop bird watching facilities
  - Prepare a marketing plan to generate festivals/ events
  - Meredith Park (stage one) development of:
    - Camping facilities
    - Development of BBQs, picnic areas
    - Boat ramp
    - Permanent accommodation – cabins
  - Explore designated tourist road development
  - Service development potential associated with aquaculture
  - Café/ restaurant development at modal point
  - Long Term
    - Develop walking/cycling track around the entire perimeter of the Lake with appropriate cultural and heritage interpretive arts projects and signage at designated points.
    - Monitoring of Bonlac Pondages
    - Meredith Park (stage two) development of:
      - Development Plan
      - Moorings/ jetty
      - Boat link with Colac caravan park
    - Delaney’s Point
      - Construction of BBQs, picnic facilities
    - Increase access along Barongarook Creek to town
    - Development of small VIC facility on foreshore
9. Management Framework (Short Term)
- The recommended management model is a:  
Committee of management auspiced by Colac Otway Shire.

- 
- This management structure would allow a unified focus on Lake Colac and a means by which the plan is implemented. Given that the Shire levies a Special Rate, we believe it should auspice the proposed committee. The foundation of the committee would be to identify, co-ordinate and facilitate the construction of appropriate infrastructure in line with the objectives and recommendations of the Management Plan. This structure has been confirmed by NRE as being legal and consistent with the approach taken at several lakes in Victoria.

## 2.0 VISION 2015

The natural environment of Lake Colac will be an inspirational place for the local community and visitors to enjoy.

## 2.1 MISSION

To rejuvenate Lake Colac as a foundation for environmental, social, cultural, recreational, economic and tourism development within the Colac Otway Shire.

## 2.2 KEY OBJECTIVES

To combat environmental degradation the Lake Colac Management Plan aims to meet the following objectives of Lake Colac to reflect the values of the community, to accommodate a wide range of activities and create a window into the natural, social, cultural and recreational environment of Western Victoria.

### I. Bio-diversity and Natural Environment

- Improve water quality
- Reduce catchment erosion and sedimentation as well as lake shore erosion
- Manage the natural environment and the habitat diversity for existing, fauna (both indigenous and non-indigenous)
- Manage existing, flora (both indigenous and non-indigenous)
- Address the impact of fluctuation in water levels
- Broaden the management of waste (litter)
- Manage the contents of stormwater both as it enters the lake and at the source
- Reduce the levels of discharge/ leachate

### 2. Economic and Tourism Development

- Increase the visitation by local community
- Increase the visitation by non-local community (day/ overnight)
- Encourage expenditure/ jobs created by increased visitation
- Increase levels of visitor satisfaction

### 3. Cultural, Social and Recreational Development

- Making activity nodes and the linkages, including signage, to activity nodes accessible and inclusive to community members of all abilities.
- Acknowledging and celebrating Lake Colac’s heritage, both Indigenous and post European.
- Providing cultural opportunities to recognize and celebrate Lake Colac and its community’s identity.
- New developments to incorporate consideration of mobility issues, circulation and linkages hence ensuring accessibility for all levels of ability, wherever possible.

## 3.0 INTRODUCTION

MacroPlan Australia, in association with Earthtec was commissioned by the Colac Otway Shire to undertake the Lake Colac Management Plan in 2001. The purpose of the plan (in addition to identifying and addressing the major issues through stakeholder involvement), was to provide ongoing framework for the community, local and state agencies to manage and promote ecologically sustainable development and land use practices for the Study Area.

The direction also included bringing together relevant local and state agencies, local communities, industry and commerce, to agree on future strategies on a catchment basis, in which more detailed planning could occur for the main study area. Economic, social and physical factors are also taken into account in determining appropriate strategies.

This management plan differs from other management plans as it identifies the need for a new management structure while also specifying a new project outcome. Because of this, the report focuses on environmental rejuvenation for the future role and development of Lake Colac. However, given that there is substantial cost associated with this direction, it became apparent that substantial effort was required to identify economically feasible ways of addressing the current environmental issues and achieving a sustainable environmental outcome.

Accordingly, the structure of the report begins with the identification of environmental, social and cultural requirements. These are then assessed in terms of:

- infrastructure requirements (and costs)
- economic development opportunities.

A triple bottom line assessment prioritises projects and programs as a basis for developing the integrated development concept for the lake. The project implementation of the concept generates a series of time frames and projects driven by environmental and economic outcomes and community expectations.

## 3.1 REPORT FRAMEWORK

The Lake Colac Management Plan is the culmination of the development of a Discussion Paper and an Issues and Opportunities Paper which involved a period of extensive background research. This has enabled the development of the Management Plan, which includes the following chapters:

### **Chapter Two: Vision**

This chapter includes a statement regarding the Vision to 2015 for Lake Colac, its mission and the key objectives driving the study.

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### **Chapter Three: Introduction**

The introduction outlines the study direction, an outline of the report format and a description of the study area.

### **Chapter Four: Environmental Management**

This section has been produced based on the identification of several management objectives for Lake Colac. It includes an identification of the environmental issues in addition to the most relevant issues from the recreational, cultural and land use research.

### **Chapter Five: Gap Analysis**

This section outlines a gap analysis based on current identified needs for service provision and lake management having addressed the current provision in the research.

The opportunities are then outlined in an Opportunities Evaluation section within the chapter, which details each of the major opportunities and their strengths, barriers and possible projects.

### **Chapter Six: Opportunity Identification**

This section outlines possible opportunities for implementation in order to address the aforementioned issues, identified in the research.

The triple bottom line approach outlined in this chapter provides a priority rating and ranks the identified gaps/ opportunities and provides a basis for the development of concepts as recommendations.

### **Chapter Seven: Implementation**

This section includes a detailed land use and capital works plan for the study areas inclusive of responsible agency, estimated implementation time line and cost for each identified outcome (where possible).

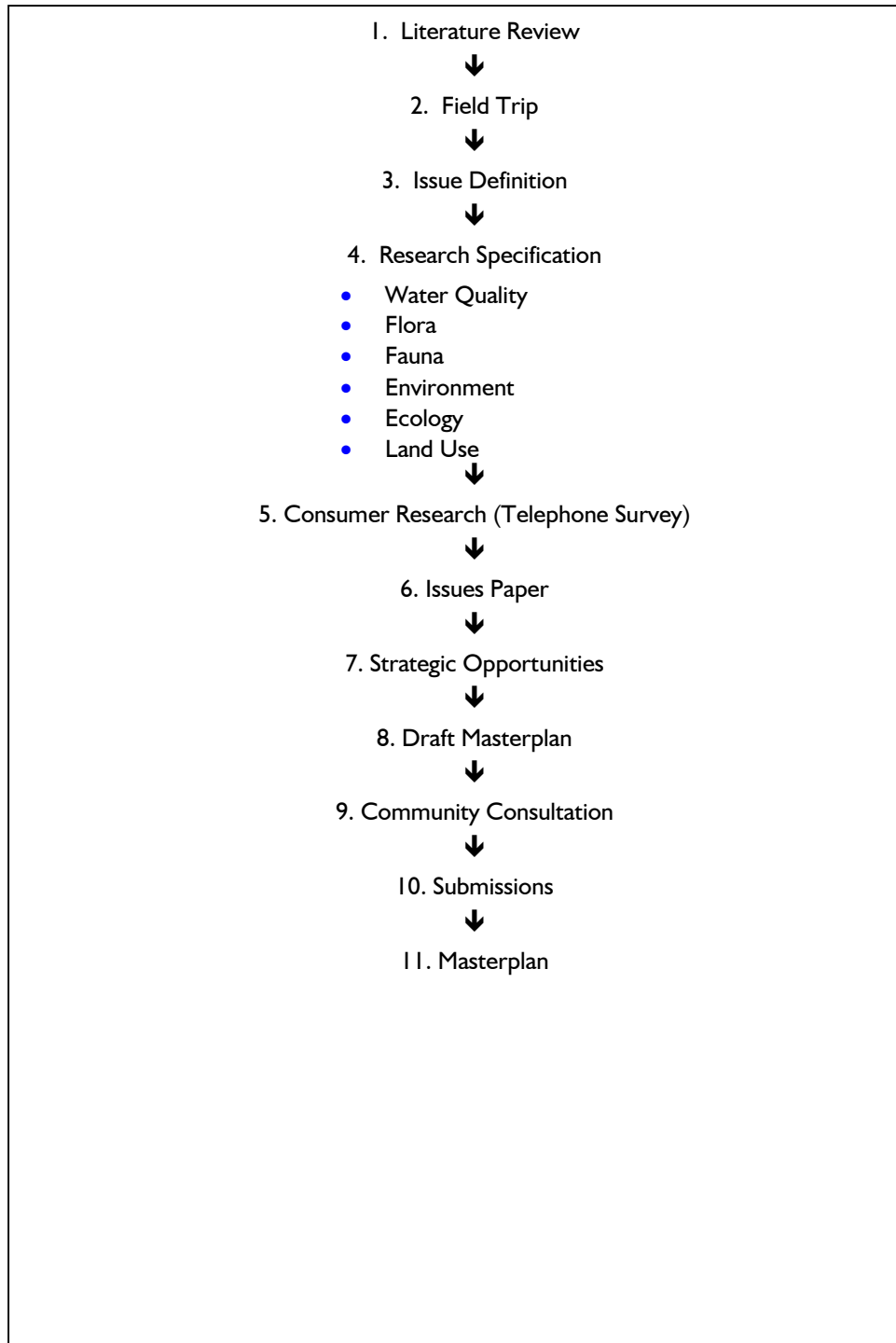
### **Chapter Eight: Organisation and Management**

This section outlines three possible management structures for the operation of the Lake Colac Catchment, of which one is recommended.

The project methodology is summarized in the chart on the following page:



## Study Methodology



## 3.2 STUDY AREA

Lake Colac is situated to the north of the township of Colac, 151 kilometres, southwest of Melbourne, among the western basalt plains of Victoria. It is a shallow lake formed in the basin of the once much more extensive Lake Corangamite.

Land use in the Lake Colac catchment is predominantly agricultural, with industrial activity centred around Colac. The lake is valued for its recreational, industrial, agricultural and environmental opportunities.

The brief identified that Lake Colac and its environs are under pressure due to historic, economic, land use and lifestyle decisions made by landowners, government agencies, businesses, residents and households.

The lake was once described as being of an “exceedingly interesting appearance adorned with ducks, geese, and swans which added to the peculiar charm of the quiet picturesque scenery surrounding the lake, the focus of Colac residents for recreational and leisure activities.”

However, recent descriptions have painted a more subdued picture of the lake, citing degraded shoreline habitats, polluted waters and a township that has in some ways turned its back on the lake. The recreational and leisure capacity of the lake is currently under utilised, particularly in comparison with historical levels. There is also significant untapped tourism and commercial opportunities connected with what should be viewed as the ‘Jewel of Colac’, Lake Colac.

- The study area is comprised of:
  - Main Area
    - Nominal 200 metres above the documented historic high water mark of the lake
  - Secondary Area
    - Remainder of the Lake Colac catchment.

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insert catchment map

## 4.0 ENVIRONMENTAL MANAGEMENT

The following section has been produced based on the identification of several management objectives for Lake Colac. These objectives are to:

- Maintain the natural environment of the catchment, including the diversity of habitat and flora and fauna species (terrestrial and aquatic), remnant vegetation representative of the western basalt plains and habitat for endangered species
- Manage the lake and its foreshore for recreational uses such as fishing, rowing, sailing and passive pursuits such as walking.
- Manage the lake for utilitarian purposes such as watering stock, irrigation for crops, fish/eel harvesting and industrial water supply. While, treated industrial waste is discharged into the lake from the Barwon Water Sewerage Treatment Plant, management of the lake for domestic water supply does not occur now and is unlikely to occur in the future.

### 4.1 NATURAL HISTORY OF THE LAKE COLAC REGION

#### 4.1.1 Location and Formation

- Lake Colac is located in Western Victoria, north from the township of Colac. It is one of the Western District lakes associated with Lake Corangamite, several of which are listed as Ramsar sites.
- Lake Colac is part of the landlocked Corangamite basin formed by early (Pleistocene and Tertiary) volcanic activity. There are over 1000 lakes and wetlands in the Corangamite Basin many of which have been drained or degraded. Volcanic activity blocked the natural outflow of Lake Colac's two tributaries, Deans Creek and Barongarook Creek to the south of Lake Colac and caused the rivers to flow into the basin and leave alluvial deposits. Wind action caused lunettes to form, creating many of these shallow lakes and wetlands.

#### 4.1.2 Shape and Geology

- Lake Colac is relatively shallow and has a water surface area of 2,668 ha (Walker, 2002). The maximum depth of the lake is 2.4 m (Lidston, 1993). The catchment area of the lake is 217 km<sup>2</sup> (State Rivers and Water Supply Commission, 1979). Most of the catchment is made up of volcanic materials whilst tertiary sand and mudstones make up the remainder. Volcanic rock and soil has low permeability, creating higher runoff than the tertiary sand and mudstone sediments.

### 4.1.3 Hydrology

- Compared to the nearby saline lakes in the area, Lake Colac is a relatively fresh water lake. However, it is still considered "brackish" as described in the 1976 Land Conservation Council Victoria "Report on the Corangamite Study Area".
- Water flows into the lake from its tributaries, Deans and Barongarook Creeks. Rainfall and domestic run off also makes up a high proportion of the total annual inflow. Changes in land-use have affected runoff in the Lake Colac catchment. Between 1884 and 1945, the average rainfall in the Lake Colac catchment is estimated to have been 675 mm. Between 1946 and 1975, the average rainfall was estimated to have increased to 798 mm (State Rivers and Water Supply Commission Victoria, 1979).
- Lake Colac has been characterised as being in a partially closed system with surface outflow restricted to particularly wet seasons. It also has low catchment relief and fluctuating water levels. (Slater & Boag, 1978). There is a close association between all the waterbodies within the comparatively small catchment. Groundwater interacts with the surface waters and creeks, which flow directly into Lake Colac without other diluting flows.
- Lake Colac has no regular drainage or natural surface outlet to the ocean. In most years, rainfall is balanced by evaporation (high evaporative capacity) or seepage. After prolonged and heavy rainfall events, natural processes involve water from Lake Colac spilling over into the nearby depression of Lough Calvert. Lake Colac overflows from its northern end into the Lower Lough Calvert when its water rises above EL 117.6m.
- Lough Calvert only receives water from rainfall in its small catchment area or from Lake Colac overflows. In its natural hydrologic regime, Lough Calvert experiences dry periods. In recent years (since 1958), the Lough Calvert Drainage Scheme has controlled the flow of water from Lake Colac to Lough Calvert and the Barwon River. A summary of Lake Colac's flooding regime appears in Table I below.

**Table I: Flooding events in Lake Colac**

Period	Flood Event
1890 – 1910	Frequent flooding
1910 – 1952	No flooding due to low rainfall
1951 – 1953	High rainfall & flooding
1973 – 1975	High rainfall, lake overflowed
1991, 1992 & 1993	Spring floods

#### 4.1.4 Background – Lough Calvert Drainage Scheme.

- The Lough Calvert Drainage Scheme was initially constructed in 1953 to effect the drainage of flood waters in the land locked Lough Calvert basin that had collected following a series of wet years and the overtopping of the banks of Lake Colac. In 1958 the discharge channel connecting the Lough Calvert basin (Lake Colac catchment) to the Birregurra creek (Barwon River catchment) was extended to lake Colac to allow seasonal releases of water from the lake to the Barwon River in an arrangement intended to limit the occurrence of future flooding.
- There is a need to regularly review the operation and management of the scheme to ensure it remains operating in a best practice regime (as has been done a number of times since 1976) with respect to current social, economic and environmental circumstances. The then SR&WSC in its Flood Mitigation Report of 1978 indicated that had the scheme not been operating in the period up to 1978, the Lough Calvert basin would have been subject to inundation from the lake 13 times since 1953. This is an indication that the scheme has an important role on the fabric of Colac society. It doesn't take away from the fact however that the scheme is one part of a larger and sensitive natural and fabricated environment and must fit appropriately in that environment.
- Hence the need for regular assessment of the best operating regime and the development of a review process which is in train by the current managers (the Corangamite Catchment Management Authority). This is the appropriate forum to assess the current best practice operational regime and will, among other things, include a range of considerations relating to scheme operation from continuing in its current form, to, on the one hand, increasing release volumes, and the other, closure of the scheme. The outline of the objectives of the CCMA's review is contained elsewhere in this report.
- The system has operated since that time under guidelines that have received minor modifications over that time to reflect community views and environmental improvements.
- The scheme is operated by the Corangamite Catchment Management Authority.

#### 4.1.5 Settlement History of the Lake Colac Region

- There is evidence that Aboriginal tribes occupied the Corangamite basin. In the 1850's gold rush, Ballarat's population increased and extended to the Corangamite region. European settlement continued and since the 1900's, large areas of land in

the region have been privately owned and cleared. The population extended from the lake's edge as the settlement occurred in a period of low rainfall. The alluvial and windblown floodplain soils made productive agriculture and grazing areas, particularly for sheep and cattle. Floodplains and wetlands were drained to increase the area of arable land.

## 4.2 CURRENT ENVIRONMENTAL ISSUES IN THE LAKE COLAC CATCHMENT

### 4.2.1 Water quality – nutrients

An historical perspective of water quality in Lake Colac;

- In February 1982, the State Environment Protection Policy (SEPP) (Waters of Lake Colac and Catchment) No. W-34A was published. It states “Water quality problems were recognised in Lake Colac at least as early as 1935. In the 1970s these problems (excessive algal growths and low dissolved oxygen levels caused by high nutrient levels and organic matter respectively) were seen to warrant detailed investigations”.
- After the summer of 1972-73, there was “public concern expressed over the occurrence of noxious blooms of blue-green algae” in Lake Colac causing the “deaths of numerous livestock and several fish kills” (Slater and Boag, 1978). Such blooms can have significant impacts on the ecological and economic values of the lake and its environs. In January 1993, there was an outbreak of *Anabaena*, a freshwater alga and *Aphanizomenon*, a blue-green alga. These algae are toxic and required warning signs to be put in place. In March 1994 a similar outbreak meant that drinking and skin contact were banned. Those properties that are not fenced off from the Lake risk exposure of their cattle to the blooms.
- The 1982 SEPP specifies that the major waste discharge licences granted in the Policy area are those for the effluents from the Colac Dairying Co. and the Colac Sewerage Authority works. It states that “...the major feature of the policy is to prohibit the discharge of dairy factory effluent to surface waters...the existing dairy factory effluent has previously caused a localised dissolved oxygen problem”.
- The 1982 policy sought to overcome “the problem of nuisance algal blooms in Lake Colac by elimination of the most significant input of nutrients, the dairy factory discharge”. In the policy it was stated “it is unlikely that such action will completely eliminate algal blooms but a reduction in their frequency and severity is expected as the lake establishes a lower nutrient status”
- There is a long history of industrial effluent flows into Lake Colac from which the lake has not recovered. Some pollutants (including heavy metals) are embedded in the sediments of Lake Colac. A study was carried out in 1978 on the sediments of three

eutrophic lakes in Victoria, including Lake Colac. The lake’s sediments were found to contain the highest levels of all forms of phosphorus and also possessed by far the greatest potential for the release of dissolved reactive phosphorus to the overlying water” (Slater & Boag, 1978). It has been suggested that the cause of high phosphorus levels in the lake are “probably a reflection of the higher external phosphorus loading rates” for the lake.

- There are three measurement sites for Water Quality (salinity and temperature) near Lake Colac. They are:
  - Deans Creek at Lake Colac number 234209
  - Lake Colac Outfall at Meredith Park number 234701
  - Lake Colac (H.G.) at Meredith Park number 234616
- Limited information about these sites including other nearby sites are available at the Victorian Water Resource Data Warehouse, found at <http://www.earthtech.com.au/>

#### 4.2.2 Current Water Quality Issues – Nutrients

- Perceptions of the “health” of Lake Colac appear to be poor. Contributing factors include the water quality, the high pollutant content in sediments of the lake bed, the impact of agricultural activities and Barwon Water discharges from the Colac Sewage Treatment Plant. The population serviced by the Sewage Treatment Plant is estimated at 12 500 people and 4.7 MI/day of sewage is treated. In addition to domestic waste, significant trade waste discharges from Regal Cream, CRF (meat processing facility) and the Colac Sale Yards (17.5% – 24% of the total load) are also processed.
- The Victorian Environment Protection Authority (EPA) produced a Draft State Environment Protection Policy (Waters of Victoria) in November 2001. This document, upon completion, will cover all the waters of Victoria. However, it does not specify quantitative water quality limits for treated effluent discharged to the lake.
- Barwon Water is upgrading the Colac Sewage Treatment Plant to improve the level of treatment and bring effluent quality into line with *Guidelines for Managing Sewage Discharges to Inland Waters* (EPA Publication 473, 1995). The discharge is currently categorised as Class C treated effluent in line with 'Guidelines for Wastewater Reuse' (EPA Publication 464, 1996). The upgrade will ensure a higher level of treatment, to Class B treated effluent quality (EPA Publication 464, 1996), prior to discharge into the Lake. There is likely to be a significant improvement in the quality of water entering the Lake as a result of these works.



- During the consultation process in December 2001, it was suggested that “independent testing should be introduced” to ensure that the quality of water from the Sewage Treatment Plant complies with its EPA licences. Barwon Water advises that all water, sewage, effluent and treated effluent quality monitoring is now conducted independently by Water EcoScience under contract to the authority. Water EcoScience has received external National Association of Testing Authorities (NATA) accreditation and operates under the requirements of this accreditation (Northey, 2002). However, the whole system needs to be considered with respect to general water quality, as compliance with individual licences is not sufficient to safeguard water quality.

**Table 2a: State Environment Protection Policy (SEPP) guideline values for effluent discharges to Lake Colac**

Barwon Water Discharge				EPA Guidelines	
Current Effluent Quality		Existing Licence		Future Limits	
				Median	90th percentile
<b>BOD</b>	mg/L	20	20	5	10
<b>SS</b>	mg/L	18	30	10	15
<b>Ammonia-N</b>	mg/L	30	20	2	5
<b>Total N</b>	mg/L	36.6	40	10	15
<b>Total P</b>	mg/L	7.3	10	0.5	1
<b>E.coli</b>	Orgs/l 00ml	~	200	200	1000

*EPA Publication#473, 1995 – Managing Sewage to Inland Waters*

**Table 2b: Lake Colac Nutrient Levels 1987 to 1995 (annual average)**

Year	TP mg/L	TN mg/L
1987	1.54	1.59
1988	1.68	3.35
1989	1.96	2.41
1990	1.66	2.69
1991	1.35	1.66
1992	1.16	1.81
1993	0.77	2.49
1994	0.79	3.19
1995	0.72	2.18
average	1.29	2.37

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*Compiled from data in "Barwon River System and Lake Colac Nutrient Management Study Resource Document", WATER ECOscience Pty Ltd May 1996*

**Table 2c: Nutrient Levels at various locations in Lake Colac**

Location	DO	pH	EC	Colour	Turbidity	SS	NOx	TKN	TN	FRP	TP
NE	10.8	8.46	2130	50	49	77	0.099	2.1	2.20	0.60	0.98
NW	11.0	8.60	2130	40	28	49	0.140	2.0	2.14	0.59	0.85
SE	11.2	8.63	2060	43	41	73	0.190	2.3	2.49	0.60	0.91
Average	11.0	8.56	2107	44	39	66	0.143	2.1	2.28	0.60	0.91

*Readings taken on 9 sampling occasions over the period November 1994 to November 1995*

NE – Meredith Park

NW – vicinity of Delaney’s point

SE – vicinity of Bruce Street

DO – Dissolved oxygen

EC – Salinity measured in  $\mu\text{S}/\text{cm}$  (1000EC ~ 1667mg/L(ppm))

SS – Suspended Solids

NOx – Oxidised Nitrogen: measures the major form of biologically available nitrogen. It can be used to estimate the potential for algal or aquatic macrophyte growth

TKN – Total Kjeldahl Nitrogen: measures the organic component of nitrogen and ammonia. The organic nitrogen is bound up in plant and animal tissue and wastes. It is commonly used as an indication of the nutrient status and overall health of a waterbody

TN – Total Nitrogen: sum of NOx and TKN

FRP – Filterable Reactive phosphorous: measures phosphorous in the form that is immediately biologically available to plants and algae. It is often used to estimate the potential for algal or aquatic plant growth

TP – Total Phosphorous: measures both the inorganic (biological available FRP) and organic (often bound in plant and animal tissue and wastes) phosphorous. It is used as an indication of nutrient status and overall health of a waterbody.

**Extracted from data in “Barwon River System and Lake Colac Nutrient Management Study Resource Document”, Water ECOscience May 1996.**

**Table 2d: OCE Classifications for Nutrient Concentrations**

OCE Classification	TP (mg/L)	TN (mg/L)
Degraded/Poor	>0.05	>0.5
Moderate	>0.025 <0.05	>0.35 <0.5
Good/Excellent	<0.025	<0.35

Extracted from “State of the Environment Report 1998: Victoria’s Inland Waters” Office of the Commissioner for the Environment (OCE) 1998.

- With reference to Table 2b, Total Phosphorous levels appear to be reducing over the measurement period and Total Nitrogen levels increasing. High lake levels occurred during the later part of this period (1991 to 1995) and thus water volume or dilution may be influencing the results. It is considered that insufficient data is available to identify trends during this period. Significant improvement in nutrient levels have been reportedly anecdotally in the early 1980’s after cessation of direct releases of waste from the Bonlac Milk Processing Plant at Cororooke, at the north west shores of the lake, occurred in 1981.
- With reference to the Office of the Commissioner for the Environment classifications, the lake is in a degraded/poor condition.
- The Environment Protection Authority (ref “Barwon River System and Lake Colac Nutrient Management Study Resource Document”, WATER ECOscience May 1996) estimates that the Barwon Water treatment plant contributes approximately 50% of the nutrient input of the lake, the remaining coming from agricultural and urban runoff.
- An upgrade of the Barwon Water treatment plant is proposed for completion in 2004 with the intention of reducing nitrogen (TN) levels in discharges by 50% and phosphorous (TP) levels by 90%. Similar reductions in agricultural and urban nutrient levels would provide a level of TN concentration in the lake in the order of average 1.2mg/L and TP concentration in the order of average 0.13 mg/L. These nutrient levels are still not improving the classification of the lake with reference to the Office of the Commissioner for the Environment classifications, but each measure to reduce nutrient input to the lake will serve, over time, to improve the aquatic environment of the lake.
- The Colac Otway Shire is developing a Stormwater Water Management Plan for their urban areas including Colac that is aimed at protecting the beneficial uses of the Lake as the receiving environment of stormwater discharges from Colac and Elliminyt.

This plan is important because urban stormwater runoff poses a threat to the water quality of the lake.

- The objective of the plan in general terms is to translate the best practice environmental guidelines for urban stormwater to the specifics of the Lake Colac catchment. The stormwater management plan for Lake Colac will include:
  - preservation methods to preserve existing valuable elements of the stormwater system such as natural channels, wetlands and stream and lakeside vegetation.
  - source control to limit changes to the quantity and quality of stormwater at or near the source.
  - structural control such as gross pollutant traps, detention basins and treatment techniques to improve water quality and control stream and drain flow discharges to the lake or creeks.
- On the eastern side of Lake Colac there was a composting service adjacent to the livestock sale yard. During the consultation process, concern was expressed about potential overflow from the settling ponds at the sale yard and stormwater runoff from the composting site. Were such runoff to occur, it would enter Lake Colac and potentially affect the water quality. However, according to the Colac-Otway Shire Council, the composting service is now closed. Prompt and thorough remediation of the soil at the site is recommended.
- Additional sources of nutrients into Lake Colac include:
  - **Land development:** Treatment measures have not been built into some aspects of the infrastructure. For example, the industrial zones are adjacent to the lake without buffers. Residential development may not have been developed to retain stormwater on-site or pre-treating it before discharging to the stormwater drainage system (Walker, 2002).
  - **Deans and Barongarook Creeks:** Agricultural runoff, eg. fertilisers, cleaners, phosphates and nitrogen from dairy activities; sawmills; car yards; new commercial estates drain to table drains without any primary treatment. The creeks are also threatened by nutrients supplied to them via the stormwater drainage system collecting them from impervious surface areas (diffuse sources) and providing the linkage with the streams (Walker, 2002).
  - **Former tip site:** Potential environmental effects include odour, leachates, and visual impact.

- **Rising sewer main:** The sewer main on the foreshore adjacent to the Botanical Gardens and the now disused tip site is close to the lake, experiencing overflows, spills and blowouts.
- **Sewerage system:** A recent failure at the Visitor Information Centre allowed raw sewerage to flow straight into the stormwater system and into Barongarook Creek.
- **Urban pollutants:** Hydrocarbons, heavy metals, nutrients and matter attached to sediment from roads and driveways potentially contribute to water quality issues in the catchment.

### Implications for the Environmental Objectives of the Lake Colac Management Plan are as follows:

- High nutrient levels and run off into the lake from its catchment are likely to have a direct effect on the lake and many of its users. For example, such changes to the composition of water in the lake are expected to have a detrimental effect on native flora and fauna species, thus affecting the environmental assets of the catchment. It will also affect the commercial and recreational fishing industry, the use of water from the lake for watering stock and potentially be the trigger for an algal bloom, which would affect the majority of users of the lake and its water. Management of the nutrient levels in the lake is an important factor of the Management Plan as high levels may affect environmental, recreational and utilitarian uses of the lake.
- In 1994, Southern Rural Water, Barwon water, the Department of Natural Resources and Environment and the National Landcare Programme commissioned Water Ecoscience Pty Ltd to undertake a study of nutrients. An investigation of the environmental systems leading to nutrient loads (eg sewage treatment plants) was undertaken and a range of possible management actions evaluated for nutrient reduction.

A four volume document was produced. This study identified a high nutrient load to the Barwon River from releases from Lake Colac and high concentrations of TKN (Total Kjeldahl Nitrogen) and TP (Total Phosphorus) in the sediment of the lake<sup>1</sup>.

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<sup>1</sup> “Barwon River System and Lake Colac Nutrient Management Study - Resource Document”, WATER ECOscience Pty Ltd May 1996 Report 72/96.  
 “Barwon River System and Lake Colac Nutrient Management Study”, WATER ECOscience Pty Ltd May 1996 Report 102/96.  
 “Barwon River System and Lake Colac Nutrient Management Study – the AEAM Model”, WATER ECOscience Pty Ltd October 1996 Report 103/96.  
 “Barwon River System and Lake Colac Nutrient Management Study – Monitoring Programme”, WATER ECOscience Pty Ltd October 1996 Report 105/96.

### 4.2.3 Rising Sewer Main

- Barwon Water advises that they have introduced an assessment scheme for their assets based on condition and criticality. This has identified the rising main along the lake foreshore as a priority for works, principally due to its inaccessibility. Barwon Water is prepared to assist in the implementation of recommendations in this plan associated with access paths and trails along this section of foreshore on the basis that they can be developed to provide the necessary maintenance function required by the authority.
- The authority has also implemented works on its Colac Pumping Station No 1 near the confluence of Birregurra Creek and the lake foreshore to improve its security against failure and accidental discharge. This was also based on a condition and criticality assessment.

### 4.2.4 Water Quality – Salinity

- As mentioned above in the hydrology section, in comparison to other lakes in the Corangamite basin, Lake Colac may be considered a freshwater lake. However, it has a relatively high salt content in both its water and sediments. When compared to other freshwater lakes in Australia, Lake Colac is considered a naturally brackish water body. (State Rivers and Water Supply Commission, 1979)
- The lake has no natural constant outlet for water, so it generally leaves the system by evaporation or seepage. In natural conditions, reduction in salt load only occurred when the lake overflows. This situation has resulted in thousands of years of salt accumulation. (State Rivers and Water Supply Commission, 1979)

**Table 3: A comparison of salinity levels in Lake Colac since 1978.**

Year	Salinity Level (mg/L)	Reference
1978	1680 – 2100	Slater & Boag, 1978
1979	1700 – 2500	State Rivers and Water Supply Commission Victoria, 1979
1993	Electrical Conductivity 3800 [ $\mu$ S/cm = 2432 mg/L	State Water Laboratory of Victoria, 1993
2000	3300 – 3400	Woodward Clyde, 2000

- The salinity of water in the lake is highly reactive to the lake level (high level, low salinity and vice-versa). This data is compared to the salinity levels required for a range of uses in Table four below.

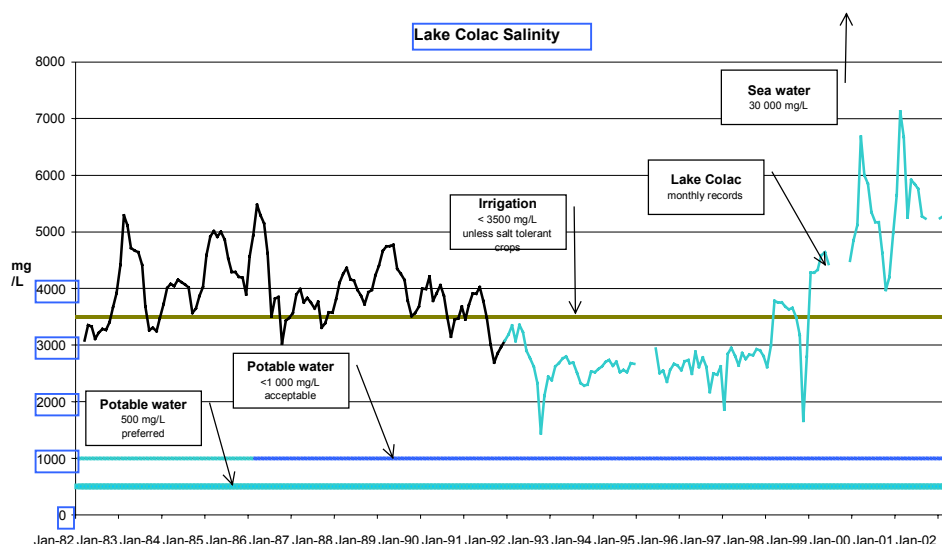
**Table 4: A comparison of salinity levels for different uses.**

Location / Water use	Salinity Level (mg/L)
Potable Water	500 preferred, < 1000 acceptable
Lake Colac	3300 – 3400 (in 2000)
Irrigation	< 3500 unless salt tolerant crops
Sea Water	30 000

(Thomas, 1983)

- The information in the following graphs indicates that the salinity of the water in Lake Colac is higher than acceptable for drinking water, but still able to be used for irrigation. It is approximately ten times less saline than seawater.
- The trend of the graph (salinity) is counter to that of the graph (level). As lake level falls, salinity rises; the range of salinity is 1500EC to 7000EC with the lower figure occurring in 1993 (after a period of flooding) and the higher figure occurring in 2001 after a period of unusually dry weather. Typical usage levels of salinity overlay the graph for comparison purposes.

**Graph I: Lake Colac Salinity**



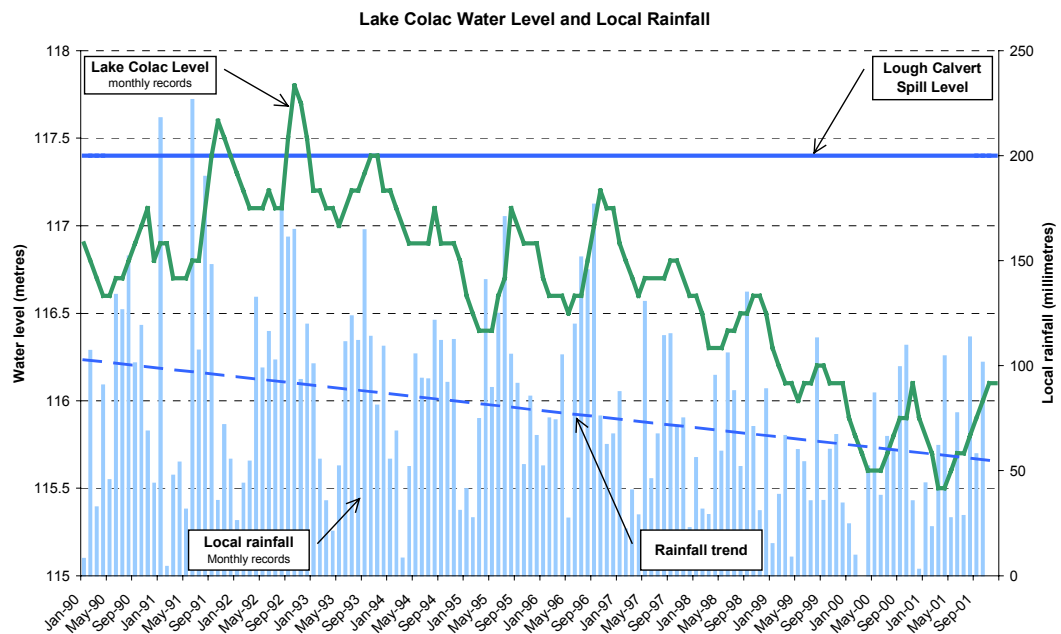
The following graph 2 shows the trend in rainfall which is a reducing annual rainfall from 100mm per month average in 1990 to 55mm per month in 2001. This is too small a sample to draw any long term conclusions, but correlates with a reducing level in the lake from the periods of overflow in the early 1990's to the currently low level. The lake is clearly rainfall sensitive and this is borne out by study of the past records that generally indicate three



consecutive years of high annual rainfall will cause the lake level to approach its upper limit with a period of lower than usual lake levels in following years.

- A total study (environmental, economic and social) outside the scope of this 'report' is required to assess this significant issue. The CCMA is currently formulating a consultants brief for such a study and is expected to have the results thereof in mid 2003.

**Graph 2: Lake Colac Water level and Local Rainfall**



- There are two major sources of salt into the lake. The first is the lake's sediments (and this ground rate), which originate from volcanic materials, including basalts that are high in salt content. The second source is from both Deans and Barongarook creeks. The sources of salt in the lake, both natural and post-European, require further investigation. Sewage input into the lake from the Barwon Water Treatment Plant is also a limited source of salt load.
- Salinity levels in Lough Calvert can be much higher than those in Lake Colac, particularly in the depression beds, which tend to be waterlogged (State Rivers and Water Supply Commission Victoria, 1979). The Lough Calvert Drainage Scheme carries water from Lake Colac into the Barwon River. Users of the Barwon River are concerned about the higher salinity of the incoming water, compared to the water in the river.

## Implications for the Environmental Objectives of the Lake Colac Management Plan

- Salinity levels, which vary from the natural regime of Lake Colac, are likely to be detrimental to native flora and fauna species of Lake Colac. The lake is naturally relatively high in salt and is likely to have had a natural regime of salinity levels fluctuating with the changes in water level. Where indigenous plants are not able to survive a different regime of salinity levels they will be replaced by more tolerant species, which may be exotic. The diversity of native plants and animals is likely to decrease with changes to the natural regime.

### 4.2.5 Catchment Erosion and Sedimentation

- Sediment enters Lake Colac through natural catchment processes. However, an increased amount of sediment is evident due to clearing of native vegetation in the catchment and foreshore zone to allow agricultural land use. Such activity has affected the natural sediment processes. Both Barongarook and Deans Creeks are subject to erosion and therefore supply sediment to the lake. Another contributing factor is sediment contained in runoff from roads and development construction.
- Catchment erosion processes cause sediment to be transported across the land surface and via the tributaries. Introduction of agricultural practices in the early 1900s affected natural processes in the Lake Colac catchment. This activity resulted in extensive gully and sheet erosion throughout the catchment, causing sediments to be transported into the waterways and Lake Colac. For example, stock access to Deans and Barongarook Creeks is likely to have contributed to liberation of sediment, increasing the contribution of sediment loads to the lake from its catchment.
- The increase in lake sediments is causing a decrease in the depth of the already shallow lake and affecting the range of activities that can take place. The Lough Calvert Drainage Scheme spillway is 117.4m AHD. Landholders report that there has been 0.2 m of sediment build-up in the spillway.

## Implications for the Environmental Objectives of the Lake Colac Management Plan

- The increasing sediment levels in the lake may potentially affect the turbidity of its water. This is likely to alter the natural habitat of native fish and macroinvertebrate communities. Sedimentation in the lake will also affect the chances of aquatic vegetation surviving. A decrease in the depth of the lake will decrease the

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opportunities for boating activities on the lake and in the longer term affect its ability to contain floods.

#### 4.2.6 Lake Shore Erosion

##### Issues with lake shore erosion include:

- Lakeshore erosion is a natural process in Lake Colac. It particularly occurs on the eastern bank of Lake Colac due to the dominant southwesterly winds, which generate waves and corresponding erosion. Although lakeshore erosion contributes to sedimentation in the lake, adjacent landholders have raised the concern of loss of land adjacent to the lake. Anecdotal evidence indicates that significant tracts of land have been lost from properties located adjacent to the eastern shoreline. The Corangamite Catchment Management Authority (CCMA) has proposed works along the eastern foreshore to control the erosion.
- While European settlement contributed to native vegetation decline, which led to erosion, there are currently three identifiable causes of lakeshore erosion.
  - The controlled levels of water in the lake and enhanced inflows from development
  - Trampling and grazing of stock in the catchment
  - Devegetation.

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## Map 1: Erosion Control Works

## Trampling and grazing of stock

- Anthropogenic activities such as allowing stock access on the lake foreshore have increased rates of lakeshore erosion, particularly on the eastern banks. Native vegetation may have held the banks of Lake Colac together in the past. Now that there is a reduction in the native, indigenous vegetation in the riparian zone of the catchment, erosion processes are effectively accelerated. The erosion problem is also affected by the natural soil type and soil structure in the catchment.

## Controlled water levels

- Maintaining a constant water level through the Lough Calvert Drainage system would also affect the natural erosion process by restricting natural fluctuations. Lakeshore erosion was notably active between 1990 and 1993 during a period of high lake levels.
- The need for level control is exacerbated by increased inflows due to development, both urban and rural.

## Implications for the Environmental Objectives of the Lake Colac Management Plan

- Erosion of the Lake Colac shores is a process to which the native flora and fauna have adapted. Removal of native vegetation which originally held the banks together, fluctuating water levels, grazing and trampling by stock and drought are all likely to have increased the rate of erosion and affected the natural communities. Increased rates of bank erosion has had detrimental effects on the habitat for native fauna.

*It should be noted that it has been recommended by the Lough Calvert Advisory Committee that the Corangamite Catchment Management Authority purchase parcels of land in the Lough Calvert basin subject to the development of an agreed management plan between the CCMA and adjoining landholders. Management plans will be developed prior to land being purchased.*

### 4.2.7 Lake Processes

- It is not possible to re-create natural lake processes under the current Lough Calvert system. The current “target level curve” for the lake has been shown by numerous investigations between 1978 and 1992<sup>2</sup> to be the most manageable approach. Lake inflows have also changed.

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<sup>2</sup> 1979 State Rivers & Water Supply Commission  
Lake Colac – Lough Calvert Flood Mitigation Report, July 1979



#### 4.2.8 Summary of Possible Pollutants into the Lake

- Main Pollutants (not in priority order):
  1. Agricultural runoff - overland  
- via creeks
  2. Colac sewerage treatment plant
  3. City stormwater drains

These could be grouped as the most significant three sources

4. Abattoirs - run-off
5. Leachate from - Bonlac  
- Tip site  
- Saleyards COS
6. Silt - Eastern Banks  
- Creeks  
- Naturally occurring

Numbers 4, 5 and 6 are unquantified and may not be a significant source.

- In terms of the background research undertaken, no results have been identified that assess the usefulness of dredged silt as landfill or beach renourishment. However, such a resource could be considered.
- An assessment of and management plan for each of these sources is recommended.

#### 4.2.9 Flora & Fauna

##### Issues with Flora and Fauna

###### Flora

- The pre-European vegetation community in the Lake Colac region is categorised as grassy woodland, plains grassy woodland and swamp scrub with small areas of other vegetation communities (NRE, 2002). North from Colac, the natural vegetation was in the general category of tussocky or tufted grasses and graminoids (a plant grass-like in form but not floristically of the family Poaceae (grasses)). South from the lake, the natural vegetation was categorised as medium (10-30 m) *Eucalyptus* trees, with 30-70% cover of the highest stratum and greater than 30% low shrubs (2 m) (AUSLIG, 1997). The following maps identify the assumed vegetation cover in the

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Colac region pre 1750 and the current extent and type of vegetation cover. The base and background data on these maps is from the NRE Corporate Geospatial Data Library which is a dynamic data source regularly updated as information becomes available.



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**Insert plan of pre European vegetation**

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**Insert plan of post European vegetation**

## Fauna

- The overall ecological condition in the Corangamite Basin is poor (Corangamite Catchment Management Authority, 2001). However, several of the lakes, including Lake Colac have significant habitat areas (Corangamite Catchment Management Authority, 2001).
- An example of a significant habitat area is the natural habitat for the Corangamite Water Skink (*Eulamprus tympanum marnieae*), which is found in three known sites on the lake's shore. The natural habitat is found near Meredith Park on the northeast shore of Lake Colac, 3 km west from Ondit. There are also two habitat areas on the west shore of the lake where the skink has been found. They are on the properties known as "The Points" (2.5 km southeast from Balintore) and "Rosemoyne Park" (4.5 km east from Cororooke) (Philip DuGuesclin, NRE, 2001).
- The Corangamite Water Skink is listed as Critically Endangered in the Flora and Fauna Guarantee Act (1988) and listed as Endangered in the ANZECC (1995) List of Threatened Australian Vertebrate Fauna. The skink is also a nationally endangered species listed in the Environment Protection and Biodiversity Conservation Act 1999 (EPBC). Section 18A of the Act, "Offences relating to threatened species etc.", states the following:

(1) A person is guilty of an offence if:

- (a) the person takes an action; and
- (b) the action **results or will result in** a significant impact on:
  - (i) a listed threatened species; or
  - (ii) a listed threatened ecological community.

Note: Chapter 2 of the *Criminal Code* sets out the general principles of criminal responsibility.

(2) A person is guilty of an offence if:

- (a) the person takes an action; and
- (b) the action **is likely to have** a significant impact on:
  - (i) a listed threatened species; or
  - (ii) a listed threatened ecological community **and the person is reckless as to that fact.**

Note: Chapter 2 of the *Criminal Code* sets out the general principles of criminal responsibility.

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- (3) An offence against subsection (1) or (2) is punishable on:
- (a) conviction by imprisonment for a term not more than 7 years, a fine not more than 420 penalty units, or both.
- More information is available in the EPBC Act that is available at the following website: <http://www.ea.gov.au/epbc/index.html>. The issue of protecting the Corangamite Water Skink must be taken into account in the Lake Colac Management Plan.
  - A bird sanctuary area was constructed at the eastern end of The Esplanade, close to the township of Colac. Some bird hides have been destroyed, possibly by high water levels, which have also affected the vegetation in the reserve (NRE, 2002). Waterfront of various species are an important component of the natural aide and any enhancement measures must consider their needs.
  - The abundance of introduced aquatic fauna species is likely to have had an effect on the native fish populations in Lake Colac. For example, the introduced species, English perch, is fished in Lake Colac. Eels are also farmed and exported. Due to the low levels of the lake, the eel fishing industry is reported to have been reduced by 50%. Concerns have also been raised about the increasing population of European Carp in the lake, which have the potential to affect the water quality and aquatic vegetation.
  - The main difficulty of this industry is the loss of sustainable feeding zones and safe boating depth over a significant portion of the lake and appropriate launch and recovery facilities given the current situation.

### Implications for the Environmental Objectives of the Lake Colac Management Plan

- Where further research is required to confirm the status of a particular species or community, it should be supported by the plan. This includes research into, for example, water birds in relation to the development of the tourist road and often impacts on flora and fauna of path, road and nodal development. Care must be taken to note the laws under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC) and the recommendations made in the Flora and Fauna Guarantee Act (1988) and the ANZECC (1995) List of Threatened Australian Vertebrate Fauna.

### Issues with Water Levels

- Lake Colac is a land locked system, which occupies an abandoned depression of the once more extensive Lake Corangamite system. The natural lake process involved

water overflowing its eastern bank into the Lough Calvert system when levels were high. Fluctuating water levels appear to be part of the natural regime of the lake. Lake Colac has had various levels of water since European Settlement.

- In an attempt to control flooding and maintain the level of the lake to satisfy recreational and industrial needs, the Lough Calvert Drainage system was constructed in 1953. Its purpose is to prevent winter and spring flooding of adjacent land, maintain adequate summertime water levels in the lake and minimise the effect on the environment. This scheme was in response to a series of floods in high rainfall years.
- Over the past 50 years, flooding has occurred in 1953, 1964, 1976 and 1991. In 1991, the high lake levels are reported to have contributed to damage around the foreshores of Lake Colac. There are 6.5 kilometres of eroded foreshore between Meredith Park and the limestone cliffs close to the Colac Township.
- Water levels are managed by the Corangamite Catchment Management Authority by way of releases from the lake under strict operation rules:
  - No releases between November and April
  - No releases if salinity in Barwon is greater than 1,700  $\mu\text{C}$  in May, June, October and greater than 2,500  $\mu\text{C}$  in July, August, September.
  - No releases if the lake is below a target level which varies with the time of the year. The lake target level is aimed at achieving a sufficient volume for flood mitigation. Had the drainage system not been constructed, Lake Colac would have flooded 13 times since 1952. (SRWSC-1979).
  - The Lough Calvert system operates by releasing water from Lake Colac or the loughs, in accordance with the above operating rules, through regulators into a channel that directs the water to the Barwon River.
  - The current (15 July 2002) level of the lake is 116.0m AHD (Australian Height Datum, approximately mean sea level) and is 0.6m below the target level curve. The depth of water represented by this level is variable peaking to in the order of 2.0m in the middle reaches of the lake

### **Implications for the Environmental Objectives of the Lake Colac Management Plan**

- The water level in Lake Colac is significantly variable. With the construction of the Lough Calvert Drainage Scheme in the 1950s, the variability was reduced as the water level was controlled to reduce the likelihood of flooding. This change in the

natural regime has affected the native flora and fauna. Species that originally existed in the flood path areas, such as most of the Lough Calvert, are now denied water, which is held in the lake. The constant water level would have an affect on many indigenous flora and fauna species.

- Water enters the system from rainfall, Deans and Barongarook Creeks, road and stormwater runoff and the Colac Sewage Treatment Plant, which provides approximately 4% of the net water inflow into the lake.
- While the Lough Calvert system regulates water levels it also affects flora and fauna. It also contributes to sediment and salinity levels in the Barwon River. Prior to the system's installation, the flow of sheet water travelled north through a number of basins (loughs). It now flows south, directly into the Barwon River.
- Low water levels in the lake limit the amount of recreational and commercial activity that can take place. Those wanting to sail watercraft on the lake prefer high levels and those wanting to provide protection against flooding of the lake environs and the Lough Calvert system downstream prefer low levels. Provision of intact environmental values relies on the provision of variable water levels in the lake.

#### 4.2.10 Litter

##### Issues

- There are several sources of litter in the Lake Colac catchment. Firstly, concern has been expressed about the dumping of hard waste on agricultural land adjacent to Lake Colac, causing an eyesore. Secondly, an existing litter trap at Armstrong Street limits the volume of litter entering Lake Colac from the township. However, the litter trap may not be operating at full effectiveness due to lack of regular cleaning.

##### Implications for the Environmental Objectives of the Lake Colac Management Plan

- Litter entering Lake Colac may potentially have a detrimental effect on the native fauna, fish and macroinvertebrate species in and around the lake. It also reduces the aesthetic appeal of the lake.

##### Conclusions

It is important to note that while recent improvements have been identified including Barwon Water's upgrade in the quality of treatment and effluent quality from C class to B class and the development of the Stormwater Management Plan, the issues identified above impinge on the environmental sustainability of Lake Colac and are addressed as the basis for

the development of recommendations in the following sections of the report. In particular this chapter identified the following threats to the sustainability of the lake and its foreshore.

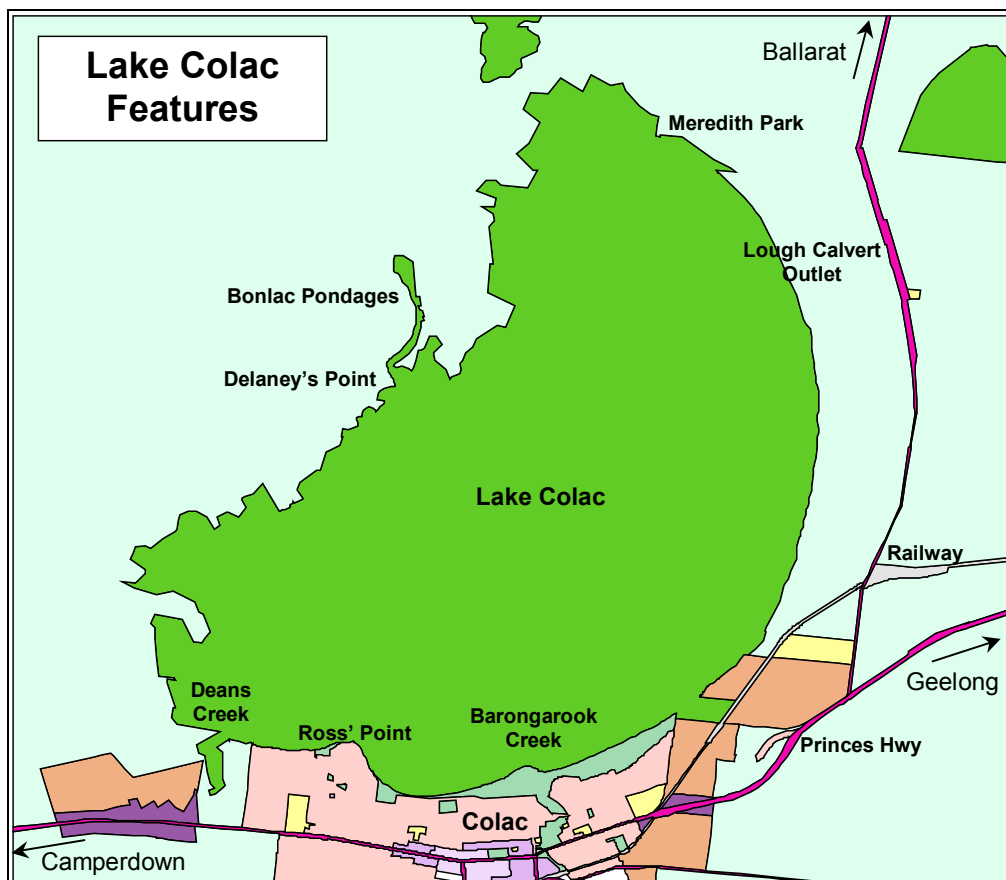
- Water quality is one of the most significant issues facing the health of the lake and is contributing to an overall negative perception of the lake
- Catchment erosion and sedimentation is also a significant issue, mostly caused by the clearing of vegetation in the catchment.
- Lake shore erosion has been caused by the controlled water levels of the lake through the Lough Calvert system, native vegetation decline and foreshore trampling from stock. Flooding has caused much of this destruction of the lake shore.
- There is a need to protect the native flora and fauna in the catchment from higher levels of salinity and discharge into the lake.
- Litter management is also an issue and has been addressed to a certain extent through the introduction of the gross pollutant trap but requires further consideration.

While these points cover a broad range of issues, addressing them will achieve many of the study's objectives both for the use and the operation of Lake Colac as a community and natural resource. In particular, the issues have identified a lake that has, to varying degrees, experienced degradation of its foreshore and water quality, which has correspondingly affected the community's relationship with it.

### 4.3 LAND USE

- Key land uses issues identified in relation to Lake Colac were:
  - physical link with town
  - foreshore cohesiveness
  - foreshore use for water activity
  - current land use on foreshore/agriculture

Map 2: Lake Colac

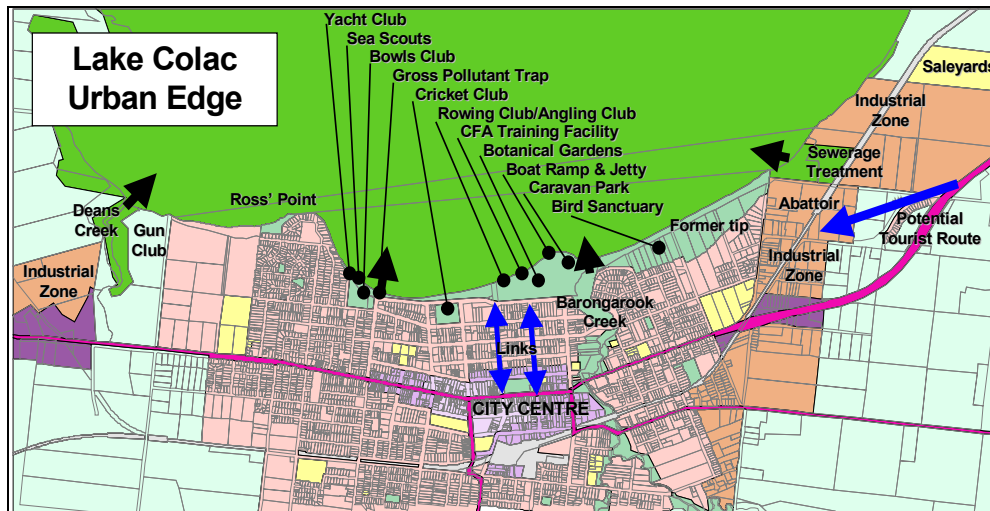


### Physical Link with Town

- There is a lack of physical and perceptual links between the Central Activities Area and Lake Colac. Although visitors gain glimpses of the Lake as they enter Colac there are no linkages or activity nodes to draw them away from Murray Street/Princes Highway to the Lake. Essentially, development, tourism and commercial activities all 'turn their backs' on Lake Colac. It was identified that this was due:
  - to the historic focus of commercial activity on Murray Street
  - the distance between the commercial area and Lake
  - absence of view lines between the commercial area and the Lake.



### Map 3: Lake Colac Urban Edge



### Foreshore Cohesiveness

- Development, activities and landscaping along the urban foreshore lack focus and cohesiveness and appear ad hoc. Individual sporting and community groups undertake their own projects with limited or no consultation or co-ordination with management bodies. This was identified as being due to:
  - Recreational activities on and adjacent to the lake have changed in nature and significance
  - Management of the foreshore and lake is fragmented and uncoordinated.
- Access and inclusion is also an issue with respect to the general access between activity areas such as the Botanical Gardens, the town centre and landmarks around the lake. All areas should be accessible including any areas in and around Meredith Park and other public access areas such as the banks of Barongarook Creek.

### Foreshore Use for Waterbased Activity

- The lake supports recreational activities that rely on the foreshore in order to utilise the waterway, these activities include boating, recreational fishing and commercial fishing. Fluctuating lake levels and sedimentation are important constraints on both commercial and recreational fishing. Recreational boating, particularly rowing and yachting have been constrained in recent years due to low water levels and obstructions in the water such as fence posts. Other facilities have now been built around the State to accommodate current and future boating needs.
- Access to the lake for activities is by boat ramp. Three boat ramps are accessible at:

- The Angling Club (adjacent to the Botanic Gardens)
- The Yacht Club
- Meredith Park (although it has difficult navigation conditions).

## Land Use Along Foreshore

- Industrial activities on the eastern and western edges of the Lake detract from the scenic landscape values and general amenity of the Lake. This is due to land use zoning around the lake, including industrial zones at the periphery of the town, reflecting historical land use patterns and attitudes to the Lake.
- In one particular case, the Bonlac dairy processing facility utilises pondages adjacent to the north-west edge of the Lake. These serve to treat waste-water generated by the facility. They are designed to prevent water from the pondages entering the Lake. The volume of wastewater entering the pondages has reduced over recent years and one of the ponds has been closed down.
- Foreshore activities along the urban lake foreshore are predominantly recreational in nature. Several community groups utilise facilities on the foreshore and have contributed to improvements and the establishment of facilities over time. However, the foreshore lacks physical linkages and a sense of coherence.
- The residential market is strongly influenced by the Lake. Attractive, well-established residential areas exist along the urban edge of the Lake, with several properties having gardens that extend to the foreshore. Newer residential areas have been established along the ridge at Elliminyt to take advantage of lake views. Views from the eastern and western edges of the Lake towards the residential areas of Colac are attractive and present a positive image of the town.
- Meredith Park, on the northern section of the lake, is currently used as a ‘free’ informal camping spot, which is particularly popular with fishing people. As this area attracts a high level of use, maintenance issues have arisen in terms of keeping the area rubbish free.
- There is an opportunity to explore possible use of Meredith Park for a range of accommodation options in addition to a camping area. The current site for caravans at the Colac Caravan Park is small. Possible development at Meredith Park could be considered within the wider management plan context.
- Several other sites adjacent to the Lake have potential for development or enhancement. This is due to changing land use activities around the lake, which have created a number of potential activity nodes in strategic locations. Several sites are under – utilised or in transition, namely:

- The Yacht Club
- The Botanical Gardens precinct
- The former tips at Colac
- The Bonlac Pondages
- Delaney’s Point
- Ross’ Point.

### Major Issues Associated with Commercial Use on Foreshore

- Eel Fishing Industry
  - The Eel fishing industry is currently constrained by approximately 50% because of the low level of the Lake.
  - The main difficulty for the industry is ingress and egress for vehicles from the foreshore due to silt build up at the boat ramps.
- Caravan Park
  - A lease is currently in place at the existing caravan park
  - Further work needs to be done to improve the appearance of the park and its interface with the foreshore.

## 4.4 CULTURAL, SOCIAL AND RECREATIONAL ISSUES

- The Australian Bureau of Statistics (ABS) has produced several publications that provide a statistical insight into leisure participation at the national level. These include:
  - Participation in Sport and Physical Activities 1998-99 (1999), ABS, Canberra
  - Participation in Sport and Physical Activities Australia, 1997-98 (1998), Population Survey Monitor (PSM), ABS, Adelaide
  - Sport and Recreation: A Statistical Overview - Australia (1997), National Centre for Culture and Recreation Statistics, ABS, Adelaide
  - How Australians Use Their Time 1997, ABS, Canberra
  - Australian Social Trends 1999, ABS, Canberra
- Outlined below is a summary of information gathered from these reports, with specific relevance to Lake Colac and its use as a recreation resource for the local and wider community. It is important to identify the following issues particularly if

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participation by the community and visitors is to be addressed within the Management Plan.

#### 4.4.1 Trends in the Demographic Characteristics of the Population<sup>5</sup>

- With an ageing of the Colac Otway Shire’s population, there is most likely to be a corresponding increase in demand for a wider range of passive activities, as well as active.
- With varying levels of disposable income in a community such as Colac Otway Shire, people’s ability to make leisure choices is often influenced by the level of disposable income they have. The supply of facilities should reflect this and should provide recreation and activity which is both paid for, thereby generating local income for groups and the Shire, but also no or low cost recreation and activities. The latter is conducive to encouraging family and community activity. (See Appendix 2).

#### 4.4.2 Trends in Health and Wellbeing of the Community

- The value of leisure to the overall health and wellbeing of the community has been acknowledged at all levels of government and through the mainstream media. This is highlighted by:
  - A greater association by the community regarding the benefits of leisure (and exercise) to health and wellbeing. Therefore, more activities undertaken by the community could be likely to have a fitness component due to increasing awareness regarding issues of public health and a direct link to lifestyle and leisure.

#### 4.4.3 Trends in the Nature of Work

- Leisure time, often be structured around work, school and family/ social commitments can limit opportunities from making long-term commitments to activities (particularly organised sporting pursuits which are time consuming). Therefore, increasing the need to provide the ability for the lake to be used in both an unstructured and structured (e.g. fishing clubs, rowing, sailing etc) capacity. In this respect, there is a move towards more casual participation, rather than making commitments.

#### 4.4.4 General Trends in Community Life

- There are a number of general trends that could impact on people’s leisure participation in and around the lake. These include:

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<sup>5</sup> Detailed demographic and socio-economic data is included in the Appendices.

- A greater emphasis on access and equity for all spheres of the community.
- A reduced perception of “community” and a greater importance placed on the value of the family unit in terms of social and recreational interaction. Therefore, there is the need for safe activities and activity based around meal times as well as for fitness reasons.
- The propensity of older members of the community to spend significant periods of time alone – the management of the lake will need to accommodate a safe environment for older people and an environment where many people can interact, thereby increasing social interaction.

#### 4.4.5 Participation in Leisure

- National and State statistical information has highlighted a number of trends in participation in leisure activities. These include:
  - Greater demand for passive and non-competitive activities along with greater emphasis on, and participation in cultural activities.
  - Greater demand for recreational activity that is active, yet informal and greater demand for activities/experiences that offer the participant safety and security.
  - Access to leisure facilities for all people (regardless of age, gender, physical or intellectual ability). This is evident through changes in legislation and in building practices.
  - The need for information and different levels of communication regarding access to better information about leisure and recreation in and around the lake. This could be through a need for signage, promotion of activities and facilities at the lake.
  - The need to engage volunteers to assist in maintaining clubs activities and operation to survive. There is therefore a need to support volunteers and volunteerism so as not to place pressure on established clubs to survive.
  - This could become an issue particularly with an expectation that sporting clubs should be well managed, offer value and provide safe experiences for participants, particularly at the junior level.
  - There is increasing competition to obtain government grants.

#### 4.4.6 Issues for Leisure Facilities and People’s Expectations Regarding Quality

- It has been identified that at a state and national level, there is increasing demand for a greater diversity of leisure opportunities, as well as expectations for higher quality facilities and services. With respect to Lake Colac:
  - Improved facilities, safety and increased accessibility for all groups in the community, will enable and encourage local members of the community and tourists to travel further to access a resource such as Lake Colac and its foreshore.
  - The cost of maintaining and upgrading facilities continues to rise and the capacity of Clubs and Councils to meet these costs is increasingly constrained. This is an issue for the future of the clubs and the increasing need to identify grants particularly if the foreshore is to be developed.
  - The rising cost of public liability insurance is also a major cost affecting clubs and recreational activities including festivals
  - Greater demand for facilities with associated amenities (ie. toilets, seats, shade, shelter, car parking etc.)
  - Vandalism and associated issues are significantly reduced as a result of greater community ownership of facilities, through involvement in the development.
  - More emphasis on joint use/joint management and occupancy agreements between clubs or user groups.
  - Greater emphasis on the multi-use of facilities.
  - Sport and outdoor recreation is emerging as a basis for tourism and is provides an appropriate synergy at Lake Colac.
  - Better access to appreciate flora and fauna including water birds.

### 4.5 RECREATION

#### 4.5.1 Recreational Boating

##### Yachting

- There are currently 50-60 members
- The sailing regatta held annually is host to up to 100 boats. It was cancelled last year due to the inadequate water level.
- The regatta has been a major income source for the Club each year.

- It is a club with significant standing in Victoria, and produced a world champion a few years ago.
- The signage and public education at the yacht club along the jetty is currently poor. The water level indicator is deceptive and indicates 6m. It is referenced to AHD. There are no “No Diving” signs.
- There are 30 boats stored at the club. The dry storage yard is not full. There are minnows, A class catamarans, trailer sailers.
- The Sonata and Sharpies Associations are interested in holding their state titles at Lake Colac but this has not been possible due to the low level of the Lake.

### Rowing

The rowing club currently has 20 members. A number of issues were identified through the consultation and site visit these include:

- VRC standard points regattas are no longer held at the lake.
- The weather has been problematic and exacerbated by the direction of the wind.
- March was indicated as an opportune time to host a regatta.
- Regattas will no longer be held if they are constantly ‘blown out’ as they have been over the past few years.
- Submerged fence posts area a danger to rowing activities and have caused damage to one boat in recent times.

### 4.5.2 Other waterway use issues

- The present rescue boat is an old couta boat.
- Jet skis are allowed on the lake but are not prevalent
- There is no real waterway zoning on the lake except the zone 30m from the foreshore where waterskiing is prohibited.
- The boat ramp at the botanical gardens is the main waterski drop off zone.
- During peak season waterskiers beach their boats on the embankment immediately to the west of the boat ramp.
- A sewer main located within the foreshore area places a constraint on physical works

### 4.5.3 Fishing

- Competitions are held at the Lake and are a popular attraction for locals and visitors

- A number of fishing spots are located around the foreshore including Ross' Point and other strategic locations including Meredith Park.
- Fishing is as economically important activity on Lake Colac, particularly in relation to Red Fin and eels. Low water levels make it difficult and dangerous to use boat ramps and as a consequence first time visitors often do not return.
- Water quality has also impacted on the Redfin stock in the lake.

#### 4.5.4 Foreshore Use

- The area between the Botanical Gardens and the Lake is a major focal point on the foreshore.
- The boat ramp currently has significant access issues. Grants applications have been submitted to the Marine Safety Victoria (formerly the Marine Board of Victoria) but funds have not been secured. Boating safety is an issue at this ramp that is considered to be narrow and in need of a jetty alongside the ramp to moor boats in order to park trailers and cars. The current jetty is located too far from the facility.
- The Botanical Gardens are possibly the only 'drive through' gardens in the State. This is popular with older locals as it allows them to continue to enjoy the gardens. People with disabilities also enjoy a high level of use of the Botanical Gardens.
- There is currently a lack of interpretation of local heritage and history around the foreshore. In particular significant Aboriginal sites should be considered. Opportunities exist for an information trail to educate the public about their cultural associations with the area. Community workshops for the development of the Lake Colac foreshore arts project resulted in strong interest for further arts installations to be featured around the lake.
- Acknowledgement of disability access and inclusion for all cultural and recreational developments should be maintained. Council has made an application for an Access for All Abilities Playground to Sport and Recreation Victoria.
- The foreshore should be developed further to attract pedestrian and bicycle transport. A walking track would be a significant addition to the foreshore, particularly increasing accessibility to the currently utilised areas between Ross' Point and the Botanic Gardens. It would also allow a linkage and could be combined for a bicycle track to link as the Lake Colac trail, in connection with the Beechy Line concept.<sup>6</sup>

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<sup>6</sup> Parklinks, 1999, Colac Otway Shire Strategic Bicycle Plan, Colac Otway Shire Council and Parklinks, 2000, Old Beechy Line Rail Trail Concept Report, Colac Otway Shire Council.



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From a recreational perspective:

- Lake Colac and environs has the potential to be an important recreational resource at a regional level
- There is a change in ‘needs’ in particular a shift to move passive activities
- Lake Colac is and should be the primary environmental/recreational node for Colac.
- Existing recreational experiences could be substantially enhanced by improving the Lake Colac environs.

## 4.6 CULTURAL HERITAGE

### 4.6.1 Indigenous

- The local Aboriginal communities are:
  - Framlingham Trust
  - Wathaurong Aboriginal Co-operative
- These families are the local custodians relevant to the study area. Local knowledge and history associated with their interpretation of the area would be a valuable contribution to community education and local understanding of the study area.
- Stakeholder consultation indicated that some areas around the lake’s foreshore are considered sacred and stories of the local Aboriginal culture are known.



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relationship with the lake. In particular the following issues were identified as needing to be addressed:

- accessibility
- enhancement of community involvement
- provision of a wide range of facilities
- management of facilities ]
- design principles

The Lake is host to a range of structured and unstructured activity including:

- structured (fishing, rowing and sailing club activity)
- unstructured (walking, picnicking)

Characteristics of usage indicated:

- there is a change in 'needs' in particular a shift to more passive activities
- provision of infrastructure for family based activity such as BBQs is needed
- there is also a need for those facilities and ancillary services to be well maintained. This is particularly important for toilets, showers, lighting, picnic and eating areas. Close proximity of car parking and shelter are also required to improve the amenity of the foreshore.
- the need for visitors to the lake to feel safe (both individuals and groups)
- existing recreational experiences could be substantially enhanced by improving the Lake Colac environs
- Lake Colac and environs has the potential to be an important recreational resource at a regional level if the aforementioned infrastructure and facilities are provided.

## 5.0 GAP ANALYSIS

The Opportunities Assessment has been compiled based on gaps identified as part of the research undertaken for the project. These gaps relate to infrastructure provision and the management and use of the lake, as identified from the research. The analysis is generated through an assessment of the implications of the key study objectives (ie. Biodiversity and the Natural Environment, Economic and Tourism Development and Cultural, Social and Recreational Development).

MacroPlan has identified a number of development opportunities based on the following:

- The requirements of the project brief
- A review of previous studies which impact of the project area
- Environmental assessment
- Social, cultural and recreational issues
- Economic analysis
- Demographic data
- Site visits
- Consultation with the stakeholders and the community
- Case studies of similar lakes and water bodies

The opportunities considered to date are:

1. Environmental Improvement
  - a. establishment of wetlands
  - b. improve water quality
  - c. community education and research
  - d. erosion management
3. Shared Pathway
4. Activity Nodes (ie. Play opportunities, heritage and cultural points of interest)
5. Tourist Drive
6. Festivals/ events and programs

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7. Foreshore development
  8. Beach renourishment and swimming opportunities
  9. Signage program
  10. Redevelopment of landfill site
  11. Improvement of accessibility around the foreshore
  12. Planning Scheme review
  13. Review of funding mechanisms for the implementation of the Management Plan
  14. Tourism development

## 5.1 OPPORTUNITY EVALUATION

### 5.1.1 Biodiversity and the Natural Environment

#### Environmental Rejuvenation

Objectives	Strengths	Opportunity	Barriers	Viability
<ul style="list-style-type: none"> <li>To provide a high quality environment in and around the lake catchment to enable sustainable management and use of the lake</li> </ul>	<ul style="list-style-type: none"> <li>Strong community support for the clean up of the lake</li> <li>The strong record of stormwater maintenance already undertaken</li> <li>The general improvement in standards of discharge into the lake (i.e. industry)</li> </ul>	<ul style="list-style-type: none"> <li>Reduce salinity</li> <li>Community input education and research</li> <li>Identify discharge levels into the lake</li> <li>Point source pollution and leaching control</li> <li>Erosion control</li> <li>Debris removal in the lake</li> <li>Species management</li> </ul>	<ul style="list-style-type: none"> <li>Current management structure</li> <li>Variable water levels</li> <li>Large areas of freehold land located adjacent to the lake and Dean's Creek</li> <li>Cost of works required</li> </ul>	High

Major concepts to be explored include:

- Establishment of wetlands
- Tributary management at Dean's and Barongarook Creeks
- Community research and education
- Stormwater management
- Point source pollution and leaching
- Salinity management through planting and fencing of tributaries
- Erosion control, particularly on eastern foreshore.
- Fence post removal
- Carp management
- Acknowledge fluctuation of water levels as process of the lake.

## 5.1.2 Economic and Tourism Development/ Infrastructure

### Lakeside Development/ Eco Tourism

Objectives	Strengths	Opportunity	Barriers	Viability
<ul style="list-style-type: none"> <li>▪ To capitalise on the natural attributes of the area to provide a unique eco tourism experience</li> <li>▪ To link and provide access to all publicly accessible areas of the foreshore for all members of the local and wider community</li> <li>▪ To provide alternative means of accessing the lake other than the existing route via the township</li> </ul>	<ul style="list-style-type: none"> <li>▪ Existing demand for walking tracks linking strategic areas of the town</li> <li>▪ Existing short stop activity and usage of facilities on the foreshore</li> <li>▪ Existing natural environment, publicly accessible foreshore area and areas close to the township affording view lines to the lake</li> </ul>	<ul style="list-style-type: none"> <li>▪ Walking tracks</li> <li>▪ Cycling tracks</li> <li>▪ Cruising /paddle boat</li> <li>▪ Picnic areas</li> <li>▪ Bird watching</li> <li>▪ Fishing e.g. pier / jetty</li> <li>▪ Barongarook Creeks access</li> <li>▪ Wetlands</li> <li>▪ Public access areas other than the township at Meredith Park and Delaney's Point</li> <li>▪ Public access linkages along river/lake shoreline</li> <li>▪ The landfill site would provide an opportunity to create an area of interest for a walking path.</li> <li>▪ The ability to link strategic areas of</li> </ul>	<ul style="list-style-type: none"> <li>▪ Cost to Council</li> <li>▪ Environmental impacts</li> <li>▪ Maintenance of infrastructure</li> <li>▪ Community awareness of and interest in future opportunities</li> <li>▪ Availability of suitable land</li> </ul>	High

<ul style="list-style-type: none"> <li>▪ To eliminate 'backyard creep' at Ross Point</li> </ul>		<p>the foreshore</p> <ul style="list-style-type: none"> <li>▪ Development of a designated tourist road with signage and promotional information</li> </ul>	<ul style="list-style-type: none"> <li>▪ Implement-ation of ongoing management and monitoring</li> </ul>	<p>High</p>
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Major concepts to be explored include:

- Designated tourist road for use by vehicles, cyclists etc that would take cars from the highway to the lake and link with the township. Signage would be an important feature to inform visitors about the lake.
- An interpretative walk, which is developed to enable passive and active uses and is accessible by all members of the community.
- Formalise and open access around Barongarook Creek
- Development of the landfill site for use with a walking track



## Infrastructure

Objectives	Strengths	Opportunity	Barriers	Viability
<ul style="list-style-type: none"> <li>▪ To increase access for the local and wider community to local services at all times of the day and week</li> <li>▪ Increase the level of information regarding Lake Colac available to the public</li> <li>▪ To develop accessible, affordable public open space from which the local community and visitors can enjoy passive and active activities and access to Lake Colac.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Existing publicly accessible foreshore area</li> <li>▪ Demonstrated support (surveys) from the community for the development and improvement of facilities on the foreshore</li> <li>▪ Existing demand for walking tracks linking strategic areas in the town</li> <li>▪ The close proximity between the Botanical Gardens, the township and the Lake</li> <li>▪ The area of land available as public open space on the foreshore</li> <li>▪ The existing range of facilities located at the</li> </ul>	<ul style="list-style-type: none"> <li>▪ Improved signage (including legible by visually impaired – tactile signage and symbols)</li> <li>▪ Provision of picnic areas</li> <li>▪ Shelter on the foreshore</li> <li>▪ Lighting</li> <li>▪ Wide paths (suitable for wheelchairs) with rest stops and shelter</li> <li>▪ Toilet/ shower/ public amenity facilities</li> <li>▪ Increased accessibility for all mobility types</li> <li>▪ To develop new facilities (e.g. comfort station, seating, barbecue facilities, shelter, car and trailer parking,</li> <li>▪ Pedestrian access</li> </ul>	<ul style="list-style-type: none"> <li>▪ Cost to Council</li> <li>▪ Lack of available land</li> </ul>	High

<ul style="list-style-type: none"> <li>Ensure all developments have appropriate pathways or linkages for people of all abilities wherever possible.</li> </ul>	foreshore	<p>from the Botanical Gardens to the common</p> <ul style="list-style-type: none"> <li>Enhanced access for people of all abilities</li> </ul>		
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Major concepts to be explored include:

- Foreshore amenity development – barbeques, seating, shelter, paths.
- High quality comfort station facility that provides seating, change rooms, showers, security lighting
- In accordance with the BCA, Council’s Disability Policy and in consideration of the Access and Mobility Standards.

### 5.1.3 Aquaculture and Commercial Fisheries

Objectives	Strengths	Opportunity	Barriers	Viability
<ul style="list-style-type: none"> <li>To provide a waterway in which aquaculture can be sustained</li> </ul>	<ul style="list-style-type: none"> <li>Existing eel export opportunities</li> <li>The large carp population</li> </ul>	<ul style="list-style-type: none"> <li>To take advantage of the numbers of carp and assist producers to expand their harvest</li> <li>Assist producers with export of eels through enabling access to the lake</li> <li>Reduce the carp population</li> </ul>	<ul style="list-style-type: none"> <li>Accessibility to the lake in periods of low water levels</li> <li>Current boat ramp infrastructure</li> </ul>	<p>Low/ Medium</p>

Major concepts to be explored include:

- Providing adequate boat ramp to allow commercial fishing vessel access to the lake at low levels

#### 5.1.4 Retail / Commercial Partnerships

Objectives	Strengths	Opportunity	Barriers	Viability
<ul style="list-style-type: none"> <li>▪ To begin to address markets and provide a mix of retail / commercial services to encourage / support population and visitation growth</li> <li>▪ To encourage partnerships with the private sector in developing facilities, infrastructure and sustainable commercial opportunities.</li> <li>▪ Maximisation of the town's comparative advantages in terms of economic development</li> </ul>	<ul style="list-style-type: none"> <li>▪ Natural environment affording view lines to the lake</li> <li>▪ Existing commercial ventures on the Lake foreshore</li> </ul>	<ul style="list-style-type: none"> <li>▪ Create partnership opportunities with commercial operators by providing land for development i.e Meredith Park, foreshore areas.</li> <li>▪ Development of a facility which incorporates the natural attributes of Lake Colac which is capable of attracting regional visitors</li> <li>▪ Additional restaurants / cafes</li> <li>▪ Local markets</li> </ul>	<ul style="list-style-type: none"> <li>▪ Investor interest</li> <li>▪ Council expenditure on local infrastructure e.g. signage, lighting, streetscaping etc</li> <li>▪ small tourist and local market</li> <li>▪ availability of suitable land for commercial development purposes (i.e. water frontage)</li> <li>▪ Competition from existing café and caravan park</li> <li>▪ Seasonality of trade</li> </ul>	Low/ Medium

Major concepts to be explored include:

- Restaurant/ café

- Caravan park development at Meredith Park
- Permanent accommodation at Meredith Park

### 5.1.5 Cultural, Social, and Recreational Development

Objectives	Strengths	Opportunity	Barriers	Viability
<ul style="list-style-type: none"> <li>▪ To promote Lake Colac as a tranquil setting</li> </ul>	<ul style="list-style-type: none"> <li>▪ Natural environment</li> <li>▪ Relative lack of competition for this type of product</li> <li>▪ Proximity to Melbourne and Great Ocean Road</li> <li>▪ Fast growing market segment</li> <li>▪ Potential local demand</li> <li>▪ Popular across a number of age cohorts</li> </ul>	<ul style="list-style-type: none"> <li>▪ To develop facilities that tap into the lakeside health and well being concept</li> <li>▪ To package the experience with eco-tourism etc</li> </ul>	<ul style="list-style-type: none"> <li>▪ Cost of development</li> <li>▪ Availability of appropriate land</li> <li>▪ Possible soft interest from developers</li> </ul>	Low / Medium

Major concepts to be explored include:

- Walking tracks around the lake and Barongarook Creek
- Bird watching facilities

### 5.1.6 Expansion of Rowing / Water Based Activities & Facilities

Objectives	Strengths	Opportunity	Barriers	Viability
<ul style="list-style-type: none"> <li>▪ To fully maximise the water environment of Lake Colac and to tap into the growing passive recreational boating market</li> <li>▪ To enhance the Lake as a recreational asset</li> </ul>	<ul style="list-style-type: none"> <li>▪ Natural environment</li> <li>▪ Growing recreational boating market especially with respect to baby boomers</li> <li>▪ Strong history with respect to sailing and rowing regattas</li> <li>▪ Strong club participation and activity (when water levels are conducive)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Provision of more toilet and shower facilities</li> <li>▪ Shared facility development (i.e. development of a watersports facility)</li> <li>▪ Tourist/ regional rowing/ sailing market</li> <li>▪ Smaller scale regattas</li> </ul>	<ul style="list-style-type: none"> <li>▪ Wind affects racing conditions for rowing/ advantage for sailing</li> <li>▪ Cost of development</li> <li>▪ Water level fluctuations</li> <li>▪ Lack of support at a state level for rowing regattas of state importance</li> <li>▪ Availability of land</li> <li>▪ Lack of facilities enabling access for physically impaired members of the community</li> </ul>	Medium

Major concepts to be explored include:

- Shared watersports facility for rowing, sailing, skiing, kayaking etc with showers and function rooms
- As part of the events program – small-scale rowing regattas and state level sailing regattas in times of higher water level.

### 5.1.7 Festival/ Events/ Programs and Culture

Objectives	Strengths	Opportunity	Barriers	Viability
<ul style="list-style-type: none"> <li>▪ Maximise tourism related activity and community development by promoting and</li> </ul>	<ul style="list-style-type: none"> <li>▪ Proximity to Great Ocean Road allows for strong potential visitation</li> <li>▪ High level of public</li> </ul>	<ul style="list-style-type: none"> <li>▪ To use Lake Colac to raise the profile of arts and culture in the Colac Otway Shire (festivals, events, exhibitions)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Lack of current facilities to host events</li> <li>▪ Lack of accessibility for all members of</li> </ul>	

<p>linking the Lake with other tourist attractions</p> <ul style="list-style-type: none"> <li>▪ Realise the potential of the existing cultural and aesthetic assets surrounding Lake Colac to enhance the town's cultural and community identity</li> </ul>	<p>open space on the foreshore</p> <ul style="list-style-type: none"> <li>▪ Large area of water for sporting events and water themed festivals</li> <li>▪ High level of activity on the lake foreshore currently afforded by the community (surveys)</li> <li>▪ Strong community focus of the Shire and involvement in clubs and groups</li> </ul>	<p>and performances)</p> <ul style="list-style-type: none"> <li>▪ To engage the whole community and visitors at events</li> <li>▪ To provide linkages with the town and the lake foreshore and facilitate economic development</li> <li>▪ Promote Lake Colac and the town's comparative advantages</li> <li>▪ Festivals can appeal to a wide range of age cohorts or specific age cohorts depending on the activity and target market</li> </ul>	<p>the community</p> <ul style="list-style-type: none"> <li>▪ Variable water levels could affect the reliability of hosting events such as sailing regattas.</li> </ul>	<p>Medium</p>
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Major concepts to be explored include:

- Water festival
- Rowing and sailing regattas
- Use of the walking path for sporting events
- Arts and cultural festivals
- Performance on the foreshore

### 5.1.8 Social capital/ community integration

Objectives	Strengths	Opportunity	Barriers	Viability
<ul style="list-style-type: none"> <li>▪ To ensure sufficient services are in place to support / encourage population and visitation increases</li> <li>▪ To involve the community to facilitate 'ownership' and the long term association between the lake and the community</li> </ul>	<ul style="list-style-type: none"> <li>▪ Lake Colac's established community</li> <li>▪ High proportion of the community actively involved in clubs</li> </ul>	<ul style="list-style-type: none"> <li>▪ Enhanced visitor information</li> <li>▪ Encourage all age groups and community groups to take a role in the management and promotion of the lake</li> <li>▪ Enable unlimited access to all members of the community</li> </ul>	<ul style="list-style-type: none"> <li>▪ Affordability to Council</li> <li>▪ The need to rely on self perpetuation of local groups to take a role in the lake</li> <li>▪ The need for a management situation to oversee and assist in the operation of groups</li> <li>▪ Lack of accessibility to water based and on shore facilities</li> </ul>	Low / Medium

Major concepts to be explored include:

- Encourage community groups to be involved in the management and promotion of the lake.

## 6.0 OPPORTUNITY IDENTIFICATION

The previous chapter reviewed a number of opportunities from an environmental, social and economic perspective based on gaps identified from the research. This chapter takes these opportunities further and firstly lists below the implications of these opportunities with respect to environmental management, infrastructure and economic development. Secondly, each of the opportunities identified in the Gap analysis are outlined in greater detail and finally, integrated into a Triple Bottom Line process to generate key priorities that will drive the concept development in this chapter.

### 6.1.1 Management of Biodiversity and the Natural Environment

**(delivery and management of outcomes to improve the community asset)**

- Deliver a sustainable management framework to oversee the rejuvenation of the lake, foreshore and catchment
- Improve water quality – erosion control, discharge and input management
- Maintain the lake and its foreshore as a habitat for indigenous and non-indigenous flora and fauna
- Enhance community education regarding the lake’s operation.

### 6.1.2 Planning Infrastructure Development

**(expenditure to achieve environmental, social and cultural aims)**

- New gateway to the lake that provides a ‘sense of arrival’ for visitors and the local community
- A walkway that integrates both passive and active recreation and links the major assets and attractions on the foreshore with the Colac township
- Development of the public access areas on the foreshore.

### 6.1.3 Economic and Tourism Development

**(economic input)**

- There is a desire to re-coup infrastructure costs through stimulation of the local economy through the generation of employment and expenditure
- Facilitating local economic development opportunities such as:
  - Festivals/ events (water and foreshore based)



- Restaurant/ café
- Accommodation (range of types e.g. permanent,) at various locations.

## 6.2 KEY OPPORTUNITIES

The opportunities, outlined broadly above, have been expanded below in detail under the key research areas of:

- Environmental rejuvenation
- Social and cultural
- Economic development.

These opportunities have been drawn from the gap analysis and provide the basis from which the concepts will be developed and finally recommended for implementation. The opportunities are then placed into the Triple Bottom Line matrix, which prioritises the opportunities for implementation.

### 6.2.1 Environmental Rejuvenation

#### Water Quality – Managing Nutrients

- **Input Audit:** An audit of the industrial, agricultural and urban inputs throughout the catchment system would assist in determining which sources would be most effectively targeted to reduce nutrients in the lake. Urban stormwater and agricultural runoff need to be managed at the source.
- **Community education:** An awareness program throughout the catchment would be beneficial to educate the community with regard to their impact on the water quality (e.g. the relationship between the stormwater system that enters the lake and the human activities in the town and on the foreshore)
- Education programs should be facilitated to ensure that they are aware that their agricultural practices in the catchment affect the lake – for example, fertilisers put onto property will enter the lake, as it is a terminal system.
- **Wetlands:** Establish artificial wetlands at places such as the end of Barongarook Creek to act as artificial “kidneys” to filter and remove sediments and nutrients.
- **Tributaries:** Management of Deans and Barongarook Creeks is important to the overall condition of the Lake Colac catchment. It would be beneficial to the environmental assets of the lake to provide continuous corridors of native riparian and instream vegetation. Such vegetation will improve nutrient control and processing within the catchment.

- **Stormwater management:** The Colac-Otway Shire has commissioned the preparation of a Stormwater Management Plan for Colac. Implementation of actions that can help improve stormwater discharges to the lake will be identified in the Plan (Walker, 2002).
- **Monitoring of point source pollution:** Point source pollution can be controlled and monitored. Existing licences should be checked to identify a model of theoretical discharges. Actual outputs should then be audited to ascertain compliance.
- **Leaching:** Even if point source pollutants are cleaned up leaching will continue to be a problem. Potential sources of leachate include the abattoir and tip site.
- **Bonlac pondages:** require assessment to determine how often they overflow and whether there is any leaching. Other concerns include what level of monitoring takes place and the future plans for the pondages.
- **Catchment based management:** One of the major objectives that has arisen from the consultation process is that the local community are keen to have the Lake as a focus for the Colac Township. A major factor influencing local people to avoid the lake is the perception of poor water quality. From discussions with interest groups, which are actively involved in the management of the lake, the issue of water quality is a high priority. One long-term vision of this plan should be to address the sources of pollutants into the lake on a catchment basis. A whole of system approach is required for management of the catchment.

### 6.2.2 Water Quality – Salinity

- Research into the inputs from Deans and Barongarook Creeks would help to understand the salinity levels in the lake and determine the natural levels of salt before effects from European occupation.

### 6.2.3 Opportunities for Managing Sedimentation

- **Investigation:** The sediment processes in the Lake Colac catchment require a thorough investigation. An understanding of these processes is essential to managing the lake effectively. Core sampling of the sediments is required to evaluate the volume and levels of contamination.
- **Drying Out:** The natural drying out of the lake would aerate sediment and allow it to blow away. However, this would also result in the re-release of pollutants and would not address the volume of sediment now accumulated in the lake.
- **Dredging:** A potentially expensive option that requires resolution of what to do with the polluted sediment.

- **Reducing inputs:** Methods of reducing the sediment load currently entering the lake from the land are an option.

#### 6.2.4 Opportunities for Managing Lake Shore Erosion

An integrated approach is needed to determine and manage the causes of erosion that need to be addressed. They include removal of the natural vegetation cover, relatively constant water levels and stock access.

- **Current projects:** Local landholders and the Corangamite Catchment Management Authority are working to control the erosion and reduce the area of agricultural land 'lost'.
- **Rockwork:** Lakeshore erosion could be controlled by rockwork, particularly along the eastern foreshore. Some work has been completed by the CCMA. This would be a potentially expensive exercise that would need to be carefully designed in order to be effective. This is an immediate solution to the process of erosion of the eastern bank from wave action due to the dominant south-westerly winds. The rockwork may stop erosion in a small, localised area, but there is a small risk that it could create erosion by transferring wave action to other sites, such as the end of the rockwork (Walker, 2002). Landholders raised concern that a pathway would promote access to the lake by the public.
- A similar project took place at Lake Colongulac where a dome of loose rock was developed with integrated vegetation. An example of a poor outcome to such an exercise is at Point Lonsdale where wave action has caused blow outs at the ends of the rock wall that was constructed to minimise erosion.
- **Structural solutions:** Groynes have been constructed close to the Botanic gardens to control lakeshore erosion. The wind-generated currents in the lake are believed to have caused removal of sediment on the east side of the groynes and build up of sediment on the west side. A concrete apron has been placed on one of the groynes to prevent further erosion of the structure. Groynes have also been constructed near meredeth Park and have allowed sand deposition to occur on both pales resulting in protection to the adjacent foreshore embankments.
- **Log reef:** One option is to create a log reef close to the shore of the lake and encourage native aquatic vegetation such as the Common Reed (*Phragmites australis*) to establish. This would act to stabilise the shore sediments in the longer term and filter sediments and nutrients entering the lake. A similar suggestion is to construct cell structures and matting along the shoreline to support vegetation.

- **Education programs:** Landholders need to be aware that their agricultural practices in the catchment affect the lake – for example, fertilisers put onto property will enter the lake, as it is a terminal system.
- A number of solutions to the erosion issue have been proposed. Structural solutions such as log reefs and rock-work should be considered, but must complement the geomorphic processes taking place in the Lake Colac catchment. A combination of several solutions is a likely outcome.

Possibly renaming the Lough Calvert Drainage system. The scheme (through the CCMA) manages the water level of the lake; hence it is not a drainage system. It is suggested to be renamed e.g. Lake Colac Waterway Management System under the Water Act 1989.

## 6.2.5 Flora and Fauna

### Flora

- Protection and restoration of native vegetation is being carried out at several locations around the lake. Revegetation includes grasses, rushes and a range of other riparian species. A 100-200m buffer zone has been suggested to reduce grazing pressure and protect native species. Such a buffer would affect access to the foreshore and require land to be acquired by the Crown. A buffer already exists on the western, northern and southern sides of the lake. Another suggestion is the construction of elevated boardwalks to protect the native flora and allow recreational activities to continue.

### Fauna

- Consideration should be made to protect the habitat of the Corangamite Water Skink. Suggestions of potential management actions include fencing and recreational management at Meredith Park, fencing, revegetation and predator control at "The Points" and fencing, revegetation, recreation management, predator control and possibly weed control at "Rosemoyne Park".
- Improved management of water birds would increase habitat quality.
- A fisheries permit is required for carp management. Indigenous species are likely to be adapted to variable water levels in the Lake. They may aestivate (hibernate) in summer by lying dormant in the mud on the lake shores. Such native species are likely to benefit from variable water levels that match the natural cycles.
- Research is required to determine the best options for the retention and improvement of flora and fauna species in the Lake Colac sphere of influence.

## 6.2.6 Opportunities for Managing Water Levels

- **Investigation:** Further investigation into the natural fluctuations of water in the lake may help in understanding the effects on the natural environment.

## 6.2.7 Opportunities for Managing Litter

- **Tip site:** The former Colac tip site at the end of Bruce Street is to be cleaned up (capped) and landscaped for use as passive recreation. This is part of a 5-year plan. Open space linkages with the Barongarook Creek corridor are planned.
- **Litter:** Litter from the Colac township is currently prevented from entering the lake by the stormwater trap in Armstrong Street. However, this trap does not collect all litter from Colac and surrounding areas. A decrease in litter in and around the lake would improve the aesthetics of the lake and encourage recreational use. The recommended strategies from the Stormwater Management Plan that has been commissioned by the council should be referred to for direction with this issue.

## 6.3 PLANNING AND INFRASTRUCTURE MANAGEMENT

### 6.3.1 Management of Lake Colac

Opportunities exist to improve the management framework of the lake, to improve promotion and to consider a local means of funding for identified lake improvements.

With regard to a management framework, an option is to consider a new “umbrella” entity or to make use of the resources of an existing entity with a structured and transparent process.

Various models could be considered.

- One option is to empower the Colac Otway Shire with a greater overseeing role in relation to the lake. The Shire already has some planning control and referral opportunities, however these could be extended to provide a management role in relation to land use licences, irrigation licences, building, waterway improvements, use approvals, etc. To achieve this, it may be appropriate to introduce a rating or ‘user pays’ system, however the intention of the Lake Colac Management Plan is to provide an overall blueprint of the future of the lake for the benefit of Colac in general and, as a consequence, the community would be generally paying for the management of the lake under the auspices of the Colac Otway Shire through their rate base. The Shire may consider introducing a Lake Management Levy.
- The opportunity also exists for the creation of a landcare structure to support the environment of Lake Colac, and this would have the support of the Catchment

Management Authority and, presumably, the Department of Natural Resources and Environment, which currently has the charter to develop and nurture landcare groups.

- A third option is that various agencies join in a Committee of Management auspiced by Colac Otway Shire to drive the completion of actions proposed in the Lake Colac Management Plan.
- Promotion of Lake Colac is seen as a key to identifying its value, increasing its use and ultimately increasing the viability of the lake as an asset to the region. Linkages have already been discussed with other tourism bodies, The Otways, the Great Ocean Road Trail, Red Rock and, on a more local level, with the Botanic Gardens and the two main tributary creeks (Dean's and Barongarook). Promotion can be directed locally through improved signage and, as surveys have shown 44% of tourists are sourced from Melbourne to the region, by promotion in Melbourne.

### 6.3.2 Land Use Opportunities

Lake Colac has the capacity to emerge as a destination in its own right. Several previous studies have highlighted the desirability of creating improved linkages with the Central Activities Area. This would be a crucial part of an overall strategy aimed at enhancing perceptions about the Lake and promoting an image of Colac that encompasses the Lake as a key asset.

#### **A tourist road:**

This would enable the ability to establish of strong physical linkages between the lake, Murray Street and the Princes Highway. These may include attractive boulevards.

The provision of new linkages to the Lake will only be effective if the Lake itself is regarded as a destination. This can be achieved through general enhancement works and the creation of interesting activity nodes that prompt visitors to stop and enjoy the Lake. An attractive 'tourist drive' or promenade which incorporates these activity nodes and scenic views of the Lake may also be considered.

#### **Appropriate land use controls:**

The creation of physical and landscape buffers between the lake, industrial and agricultural activities to improve water quality and enhance vistas across the lake from prominent vantage points.

The enhancement of urban design and land use controls around the lake to achieve this would include upgraded height, setback and urban character controls.

## Access

Open space/ path – linkages between the Botanical Gardens and a path development with opportunity to extend from Ross’ Point to Bruce Street.

Ensure that access and inclusion underpin any development of access paths and linkages, in all public access areas including Ross’ Point, Meredith Park and the Barongarook Creek.

### 6.3.3 Social indicators

Design of new facilities and areas of public open space will need to address:

- The current and future age group distribution (i.e. the population is predicted to age over the next twenty years).
- “Quiet and peacefulness” is important to locals and needs to be balanced against visitor needs and those in the community interested in more active use.
- Current and future levels of accessibility enjoyed by the majority of the population. As the population ages, there is an expectation that the replaced by more specialist needs with an increase in the number of individuals with reduced mobility and people requiring disability access. This will include catering for:
  - the interests of younger and older age groups with a range of passive and active interests
  - all characteristics of disability including sight and hearing impairment as well as people with mobility constraints.

### 6.3.4 Cultural, Social and Recreational Development

- Cultural development
  - Focus for public education/ interpretation
  - Interpretive walk - history, heritage, public art.
- Promotion of the lake through cultural and sporting activity
  - Road/ entry experience - new way for visitors to experience Colac incorporating a tourist road connection with Highway, Botanic Gardens & lake
  - Food/ wine industry focussed restaurant/ café
  - Greater link between the Visitor Information Centre and the foreshore
  - Competitions - e.g. fishing
  - Festivals.

- Bicycle path linkages between Lake Colac, the Old Beechy Line and the Great Ocean Road and other significant areas (ie. Meredith Park).
  - Incorporation of Barongarook Creek in pedestrian linkages between the foreshore and the town centre.
- Consider cultural groups located within the lake parameters.
- Safety
  - Overall increase in safety i.e. the maintenance of the provision of a rescue boat for rowing and sailing. Address current waterway zoning for watercraft use on the Lake. This will be necessary if increased use of the waterway is anticipated.
  - The provision of a safe foreshore. This is particularly important if the foreshore is to be used for social interaction for the elderly or people with reduced mobility. It is also necessary to encourage increased usage over longer hours of the day. Lighting should be addressed and the levels of visibility along areas of the foreshore.
- Disability access and inclusion of all members of the community
  - Provision of seating for rest points
  - Provision of ramps for wheelchair access or easier pedestrian access
- Low cost activities and facilities
  - The provision of facilities such as the proposed bike path, walking track, barbeques, sightseeing areas all enable a low cost use of the foreshore.
- Encouragement of family and community activities
  - Major gathering point for community, BBQs – picnic facilities, sheltered area
  - As above, the provision of facilities that enable gatherings around meal times or safe use of facilities will be more conducive to family use.
- Information and Communication
  - Increased information regarding activities and facilities on the foreshore will promote the use of the area as a major recreation resource
  - Information regarding waterway zoning and general guides to the use of the lake and foreshore (i.e. swimming areas) will enable the public to use the area more wisely and facilitate a safer environment.
  - Opportunity to develop volunteer groups to assist with the management of the lake



- Sporting Clubs and activity
  - Support for sporting clubs (i.e. Council assisted promotion of activities) could enable greater participation and therefore increased use of the lake as a resource.
  - Development of rowing/ yachting facility into a water - sports facility
  - Greater communication between the sporting clubs and the management bodies – particularly to provide support when holding events and applying for grants
  - Removal of obstructions in the lake (e.g. fence posts) that limit recreational activity

### 6.3.5 Economic Development

- Lake Colac should be seen as a major asset and comparative advantage for the Town in terms of economic development. The Lake should therefore be used to leverage economic benefits for the Town in terms of developing appropriate and sustainable opportunities including tourism, aquaculture and the development on a number of land areas.
- Only one company 88 Golden Eels (Aust) Pty Ltd has any commercial fishing or aquaculture entitlements to the lake. While there is no identified potential for the growth in the aquaculture industry there is potential for establishment and growth of an associated service industry (e.g. processing).
- The Lake can also build on the town's other comparative advantages such as its access to transport corridors (e.g. pedestrian, recreation, tourism linkages).
- Creating local employment to retain the Town's younger workforce, especially in terms of tourism, recreation and leisure based opportunities should be a key long term consideration of the Lake Colac Strategy.
- It would appear that there are opportunities to develop the range of accommodation facilities, to complement the development of the Lake and its activities, which will cater for different market segments. This could assist in generating greater visitation and supporting economic development for the Town. This could in the short term include the possible charging of camping fees at Meredith Park and in the medium term also include more permanent commercial development.
- Affordability, accessibility and communication however will be the key to enable a wide level of visitation and utilization of this resource particularly with consideration of people with disabilities.

## Tourism Opportunities

A stimulation of the tourism industry would mean:

- Tourism market upturn - benefits experienced by the town through synergy with lake.
- Provision of a range of accommodation types at different locations around the lake - taps into different market segments.
- A significant level of tourism is likely to be generated from people visiting friends and relatives. This market has the potential to expand with the increased awareness of the Lake and an improved local perception of the Lake.
- Tapping into opportunities for growth in tourism such as at Apollo Bay and Lorne, relatively untapped markets located within 40 – 60 minutes drive from Colac.
- Creation of activities and experiences required to stimulate visitation would involve:
  - capitalising on natural features - increase access, marketing of assets, ecological characteristics - interpretative walks, Aboriginal and European heritage, fishing competitions
  - Infrastructure and activities - sailing, water skiing and possibly jet skiing (environment impacts of sound pollution should be considered however), canoeing, festivals
  - ‘Themed’ developments (i.e. restaurants and interactive and sensory gardens focussing on local food industry and comparative advantages).
- Marketing and promotion strategy.

### 6.3.6 Opportunity Identification

The opportunities considered were:

1. Shared Pathway (walking/ cycling)
2. Access for All Abilities Playground
3. Tourist Drive
4. Environmental
  - a. establishment of wetlands
  - b. improve water quality
  - c. community education and research

- 
- d. erosion management
  5. Festivals/ events and programs
  6. Development of activity and heritage nodes at various points around the lake (ie. Delaney’s Point, Meredith Park and Ross Point).
  7. Facility consolidation and re-development for water sport activities, cultural groups.
  8. Foreshore development
  9. Beach renourishment and swimming opportunities
  10. Signage program
  11. Redevelopment of landfill site
  12. Improvement of accessibility around the foreshore
  13. Planning Scheme review
  14. Review of funding mechanisms for the implementation of the Management Plan
  15. Tourism Development

## 6.4 TRIPLE BOTTOM LINE APPROACH

A Triple Bottom Line analysis approach was adopted to evaluate the proposed Lake Colac Masterplan.

The triple bottom line analysis utilised refers to a method of evaluating the level of accountability associated with the project at three levels - social, environmental, and economic. It is a method that is finding increasing and widespread international acceptance and one that is informing and transforming reporting practices.

The notion of reporting against the three components (bottom lines) of economic, environmental, and social performance is directly tied to the concept and goal of sustainable development. Triple bottom line reporting recognises the wider range of impacts that a major change to land form, as proposed in the Materplan, will have.

The principles of triple bottom line accountability were taken into consideration through a “priority rating” approach based on qualifying the triple bottom line outcomes of opportunities afforded to the Masterplan according to relative importance.

The project opportunities are seen to be wide spread and are categorised under three broad areas of Biodiversity and the Natural Environment, Economic and Tourism Development and Cultural, Social and Recreational Development, representing the triple bottom line of the Masterplan.

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The “priority rating” approach involves all inputs and outcomes of Masterplan being reduced to a common unit of impact (in this case an interpretive rating), which is then compared (in relative terms). The interpretive analysis techniques applied in this report simply identify opportunities and provide an indication as to the likely extent of benefits/ costs.

The aim was to encompass all prospective project outcomes of the Masterplan (establish the triple bottom line) by interconnecting the outcomes from the environmental, social and economic assessments.

The ratings incorporate the outcomes of consumer surveys (see Appendix 3), research (see Appendix 2), steering committee input and stakeholder consultation.

The following tables detail the opportunities and the corresponding priority for recommendation. Each of the opportunities is allocated a time frame based upon the priority rating.

The following tables detail the opportunities and the corresponding priority for recommendation:

- The ratings are derived from;
  - Consumer surveys (see Appendix 3)
  - Research (See Appendix 2)
  - Steering committee
  - Stakeholder consultation

## PRIORITIES

rating

### Scoring

1 = low  
2 = medium  
3 = high

### INDICATORS

<b>Biodiversity and the Natural Environment</b>		
Water quality		
	<i>Wetland development</i>	1
	<i>Improve tributary management</i>	1
	<i>Community education</i>	1
	<i>Stormwater load management</i>	1
	<i>Monitoring point source pollution &amp; leaching</i>	1
	<i>Reduce saline loads</i>	1
	<i>Sampling and monitoring of sediments</i>	1
	<i>Remediate eastern foreshore</i>	1
	<i>Fence post removal</i>	1
	<i>Carp management</i>	1
	<i>Reestablishment of flora to assist in development of catchment and reduce erosion</i>	2
	<i>Address litter management within the water cycle</i>	2
	<i>Monitoring of Bonlac Pondages</i>	3
	<i>Erosion control works</i>	1
<b>Cultural, Social and Recreational Development</b>		
Foreshore amenity		1
	<i>comfort station</i>	1
	<i>BBQ's seating, shelter etc stage one</i>	1
	<i>jetty upgrade,</i>	
Foreshore safety		
	<i>lighting, visibility</i>	1
Watersports facility		2
Accessibility to the lake - jetty upgrade		2
Walking track from Ross' Point to Abbatoirs		1
Walking track to Delaney's Point		2
Interpretative walk in line with existing pathway		2
Walking track around entire perimeter of lake		3
Bird watching facilities		2
Festivals/ events/ program		2
Harness social capital in management of lake		1
Meredith Park		
	<i>Development Plan</i>	3
	<i>Camping facilities at Meredith Park</i>	2
	<i>Boat ramp</i>	2

PRIORITIES			rating
INDICATORS			
<b>Social Cultural</b>			
	Meredith Park		
		<i>Permanent accommodation - cabins</i>	2
		<i>Develop BBQs, picnic areas</i>	3
		<i>Moorings/ jetty</i>	3
		<i>Boat link with Colac caravan park</i>	3
	Delaney's Point		
		<i>Construction BBQs, picnic areas</i>	3
		Increase access along Barongarook Creek & town	3
		Development of a small VIC facility on foreshore	3
<b>Economic and Tourism Development</b>			
		Designated tourist road development	1
		Service dev't potential assoc with aquaculture	2
		Permanent accommodation development	3
		Café/ restaurant development	2
		Construction of boating and recreational	2
		facilities to support accommodation	

## 6.5 CONCLUSION: CONCEPT PLANS

- This Management Plan draws together;
  - Gaps/issues in terms of environment management
  - Gaps/issues in terms of planning/infrastructure and economic development
  - Opportunities/issues/competitive framework in relation to other lakes.

The following chapter includes:

- Implementation: Description of the initial list of projects and an outline of the recommendations in the matrices
- Matrices: detailing the recommendations, the estimated cost, funding and process
- Concept plans: indicative plans.

## 7.0 IMPLEMENTATION

Enhancing the image and profile of Lake Colac is a foundational objective arising from the study. Historically, Lake Colac has been pivotal to the existence and identity of the town of Colac. The lake has traditionally been an important place for social interaction, recreation and tourism. Over time the impact of human activity on the lake has been so significant that it has diminished the health, attractiveness, and usability of the lake. The master plan proposes a raft of measures to re-habilitate the lake, thereby enhancing its image and attracting new uses. The vision for the Lake Colac is to re-establish it as a destination in its own right and in turn promote a more sustainable approach to its use, development, management and maintenance into the future. A key requirement for implementation is to ensure access to all facilities and activity nodes with appropriate linkages, as a high priority.

### 7.1 STAGE ONE – “REINSTATING THE ENVIRONMENT”

#### 7.1.1 Organisation and Management

- A new management entity is proposed to be introduced (see Chapter 9.0) to implement the Lake Colac Management Plan.

#### 7.1.2 Water Quality

##### Establishment of Wetlands

- Establishment of artificial wetlands at places such as Barongarook Creek, Deans Creek and selected stormwater outlets to act as “kidneys” to filter and reduce sediments and nutrients. Such treatment would enhance the quality of water entering the lake from identifiable point sources and over time allow the lake water to reflect the quality of the water feeding it. Treatment of outfall from stormwater outlets would benefit from the installation of a gross pollutant trap (GPT).

#### 7.1.3 Water Quality

##### Tributaries

- The improvement of water quality through improving the riparian environment of the two main tributary creeks into the lake.
- It would be beneficial to the environmental health of Lake Colac to provide continuous corridors of native riparian and instream vegetation along these two tributary creeks. Such vegetation will improve nutrient control and processing within the catchment and will reduce sediment transportation to the lake.

- To gain the maximum benefit from such measures fencing out of the creeks is a necessary part of the strategy to achieve optimum results.

## 7.1.4 Water Quality

### Community Education and Research

- a) There will be a requirement to create community awareness of the lake, its health processes and its benefits. It is an accepted strategy that awareness of a situation results in a changed attitude to it. In the case of Lake Colac, educating the community (both local and visitors) of the threats to the lake and the measures that can be simply practised by individuals and households to reduce the threats will result in an improved attitude to the lake and consequent reduction in deleterious behaviour. Such community education could include matters associated with litter, stormwater processes and paths of travel, vegetation, water use, farm practices, etc.
- b) To audit the industrial, agricultural and urban inputs throughout the catchment system to enable a strategy to be developed to target the most damaging sources.

Knowledge of the sources of nutrients and water quality detractors will enable the most cost effective measures to be identified to manage the pollution such that the gain to lake health is maximised over the minimum timeframe. Such knowledge will also assist in developing the community awareness campaign.

## 7.1.5 Water Quality

### Stormwater Management

- Development of an integrated approach to the management of existing and new stormwater loads will allow for the better control of the quality and outputs of stormwater to the lake.
- All of the environs of the township of Colac ultimately drains to the lake. This drainage usually takes the form of underground pipes collecting stormwater from vegetated, paved and roofed areas through overland and channelled flow paths. Opportunity exists for pollutants to be collected in this process. In addition, new developments are forever increasing the load on existing infrastructure. Methods can be adopted to reduce new inputs (on site detention) and to minimise pollutant collection. Such measures require identification and implementation by policy, both for new development and by retrospective action.



## 7.1.6 Water Quality

### Point source pollution and leaching

- The aim of this exercise would be to monitor and redress identifiable point source pollution inputs and leachate sources
- Point sources of pollution can be more readily addressed due to their quantifiable nature. Such measures can be through issue of conditional licences or enhancement of existing licences and by ensuring compliance with licence conditions (such as those which Barwon Water have with some local industry). Licences can be drafted to include increasingly restrictive discharge allowances to enable industry to plan pollution control and abatement measures.
- Leachate sources (potentially sites close to the lake foreshore such as the tip, abattoirs, sale yards etc) are more difficult to control. Capping of the tip as is proposed by the COS will reduce the potential for leachate recharge and is positive measures.

### Salinity

- There is a need to reduce the saline loads into the lake that have been generated as a consequence of European activity.
- The water quality opportunities previously mentioned will improve the salinity loads to the lake. Further emphasis can be given to Deans and Barongarook Creeks, as these are the two major re-supply tributaries to the lake. Research into the inputs from these creeks will increase the understanding of the impact of European activity and will allow the most effective development of improvement methods. A monitoring station already exists on Deans Creek. A similar station is required on Barongarook Creek. The salinity level of the discharge from the Sewerage treatment plant is less than 1000EC (ie. less than the natural salinity level of the lake)

### Management Investigation

- Sediment removal is shown to be important to the improvement of water quality in inland water bodies (eg Lake Trummen Sweden).
- The sediment processes in the Lake Colac catchment require a thorough investigation. An understanding of these processes is essential to managing the lake effectively. Core sampling of the sediments is required to evaluate the volume and levels of contamination and the opportunities for reuse. Methods to reduce sediment inputs to the lake require development and

implementation as do the options for improving the condition of the existing lake bed sediment without the need to remove/dredge it.

## 7.1.7 Erosion

### Eastern Foreshore Management

- An identified source of sediment to the lake, the eastern shore lunettes can be readily remediated to reduce erosion
- Particular distress occurs to the eastern foreshore lunette embankments at periods of high lake levels (eg commencing in the early 50s and more recently seen in 1991 to 1993) and while there is documented evidence, consultation supports this and referred to “many metres of prime freehold land being lost” during these times. Previous erosion control work has been carried out on the eastern foreshores by the CCMA and its former entities (Barwon Water, Otway Water, Colac Water, Lough Calvert Drainage Trust and private landholders). Continuing work is proposed by the CCMA.

## 7.1.8 Erosion – Tributaries

- Minimise sediment input through revegetating the banks.

## 7.1.9 Water Environment

### Fence Post Removal

- The use of the lake for water sports, particularly on-water activities, is compromised in terms of available area and safety by the presence of fence posts in the lake.
- Adjacent landowners have historically fenced into the lake as water levels have dropped to contain their stock. With water levels now being generally maintained at more constant levels, the existence of posts at and below water level is an issue to lake users.
- Their removal will require the reinstallation of fencing parallel to the shoreline to contain stock. In many instances these parallel fences, if constructed on title boundaries, will be within the water body. This situation occurs for about 6 km along the eastern shoreline, other sections of shoreline having boundaries above the usual water levels.
- Survey is required to identify the extent of boundaries and investigation into methods to reference the boundaries – eg land acquisition, easements, and agreements?)

## Carp

- There is an identified need to improve the environment of the lake for native flora and fauna by eradication of this introduced species.
- This is a particularly difficult task, not achieved elsewhere in Victoria. Encouragement of harvesting of carp would assist in reducing numbers, as would improvement in water quality and habitat. The Fauna research referred in item 14 will assist in developing strategies for managing carp.
- The Colac based eel export company “88 Golden Eel (Aust) Pty Ltd has obtained a Federal Government Grant under the New Industry Development Program to develop export markets and will commence commercially harvesting E carp for export next season. This, in addition to the company’s current control measures are expected over time to significantly reduce the impact of E carp on the lake’s aquatic environment. Therefore, support in terms of ensuring adequate access to the waterway is required to support private methods of reducing this species numbers.

### 7.1.10 Planning Scheme Amendment

- Amend the *Colac Otway Planning Scheme* to provide an overview of the *Lake Colac Management Plan* in the Municipal Strategic Statement, include the plan as an incorporated document, and list the plan in the schedules to the Public Conservation and Resource Zone and the Public Park and Recreation Zone. Incorporation of the plan into the schedules of the PCRZ and PPRZ will facilitate many of the development initiatives without the need for a planning permit.
- Prepare an amendment to the *Colac Otway Planning Scheme* to introduce a raft of measure to implement the *Lake Colac Management Plan*.
- Amend the *Colac Otway Planning Scheme* by:
  - Including an overview of the *Lake Colac Management Plan* in the Municipal Strategic Statement.
  - Including the *Lake Colac Management Plan* in the list of Incorporated Documents and in the schedules to the Public Park and Recreation Zone and the Public Conservation and Resource Zone.
  - Modifying Design and Development Overlay Schedules 1, 2 and 3 and Development Plan Overlay Schedule 1 to include a 20m buffer distance from Lake Colac, Deans Creek and the proposed tourist route; require the use of subdued colours and materials; and require referral of applications to Parks Victoria and Council’s Environmental Planner.

- Apply a Development Plan Overlay to the proposed tourist route.
- Apply a Development Contributions Overlay to land likely to be further subdivided to gain access to the proposed tourist road.
- Include all rural properties within 500m of Lake Colac within an Environmental Rural Zone for the purpose of gaining greater control over agricultural practices and works. With the objective of improving water quality
- Rezone part of the Industrial Zone immediately abutting Deans Creek to Rural Zone.
- Reference should also be made to recommendations in the Colac Otway Strategic Development Masterplan Colac Structure Plan

### 7.1.11 Open Space Development – “the Colac Common”

- Prepare detailed landscape and engineering design plans for the foreshore works adjacent to Colac identified in the Lake Colac Masterplan – Vision for 2005 (ie. the activity node, swimming precinct, ‘the common’, pathways, wetland walk, toilets, barbecues, picnic areas, caravan park). The design brief should place emphasis on access and inclusion. Call for expressions of interest in the development of a commercial activity, such as a restaurant, in the proposed Gellibrand Street activity node based on a long-term lease. Construct building and works, commencing with activity nodes and public facilities and concluding with shared pathways and landscaping.

### 7.1.12 Improve Connectivity/Integration– Enhance pedestrian and vehicular linkages between Lake Colac and the Colac Central Activities Area.

- Several previous studies have highlighted the desirability of creating improved linkages with the Central Activities Area. This is a crucial part of an overall strategy aimed at enhancing perceptions about the lake and promoting an image of Colac that encompasses the lake as a key asset.
- Prepare detailed landscape design and engineering plans to enhance the boulevard character of Gellibrand Street, provide connections to the foreshore walkway, and extend the Barongarook Creek pathway to Murray Street in accordance with the *Lake Colac Masterplan – Vision for 2005*. Provide interpretative signage highlighting features of the pedestrian circuit, such as Memorial Square, heritage buildings, the proposed Gellibrand Street Activity Node, the Botanical Gardens and Barongarook Creek. Install landscape elements and signage.

### 7.1.13 Landfill site – former tip site

- The Colac Otway Shire Council has allocated \$2 million over the next four years for rehabilitation of the landfill site, which will include placing a capping over the surface. The work is scheduled to commence in March 2003. Once rehabilitated, the site will be made available for public open space. To enhance connectivity and continuity, it will form an integral part of wetland/ interpretative walk. As stated in the plan, the walk will comprise a boardwalk/pathway that will traverse the site. The remainder of the site will be landscaped and vegetated.
- A development plan for the site should be produced which takes into account further stages outlined in this Management Plan.

### 7.1.14 Signage Program

- Prepare a hierarchical suite of identification, direction and interpretation signs to be implemented progressively in conjunction with the masterplan. The signage theme should be established at the upper end of the hierarchy, in consultation with Tourism Victoria, Geelong Otway Tourism and Vic Roads, and carried consistently through to the lower end (e.g. minor interpretative and directional signs). Distinctive use of colours, imagery, materials, a logo, or sign structure (or a combination of these) may be used to define the overall theme.
- The recommended sign hierarchy is as follows:
  - Level 1 – Major Tourist Signs: Princes Hwy at Treatment Works Road (facing east), Gellibrand Street (facing east and west) and Deans Creek Road (facing west); Colac Ballarat Road at Meredith Park Road (facing north and south).
  - Level 2 – Tourist Route Markers: Define the major tourist drives, i.e. Gellibrand/ Fyans/ Queen Streets; proposed foreshore tourist drive from Treatment Works Road; Meredith Park; route Delaney’s Point.
  - Level 3 – Locality Markers: Located at Gellibrand Street activity node; Barongarook Gardens; ‘The Common’; Meredith Park; Delaney’s Point.
  - Level 4 – Interpretative Plaques: Discrete plaques identify features and places of heritage or environmental significance and include limited text. Located along pedestrian routes and the wetland walk.
- There is a need to consult with Vision Australia regarding this issue.

### 7.1.15 Assessment Bonlac Pondages

- Currently these pondages form an integral part of the operation of the Bonlac Cororooke plan. They are close to the lake foreshore and provide opportunity for other uses if they were to become surplus to the needs of the company.
- Although there is no sighted record of overflow and/ or leaching history of these ponds, their proximity to the western foreshore of the lake suggests potential water quality related uses such as wetlands development is significant particularly given their proximity to Delaney’s Point.
- Negotiate with Bonlac concerning the decommissioning and rehabilitation of the Bonlac Pondages.

### 7.1.16 Beach renourishment and swimming area

- An opportunity exists for a swimming precinct to be developed to increase accessibility to the water and encourage foreshore use during the warmer summer months. It would be located adjacent to the ‘Common’ at the town foreshore area between the boat ramp and jetty in order to create an activity node for a family group – fishing, walking, swimming, and hospitality.
- The precinct would incorporate two components:
  1. Land development: Beach renourishment
    - Replenishment of beach area including sand
  2. Lake bed development:
    - Due to the silt build up, it is considered favourable that a geofabric flooring be placed on the lake bed to provide a ‘comfortable’ lake floor. The geofabric flooring would lie on top of the lake floor and provide a solid base on which to walk, thereby increasing access and the amenity of the area. This technique has been successfully employed for the Gippsland Lakes at Lakes Entrance and reinforces the ‘invitation’ to use the lake in a safer and pleasant manner. The fabric is ecologically sensitive.

### 7.1.17 The Colac Common

- The ‘Common’ precinct has been identified as the main foreshore public access area and is recommended to include the major recreational, cultural and economic development facilities along the foreshore adjacent to the township. It is envisaged

that the Common will be the main activity area on the foreshore and linked to the proposed tourist road with the Colac Town Centre.

## Infrastructure

- Additional facilities on the foreshore were identified as an important aspect of the research and consultations, as being improvement for the Colac community. The following facilities have been identified for development within the Common precinct of the foreshore:
  - Best practice comfort stations including toilets, showers, baby changing, hot water etc.
  - Picnic area with barbeques and innovative features such as a spit, covered table areas with individual cooking facilities and gas heating (all user pays).
  - Shelter for respite and soaking in the ambience of all the lake.
  - Pedestrian access from the Common to the Botanical Gardens, which inspires and invites exploration of this high quality experience.
  - Development of an Access for All Abilities Playground linked to Botanic Gardens, Foreshore, amenities etc.
  - Replanning of the boat and trailer parks to increase access at this point.

### 7.1.18 Barongarook Creek access

- Prepare detailed landscape design and engineering plans to enhance the boulevard character of Gellibrand Street, provide connections to the foreshore walkway, and extend the Barongarook Creek pathway to Murray Street in accordance with the *Lake Colac Masterplan – Vision for 2005*. Provide interpretive signage highlighting features of the pedestrian circuit, such as Memorial Square, heritage buildings, the proposed Gellibrand Street Activity Node, the Botanical Gardens and Barongarook Creek. Install landscape elements and signage.

### 7.1.19 Festivals/ events and programs

- Stage I of the management plan is an ‘invitation’ that can ‘preach to the converted’.
  - Festivals, events and programs are an integral part of the vision to embrace Lake Colac. The summer ‘highs’ should be pursued as an opportunity to attract visitors from the Great Ocean Road. Given the profile of Great Ocean Road visitors a festival including food, wine and environment, using art, music and performance over 2 days has good prospects of success. The Water of Life

festival could become a symbol for regeneration of water bodies around Australia.

- The lake can accommodate a wide range of events. These include recreation: rowing, triathlon, sailing, fishing, wind surfing etc. We believe an annual signature event which involves the circumference of the lake could be implemented (e.g. Mountain Bike and/ or integrates the proposed events area on the Colac Common with the lake for spectator sports e.g. paddle board, kayak together with arena based sports – athletics etc).
- An annual King and Queen of the Lake event could be envisaged for example to combine recreational events with entertainment.
- Programs will maintain interest in the lake and these should include education, recreation, culture and environmental rehabilitation.

### 7.1.20 Wetland walk

- Interpretative walks to be developed through the wetlands to the south of the lake and adjacent to the Colac Common area, utilising the former tip site as the main linking parcel of land for the eastern section of the walk.

The aforementioned details outline the initial projects and recommendations for the commencement of works for the Lake Colac Management Plan. Also detailed in the matrices for Stages Two and Three are the following recommendations which include:

- The project
- Description
- Estimated Cost
- Responsible agencies
- Funding
- Process
- Ongoing management agencies
- Ongoing operational funding sources

The details include:

- Re-establishment of indigenous flora
- Removal of litter from the water cycle



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- Development of Tourist Road – Princes Highway to Lake Colac to Colac Centre
  - Development of a watersports facility
  - Colac Common facility development
  - Extended pathway to Delaney’s Point
  - Establish interpretative Walk in line with existing pathway
  - Meredith Park facility development
  - Restaurant EOI
  - Rowing shed conversion to community facility
  - Relocation of CFA
  - Festivals/ events and programs
    - See Stage One.
  - Development of Commercial Options
  - Meredith Park – second stage of facility development
  - Delaney’s Point – development of facilities and integration with parks
  - Increase Access along Barongarook Creek
  - Eastern shore erosion control measures
  - Visitor Information Centre – assessment of options
  - Monitoring of Bonlac Pondages
  - Link to Meredith Park – water based transport link

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**Insert Stage One Matrix**

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**Insert Stage One Map**

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**Insert Stage Two Matrix**

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**Insert Stage two Map**

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**Insert Stage Three Matrix**

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**Insert Stage Three Map**

## 8.0 ORGANISATION AND MANAGEMENT

### 8.1.1 Introduction

- The following chapter addresses the issues outlined in Chapter Four regarding management and introduces three management models, out of which a preferred model has been chosen. The recommendations have been made based on the model that is ideally structured to:
  - accommodate the range of issues presented throughout the research
  - implement the actions identified in the Lake Colac Management Plan.
- It is also vital that a new management entity is able to achieve the following objectives:
  - clarify and delineate responsibility for the management of the lake body and the adjacent foreshore
  - identify a management structure that streamlines management but continues to accommodate the current diversity and range of management expertise.
  - the ability to exchange and provide information regarding the status of the lake (e.g. water quality data) to assist in management.
  - the ability to prioritise development opportunities and expenditure in line with the Lake Colac Development Plan.
  - achieve a balanced approach to economic, environmental, cultural, recreational and social development at the lake.
  - a coordinated approach to funding applications.

## 8.2 DEVELOPMENT OF MANAGEMENT OPTIONS

- The study has concluded that a diverse range of projects and initiatives, undertaken and in progress, have contributed to the continuing environmental improvement of Lake Colac. A critical part of this plan is to develop a framework for organisation and management that can deliver the new vision.
- A detailed assessment of organisational responsibilities has been undertaken and this study has found that initiatives both recent and past, and shared values for Lake Colac combine to suggest a single landside management agency. Our consultation has reinforced this view and revealed an enthusiastic response from all agencies involved.



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Further our research and consultation has indicated that one model is practical i.e. a committee of management auspiced by Colac Otway Shire.

### 8.2.1 Option One – Maintain Current Structure

- Under Option One, the current management structure would be maintained incorporating all nine various management bodies. This would include the continuance of Parks managing Delaney’s Point and Meredith Park and Colac Otway Shire having jurisdiction for the foreshore adjacent to the foreshore. This option lacks priorities and a specific focus and while positive outcomes have evolved a new structure can take a more holistic, energetic and focused approach.

### 8.2.2 Option Two – Committee of Management (DNRE)

- A committee of management would be established and have representatives from the various management bodies with jurisdiction over the Lake Colac catchment. The Committee would be managed by Department of Natural Resources and Environment and would be vested with winning grants and the implementation of the Lake Colac Management Plan. This reflects emphasis, timing and the significance of projects recommended. The lack of alignment of these interests could cause friction and inaction, which are not in the interests of the catchment of Lake Colac.

### 8.2.3 Option Three – Committee of Management (Colac Otway Shire)

- A committee of management would be established, auspiced by Colac Otway Shire. It would comprise representatives from the current management bodies with jurisdiction over Lake Colac. It would be a permanent management entity and would liaise with the community, the Shire and government bodies to apply for funds in order to implement the Lake Colac management Plan. A Colac Otway Shire Councillor would sit on the committee, as the community representative.
- This entity would be responsible for the capital works budget and ongoing operational expenditure. Within this system, the CoM would be funded if a special rate or differential rate were levied.
- The Committee would produce an annual business plan and key performance indicators, and be accountable to the Colac Otway Shire for its management costs and strategy implementation.

### 8.2.4 Preferred Option

- Option three creates for the first time, a focus on Lake Colac. This single focus is now required. The success of this plan will be reflected in 2015 when capital raised

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by the special / differential rates and matched by Commonwealth, State and private sector are no longer required.

### Function and Responsibilities

- Option Three would enable a flexible approach to management and would be able to operate on two levels:

### Project Development and Initiation

- To identify, co-ordinate and facilitate the construction of appropriate infrastructure in line with the objectives and recommendations of the Management Plan.
- The development responsibilities would include:
  - Developing a detailed business plan for the Lake Colac Management Plan
  - Identifying potential funding sources
  - Prioritising maintenance and infrastructure development
  - Facilitating partnerships between the private and public sector.
- Operational Management
  - Establish a business plan and budget for the existing management bodies, to ensure that all necessary infrastructure is maintained for all users
  - Work with all agencies to develop long term funding options
  - Report to the Colac Otway Shire and review the staging of the Lake Colac Management Plan.

## 8.2.5 Management outcomes corresponding to actions

- It is clear that there are a number of outcomes that should eventuate from the process. Therefore, the management structure that oversees the development phase should be responsible for the policies to establish the short and long term management framework. Specifically this would include:
  - Colac Otway Shire initiating a Special or Differential Rate to fund the Management Plan
  - The Special Rate would be levied by Colac Otway (proposed to auspice the project).
  - The Steering Committee adopting the Management Plan to guide implementation and to guide preparation of a Business Plan by the Committee of Management.
  - The Steering Committee approaching the State Government for \$1.0 million in matching funding on behalf of the catchment and western Victoria to ‘make good’ the broader community responsibility
  - Lake Colac becoming the community development project around Australia demonstrating commitment, energy and skills.

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# APPENDICES

## 9.0 APPENDIX 1 – DATA COLLECTION AND STAKEHOLDERS

The study has been undertaken based on detailed primary and secondary data collection and analysis. The research has included:

- **Site visits**

Including a full day excursion with members of the consultant team, Steering Committee and Reference Group to the accessible areas of the Lake Colac foreshore and surrounding areas.
- **Literature Review**

A review of documentation and previous studies pertaining to Lake Colac, its surrounds and other relevant Council policies was undertaken.
- **Data analysis**

Secondary data has been sourced from a number of relevant sources and analysed. This includes socio-demographic data and data which identified economic indicators, environmental indicators.
- **Municipal-wide Survey**

The survey was specifically designed to capture the community's values and perceptions of the lake and identify both broad scale and specific user needs.

A random telephone survey of 300 residents was conducted across the Shire between November 26th and December 9th 2001. The survey was stratified as follows, in line with client requirements:

  - 200 surveys within the Colac Township
  - 100 surveys across Colac Otway Shire (excluding the Colac Township)
- **Stakeholder consultation**

A broad group of stakeholders were consulted both individually and within groups prior to the development of the Issues Paper. A list of those consulted is included in Appendix 3.
- **The research for the environmental issues was based around a literature review and data collected from the NRE and Colac Otway Shire Council (COSC) in Colac, Melbourne University, the Internet and discussions with specialists and others with relevant local knowledge. Contact was made with:**

- Wayne Erskine, Senior Soil and Water Specialist, Forest Resources Division, Environmental Management Branch, State Forests of New South Wales

## 9.1 MANAGEMENT OF LAKE COLAC

### Current Structure

There are a number of authorities that have an interest in the management of Lake Colac. These authorities are usually broadly based with regard to their general charter, but encompass a specific area of interest with regard to the lake. Some are located locally, others are regionally based or Melbourne based.

The following outlines the authorities and their area of influence.

#### 1. Colac Otway Shire

- The Shire office is situated in the central activity area of Colac and its councillors have a responsibility for infrastructure development and maintenance, planning and building. In particular, the Shire is the planning authority for the majority of works that may be proposed to be carried out around the lake foreshore, with a responsibility to refer certain works to other authorities.
- The Shire is also a Committee of Management over a part of the lake, being that area south of a line drawn between Ross's Point and the Colac Sewage Treatment Plant. This is a transferal of the authority of the former City of Colac prior to municipal amalgamation in 1994 and has, among other things, the intention to allow the municipality a degree of management control over the recreational use of this part of the lake.

#### 2. Corangamite Catchment Management Authority

- The Catchment Management Authority (CMA) has a strategic role in relation to waterways which, in the case of Lake Colac, principally involves Deans Creek and Barongarook Creek, the two main tributaries entering Lake Colac from the south-west and south-east respectively.
- The CMA also has a floodplain management responsibility and is a referral authority for works in designated floodplains. It also has a specific role in relation to management of the water level of Lake Colac through the Lough Calvert Drainage Scheme. The general charter of this scheme is to manage the water level of Lake Colac to a pre-determined target level by releasing waters into the Barwon River in accordance with a set of environmental guidelines.

### 3. Department of Natural Resources and Environment

- The Department is a referral authority and is the representative of the Crown in relation to Crown Lands (the bed of Lake Colac is Crown Land). Parks Victoria, a sub-service of the Department of Natural Resources and Environment, is responsible for streamside reserves, although there are no nominated reserves around the perimeter of Lake Colac.
- The Department of Natural Resources and Environment is also responsible for the issue and management of Crown Land licences, generally for grazing purposes, and a number of these exist around the foreshore of Lake Colac.
- The Department has an overview role with respect to Landcare groups. NRE also manage fishing licences in all catchment waterways.’
- NRE through Fisheries Victoria are the responsible manager for all fish and aquaculture activity on the lake.

### 4. Barwon Region Water Authority

- As an Authority, Barwon Water has responsibility for the Colac Sewage Treatment Plant located on the south-eastern foreshore of the lake. This plant discharges approximately 4 ML of treated effluent per day into the lake (a total of approximately 1,500 ML per annum). *[The Lough Calvert system discharges an average of 15,000 ML per annum].*
- Barwon Water has entered into wastewater discharge licence agreements with various local Colac industries that utilise the reticulated sewerage system in order to monitor and control the quality of discharge to its Sewage Treatment Plant.

### 5. Environment Protection Authority

- This Authority manages the SEPP (State Environment Protection Policy) for Lake Colac, which outlines water quality parameters and other aspects of the environmental management of Lake Colac.
- The EPA also oversees the discharge from the Sewage Treatment Plant in accordance with a set of licence conditions.

### 6. Southern Rural Water

- Southern Rural Water issues, and manages the use of, irrigation licences from water bodies. There are currently two irrigation licences with respect to Lake Colac, giving the holders a right to remove 40 ML of water per annum from the lake.

## 7. The Marine Board of Victoria

- The Marine Board has a responsibility to manage boating on the lake to ensure compliance with boating rules and regulations.

## 8. Victoria Police

- The Victoria Police have responsibility to manage traffic and the general lawfulness of activities on and around the lake, not otherwise covered by The Marine Board of Victoria.

## 9. Aboriginal Groups

- Both the Framlingham Aboriginal Trust (in Warrnambool) and the Wathaurong Aboriginal Co-operative (in Geelong) have an interest in the aboriginal cultural and heritage aspects of Lake Colac and its surrounds (see map at 4.10.1)

### 9.1.1 Interest Groups

There are a number of interest groups relative to the lake and its surrounds. These generally exist for a specific activity and some have existed for many years. The following interest groups have been identified:

#### 1. Country Fire Authority

- This authority owns a fire-training strip at the south end of the lake (between the Botanic Gardens and the foreshore).

#### 2. Heritage Victoria

#### 3. The Friends of the Lake

- This is a recently formed interest group, comprising approximately 20 members. It meets on an 'ad hoc' basis and has been responsible in recent years for works on the foreshore of Lake Colac, particularly in the city environs.

#### 4. Colac Yacht Club

- This is a long-standing club that operates from premises at the lake end of Armstrong Street, Colac and currently has approximately 60 members.

#### 5. Colac Anglers' Club

- This is also a long-standing club with approximately 40 members.



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## 6. Colac Rowing Club

- This is another long-standing club with clubrooms at the lake end of Gellibrand Street. Low lake levels and an exposed aspect have curtailed the activities of this club in recent years.

## 7. Colac Water Ski Club

- The club is believed to have been strong in the 1980's, but is evident that a formal water skiing club with activities has operated on the lake.

## 8. Colac Development Committee

- This committee has recently been formed to promote development, particularly of the central activities area of Colac, and comprises business people with an interest in this area.

## 9. Rural Landholders

## 10. Commercial fishing licences

## 11. Landcare Groups

- Landcare and other similar groups
- Barongarook Landcare Group
- Birregurra Landcare Group
- Murroon Landcare Group
- Gerangamete Flats Landcare Group
- Spring Gully Landcare Group
- Cundare-Duverny Landcare Group
- Pirron Yallock Creek Catchment Landcare Group
- Warrion-Dreeite Landcare Group
- Werneth Landcare Group
- Kawarren-Gellibrand Progress Association Landcare Committee
- Weering-Eurack Land Protection Group
- Nalangil Basin Protection Group
- Friends of Lake Colac

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- Friends of Deans Creek
  - Alvie Tree Planters
  - Friends of Beeac Swamp
  - Friends of Deans Creek
  - This is a group recently formed to co-ordinate the re-establishment of the natural environment of Deans Creek.
    - Friends of the Botanic Gardens
  - This is a group formed to improve the Botanic Gardens at the south end of Lake Colac.
  - A relatively new interest group, the eastern shore landholders has particular interest with regard to freehold land and its interface with the lake on the eastern shores, particularly concerning erosion and public access.

### 9.1.2 Issues

- Investigation to date has indicated a number of issues (perceived or otherwise) in relation to the current management of Lake Colac.
- The main issue is in relation to fragmentation of authority with regard to management of the lake, and this is particularly evident in both the number of government or semi-government authorities that have some level of jurisdiction over aspects associated with the lake and also the number of interest groups associated with the lake.
- It has also been shown that there needs to be a balance between the various physical activities associated with the lake – such as sport, tourism, recreation, commerce, environment, etc – as each of these often have competing needs.
- Surrounding land use and management has also been identified as an issue with particular reference to aspects such as the tips, both at Colac and at Beeac, the Bonlac settling ponds at Ballintore, Meredith Park use and use of other perimeter Crown Lands, farm access, etc. These uses have a particular effect on water quality, but also public accessibility to the lake and possible future uses.
- Open space linkages have also been identified as an area of useful improvement. Particular emphasis has already been placed on the broad link of Colac (Lake Colac) in the Great Ocean Road Trail, but also in a more local sense linking the lake with the environs of Barongarook Creek, particularly away from the creek mouth, linkages with the central activities area and linkages to Meredith Park and Delaneys Point

from the more populated Colac township. The possibility of incorporating disused railway lines and a linkage between the Colac Railway Station, Lake Colac and the Beachy line, thus The Otways, has also been raised as worth considering.

- With regard to the main management issue of fragmentation, there will always remain a need for the involvement of numerous authorities in the management of Lake Colac. A particular consideration of one-off specific requirements is the application of boating and other laws by The Marine Board and, for example, the monitoring of water quality by the Environment Protection Authority. Of particular issue, however, is the often closeted information gained by the various authorities that is not readily available and often duplicated. For example, the Corangamite CMA and the Environment Protection Authority both take water samples for different purposes and retain their data on separate databases.
- Fragmentation of the management structure of the lake has resulted in a lack of clarity about who has what authority to allow certain activities and, as a consequence, improvements, activities and uses are often carried out on an 'ad hoc' basis, without the necessary approvals and causing a lost opportunity to maximise the community benefit to whatever activity is being considered.

### Benchmarking other Lakes

The Lake Colac Management Plan required an assessment of the way in which other, similar lakes in Australia are managed. The methods used and opportunities taken to effectively manage such system are to be incorporated into the plan for Lake Colac. However, Lake Colac is a unique lake in that it has the following characteristics:

- Its sediments and catchment inputs create a higher salinity than freshwater lakes
- The township of Colac is situated on the shores of Lake Colac
- The Lough Calvert Drainage Scheme directly affects the hydrological regime of the Lake by controlling the water levels
- The Barwon Water Sewage Treatment Plant contributes a constant supply of water to the lake, which is not part of its natural regime

Several Management strategies were referred to in the literature review carried out at the beginning of this project. However, in terms of the environmental aspects of the lakes, most of them are dissimilar to Lake Colac.

Research carried out on the Gippsland Lakes by Haupt and Candy (2001) in association with the East Gippsland Catchment Management Authority, can be related to the environmental aspects of Lake Colac.

In the late 1800s, an artificial opening of the Gippsland Lakes system at Lakes Entrance was created. The sea water has since intruded, effectively changing the freshwater system into a predominantly saline environment. The Lakes are considered the largest estuarine lake system in Australia and are listed under the Ramsar Convention. Changes in land use, including land clearing and urbanisation, have combined with other impacts to affect the Lakes system. Such effects include:

- Blue green algal blooms
- Degradation of the riparian environment, in particular the reed swamps, which previously stabilised the banks
- Control of the water levels in the lake, changing them from a naturally fluctuating system to a tidal environment, in which the water level throughout the lakes system is not as variable as its natural regime. (Haupt & Candy, 2001)

The East Gippsland CMA has developed a staged management process for rehabilitation of the tributaries that have been affected by these changes. Strategies focus on a reduction in the sediment and nutrients supplied to the waterways from their surrounding catchment. Stabilisation of the banks has also been priority. Steps in their approach include:

- Stage One – identification of priority sites and early intervention
- Stage Two – Identification of bank destabilisation mechanism
- Stage Three – Primary Stabilisation of the bank (where required)
- Stage Four – Enhancement of in-stream habitat
- Stage Five – Revegetation of riparian zone with native species (includes removal of exotic species)
- Stage Six – Monitoring and Evaluation

Haupt and Candy (2001)<sup>7</sup> state that the staged approach to their rehabilitation strategy “has been vital to successfully accommodate a range of conflicting interests”. Their document concludes that this management approach “provides the ideal basis for an adaptive framework necessary to effectively manage these sensitive areas into the future”.

Reference for benchmarking the environmental aspects of the Lake Colac Management Plan should also be made to other lakes in the western basalt plains region. The management programs adopted for the following lakes may also be useful:

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<sup>7</sup> Haupt L J and Candy R B (2001) An Adaptive Management Approach to Rehabilitation of Tributaries of the Gippsland Lakes in *Third Australian Stream Management Conference proceedings*. Rutherford *et al.* Brisbane, 27-29 August 2001.

- 
- Lake Corangamite
  - Lake Beeac
  - Lake Burrumbeet
  - Lake Bolac

However, although these lakes are placed within a similar geological setting, they are not exposed to the same combination of pressures as experienced by Lake Colac.

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## APPENDIX 2

### 9.2 DEMOGRAPHIC ANALYSIS

- To identify the social profile of the Colac Otway Shire a socio-economic issues assessment was undertaken through the analysis of demographic data provided through the Australian Bureau of Statistics' 1996 Australian Census of Population and Housing and the Department of Infrastructure's population projections. Specifically, the analysis has focussed on an outline of birthplace, religion and the projected population change for the Shire's community between 2001 and 2021.
- The following section 3.2 provides an economic 'snapshot' of the Shire.
- The following demographic analysis indicates that by 2001:
  - The estimated residential population of Colac Otway Shire to be 21,000 (estimated)
  - The estimated residential population of the Colac township to be 10,000 (estimated)
- While the Colac Shire Council estimates that the current population of Colac is 10,250, the Australian Bureau of Statistics identified it to be 9,790 people in the township. It indicates this is broken into:
  - 4,646 male (47%)
  - 5,144 female (53%)

**Table I – Population by Age Group of people in the Colac Otway Shire (1996)**

Age Group	Number of Persons	Percentage
0-4	701	7%
5-14	1,506	15%
15-24	1,252	13%
24-39	1,946	20%
40-64	2,569	26%
65-79	1,797	13%
80+	477	5%
Overseas Visitors	19	0%
<i>Total</i>	<i>9,787</i>	<i>100%</i>

*Source: Australian Bureau of Statistics, 1996 Census of Population and Housing.*

A breakdown of age groups indicates:

- A relatively even distribution of the population over the age groups represented by the following data:
  - A large proportion (35%) of people aged under 24
  - A significant proportion (26%) of middle aged people, between 40-64
  - A significant proportion of the population (18%) aged over 65.

## Birthplace

- Ethnic groups do not occupy a significant proportion of the population. A significant majority (94%) of the Colac Otway Shire's population was born in English speaking countries (i.e. Australia, United Kingdom, New Zealand).

Australia	91%	United Kingdom	2%
New Zealand	1%	Lebanon	1%
Italy	1%	Other	1%
Not stated	3%		

## Population Projections

An analysis of the population projections for the Colac Otway Shire and the Colac Township itself, indicates that:

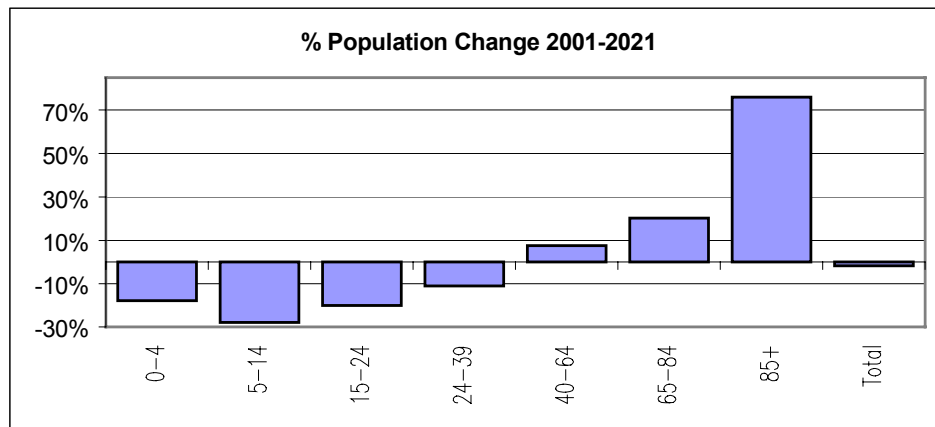
- While the population of the Colac Otway Shire is forecast to increase by 1%, the population of the Colac township is forecast to fall by 2% (or 198 people) over the period 2001-2021
- For the Colac Township specifically, there will be a significant shift in the composition of the town's population over the 2001-2021 period with a noticeable aging of the Colac population:
  - There will be significant falls in all age groups between 0-39 (19% or 973 individuals), with the falls most pronounced in the 0-14 year old groups (25% or 528 individuals)
  - The 44-54 age group will remain relatively stable increasing by 221 people or 8%
  - There will be significant rises in the elderly and frail aged population 65-85+ (387 individuals or 20%), with the rises most pronounced in the 85+ year old group (186 individuals or 76%)
  - The ageing population trend is consistent with the population forecasts for the entire Colac Otway Shire.
- 19 per cent of the population is estimated to have a permanent disability with 35% (which includes the 19%) estimated to have a temporary or ongoing disability at any one time.



**Table 2 - Population Projections for the Colac Township 2001-2021**

**Colac Population Projections 2001-2021**

	2001	2006	2011	2016	2021	Change	% Change
0-4	615	545	512	512	505	(110)	-18%
5-14	1,497	1,347	1,209	1,130	1,079	(418)	-28%
15-24	1,153	1,172	1,130	1,033	923	(230)	-20%
24-39	1,927	1,811	1,756	1,742	1,712	(215)	-11%
40-64	2,907	3,057	3,182	3,203	3,128	221	8%
65-84	1,903	1,940	1,939	2,050	2,290	387	20%
85+	245	302	381	442	431	186	76%
<b>Total</b>	<b>10,247</b>	<b>10,174</b>	<b>10,109</b>	<b>10,112</b>	<b>10,068</b>	<b>(179)</b>	<b>-2%</b>



Source: Victoria In Future, Department of Infrastructure, 1996.

## 9.2.1 Estimated Number of Persons in the Colac Otway Shire with a Profound or Severe Disability

The Australian Bureau of Statistics survey results indicate the following numbers of people with profound or severe disability within the Colac Otway Shire’s population.

**Table: People with Severe Disabilities in Colac Otway Shire**

Age Groups	1998 Population Estimate	Total Estimated No. of People with a Disability	% of Population	Estimated No. of Profound & Severely Disabled	% of Population
0-4	1,367	15	1%	8	1%
5-14	3,253	104	3%	42	1%
15-24	2,464	83	3%	21	1%
25-39	3,910	180	5%	45	1%
40-64	6,154	437	7%	114	2%
65-84	3,010	236	8%	74	2%
85+	315	18	6%	14	4%
<b>TOTAL</b>	<b>20,473</b>	<b>1,072</b>	<b>5%</b>	<b>614</b>	<b>3%</b>

Source: Australian Bureau of Statistics (1998)

It is evident that:

- While there is a considerable group of people with disabilities in the 25-39 year old age group (5%) this increases in the older age groups of 40-64 and 65-84, with 7% and 8% of the population, respectively, exhibiting some form of disability.
- People with a profound disability also make up a 2% of 40-64 and 65-84 age groups, increasing to 4% for the 85 and over group.

In addition:

- The proportion of the Shire’s population on a disability support pension is 4.9%. This equates to 5% of the working age population. <sup>8</sup>

<sup>8</sup> Centrelink –Colac Otway Shire Centrelink Support Pension Recipients – July 1998.

## 9.3 LOCAL ECONOMY

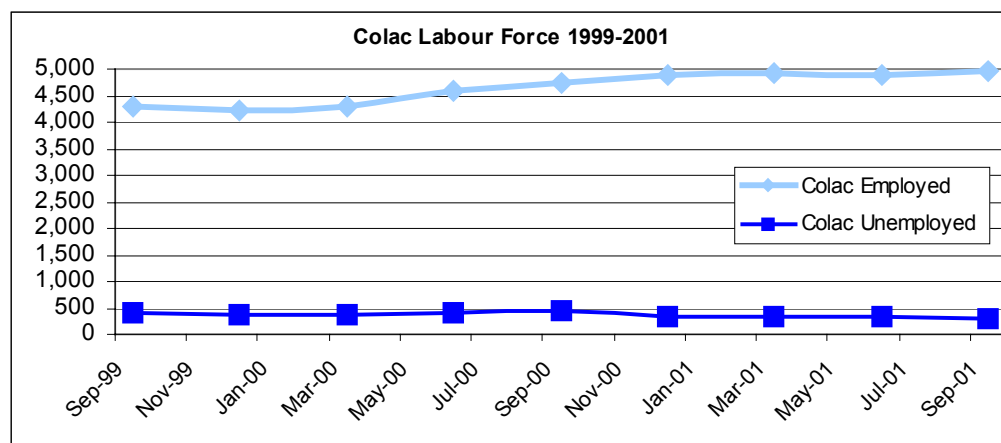
- An economic 'snapshot' of the Shire has been undertaken to identify the major characteristics of the local economy. This has included an assessment of labour force, employment, income, dwelling structure occupation, and an outline of the type and number of businesses in the Shire. An outline of the economic performance of the shire is also included for particular industries. Much of the data has been drawn from the Australian Bureau of Statistics, the Building Control Commission, the Department of Employment, Workplace Relations and Small Business and the Colac Otway Shire.

### Employment

- The labour market has grown by 8% over the past 2 years or which represents additional 372 jobs in the local economy and employment is now close to 5,000 in Colac.
- Over the same time the number of people out of work has dropped by 126
- The net employment gain over the period March 1999 - September 2001 is therefore 645, as Table 3. below indicates.

**Table 3 – Employment status for Colac Township September 99 – September 01**

	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01	Sep-01
Colac Employed	4,312	4,204	4,306	4,585	4,750	4,889	4,909	4,896	4,957
Colac Unemployed	406	385	379	393	436	339	326	332	280



Source: Department of Employment, Workplace Relations and Small Business, Small Area Labour Markets, Sept 2001.

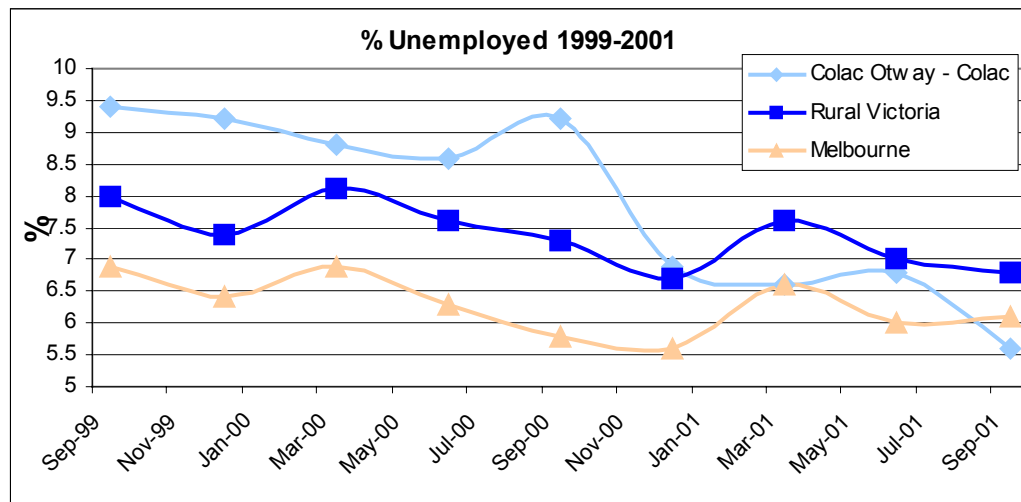
- The level of esteemed unemployment in Colac in September 2001 was 5.6%, this represents a steep decline from 8.8% in June 2000 and 10.5 % in June 1999. The

current unemployment rate is slightly below the Regional Victorian average of 6.8% and below the State average of 6.1%. Although the unemployment rate is currently close to the regional average.

- The unemployment rate for Colac has been lower than the rural Victorian average since March 2001 which was the first time over the period March 1999 - March 2001. This represents a strong recent employment performance, given the corresponding growth in the local labour market and a comparison with the unemployment rate for the MSD.

**Table 4 – Comparison of Colac’s Unemployment Rate with MSD<sup>9</sup> and Victoria**

Unemployment Rate										
	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01	Sep-01	
Colac Otway - Colac	9.4	9.2	8.8	8.6	9.2	6.9	6.6	6.8	5.6	
Rural Victoria	8	7.4	8.1	7.6	7.3	6.7	7.6	7.0	6.8	
Melbourne	6.9	6.4	6.9	6.3	5.8	5.6	6.6	6.0	6.1	



Source: Department of Employment, Workplace Relations and Small Business, Small Area Labour Markets, Sept 2001.

## Income, Occupation and Labour Force of Colac Community

### Income

- The analysis of the Australian Bureau of Statistics average weekly income statistics recorded for the Colac Otway Shire indicates that the largest proportion (14%) of wages fell within the \$120-\$159 bracket, or one of the comparatively lower brackets. Overall, the majority of the working aged population (52%), earn under \$299 per week.

<sup>9</sup> NSD – Melbourne Statistical Division.

**Table 5 – Colac Otway Shire Income (weekly)**

Income Group	Number of Persons	Percentage
Negative income	39	1%
Nil income	313	4%
\$1-\$39	203	3%
\$40-79	253	3%
\$80-\$119	253	3%
\$120-\$159	1039	14%
\$160-199	938	12%
\$200-\$299	989	13%
\$300-\$399	866	11%
\$400-\$499	823	11%
\$500-\$599	534	7%
\$600-\$699	305	4%
\$700-\$799	200	3%
\$800-\$999	207	3%
\$1,000-\$1,499	74	1%
\$1,500 or more	31	0%
Not stated	494	7%
Overseas visitors	17	0%
<i>Total</i>	<i>7,578</i>	<i>100%</i>

Source: ABS, 1996 Census of Population and Housing

### Occupation

- The two largest categories of occupations in the Colac Otway Shire included Managers and Administrators (18%) and Labourers and Related Workers (14%).

**Table 6 - Occupation Profile (Colac Otway Shire)**

Occupation	Number of Persons	Percentage
Managers and administrators	1,429	18%
Professionals	978	12%
Associate professionals	914	11%
Tradespersons and related workers	957	12%
Advanced clerical and service workers	198	2%
Intermediate clerical, sales and service workers	879	11%
Intermediate production and transport workers	701	9%
Elementary clerical, sales and service workers	642	8%
Labourers and related workers	1,100	14%
Not stated	215	3%
<i>Total</i>	<i>8,013</i>	

Source: ABS, 1996 Census of Population and Housing

### Labour Force Profile

- The main labour force categories employing individuals in the Colac Otway Shire are listed by the Australian Bureau of Statistics as Agriculture, forestry and fishing (18%), Manufacturing (13%), Retail Trade (13%) and Health and Community Services (10%). The labour force distribution is indicative of the rural/ farming base that makes up the local community.

**Table 7 -Labour Force Profile (Colac Otway Shire)**

Employment Group	Number of Persons	Percentage
Agriculture, forestry and fishing	1,546	18%
Mining	816	9%
Manufacturing	1,122	13%
Electricity, gas and water supply	83	1%
Construction	410	5%
Wholesale trade	364	3%
Retail trade	1,093	13%
Accommodation, café & restaurant	379	4%
Transport and storage	265	3%
Communication services	94	1%
Finance and insurance	133	2%
Property and business services	291	3%
Government, administration & defense	297	3%
Education	485	5%
Health and community services	888	10%
Cultural and recreational services	85	1%
Personal and other services	238	3%
Not stated	204	2%
<i>Total</i>	<i>8,793</i>	

Source: ABS, 1996 Census of Population and Housing

## Housing Market

### Dwelling Structure

- The Colac Otway Shire community has a relatively high level of home ownership (45%). Less than half this proportion (21%) are purchasing their home as is the number renting (21%).

**Table 8 – Colac Otway Shire Dwelling Structure**

Dwelling Group	Number of Persons	Percentage
Fully owned	1,939	45%
Being purchased	893	21%
Rented	886	21%
Other	35	1%
Not stated	146	3%
Unoccupied private dwelling	422	10%
<i>Total</i>	<i>4,321</i>	<i>100%</i>

Source: ABS, 1996 Census of Population and Housing

## Building Approvals

- Over the three years, 1998 – 2000, there has been an overall increase in the number of single dwellings and public buildings approved for construction in the Colac Otway Shire but a drop in the number of multi-dwelling and industrial developments approved. Overall, however, the total value of building construction has risen by 96% over this time.

**Table 9 - Building Approvals (Colac Otway Shire)**

	1998	Value	1999	Value	2000	Value
	No	\$ M	No	\$ M	No	\$ M
Single Dwellings	331	12.3	372	22.8	357	20.1
Multi Dwelling Units	10	1.6	13	1.4	6	1.2
Commercial	19	1.5	35	2.0	35	9.6
Industrial	13	1.3	18	5.5	9	1.0
Public Buildings	12	2.0	12	1.6	17	4.8
<i>Total</i>	<i>385</i>	<i>18.7</i>	<i>450</i>	<i>33.3</i>	<i>424</i>	<i>36.7</i>

Source: Building Control Commission

## Implications

- Overall, the 1996 ABS census reveals that with respect to both Regional Victoria and Metropolitan Melbourne, Colac residents have lower incomes and are predominantly employed in agriculture and the manufacturing industry or in administrative/ managerial/ professional work, but have relatively high levels of home ownership.
- Employment growth is stable in Colac with a net gain recorded in the number of people in paid work.
- The local property industry has seen an increase in the value of property approved for construction but a relatively subdued change in the number of approvals, particularly between 1999 and 2000.

## Business Profile

- The Colac Otway Shire supports a network of over 800 businesses and 400 farms<sup>10</sup>, (a list of categories is outlined below)
- There are 655 businesses currently listed in Colac itself

The concentration of industries is in agriculture, forestry & fisheries, manufacturing, retail, construction services and products. Major employment opportunities exist in the wholesale

<sup>10</sup> Australia and New Zealand Industry Code Database, 2001.



& retail trade, manufacturing and community services sectors. A number of major operators have vacated the town in recent years, however a number of operators have also commenced or expanded, e.g. CRF Meat processing (80-250 staff, Colac Cinemas – 0 – 20 a majority of casual staff, regal Cream Products – Stage 1 and 2).

- Aquaculture is also a significant local business although production has been recently constrained due to the low water levels on the lake
- Only one company 88 Golden Eels (Aust) Pty Ltd has any commercial fishing or aquaculture entitlements to the lake. While there is no identified potential for the growth in the aquaculture industry there is potential for establishment and growth of an associated service industry.
- Tourism and related support sectors are not significant in Colac
- The local tourism market is constrained due to the limited number and range of accommodation establishments and guest rooms available in Colac and occupancy rates are relatively low at less than 50% on an annual basis

The following is a list of the key industries operating within the Shire.

### Key Industries

- Primary Producers
  - Beef
  - Dairy
  - Sheep
  - Crops
  - Specified pastures
  - Horticulture
  - Organic farming
- Timber Manufacturing and Service
- Construction
  - Retail and Wholesale
  - Tourism

## Implications for the Socio-economic Status of Colac

- Youth migrating to Geelong and Melbourne for education, training and employment
- Falling unemployment but skills shortage
- Small tourism sector - limited linkages to other industries e.g. food and wine
- Limited opportunities to expand the overnight tourism sector due to constrained availability of accommodation facilities (quantity and quality)
- Aquaculture industry limited by lake water level
- With the ageing population there will be a declining potential workforce over the next 20 years
- There is limited direct employment associated with the lake (e.g. unlike Lake Victoria - Daylesford, Gippsland Lakes)

## Opportunities to boost Colac's Economy

- Lake Colac should be seen as a major asset and comparative advantage for the Town in terms of economic development. The lake should therefore be used to leverage economic benefits for the Town in terms of developing appropriate and sustainable opportunities including tourism, aquaculture and the development on a number of land areas
- The lake can also build on the town's other comparative advantages such as its access to transport corridors
- Creating local employment to retain the Town's younger workforce, especially in terms of tourism, recreation and leisure based opportunities should be a key long term consideration of the Lake Colac Strategy
- It would appear that there are opportunities to develop the range of accommodation facilities, to complement the development of the lake and its activities, which will cater for different market segments. This could assist in generating greater visitation and supporting economic development for the Town. This could in the short term include the possible charging of camping fees at Meredith Park and in the medium term also include more permanent commercial development.
- Affordability, accessibility and communication however will be the key to enable a wide level of visitation and utilization of this resource particularly with consideration of people with disabilities.

## Tourism Opportunities

- A stimulation of the tourism industry would mean:
  - tourism market upturn - benefits town through synergy with lake
  - provision of a range of accommodation types at different locations around the lake - taps into different market segments
- A significant level of tourism is likely to be generated from people visiting friends and relatives. This market has the potential to expand with the increased awareness of the lake and an improved local perception of the lake.
- Tapping into opportunities for growth in tourism exist at areas such as Apollo Bay and Lorne, relatively untapped markets located within 40 – 60 minutes drive from Colac.
- Creation of activities and experiences required to stimulate visitation would involve:
  - capitalise on natural features - increase access, marketing of assets, ecological characteristics - interpretive walks, Aboriginal heritage, fishing competitions
- Infrastructure and activities - sailing, water skiing, canoeing, festivals
- 'themed' developments (i.e. restaurants focussing on local food industry and comparative advantages)

## 10.0 APPENDIX 3 – SURVEY RESULTS

### 10.1 KEY ATTRIBUTES

- The majority of the following section outlines the results of the municipal-wide survey undertaken to gauge the community’s perception of Lake Colac and to identify their priority needs for Lake Colac. It provides an analysis of each question based around five main categories outlined below.

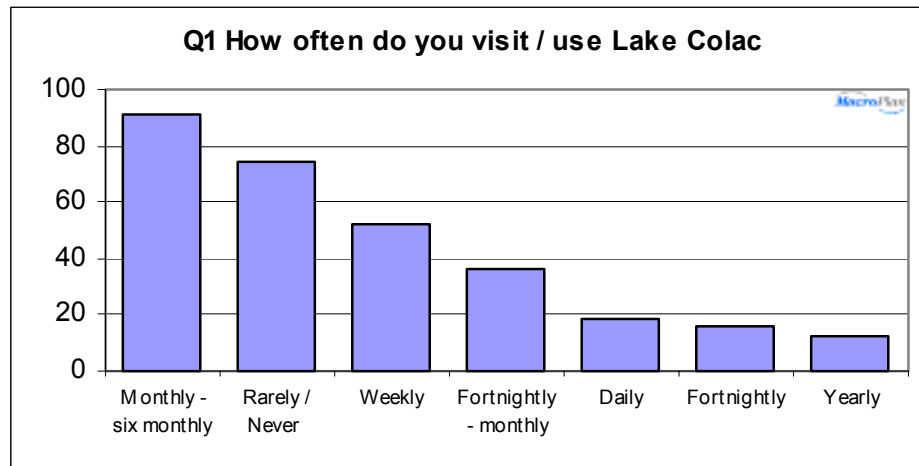
### 10.2 SURVEY METHODOLOGY

- A random telephone survey of 300 residents was conducted across the Shire between November 26th and December 9th 2001. The survey was stratified as follows, in line with client requirements:
  - 200 surveys within the Colac Township
  - 100 surveys across Colac Otway Shire (excluding the Colac Township)
- A “draft” survey was piloted and adjusted, where appropriate, prior to the commencement of the 300 surveys.
- The survey questions were based around the following categories are the results are outlined below:
  - characteristics and use of Lake Colac
  - visitors to Lake Colac
  - Lake Colac township
  - Lake Colac’s future strategic position
  - Lake Colac Development

#### 10.2.1 Characteristics and Use of Lake Colac

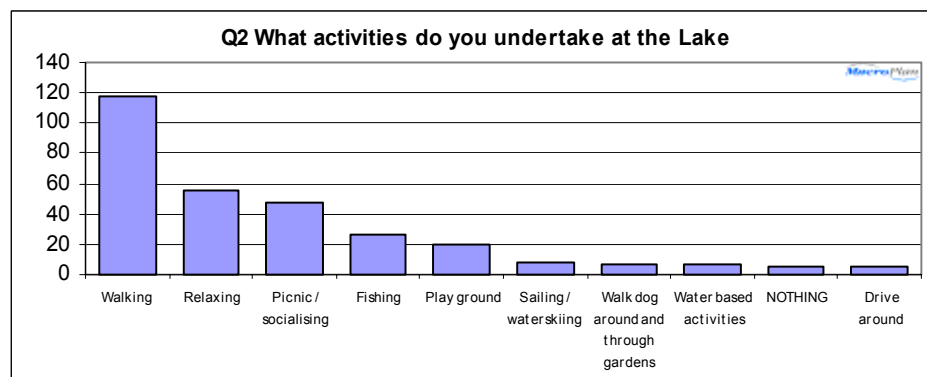
- Twenty three percent (23%) of respondents visit or use Lake Colac at least once a week. However, 66% of Town respondents, compared with 9% of Shire respondents, use or visit the lake on a weekly basis. A further (17%) visit or use the lake at least once a month whilst (34%) use or visit the lake only six monthly or once a year. Twenty five percent (25%) of respondents rarely or never use or visit the lake. (See Appendices Table 1).

Graph: How often do you visit/ Use lake Colac



- Of those respondents that indicated activities undertaken at the lake “passive” activities dominate the current use of Lake Colac. The most frequently mentioned activities at the lake being walking (37%), relaxing (18%), having a picnic / socialising (15%). Fishing is the top “active” use (9%) When the results were divided into ‘Shire’ and ‘Town’ response it was found that there were significant differences in use for walking (24% Shire and Town 42%), relaxing (24% Shire and 15% Town) and picnicking / socialising (33% Shire and 7% Town)

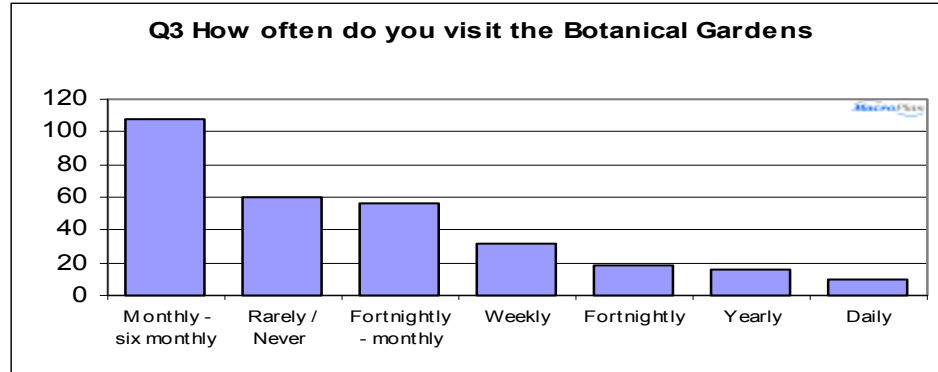
Graph: What Activities do you undertake at the Lake



- Regular usage (e.g. at least once a month) of the Botanical Gardens is similar to that of Lake Colac, with fourteen percent (14%) of respondents visiting the Botanical Gardens at least once a week and a further (25%) visiting the Botanical Gardens at least once a month. Forty one percent (41%) visit the Botanical Gardens only six monthly or once a year, whilst twenty percent (20%) of respondents rarely or never

visit the Gardens. When ‘Shire’ and ‘Town’ respondents are compared there are found to be no significant differences in visitation of the Botanical Gardens.

**Graph: How often do you visit the Botanical Gardens**

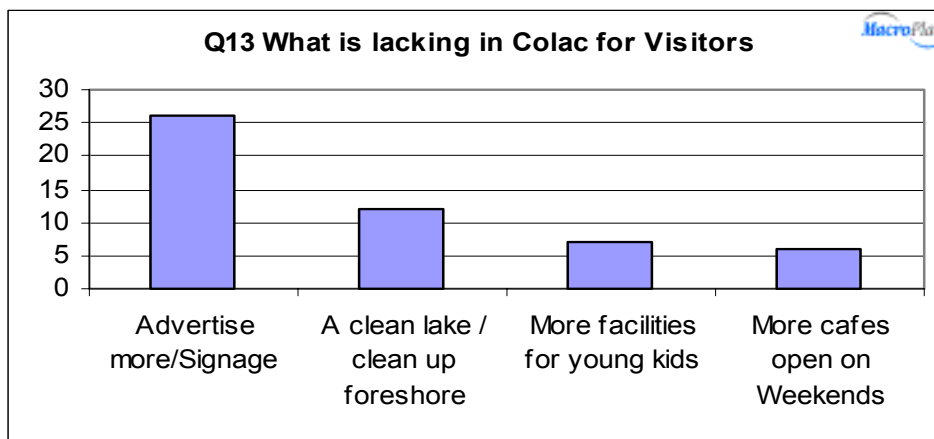


- The most important features of the Botanical Gardens were considered to be the trees, gardens and flowers (39%), the playground (13%) and it being “nice and peaceful” (8%). (See Appendix 2 Table 4).
- The most frequent activities undertaken when visiting the Gardens are primarily “passive” in nature and include walking (44%), socialising (17%), taking the kids to the park (15%) and going to the café (13%). This indicates similar usage behavior with respect to Lake Colac. (See Appendix 2 Table 5).
- Thirty six percent (36%) of respondents are members of a club, with (64%) not being members of a club. Of those respondents who are a member of a club, the majority (56%) are members of a sporting club. (See Appendix 2 Table 6).
- The most frequent places visited outside of Colac for recreational purposes were Lorne (12%), Geelong (10%), Apollo Bay (10%), Melbourne (8%) and the Coast (8%), however, 15% of respondents mainly stayed in Colac for their recreational needs. (See Appendix 2 Table 7).
- The major incentive that would make people use the lake more often is an improvement in cleanliness (53%) – this includes cleaning up both the lake and the foreshore and preventing sewerage flowing into the lake. Other improvements which would induce greater use include better sports and recreational facilities (12%), an improvement in landside facilities (11%) and an improvement in other environmental aspects of the lake and its surrounds (9%) e.g. more trees, sand, native animals etc. (See Appendix 2 Table 8).

## Visitors to Colac

- Seventy two percent (72%) of all respondents have people visiting or staying with them at least once a year. Of these, four percent (4%) have people visiting / staying with them on a weekly basis, ten percent (10%) host visitors on a monthly basis, (50%) have people visiting / staying on a monthly to six monthly basis whilst a further (8%) host visitors once a year. Only twenty seven percent (27%) of respondents rarely or never have people visiting or staying with them (See Appendix 2 Table 9).
- Most people visiting / staying with Colac residents are from Melbourne (44%), the country (37%) or Interstate (14%). (See Appendix 2 Table 10).
- The first impressions of Colac are generally positive (73%), and include comments such as they like it / love it, it's a lovely little town, it's a nice place / very pretty, peaceful & quiet. Negative comments (15%) centre on the town being a bit grim / drab / tired and old fashioned, average / not being very flash / not much to offer etc (See Appendix 2 Table 11).
- The most frequently identified activities / tourist attractions visited are the Redrock volcanic area (17%), Lake Colac. (14%), the Botanical Gardens (13%) and driving around the Ocean Road (10%), the Otways (9%) (See Appendix 2 Table 12).
- Forty eight percent (48%) of respondents felt there were facilities lacking for visitors to Colac. Of these (18%) believed more advertising / signage was required, whilst (8%) stated a cleaner lake and (5%) more facilities for young kids. (See Appendix 2 Table 13).

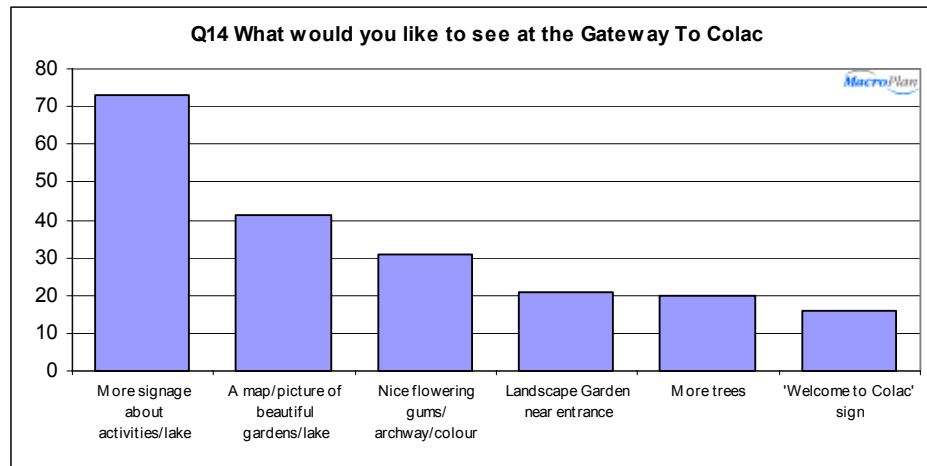
### Graph; What is Lacking in Colac for Visitors



## Colac Township

- Twenty seven percent (27%) of respondents suggested more signage regarding activities / Lake Colac as the prime Gateway requirement which would enhance the identity of Colac. A map / picture of beautiful gardens / Lake Colac at the Gateway was supported by a further (15%) of respondents. Eleven percent (11%) thought flowering gums / archway / colour was important at the Town's Gateway. (See Appendix 2 Table 14).

### Graph; What would you like to see at the Gateway to Lake Colac



- In response to whether the highway, the Lake Colac and the Botanical Gardens should be linked, (54%) of respondents supported the idea, whilst (32%) did not. (See Appendix 2 Table 15).
- The things most liked about Colac were identified as it being “quiet and peaceful” (19%), family and friends (13%), a sense of community (12%), having good services and facilities (8%) and being the gateway to the Ocean Road / Tourism Trail (7%) (See Appendix 2 Table 16).
- Fifty four percent (54%) of respondents identified that there was nothing that they disliked about Colac. However when considering the dislikes of Colac, the major issues concerned the local community and the township. Social issues such as vandalism, crime, migrating youth, nothing to do, lack of safety, drugs, lack of jobs etc accounted for (29%) of all responses. Township issues such as lack of facilities, poor range of shops, and being a small town accounted for (27%) of responses, whilst environmental problems accounted for only (1%) of dislikes. (See Appendix 2 Table 17).



- Improvements that were identified as benefiting the local community included by-passing big trucks (16%), development of the lake (clean it up) (8%), more facilities for young kids / teenagers (7%), fix up country roads (6%) and attracting businesses (4%). (See Appendix 2 Table 18).

### 10.2.2 Lake Colac's Future Strategic Position

- When the respondents were asked to relate to a number of value statements about Lake Colac, the following was revealed:
  - Seventy-one percent (71%) of respondents agree or strongly agree that Lake Colac is Colac's biggest asset. There was no significant difference between Town and rural respondents.
  - Eighty-two percent (82%) of respondents agree or strongly agree that existing public access areas of the lake should be developed. There is a difference of 17% between Town and rural respondents.
  - Eighty-five percent (85%) of respondents agree or strongly agree that a large part of Lake Colac's foreshore should be developed. There is a 19% difference between Town and Rural respondents.
  - Eighty percent (80%) of respondents agree or strongly agree that Lake Colac should become the main tourist icon for Colac. There is a difference of 10% between Town and Rural respondents.
  - Fifty-seven percent (57%) of respondents agree or strongly agree that tourism should be developed as Colac's main industry. There is no difference between Town and Rural respondents.
  - Eighty-eight percent (88%) of respondents agree or strongly agree Lake Colac should be redeveloped to encourage greater visitation (See Appendix 2 Table 19). There is an 11% difference between Town and Rural respondents.
- When prompted for any general comments to the above statements the most common included, environmental considerations, including cleaning up the lake and the surrounding area, and tourism, including town development and promotion. (See Appendix 2 Table 20)

### Lake Colac Development

- When asked to indicate the importance of a number of facilities / infrastructure in any future lake development, responses indicated the following priorities. (See Appendix 2 Table 21):

- 
- Seventy-four percent (74%) identified that toilet facilities are extremely important or very important
  - Sixty-seven percent (67%) thought picnic facilities are extremely important or very important
  - Forty-seven percent (47%) indicated that a bicycle track was extremely important or very important
  - Forty-three percent (43%) thought that developing sporting events is extremely important or very important
  - Forty-one percent (41%) indicated that a full walking track around the lake was extremely important or very important
  - Thirty-eight percent (38%) said that a partial walking track around the lake was extremely important or very important
  - Thirty-two percent (32%) of respondents thought the re-instatement of the Ferry was extremely important or very important
  - Twenty-nine percent (29%) identified a festival as extremely important or very important
  - Twenty-nine percent (29%) identified a market as extremely important or very important
  - Twenty-four percent (24%) indicated that a restaurant / café on the lake extremely important or very important
  - Twenty-two percent (22%) said that a tourist road linking the Botanical Gardens to the lake were extremely important or very important
  - Twenty-one percent (21%) of respondents indicated that tourist accommodation was considered to be extremely important or very important
  - Twenty percent (20%) identified a visitor / interpretative centre as extremely important or very important
  - Twelve percent (12%) identified a heritage boat display as extremely important or very important
  - Ten percent (10%) of respondents thought that a sculptural walk was extremely important or very important
  - In any future development of the lake the most important issues for **Council to address** were identified as being associated with the lake-environmental or clean-up issues (46%) (See Appendix 2 Table 22).

- 
- Fifty-five percent (55%) of respondents stated that they would be prepared to contribute a levy to help fund improvements to the lake with (37%) stating they would not be prepared to contribute. When the respondents are divided between Town and Rural it is found that 35% of Shire respondents would be prepared to contribute a levy compared with 65% of those in Town (See Appendix 2 Table 23).
  - The most frequently mentioned general comment in relation to the Lake Colac was concern regarding current water quality and that there is an urgency to do something about it as soon as possible (See Appendix 2 Table 24).

## 11.0 APPENDIX 4

### 11.1 CONSULTATION

#### 11.1.1 Implications of research on possible opportunities

- These factors need to be considered when undertaking any planning for leisure facilities, services and programs at Lake Colac. It should be noted however, that such factors should not be viewed as static. They are susceptible to changes in the make up of and behavioural patterns of the community and perceptions regarding people’s “way of life”.
- It is also important that the leisure opportunities provided by Council, continue to reflect the needs, wants and aspirations of the community. By continuing to monitor these trends, Council will be able to respond to changes and ensure the provision of leisure opportunities remains relevant.

#### 11.1.2 Stakeholder Consultation

- An extensive amount of both qualitative and quantitative consultation was undertaken to identify the issues associated with Lake Colac. Consultation, both group and individual, was undertaken with members of the community, community groups and agencies, all identified for the purposes of this study as ‘stakeholders’.
- Workshops and surveys were undertaken throughout November and December 2001.
- The following stakeholders were consulted:
  - Colac Otway Shire
  - Department of Natural Resources and Environment
  - Barwon Water
  - Parks Victoria
  - Corrangamite Catchment Management Authority
  - Colac Yacht Club
  - Colac Rowing Club
  - Colac Anglers Club
  - Colac Development Committee

- Lake Colac Commercial Fishers
- Disability Action Group
- Wautherong Aboriginal Co-operative
- Colac Historical Society
- Landholders

### 11.1.3 Economic Issues

- At present key issues for Lake Colac include:
  - A significant level of promotion currently being enjoyed by the Great Ocean Road area
  - Promotional activities had not included Lake Colac and the hinterland
  - The community has not turned its back on Lake Colac.
- Tourism is considered to be a key driver of economic development for Lake Colac – it was asserted that enhanced facilities leads to improved tourism which in turn leads to broader economic spin-offs (Shepparton cited as an example).
- Cleaning up the lake water and its surrounds was seen as a means to facilitate improved facilities and therefore enhance tourism (Lake Boort cited as an example – lake emptied to remove silt).
- Current perceptions of the lake tend to be negative due to water quality, the quality of the lake bed, the impact of agricultural activities and Barwon Water discharges.
- Few businesses have attempted to set up on the lake. The notable exception is the restaurant located in the Botanical Gardens caretaker’s residence.
- The Botanical Gardens are a big attraction that is under-marketed. Linkages to the lake are important. Council is responsible for managing the gardens.
- There is limited accommodation located in close proximity to the lake. The Balnagowan and Lake Bank Lodge ‘bed and breakfast’ establishments were included as part of very few establishments cited. The former is an original homestead which is potentially expanding in the future.
- The current uses around the lake include:
  - Sporting emphasis, eg. yachts, waterskiing, rowing
  - Fishing – eels, carp (commercial)
  - Potential for aquaculture away from the residential areas

- The former tip site is to be cleaned up (capped) and landscaped for use as passive recreation. This is part of a 5 year plan. Open space linkages with the Barongarook Creek corridor will be established.
- Potential uses for Meredith Park include formalised camping, cabins and a seasonal kiosk/café. A year round café may be unviable. Infrastructure services are an issue in this location.
- The future of Bonlac and its pondages was identified as being in doubt.
- It was identified that there is great potential for a walking/bicycle track that could be linked to the Beechy Line track via the Colac Railway Station. This would then form part of a network of national tracks, including the Great Ocean Road trail.

#### 11.1.4 Environmental Discussion

It was identified by stakeholders that the key issue for Lake Colac is water quality. The results of the consultation also indicated the following:

- Stormwater management is an issue, particularly at Bruce Street, Barongarook Creek, re. nutrients, sediment and pollutants. Industrial effluent is also an issue at the feedlot (grain) and Regal (chocolate).
- Deans Creek issues – agricultural runoff, eg. fertilisers, cleaners, phosphates and nitrogen from dairy activities; sawmills; car yards; new commercial estate drains to table drains without any primary treatment.
- Urban pollutants – hydrocarbons from roads and driveways.
- Sewerage system needs to be reviewed – recent failure at the Visitor Information Centre allowed raw sewerage to flow straight into the open stormwater channel and into Barongarook Creek.
- There is a long history of industrial effluent flows from which the lake has not recovered. The pollutants (including heavy metals) are embedded in the sediments and may be re-released if the sediments are disturbed. Core sampling of the sediments has been conducted, but it is not known by whom.
- Point source pollution can be controlled and monitored. Existing licences should be checked to identify a model of theoretical discharges. Actual outputs should then be audited to ascertain compliance. Even if point source pollutants are cleaned up leaching will continue to be a problem.
- Land development – treatment measures not being built into infrastructure; industrial zones adjacent to lake with no buffers; consider rezoning around abattoir/tip site.

- Litter traps – Gross pollutant trap at Armstrong Street may not be operating at full effectiveness due to lack of regular cleaning. Anaerobic conditions develop in sump leading to pollution in lake.
- Artificial wetlands should be developed to filter sediments and nutrients, both upstream and downstream.
- Barwon Water plant – question quality of water and compliance with EPA licence, independent testing should be introduced.
- An issue was identified at the former tip site – odour, leachates, and visual impact.
- Rising sewer main on foreshore adjacent to Botanical Gardens – close proximity to lake; overflows, spill and blowouts have occurred.
- Whole system needs to be considered with respect to general water quality – compliance with individual licences is not sufficient to safeguard water quality.
- It was suggested that the Lough Calvert system disrupts natural cycles and therefore impacts on flora and fauna. It was also asserted that the system contributes to sediment and salinity levels in the Barwon River. The pre- Lough Calvert flow of sheet water travelled north through a number of lochs.
- Council as Committee of Management is responsible for the area between Ross' Point and the Barwon Water Treatment Plant. Jurisdiction includes the foreshore and the infrastructure on the lake bed (eg. red gum posts designate the original rowing course). The Committee of Management cannot grant permission to do anything on the water body itself however.
- Community groups generally do not seek permission to undertake works on the foreshore (or do so retrospectively). In some cases the planning scheme has not been adhered to.
- There is a lack of clarity about who has authority to grant permission for development around the lake. This contributes to ad hoc development.
- There is a need for a management structure and consultation process between the various authorities to co-ordinate activities.
- Corangamite Catchment Management Authority is responsible for managing the Barongarook and Deans Creeks beds and banks.
- Parks Victoria is responsible for streamside reserves (however, there are none).
- NRE is a referral authority where works are proposed in a waterway, however Council referrals do not always make it to NRE where the issue is not obvious, eg.

where development drains into creeks but does not involve any construction within the creek.

### Grants:

- There are a number of grants to Land Care groups upstream and to landholders associated with Deans Creek, mainly for re-vegetation and fencing.
- Most funding is now controlled by CCMA, usually on a dollar for dollar basis.
- Groynes and structures around the lake have been funded by the community, landholders and sometimes by Council, eg. revegetation of the groyne near the yacht club was undertaken by the Scouts.
- Carp Management:
  - A fisheries permit is required.
  - Both State and Federal approvals have been obtained to commercially harvest and export carp from Lake Colac and the operation is scheduled to commence in 2002.
  - Electro fishing equipment has also been obtained and has been activity involved in carp control in Lake Colac and elsewhere for the past six years.
  - Carp is being harvested for fertiliser and crayfish bait.
- Erosion:
  - The natural soil type and soil structure contribute to the erosion problem.
  - Native vegetation may have held the banks together in the past.
  - The key issues are the water level and the lack of native vegetation.
  - Stock access to the lake and creeks is a problem.
- Barongarook Creek is subject to erosion and therefore supplies sediment to the lake. The creek (or at least part of it) is an engineered structure designed to drain the natural wetlands. Weeds are also a problem.
- A rock wall is a very expensive solution that needs to be carefully designed in order to be effective, eg. at Lake Calongulac a dome of loose rock with integrated vegetation was developed; eg2. poor outcomes at Point Lonsdale where wave action has caused blow outs at the ends of the rock wall.
- Group is generally opposed to hard engineering solutions. Preferred options include cell structures and matting along the shoreline to support vegetation.



- Causes of erosion need to be addressed – deforestation, altered water flows, stock access. An integrated approach is needed.
- Groynes do not resolve erosion problems, they merely transfer them or create new problems by transferring wave action.
- Key priorities identified by the group (not in any order):
- Nutrients/Algal blooms – stormwater and agricultural runoff need to be managed at the source (eg. conditions to be placed on permits within the whole catchment).
- Water quality – establish wetlands at places such as the end of Barongarook Creek to act as artificial kidneys and provide habitat.
- Education – focus on vegetation, water quality and greater appreciation of the lake by the community.
- Protection and restoration of native vegetation around the lake – grasses/rushes, riparian species. A 100-200m buffer is required, particularly to stop overgrazing.
- Sediment – The natural drying out of the lake would aerate sediment and allow it to blow away. However, this would also result in the re-release of pollutants and would not address the volume of sediment now accumulated in the lake. Core sampling of the sediments is required to evaluate the volume and levels of contamination. Dredging is very expensive (in the order of \$10mill) and does not resolve the question of what to do with the polluted sediment.
- A whole of system approach is required for the catchment.
- Licensing/Law enforcement – water quality standards should be based on the quality of the water body rather than that of the effluent itself. Rigid controls should be applied and enforced as flexible ‘self-monitoring’ controls have not worked. There is a need to audit and benchmark water quality against other lakes.

### 11.1.5 European Heritage

- European settlement at Colac first occurred in 1837.
- Botanical gardens were first planned in the 1840s, around the same time that Huddle surveyed the town of Colac (Queen – Armstrong Streets; Wilson Street to lake). The plan was prepared by von Mueller of the Royal Botanic Gardens in Melbourne. The Friends of the Botanic Gardens are now in the process of restoring the gardens in accordance with the original plan.
- Rowing and yacht clubs have existed for over 100 years.

- A New Year's Day rowing regatta was held for many years, with competitors bringing their boats by train.
- In the early 20<sup>th</sup> century pleasure boats such as the 'Wanda' would traverse between the main jetty at the end of Hesse Street (destroyed in the 1950s), Meredith Park and Corarook. One of the boats, the 'Dorothy', broke its moorings and was shipwrecked in the middle of the lake until removed in the 1960s.
- Swimming baths existed at the end of Gellibrand Street near the Botanic Gardens. They included a diving tower.
- Until the Lough Calvert system was completed the levels of the lake fluctuated wildly and periodically flooded the surrounding area.
- Barongarook Creek was the original water supply for the town and included a swimming hole. It was realigned as part of the Lough Calvert Scheme. Originally it was closer to the Botanical Gardens.
- Colac was originally a supply town for western district squatters. The oldest surviving home was built in the 1860s. Much of the area between Murray Street and the lake was built between 1900-1920s.
- In the 1950s and 60s a regular street festival and carnival was held on the banks of the lake, there were also highland gatherings. Fire brigade competitions and championships are still held there.
- The flowering gums on Queens Avenue appear to have been part of a beautification project.

## Conclusion

- Much of the consultation findings have formed an integral part of the background findings for the study. These findings have been addressed and the following sections of the report identify the key concepts and recommendations that can realise the opportunities identified in the previous sections of the report.

## 12.0 APPENDIX 5: POLICY FRAMEWORK

### 12.1 POLICY REVIEW

- A number of studies were identified in the research and were reviewed (see Appendix 1). The following studies provided particular direction and identified particular issues specific to the development of the Lake Colac Management Plan.
- The following brief overview includes an outline of the most relevant sections of Municipal Strategic Statement, Colac Otway Strategic Development Masterplan Colac Structure Plan, Recreational Needs Study and Strategic Plan.
- Much of the strategic direction for the Management Plan is provided by the Municipal Strategic Statement (MSS) and Colac Otway Strategic Development Masterplan Colac Structure Plan, Recreational Needs Study and Strategic Plan. These studies have been reviewed and the most relevant issues have been outlined below. A full literature review is included in Appendix 2.

### 12.2 STRATEGICALLY SIGNIFICANT POLICIES

#### 12.2.1 Municipal Strategic Statement – Local Planning Policy Framework

- The Local Planning Policy Framework consists of a Municipal Strategic Statement and Local Planning Policies.
- The Colac Otway Municipal Strategic Statement describes Colac as:  
*‘...strategically placed as a key industrial, commercial and service centre for the Shire and the surrounding region. The Shire provides diverse employment opportunities through a range of primary industries, tourism and commercial and community services (Clause 21.01-01).’*
- Lake Colac is the largest of several natural lakes located in the northern areas of Colac Otway Shire.

#### Planning Controls:

- Lake Colac itself is included within the Public Conservation and Resource Zone (PCRZ).
- The purpose of the Public Conservation and Resource Zone is (amongst other things):

*‘To protect and conserve the natural environment and natural processes for their historic, scientific, landscape, habitat or cultural values.*

*To provide facilities which assist in public education and interpretation of the natural environment within minimal degradation of the natural environment or natural processes.*

*To provide for appropriate resource based uses.’*

- Land within a 200-metre vicinity of the lake is included within the following zone and overlays:

### **Residential 1 Zone (R1Z):**

- The Residential 1 Zone is generally located on the southern side of the lake, comprising the residential areas of Colac township. The purpose of the Residential 1 Zone (amongst other things) is:

*‘To provide for residential development at a range of densities with a variety of dwellings to meet the housing needs of all households.*

*To encourage residential development that respects the neighbourhood character.*

*In appropriate locations, to allow educational, recreational, religious, community and a limited range of other non-residential uses to serve local community needs.’*

### **Public Park and Recreation Zone (PPRZ):**

- Land included in the Public Park and Recreation Zone generally abuts the southern foreshore of the lake, north of the Colac town centre. The purpose of the Public Park and Recreation Zone is (amongst other things):

*To protect and conserve areas of significance where appropriate.*

*To provide for commercial uses where appropriate.’*

### **Industrial 1 Zone (IN1Z)**

- Land included in the Industrial 1 Zone generally abuts the southeast and south-west foreshores of Lake Colac. The purpose of the Industrial 1 Zone is (amongst other things):

*‘To provide for manufacturing industry, the storage and distribution of goods and associated uses in a manner which does not affect the safety and amenity of local communities.’*

## 12.2.2 Business 4 Zone (B4Z)

### Public Use Zone (Schedule 4) (PUZ4)

- The purpose of the Public Use Zone (Schedule 4) is to recognize land used for the purpose of 'Transport'. The Melbourne-Warrnambool Railway, south east of Lake Colac is included in the PUZ4. The purpose of the Public Use Zone is (amongst other things):

*To provide for associated uses that are consistent with the intent of the public land reservation or purpose.'*

### Public Use Zone (Schedule 6) (PUZ6)

- Land east of Lake Colac, adjoining the Warrnambool-Warrnambool Railway is included in the PUZ6. The purpose of the Public Use Zone (Schedule 6) is to recognize land used for the purpose of 'Local Government.

### Rural Zone (RUZ)

- Land included in the Rural Zone generally surrounds the lake to the north, east and west. The purpose of the Rural Zone is (amongst other things):

*'To provide for the sustainable use of land for extensive animal husbandry (including dairying and grazing) and crop raising (including horticulture and timber production).*

### Land Subject to Inundation Overlay (LSIO)

- Lake Colac, and a significant extent of land within 200 metres surrounding the lake is included within the Land Subject to Inundation Overlay. The purpose of the Land Subject to Inundation Overlay is (amongst other things):

*'To identify land in a flood storage or flood fringe area affected by the 1 in 100 year flood or any other area determined by the floodplain management authority.'*

### Design and Development Overlay (Schedule 2) (DDO2)

- The land included in the Design and Development Overlay (Schedule 2) is located south west, and south east of Lake Colac. The purpose of the Design and Development Overlay is (amongst other things):

*'To identify areas which are affected by specific requirements relating to the design and built form of new development.'*

- The design objective of the DDO2 is:

*‘To ensure that the industrial area on the western end of Colac is developed so that quality of buildings and works do not detract from the landscape character of this main entrance to the town.’*

### Heritage Overlay (Schedule 9) (HO9)

- Colac Botanic Gardens is protected under the Heritage Overlay at Schedule HO9. The Gardens are located on the southern foreshore of Lake Colac, approximately 750 metres north of Colac town centre. The purpose of the Heritage Overlay (amongst other things) is:

*‘To conserve and enhance heritage places of natural or cultural significance.*

*To conserve and enhance those elements which contribute to the significance of heritage places.*

*To ensure that development does not adversely affect the significance of heritage places.*

### Development Plan Overlay (Schedule 1) (DPO1)

- Land included in the DPO1 consists of Colac Abattoir and Food Production Plant which is located south east of Lake Colac. The purpose of the Development Plan Overlay is (amongst other things):

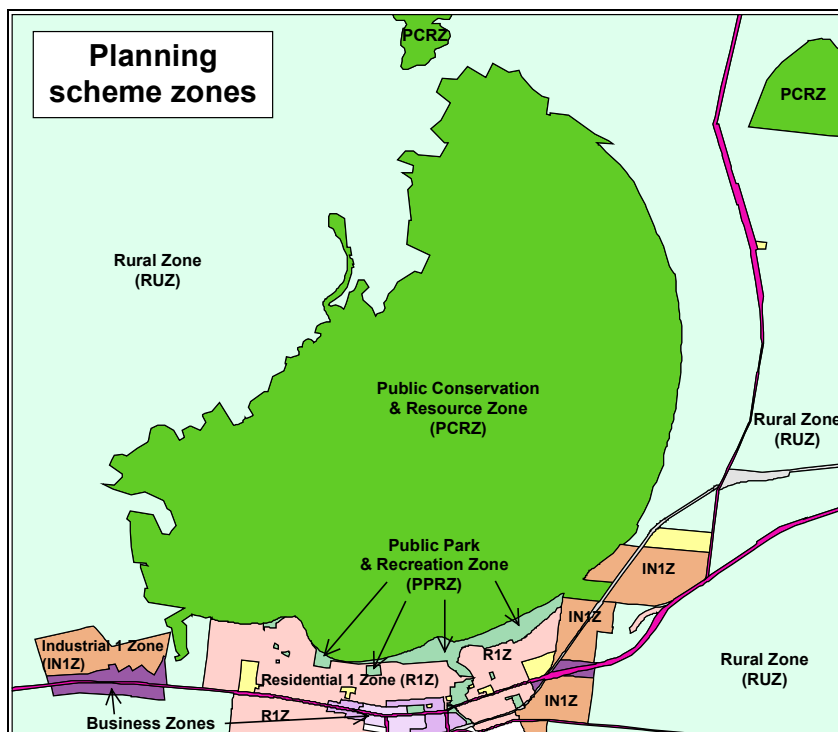
*‘To identify areas which require the form and conditions of future use and development to be shown on a development plan before a permit can be granted to use or develop the land.*

*To exempt an application from notice and review if it is generally in accordance with a development plan.’*

### Wildfire Management Overlay (WMO)

- Land included with the Wild Fire Management Overlay is located in two parcels, east of Lake Colac. One is located within the Industrial I Zone, the other in the Rural Zone.
- The purpose of the Wildfire Management Overlay is (amongst other things):  
*‘To identify areas where the intensity of wildfire is significant and likely to pose a threat to life and property.*

Map; A zone map has been included below to identify the locality of the zones.



### 12.2.3 Colac Otway Strategic Development Master Plan Colac Structure Plan

- PPK Environment & Infrastructure Pty Ltd, in association with Spiller Gibbins Swan Pty Ltd, BG Urban Solutions, Green & Dale Associates (2001) Commissioned by: Colac Otway Shire
- Purpose of study as to guide the future development and growth of Colac including the adjoining Elliminyt area, over the period to 2020 (page 1).

Major Findings:

- Land supply and demand:
  - ‘About 80 hectares of vacant industrial land is located in the north east part of Colac. Development of this land for industrial purposes would restrict views of Lake Colac as seen from the Princes Highway. The Planning for Industrial Development in Colac Study (1992) suggested that this land not be used for industrial purposes and rezone to broad-acre farming purposes. It is agreed that this area is not appropriate for industrial development given its close proximity to Lake Colac...’ (page 14).

- Environment:
  - ‘Lake Colac is the most significant environmental attribute of Colac. The lake and the surrounding rural areas contribute to Colac’s town character and are an influencing factor in the choice of residential location... Whilst the lake and environs are a tremendous asset to Colac, they appear to be underutilized. They could be more strongly prompted to encourage greater use by the local community and visitors to the town’ (page 15)
- The study acknowledges the need to undertake a study into the use, development and condition of the Lake Colac foreshore (page 16).
- Community Consultation Findings:
  - ‘Lake Colac is under-utilised and considered the Town’s best kept secret.
  - There is a water quality problem with respect to Lake Colac, which effects its promotion and use.
  - Need to ensure that adjoining land uses do not affect the quality of Lake Colac as has been the case in the past.
  - The lake is used for rowing, swimming, angling and sailing, but its poor environmental quality stops many people from using it, particularly for recreational purposes. It is also used commercially for eel aquaculture and commercial fishing.
  - Need to provide more picnic and camping areas around Lake Colac’ (page 19-20).
- Strategies and Action Plans:
  - ‘Rezone the area designated as Industrial 1 situated to the north-east of the town centre to Rural to protect its landscape values and Lake Colac vista from town approach (page 27).
  - Prepare a catchment management plan aimed at improving Lake Colac’s water quality...’ (page 28).
  - Require development to be appropriately located and sited in order to protect the quality of Lake Colac... (page 28).
  - Create a suitable buffer/setback for development around Lake Colac (page 28).
  - Prepare a master plan for the foreshore and surrounds of Lake Colac (page 28).
  - Prepare a master plan for the foreshore of Lake Colac to ensure that future recreation uses do not detrimentally affect the quality of Lake Colac (page 30).



- Undertake a feasibility study for Lake Colac focusing on the development of shared walking/cycling pathways, camping/picnic facilities, heritage and interpretation facilities (page 30).
- Promote Lake Colac through the 'Pride of Place' scheme (page 30).

#### 12.2.4 Colac Otway Shire Recreational Needs Study and Strategic Plan

- Colac Otway Shire, October 1997, Michael King and Associates Pty Ltd.
- The Colac Otway Recreation Needs Study and Strategic Plan process has involved extensive community consultation, service reviews, projections of likely future demands and identification of recreation trends relevant to the social and cultural population diversity of the Shire area.

##### Major findings:

- Approximately 21,800 people live in the Shire area with more than half of these people (58%) aged in their most active years (1-38).
- The area's population is reducing with 1,700 less people living in the area (8% reduction) in 1996 than in 1991.
- The majority of the 13,000 people live in the Colac township (61% of total population) whilst (8%) of residents live in coastal areas (31%) live in rural areas and small townships.
- Residents' average income levels are lower than state averages and this may limit people's ability to pay and use recreational facilities and programs.
- The community data bank indicates that there are in excess of 180 recreation, leisure or cultural groups in the Shire. The majority of these are based in Colac (80 clubs: 44%), Apollo Bay (8 clubs: 4%).

#### Recommendations

##### Issues and Strategy Directions

- There is major support for a shared footway/ trail/ bike/ skateboard network throughout Colac City areas linking the Colac Lake, Botanic Gardens and main recreation areas.
- Opportunities exist for the enhancement of individual passive recreation pursuits in non-formal settings throughout the Shire.

- Ongoing resource support to protect the unique natural features (i.e. foreshore dune systems, bushlands) of the Shire's open space, while enabling visitors and residents access to points of interest via established pathways and viewing platforms.
- Council to establish a taskforce with DNRE, Parks Vic, Barwon Region Bicycle Council and other related authorities to review, monitor and further develop pathways and trails throughout the Shire and the region.
- Council instigate township open space area reviews to highlight existing linear trails, features and future opportunities to link recreation areas together.

## Foreshore/ Crown Land

### Issues

- There is a high reliance by residents on use of Foreshore and Crown Land areas for recreation
- Improved communication required for clubs based on foreshore or Crown Land to land ownership and governing bodies, roles and responsibilities and coordinate between the management of Crown Land.
- Need for coordinated approach for recreation use of open space, inland bushlands, foreshores and waterways.
- Need for protection and policing of activities under-taken on inland waterways while encouraging use of these natural features as recreation facilities.

### Recommendations

- Lake Colac and surrounding lakes need development strategies completed with new trails developed and associated amenities to encourage more use.
- Opportunities to promote the diversity of natural resources and establish opportunities to use them within sustainable management practices.
- Council support the formation of a new communication group of foreshore/crown land managers to enable discussions on issues and future developments to be ongoing.
- Council seek to be represented on any planning groups considering future development or recreation use of inland lakes or waterways, in the municipality.
- Council authorise Recreation Services to identify and review any current plans or schemes for inland lakes and waterways and that a summary be presented to Council on the review findings/ recommendations.

- That Council seek the support of Foreshore and Crown Land Committees in a co-ordinated approach to open space planning and development and involve such groups in township plans, linear trails and park development i.e. Meredith Park, Lake Colac future developments.

#### **Funding:**

- Historically, Council has tried to meet capital works and grant demands through a the Community support fund

#### **12.2.5 ‘Pride of Place’ Colac Otway Heritage Study, Stage One**

- Colac Otway Shire, October 1998, Mary Sheehan and Associates.
- The most important characteristics of Colac mentioned in the Heritage Study pertained to Colac’s economic history:
  - Secondary industry has been dominant in the town throughout the Shire’s history including meat preserving which presently has connections with the abattoir (established in 1924), dairy with Regal Cream Products.
  - Natural Resources, particularly the timber industry, originally dominant at the turn of the century –have exploited the timber resources of the “formidable, forested uplands of the Otway Ranges.” Colac continues to operate milling plants.

#### **12.2.6 Colac Otway Shire Strategic Bicycle Plan**

- Park Links in association with Ardham Design Services, 1999, Colac Otway Shire
- The major recommendations identified in this plan that are of particular relevance to the Lake Colac Management Plan include:
  - A separate shared walking and cycling track was identified as proposed for Lake Colac (P24)
  - A feasibility study was identified as needed to construct walking and cycling tracks that includes botanical surveys, land use investigations, environmental impacts, engineering solutions, planning and landscape architecture and involvement ( P24)
  - Development of paths should take account of and integrate Koori Heritage and historical episodes from pre and post-white settlement. This would all be collated into a masterplan for the project, identifying recreation uses and including factors such as major focal points and cultural interpretation areas. (P24)
  - Figure 10 of the study indicates the proposed trail around Lake Colac (P36)

## 13.0 APPENDIX 6

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