BEGA VALLEY SHIRE COUNCIL

EUROBODALLA SHIRE COUNCIL

WALLAGA LAKE
ESTUARY MANAGEMENT PLAN

Issue No. 5
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FOREWORD

This Estuary Management Plan was prepared under the direction of the Wallaga Lake Estuary Management Committee (EMC) and in accordance with the NSW State Government's Estuary Management Policy. The process for developing the plan included the preparation of a number of component plans presented as Figures in **Appendix B** of this report reflecting the EMC and community's input on aspects such as the key values of Wallaga Lake, opportunities and constraints to various management strategies, and objectives for the management of the lake and surrounds. The Estuary Management Plan was developed from this input, a review of relevant reports, plans and policies together with an understanding of lake behaviour from an earlier Estuary Processes Study.

The goals and objectives of the Estuary Management Plan are listed below.

Goal: To conserve indigenous terrestrial flora and fauna and enhance habitats

Objectives
- To preserve areas of high conservation value
- To protect and enhance riparian and foreshore vegetation
- To protect, improve and increase habitat for native fauna

Goal: To conserve aquatic habitats and restore more natural water flows

Objectives
- To protect and conserve native aquatic species and habitats
- To address human impacts on natural estuarine processes
- To minimise entrance manipulation to mimic a more natural opening regime
- To achieve and protect environmental flows that maintain estuarine ecosystems

Goal: To improve fish stocks and achieve a sustainable recreational and commercial fishery

Objective
- To conserve and increase fish stocks for commercial and recreational fishing

Goal: To recognise and protect natural and cultural heritage

Objectives
- To recognise the natural and cultural heritage values of Wallaga Lake and the surrounding landscape
- To conserve and protect areas and items of cultural heritage
- To formally recognise sites of Aboriginal and Non-Aboriginal heritage
- To increase the understanding of the significance of cultural heritage sites

Goal: To encourage low impact recreation and tourism

Objectives
- To encourage low-key recreation and tourism opportunities
- To minimise the impacts of recreational use on conservation and local amenity values

Goal: To increase the understanding of the Lake's value and estuarine processes

Objectives
- To gain a better understanding of the factors affecting water quality, biota and physical processes in Wallaga Lake
- To encourage environmental awareness

Goal: To reduce the impact of development and human activities on lake water quality

Objectives
- To reduce or eliminate seepage from septic tank systems
- To improve the quality of run-off from rural, urban and forested areas

Goal: To promote ecologically sustainable development

Objectives
- To guide and control development in the catchment by applying the principles of ecologically sustainable development
- To provide specific controls for the protection of Meads Bay
- To minimise the impacts of catchment activities, construction works and urban development on Wallaga Lake
- To adaptively manage the lake through monitoring implementation of the plan's strategies and the environmental status and trends of the lake
- To promote information sharing and ongoing learning about Wallaga Lake and its catchment

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1 INTRODUCTION

1.1 BACKGROUND

Wallaga Lake is situated on the far south coast of New South Wales, between Tilba Tilba and Bermagui. It has a surface area of 7.8 km^2 and a catchment of 280 km^2. The two main creeks feeding the lake are Dignams and Narira Creeks. Wallaga Lake and the majority of its catchment falls within the Bega Valley Local Government Area (LGA), with the northern section of the catchment falling within the Eurobodalla LGA. The LGA boundary is along the northern shore of Wallaga Lake and Dignams Creek. Wallaga Lake National Park and Bermagui State Forest are located within the catchment *(see **Figure 1**)*.

1.2 ESTUARY MANAGEMENT PLAN PREPARATION

The Wallaga Lake Estuary Management Committee (EMC) was established by Bega Valley and Eurobodalla Shire Councils in July 1993, under the NSW Government's Estuary Management Policy. This policy recommends that EMCs prepare and implement Estuary Management Plans based on a sound understanding of the processes that give estuaries their physical, chemical and biological characteristics. An Estuary Processes Study for Wallaga Lake *(Patterson Britton & Partners 1996)* was completed in 1996 and provides the basis for this management plan. The Estuary Processes Study examined tidal and flood flows, water quality, sediments, flora and fauna and cultural values, and the effect that human activities have had on these aspects of Wallaga Lake. Refer to **Appendix A** for a summary of the study.

Development of the Wallaga Lake Estuary Management Plan involved consultation with the community, interest groups, Councils and agencies. The first stage of the study included a workshop to determine what the community valued about the estuary, issues that were considered important and future visions. A graphical plan of the regional significance and key values of Wallaga Lake was prepared and reviewed by the EMC. Following further discussion with the Bega Valley Shire Council, Eurobodalla Shire Council and agencies, graphical plans showing land use, land ownership, future use, heritage, conservation and constraints and opportunities were developed and reviewed by the EMC. These plans present the current land and waterway uses, conflicts, impacts and controls, the likely future land and waterway uses, the potential for nature conservation, remedial measures and enhancement opportunities.

A management framework plan was then prepared presenting the outcomes of the above plans and establishing objectives for devising management strategies. Individual management strategies were identified and a matrix assessment chart prepared for the weighting and ranking of strategies and options. A second community workshop was held to assign priorities and responsibilities to each of the identified strategies.

Management issues relating to Wallaga Lake were canvassed through a Data Compilation Study *(Bryant et al 1994)* and consultation carried out as part of the Estuary Processes Study and development of the Estuary Management Plan. This included input from the Wallaga Lake Estuary Management Committee and two community workshops. **Section 3** provides a summary

AERIAL PHOTO OF STUDY AREA

Figure 1 Study Area

and discussion on the issues raised during the various studies and **Appendix B** contains details of the input provided by the Wallaga Lake EMC and community to this management plan.

1.3 PLANNING AND MANAGEMENT FRAMEWORK

NSW Coastal Policy
The NSW Coastal Policy 1997 is the Government's policy for the coordinated planning and management of the NSW coastal zone. It aims to guide coastal zone planning and management by coordinating the various policies, programs and standards which apply at both State and Local Government level including the NSW Estuary Management Policy under which this Estuary Management Plan has been developed.

The Coastal Policy is based on the four principles of ecologically sustainable development (ESD) contained in the Intergovernmental Agreement on the Environment signed in 1992 as follows:

- conservation of biological diversity and ecological integrity
- inter-generational equity
- improved valuation, pricing and incentive mechanisms
- the precautionary principle.

The Policy advocates that ESD principles be used to guide decision making in all areas and activities affecting the NSW coast. Within this context the Coastal Policy establishes the following goals:

- to protect, rehabilitate and improve the natural environment
- to recognise and accommodate natural processes and climate change
- to protect and enhance the aesthetic qualities of the coastal zone
- to protect and conserve cultural heritage
- to promote ecologically sustainable development and use of resources
- to provide for ecologically sustainable human settlement
- to provide for appropriate public access and use
- to provide information to enable effective management
- to provide for integrated planning and management.

The goals of the Coastal Policy establish the overall long term outcomes for the Policy and they are to be achieved through specific objectives and strategic actions for which responsibility is assigned to Government agencies, local Councils and the wider community. Estuary Management Plans are one of the many tools by which the objectives of the Coastal Policy are to be met.

NSW Estuary Management Policy
The New South Wales Government recognises the ecological, social and economic importance of the State's estuaries and is concerned about the long term consequences of their accelerating degradation. In response to this concern, an Estuary Management Policy was developed in 1992. This Policy forms part of a suite of catchment management policies and provides for the assessment of all estuarine uses, the resolution of conflicts and the production of a unified and sustainable management plan for each estuary, including remedial works and the redirection of activities, where appropriate.

The general goal of the Government's Estuary Management Policy is to achieve an integrated, balanced, responsible and ecologically sustainable use of the State's estuaries which form a key component of coastal catchments. Specific objectives of the Policy (NSW Government, 1992) are:

- the protection of estuarine habitats and ecosystems in the long-term, including maintenance in each estuary of the necessary hydraulic regime;
- the preparation and implementation of a balanced long-term management plan for the sustainable use of each estuary and its catchment, in which all values and uses are considered, and which defines management strategies for:
  - conservation of aquatic and other wildlife habitats
  - conservation of the aesthetic values of estuaries and wetlands
  - prevention of further estuary degradation
  - repair of damage to the estuarine environment
  - sustainable use of estuarine resources, including commercial uses and recreational uses as appropriate.

The Policy itself will be implemented through the preparation and implementation of Estuary Management Plans. This process requires the formation of an Estuary Management Committee, chaired by the local Council, to supervise subsequent investigations and the ultimate formulation of an Estuary Management Plan. Important steps in this process are the undertaking of Estuary Processes and Estuary Management Studies. An Estuary Processes Study defines baseline conditions including status and trends for the various physical, chemical and biological estuarine processes and interactions between them and between other land and water uses. An Estuary Management Study defines management objectives, options and impacts on the estuary. This leads to the development of an Estuary Management Plan, which consists of management strategies and a scheduled sequence of activities that need to be undertaken to achieve the estuary management objectives. The estuary management process involves public participation at all stages.

NSW Water Reforms

In mid 1997 the NSW Government announced a series of water reforms aimed at achieving clean healthy rivers and groundwater systems and productive use of water by:

- better sharing of available water
- enhancing investment strategies for the rural water sector
- reshaping how water management is delivered.

The key community-based mechanism for advising the Government in its delivery of water reforms is the establishment of River, Groundwater and Water Management Committees. These Committees are being gradually set up in response to community interest, a stressed rivers classification system and for major groundwater systems that are at risk from over-extraction or contamination. Each of these Committees will have to prepare plans for the future management of water in their area. Such plans may have a range of elements covering surface water sharing, managing natural flow variability, instream aquatic environment, water quality, floodplain management including wetlands, river bed and bank management, associated groundwater management and estuary management for coastal rivers. Information and advice will be sought from Estuary and Floodplain Management Committees particularly where Estuary and Floodplain Management Plans have already been prepared. More recently, Catchment Boards have been

established by the NSW Government to integrate natural resource management at a catchment level.

Central to the 1997 water reform package is the setting of water quality objectives (WQOs) and river flow objectives (RFOs). The River, Water and Estuary Management Committees can refine or expand these objectives through their river planning process. Interim WQOs and RFOs were released by the Government in 1999 to assist Committees in developing their plans. The objectives are detailed in a series of documents published by the NSW Environment Protection Authority (EPA) and covering all NSW catchments titled 'Water Quality and River Flow Interim Environmental Objectives, Guidelines for River, Groundwater and Water Management Committees' (NSW Government, 1999). Wallaga Lake is covered under the 'Bega River Catchment' along with all estuaries from Wallaga Lake in the north to Wallagoot Lake in the south.

The water quality objectives for all these estuaries are protection of:
- aquatic ecosystems
- visual amenity
- secondary contact recreation
- primary contact recreation
- aquatic foods (cooked) and commercial shellfish production.

The EPA Guidelines provide key water quality indicators and numerical criteria for each objective and these have been adopted as the standards for Wallaga Lake in this Estuary Management Plan. Available water quality data was collated, analysed and interpreted in the Estuary Processes Study conducted prior to preparing the Plan and the level of compliance with indicators contained in the Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC, 1992) assessed. However, both the ANZECC Guidelines and the subsequent EPA Guidelines only provide ranges for a number of indicators and recognise the need for site- or region-specific information. The Plan acknowledges this need and includes strategies for further data collection and setting of water quality targets which will be done in conjunction with the South Coast Water Management Committee.

For the same estuaries the river flow objectives are to:
- maintain wetland and floodplain inundation
- manage groundwater for ecosystems
- minimise effects of weirs and other structures
- maintain or rehabilitate estuarine processes and habitats.

Specific measures have been proposed in the Guidelines to achieve these objectives as follows:

River Flow Objective	Measures to Achieve Objective
Maintain wetland and floodplain inundation	Maintain, restore or mimic natural inundation and drying patterns in natural and semi-natural wetlands and remaining native floodplain ecosystems.
	Ensure adequate access for native fish to and from floodplain wetlands.
Manage groundwater for ecosystems	Implement the NSW Groundwater Policy (DLWC 1997a, 1998).
	Identify any streams or ecosystems that may depend on high groundwater levels, and assess whether impacts on these may be caused by changed recharge rates or excessive pumping.
	Identify areas where groundwater may be rising and likely to threaten ecosystems or surface water quality.
	Identify long-term trends or changes in groundwater levels that are likely to threaten ecosystems or the quality of ground- or surface-water.
	Determine appropriate action to keep changes in groundwater levels within acceptable bounds.
Minimise effects of weirs and other structures	Implement the NSW Weirs Policy (DLWC 1997b).
	Identify and take action to reduce the impact on native fauna of other structures that impede movement of water - eg. floodgates, tidal barriers.
Maintain or rehabilitate estuarine processes and habitats	Adequate environmental assessment is necessary to determine the optimal opening regime of coastal lagoons and lakes. Management in the longer term should require planning to reduce the risk of flooding, and management of catchment activities to improve water quality.
	Dredging beyond the minimum needed to maintain navigation channels should be subject to environment assessment before being allowed to proceed.
	Minimise draining or disturbance of areas of potential acid sulfate soils.
	Protect fish habitats - such as protected areas, seagrass beds and mangroves - from pollution and increased sedimentation or erosion. Polluted sites should be rehabilitated.
	Ensure that water-based activities have minimal impact on fish habitat.
	Deal with other processes affecting (or potentially affecting) estuary health - eg. where increased urbanisation is proposed, ensure that impacts are avoided or minimised.

Some of these objectives and measures are derived from existing State Government policies such as the State Rivers and Estuaries Policy, the Estuary Management Policy and the NSW Wetlands Management Policy and have therefore been considered in developing the Estuary Management Plan. Most of the remaining objectives and measures are relevant to the management of Wallaga Lake and have been incorporated into the goals, objectives, strategies and actions of the Estuary Management Plan with the main exception of the groundwater objective. The issue of

groundwater has not been addressed at this stage as it was not raised as a significant issue during the community consultation phases of Plan preparation.

Management of Wallaga Lake

The Wallaga Lake EMC comprises representatives from the public and private sectors having a role, or interest, in the management of Wallaga Lake and its catchment. In addition to Bega Valley and Eurobodalla Shire Councils, State Government authorities with a management role include the National Parks and Wildlife Service (NPWS), State Forests, Department of Land and Water Conservation (DLWC), NSW Fisheries, NSW Waterways, Environment Protection Authority (EPA) and Department of Urban Affairs and Planning (DUAP).

Each of these authorities is responsible for preparing and implementing plans and policies relating to their particular responsibilities. Accordingly, this Estuary Management Plan seeks to ensure that these plans and policies are consistent with the goals for management of Wallaga Lake *(as outlined in **Section 4**)*. Planning documents which are, or will be, of particular relevance to the management of Wallaga Lake include the following:

Acts

Marine (Boating Safety - Alcohol and Drugs) Act, 1994
Heritage Act, 1997
National Parks and Wildlife Act, 1974
Crown Lands Act, 1989
Rivers and Foreshores Improvement Act, 1948
Native Vegetation Conservation Act, 1997
Fisheries Management Act, 1994
Forestry Act 1916
Forestry and National Parks Estate Act 1998
Navigation Act, 1901
Protection of the Environment Operations Act, 1997
Environment Planning and Assessment Act, 1979
Threatened Species Conservation Act, 1995
Environment Offences and Penalties Act, 1989
Catchment Management Act, 1989

Management Plans

Eden Ecologically Sustainable Forest Management Plan (SF)
Eden Regional Forest Agreement
Southern Regional Forest Agreement
Eden Forest Agreement
Southern Forest Agreement
SFNSW Forest Management Zoning
SFNSW Working Plan for Gulaga Flora Reserve No 7
Wallaga Lake Local Parks and Foreshores Plan of Management, 1996
Bega Valley and Eurobodalla Urban Stormwater Management Plans *(to be prepared)*
Far South Coast Catchment Management Strategic Plan, 1996
Wallaga Lake National Park, Goura Nature Reserve, Bermagui Nature Reserve Draft Plan of Management 1997
Bega Valley Shire Management Plan, Environment Policy, 1996 - 99

Bermagui – Wallaga Lake Sewerage Strategy Study Report, NSW Public Works, 1993

Environmental Planning Instruments
Bega Valley Local Environmental Plan *(LEP)* 1987
Eden Integrated Forestry Operations Approval
Eurobodalla Rural LEP, 1987
Eurobodalla Urban LEP 1999
Lower South Coast Regional Environment Plan REP No. 2, 1994
State Environmental Planning Policy No. 14 – Wetlands
State Environmental Planning Policy No. 19 – Bushland in Urban Areas
State Environmental Planning Policy No. 44 – Koala Habitat Protection

General Planning Instruments
Draft Bega Valley Shire Local Strategy for Residential and Rural Residential Land Supply 1997
Lower South Coast Regional Settlement Strategy, 1997
Bega Valley Shire Council Tree Preservation Order
Bega Valley Shire Council DCP's Nos. 3, 5, 9, 16A1, 21, 24, 25, 27, 45, 53
Eurobodalla Shire DCP, No. 156, Rural Sub-divisions, 1994
Eurobodalla Shire Council Rural Land Clearing Guidelines
Wallaga Lake and Foreshores Development Control Plan(s) *(DCPs) (to be prepared)*
Fish Habitat Protection Plan No. 2 – Seagrasses

Tourism
The Sapphire Coast Regional Tourism Strategy
Eurobodalla Shire Nature Coast - Tourism Development Strategy
South Coast Region NSW Tourism Development Strategy, 1990

State Policies, Guidelines and Strategies
NSW Water Reforms 1997
NSW Coastal Policy, 1997
Estuary Management Policy and Manual, 1992
Crown Land Foreshore Tenures Policy (Non-Commercial Operations), November 1991
Coastal Crown Lands Policy, 1991
NSW State Rivers and Estuaries Policy, 1989
State Soils Policy, 1987
NSW Wetlands Management Policy, 1996
Public Wharf and Jetties Guidelines, 1990
Draft NSW Biodiversity Strategy, 1998
NSW Sewerage Strategy

The Estuary Management Plan provides recommendations for the review of existing plans and sets objectives for the development of future plans. It also provides recommendations on how the community, Councils and agencies can participate in the management of Wallaga Lake, thereby providing the mechanisms for implementing the Plan.

Adaptive Management

Adaptive management is being used increasingly in the management of ecosystems. It allows for decisions (sometimes critical) to be made in advance of scientific certainty and adapted as more or

better information becomes available. Thus managers can progress towards a longer term, but initially unknown goal in as many steps as may be necessary.

Estuarine ecosystems and the effects of human disturbances to them are not well understood. While they are naturally subject to dramatic change imposed by flood, fire and drought, they are not infinitely resilient to external change. In recognition of these scientific uncertainties, any management regime adopted must include monitoring of the effects of implementation and also of unexpected events to review and improve management policies. This continuous feedback and periodic adjustment of the management regime is termed adaptive management and has been adopted for Wallaga Lake.

The Precautionary Principle

As the management regime for Wallaga Lake embraces the Adaptive Management model in policy development, the model should be guided by the Precautionary Principle.

This principle of policy-making is based upon the reflection that, given the complexity and diversity of environmental issues, when an activity is perceived to pose a threat to harm the environment or human health, precautionary measures should be taken even if some direct cause and effect relationships are not fully proven scientifically. In this context the proponents of an activity, rather than the public, should bear the burden of proof.

The precautionary principle is an approach to risk management in cases where the scientific evidence is not conclusive enough to determine a level of protection, but where there is a potential of damage to the environment and/or public health, so that protective measures must be taken.

Planning Process

The process followed in preparing the Plan is set out in the Estuary Management Manual and is broadly summarised as follows:

VISION: a short unifying statement of the desired future lake environment
↓
VALUES: a detailed statement of what is important about the lake
↓
GOALS: broad outcomes or guiding principles for decisions
↓
OBJECTIVES: specific outcomes to be achieved
↓
ISSUES: the threats to the values
↓
PROCESSES: how the estuary functions and the causes of the issues
↓
STRATEGIES: how the objectives will be achieved and the issues addressed
↓
ACTIONS: the specific tasks required to implement the strategies
↓
MONITORING: quantified performance indicators for determining plan success
↓
REVIEW: required to adapt management strategies based on monitoring results.

2 VALUES OF WALLAGA LAKE

2.1 COMMUNITY VALUES ASSOCIATED WITH WALLAGA LAKE

The vision:- 'An estuarine environment that is conserved and enhanced for its natural, aesthetic and cultural values, while also providing for economic, social and spiritual wellbeing for the community. Management will be based on ecologically sustainable development principles for the benefit of present and future generations.

At a more detailed level, the values the community associates with Wallaga Lake are shown in **Table 1**. These values were established from the outcomes of a workshop and consultation held during the preparation of the Estuary Management Plan and are summarised in **Figure 2**.

2.2 LAND USES AND ACTIVITIES

The following sections provide information on the main land uses and activities within the catchment of Wallaga Lake. Land ownership and land uses surrounding the lake are shown in **Figure 3**.

Urban Development
There are five main sites of urban development surrounding Wallaga Lake. Fairhaven and Beauty Point lie on the eastern shore of the lake. Wallaga Lake Heights faces the entrance channel, while Akolele and the Koori Village are located on the northern shore. The township of Cobargo *(population 375)* is located approximately 14 km south-west of Wallaga Lake. The urban areas *(all of which are unsewered)* make up 0.5% of the catchment of Wallaga Lake.

Recreational Open Space
The main recreational zone is the lake itself. It is used for numerous activities including boating, waterskiing, swimming and fishing. Aboriginal cultural tours are also based on and around the lake. Other open space includes public reserves located along the foreshores of Wallaga Lake and the beach areas along the adjacent coastal zone. These recreational areas cover 1.0% of the catchment.

Agriculture
The removal of native vegetation for agricultural purposes began in the Wallaga Lake catchment in the 1840s. Since Non-Aboriginal settlement, most of the land clearing has been in the Narira Creek catchment. Agricultural land uses account for 61.8% of the catchment of Wallaga Lake. The agricultural areas are situated on rolling to undulating country and support a wide range of agricultural activities. The agricultural areas are occupied primarily by rural holdings devoted mainly to specialist dairying and to a lesser extent running beef cattle. Farms are generally small, substantially cleared and improved. .

Rural Small Holdings
In recent times there has been a trend towards development for the purposes of rural small holdings or hobby farms in the Shire. Rural small holding development is created from 2 different land uses zones. On one hand we have the 1(a) zone with a minimum subdivision area of 120 hectares, but with concessional allotments providing potential for a scattering of lots in the 2-10

Table 1 Key Values of Wallaga Lake

• **Natural Beauty**	• Wallaga Lake is considered an area of significant natural beauty. • The diverse features of the area, ie the lake, forests, and Gulaga/Mt Dromadery, within such close proximity to each other make Wallaga Lake a unique location in the region. • The visual beauty of the lake and its surrounds is a key value of the Wallaga Lake estuary.
• **Unspoiled Environment**	• The unspoiled nature or relatively pristine condition of Wallaga Lake estuary is valued by residents and visitors. • The relatively pristine condition of the area is due to factors such as the low level of development on the foreshores and the presence of permanent forests on the north western shore resulting in an estuary with good habitat condition and relatively good water quality.
• **Tranquillity**	• Wallaga Lake is considered a peaceful and relaxing area. • The tranquillity of the area is primarily due to the low level of development on the foreshores and the current low impact use of lake, ie very few speedboats or jet skis.
• **Recreation**	• Wallaga Lake provides opportunities for recreational fishing, sailing, boating, swimming and water skiing in protected waters. • There are numerous picnic areas around the lake foreshores.
• **Tourism**	• Wallaga Lake is part of a wider cultural landscape including Baranguba - Montague Island(World Heritage site), Najanuga - Little Dromedary, Gulaga – Mt Dromedary(World Heritage site), Montreal Goldfields, Wallaga Lake National Park, Goura Nature Reserve, Mt Dromedary Conservation Area and Tilba Conservation Area. • Wallaga Lake is a popular tourist destination. • The primary tourist operators around the estuary are the caravan park and holiday cabin owners. • Tourist operators rely on visitors to the area for income. • Tourism provides an injection of money into the wider community and employment opportunities.
• **Commercial Fishing**	• Commercial fishers value the lake as it provides employment and income. • There are six regular, nine frequent and twenty-four seasonal fishers who fish commercially in Wallaga Lake and many more who hold licences enabling them to fish the lake. • The primary source of income for commercial fishers comes from finfish although prawn and oysters are also commercially harvested within the lake.
• **Residential Area**	• Wallaga Lake is valued as a residential area. • The community described the area as “a great place to live”, “safe place to raise a family”. • The residential centres on the Koori land and at Akolele, Wallaga Lake Heights, Beauty Point and Fairhaven are closely associated with the lake environment. • Residents value the lifestyle associated with living near the lake. • Wallaga Lake is a significant retirement area.
• **Cultural Heritage**	• The most prominent cultural values and sites around Wallaga Lake stem from the Aboriginal history and deep significance of the lake and surrounding area to the Aboriginal people. • Merrimans Island Aboriginal Place was the first Aboriginal Place gazetted in NSW. • Extensive midden sites are located around the lake and suggest the local Aboriginal community have lived here for at least 6000 years. • Gulaga/Mt Dromedary Landscape Conservation Area is in the northern part of the study area. • Non-Aboriginal historic sites relate to goldmining. • Montreal Goldfields are located behind the beach dunes and the site is currently zoned a public reserve.
• **Development Potential**	• There is scope for development on the northern (limited) and eastern shores of Wallaga Lake • Development has the potential to provide income for landholders, developers and tradespeople. • An increase in development and employment around Wallaga Lake would also provide an injection of money into the local economy.
• **Flora and Fauna**	• Over 60 lake dependent bird species rely on the Wallaga Lake ecosystem for breeding, shelter and food. • The lake is considered one of the most significant estuaries for birdlife in NSW because of the Little Tern breeding area in the vicinity of the Baroongatoo Wildlife Reserve. • The fish stocks, prawn and fish nursery identified in Meads Bay, surrounding forests, seagrass beds, swamps, saltmarsh and delta wetlands are all valued components of the Wallaga Lake estuary. • The riparian vegetation provides significant habitat for many species some of which are endangered. • The bio-diversity of the lake and its surrounds is a key value of the Wallaga Lake estuary. • The catchment of Wallaga Lake is known habitat for several threatened and endangered species of flora and fauna including the koala and the long nosed potoroo.
• **National Park and State Forest**	• Wallaga Lake National Park is on the register of the National Estate. • The National Park and State Forests are valuable resources for day use activities such as hiking and picnicking.

	• They are also valued as a visual resource as they limit the scope for future development around Wallaga Lake. • The National Park and State Forests are located in a unique position on the foreshores of the estuary. • Bermagui State Forest contributes sustainable timber resources under the Regional Forest Agreement
• **Accessibility**	• Visitors to Wallaga Lake and residents of the area value that the lake foreshore and waterway are accessible.

Rural Small Holdings (continued)

hectare range in this zone. Excluding the environment protection zones which have limited capacity to supply small holdings, the only other zone relevant to rural small holdings is the 1(c) zone which allows in theory subdivision down to 5000m^2 depending on site constraints and relevant development control plans.

Aboriginal Land

A Koori reserve is located on the northern shores of Wallaga Lake and makes up 0.3% of the catchment of Wallaga Lake. The Kooris living at Wallaga Lake are part of the Yuin people who have occupied the area for many generations. The Wallaga Lake Koori Village (including the Umbarra Cultural Centre) occupies an elevated promontory in the vicinity of Kings Corner and School and Cemetery Points. The village and adjoining lots are owned by the Koori people through the Merrimans Local Aboriginal Land Council *(LALC)*.

National Parks (pre Regional Forest Agreement)

Wallaga Lake National Park covers an area of 1237 ha on the western and northern shores of the lake. There have been a number of Aboriginal midden sites and artefacts discovered within the National Park. The park also supports a number of recreational activities such as boating, bushwalking, swimming, fishing and wildlife observation. There are currently no formal walking tracks or other facilities within the National Park. Wallaga Lake National Park and Goura Nature Reserve *(which is located close to Wallaga Lake)* make up 6.2% of the catchment.

State Forests (pre Regional Forest Agreement)

Timber getting in the Wallaga Lake area dates back to the early period of Non-Aboriginal settlement in the 1800s. Bermagui State Forest is located to the south of Wallaga Lake, with a frontage of about 4 km to the Narira Creek Basin. Logging commenced in the Bermagui State Forest over 100 years ago. Other State Forest lands located, or partly located, within the catchment of Wallaga Lake are the Bodalla and Murrabrine State Forests, and Gulaga Flora Reserve (formerly known as Mt Dromedary Flora Reserve). These areas cover 28.4% of the catchment.

Under the Regional Forest Agreement only sections of Bermagui State Forest remain within the Wallaga Lake catchment These will be subject to integrated harvesting for sawlogs and pulpwood and will contribute approximately 17,000 cubic metres of high value timber to the sustainable sawlog supply in the region during the next 20 years.

Vacant Crown Land (pre Regional Forest Agreement)

Vacant Crown land comprises 1.8% of the catchment.

Forested Private Land

There are a number of areas of remnant vegetation on private land that include habitat links between forest reserves and areas of forest in the immediate lake catchment.

Figure 2 Key Values and Regional Significance Plan

Figure 3 Land Use and Land Ownership Plan

2.3 NATURAL AND CULTURAL RESOURCES OF WALLAGA LAKE

National Parks and other Reserves
The conservation significance of the western shore of Wallaga Lake was recognised by the establishment of the Wallaga Lake National Park in 1972 and its inclusion in the register of the National Estate in 1978. The park is considered of local and regional conservation significance as it contains a large number of Aboriginal sites, habitat for several threatened animal species, and areas of rainforest and estuarine wetland. It also provides protection for part of the catchment of Wallaga Lake, and foreshore recreational and tourism opportunities. The National Parks and Wildlife Service have developed a draft Management Plan for Wallaga Lake National Park, which allows for traditional Koori activities and day use only *(NPWS 1997).*

The Goura Nature Reserve is located to the north west of Wallaga Lake. The reserve is considered of State and regional conservation significance, particularly with regard to the conservation of the endangered Long Nosed Potoroo.

Much of the Wallaga Lake foreshores adjacent to the urban areas is zoned 6a Public Open Space. Conservation areas have also been recognised. Sections of the foreshore are zoned 7a Environmental Protection - wetland and 7b Environmental Protection - foreshore.

Heritage Sites
Aboriginal Sites
Aboriginal land around Wallaga Lake currently includes Merrimans Island Aboriginal Place (first Aboriginal Place gazetted in NSW) and the former Wallaga Lake Aboriginal reserve located on the northern shore of Wallaga Lake. The Local Environmental Study *(LES)* for the Wallaga Lake Koori Village states that the former Wallaga Lake Aboriginal Reserve is a culturally significant place associated with physical, written and oral evidence demonstrating many thousands of years of continuous Aboriginal occupation.

Documented sites of cultural significance in the village precinct include sacred trees, a stone arrangement, corroboree ground and the mission cemetery. There are also numerous Aboriginal midden and cultural sites around the Wallaga Lake foreshore, Murunna Point and the hinterland. Wallaga Lake and Gulaga *(Mt Dromedary)* are important places of cultural and spiritual significance. Wallaga Lake is also a source of traditional foods and medicines for the local Koori community *(NPWS 1997).*

Montreal Goldfields
The Montreal Goldfields site is located between Beauty Point and Fairhaven. It was one of the main workings of the Montreal gold strike and includes numerous mining shafts, a ruin of a shack probably dating from the 1930s and a 'whim' *(a large vertical drum turned by horses and used to raise mine excavation material).*

The Montreal Goldfields Management Committee propose that the Montreal Goldfields be preserved for educational and recreational purposes, which could include tourist interpretation of the former goldfields. The significance of the goldfields has also been recognised in the Bega Valley Urban Overview Report *(BVSC 1995).*

State Forests
Management of Bermagui State Forest is aimed at sustainable timber production and conservation of environmental and cultural values. The State Forest system of Forest Management Zoning, identifies about 100ha of harvesting exclusion or special prescription zones to protect wildlife and visual resources in the Wallaga Lake catchment. Forestry operations will be subject to the Integrated Forestry Operations Approval including the conditions of licences issued by the EPA, NPWS and NSW Fisheries

Bermagui State Forest surrounds Black Lagoon (a cutoff embayment) and fronts part of the Narira Creek Basin. A scenic drive follows much of this frontage and the Bermagui Forest Park has been built and maintained by State Forests to allow for public access and enjoyment of this area and lagoon foreshore.

Fisheries
Wallaga Lake has the 5th largest annual average commercial catch on the south coast, estimated at 27,500 kg. A Review of South Coast Estuarine Fisheries *(NSW Fisheries Institute 1997)* for the years 1984/85 to 1995/96 found that total production for Wallaga Lake has been variable, with no overall long-term downward trend. However, the recorded catches for the 3 subsequent years have been 39,672 kg, 15,216 kg and 18,644 kg and the catch rates for both bream and luderick were found to have declined over the period of the Review. The Review recommends that current management arrangements for Wallaga Lake be assessed to determine if any additional management intervention is required. It also notes the need for further information on recreational fishing catches. There is no data available on total recreational finfish catches for Wallaga Lake, however anecdotal evidence over a long period indicates that recreational fish catches are declining. Wallaga Lake is also an important source of fish, including shellfish, for the local Aboriginal community.

2.4 EXISTING AND POTENTIAL URBAN AND RURAL DEVELOPMENT

Urban Development
The Department of Urban Affairs and Planning's report, *'Lower South Coast Regional Settlement Strategy',* (LSCRSS) identifies principles for future planning, to provide an adequate supply of suitable residential land and services to accommodate the projected growth, while retaining the region's unique character. The document is a policy document with the full support of the NSW Government. Development decisions within the Lower South Coast Region will need to be consistent with the strategy.

The LSCRSS and accompanying Land and Housing Monitor (1996 edition) record the urban lot supply (subdivided and un-subdivided vacant lots) at 319. The estimated urban land supply around Wallaga Lake is sufficient to meet predicted demand for the next 25 years or more.

The LSCRSS notes the availability and capacity of services may limit the development potential of some land. Some villages may have minimal capacity for development without the provision of a sewerage system. The strategy notes the expansion of the urban area around Wallaga Lake is limited by environmental constraints and priority investigations are to determine an appropriate sewerage solution and to resolve foreshore management issues. It is also noted the Akolele urban area is not connected to a sewerage system and without servicing, water quality issues may limit the growth potential.

The LSCRSS also recommends (p 20) that Wallaga Lake should retain its low key character and that urban development should be encouraged in existing centres e.g. Bermagui. In addition, one of the objectives of the NSW Coastal Policy is to promote compact and contained planned urban development in order to avoid ribbon development, unrelated cluster development and continuous urban areas on the coast. This is to be achieved by preparing planning instruments and development control plans that define the boundaries of urban areas and indicate the amount and form of development which is appropriate for each location taking into account the environmental and servicing implications.

The Land and Housing Monitor emphasises the importance of caravan parks for tourism and comments on the increase in the number of caravans in the region occupied as long term dwellings. The Monitor suggests a Zoning Review period of greater than 15 years for urban settlement at Wallaga Lake.

The LSCRSS estimate of 319 lots available for urban supply assumes the land zoned 2c to the north of Beauty Point Road is developed to accommodate 100 dwellings. Currently Council has no definite plans to sell this land. Therefore should it continue to be unavailable for development the potential dwelling supply for Wallaga Lake would be reduced.

The Koori Village presently contains 27 dwellings. The Merrimans Local Aboriginal Land Council indicates a future demand of 1-2 additional dwellings each year.

The surrounding urban area, which has a direct impact on Wallaga Lake, is currently very small. The shoreline is stable and suffering no significant erosion. As discussed in Section 2.3 much of the Wallaga Lake foreshore adjacent to the urban areas is zoned 6(a) Existing Open Space under BVSC LEP 1987 while sections of the foreshore are zoned 7(a) Environmental Protection – (Wetland) under ESC Rural LEP 1987 and 7(b) Environmental Protection – (Foreshore) under BVSC LEP 1987. The strategies developed under the Wallaga Lake Estuary Management Plan will need to recognise that wetlands and foreshores can be impacted by development draining to these areas. Accordingly catchment controls will need to be examined e.g. zoning, buffer strips, water quality and quantity measures etc.

Rural Development

There are 12 existing dwellings in the northern Rural 1a Zone within Eurobodalla Shire. Under the current planning provisions there is potential for six more dwellings. Wherever a dwelling is permitted a dual occupancy is permissible. The estimated total dwelling potential for the Eurobodalla Shire Rural 1a zone is 20 dwellings.

In Bega Valley Shire the 1a zoned land that stretches along Narira Creek for a distance of approximately 8 kilometres upstream of Wallaga Lake has been assessed. In this area there is the potential for a total of 16 dwellings under current planning provisions. Attached dual occupancies are also permissible in the 1a zone in lieu of single dwellings but there are few examples of this option being taken up in the Bega Valley Shire.

In the 1(c) area on Narira Creek there are approximately 48 lots existing with 16 dwellings. Dual occupancy development is permissible with consent in this 1(c) area. Any remaining land with subdivision potential in the catchment is generally zoned 1(a) and not considered suitable for rural small holdings due to its environmentally sensitive nature, current land uses and level of servicing provided.

A preliminary investigation of the short term land supply in the local Bermagui area including Wallaga Lake and Narira Creek areas has been undertaken as part of Council's Rural Residential Land Supply Strategy, and reveals that existing supply is adequate. As part of the research some issues have been investigated relating to the impact of rural small holding development. Concerns about the following impacts have been expressed:

- adverse impacts on water quality and quantity
- excessive clearing of steep or sensitive environmental land and remnant vegetation
- increased exposure of built assets to bush fire hazard
- constraints placed on agricultural operations
- extra maintenance and capital works expenditure for Council associated with scattered development
- high community costs.

Having regard to the environmental considerations above and current supply of land, any further subdivision of land in the Wallaga Lake catchment area for rural small holdings is very unlikely.

Constraints to Development

Constraints to development around Wallaga Lake include a potential deterioration in water quality due to nutrient inputs from remnant vegetation clearing, catchment runoff, urban stormwater and septic tanks, particularly in poorly flushed backwaters and indented bays.

Figure 4 shows proposed or potential uses of land surrounding Wallaga Lake, while **Appendix B** provides an overview of urban and rural residential development potential throughout the Wallaga Lake estuary.

Figure 4 Future use Heritage and Conservation Plan

3 ISSUES

3.1 GENERAL ISSUES

A range of concerns are held by the local community and have been documented in the Data Compilation Study. The extent and causes of these issues were investigated in the subsequent Estuary Processes Study. All of the issues raised were confirmed to be valid and are summarised as:

- the growth of the deltas; where the concern is infilling of the lake by fluvial sediments. While the predicted future growth is not as dramatic as previously thought, it is recognised that infill rates are an order of magnitude greater than those prevailing prior to Non-Aboriginal settlement
- water quality generally within the lake; where the concerns are nutrient impacts from existing and potential urban development, ineffective septic systems, urban stormwater, poorly flushed backwaters and indented bays, and catchment runoff
- conservation; where the concerns are protection of aquatic and terrestrial wildlife, relatively shallow depth for seagrass growth, loss or degradation of vegetation and habitats and need for retention and rehabilitation of foreshore and riparian vegetation in urban areas
- reduction in fish stocks; where the concerns are overfishing, commercial haul netting and bycatch kills, unwitting or illegal taking of juveniles, reduction in food sources from bait gathering, and loss of habitat through natural and anthropogenic changes to breeding and nursery grounds
- human use and access to the foreshores and waterway of Wallaga Lake; where the concerns are protection of the Aboriginal and non-Aboriginal heritage, effects of recreational boating and lack of associated facilities and visual amenity of the foreshore
- the need to protect the overall visual, aesthetic and spiritual values of the lake and its environs.

3.2 MEADS BAY

Currently one of the most significant issues to the local community is the proposed development potential around Meads Bay. Meads Bay is flushed much less than the main body of the lake and as a remnant infilled geomorphic feature, is shallow and in the process of becoming further isolated from the lake in a similar manner to Black Lagoon. The information available indicates there are some signs of reduced water quality in this area compared to the main body of the lake. The community concerns are:

- infilling of the bay by sediments generated through any development
- increased nutrient load into the bay
- impacts on the fish and prawn nursery function of the bay
- removal of remnant vegetation and habitat
- impacts on the visual amenity at the southern end of the lake
- impacts related to expectations that future residents may have regarding water access.

3.3 LAKE HEALTH ASSESSMENT

National State of the Marine Environment Report
Many of the issues raised during development of the Plan relate to the condition or 'health' of the sediments, water and biota that together make up the lake's ecosystem. A range of indicators has been proposed by agencies and researchers to assess the environmental status and trends of estuarine ecosystems. It is useful to summarise such assessments into a simplified format in order to convey an overview of the status of the ecosystem. Such an approach was used in the State of the Marine Environment Report (*SOMER, Zann 1995*) that was produced to assist and guide the management of Australia's marine environment. From that report, a system of Report Cards was developed to simplify and summarise the status and trends of various aspects of the marine environment. Particular ecosystem indicators were identified and assigned grades which were broad and descriptive, intended for qualitative assessments of the scale of the particular health issue. The grades are defined as follows (*Zann 1995*):

A: EXCELLENT	(*no obvious effects of human activities*)
B: GOOD	(*general slight effects, or few sites with moderate effects*)
C: FAIR	(*general moderate effects, or some sites with serious effects*)
D: POOR	(*general serious effects, or some very serious effects*)
?: UNCERTAIN STATUS	(*insufficient knowledge*)

Wallaga Lake Report Card
A Report Card has been produced for Wallaga Lake summarising the lake's ecosystem health using 25 biophysical indicators. The Report Card system used in the National report has been expanded for Wallaga Lake to include the current value of the indicator, comparison of the current value with a reference value, the trend in the status of the indicator and the pressures and their trends causing deterioration in the indicator. The reference values are drawn from a number of sources depending on the nature of the indicator including:

- established quantitative guidelines (eg. EPA or ANZECC water quality criteria)
- levels or rates of change assuming undisturbed conditions (eg. comparison of contemporary sedimentation rates with pre-development rates)
- values from similar estuaries on the far south coast to provide a regional context for the indicator (eg. depth distribution of seagrass).

The primary data sources for the Report Card were the Wallaga Lake Estuary Processes Study (*WLEPS*) and the State of the Rivers and Estuaries, NSW Far South Coast Report (*SORE*). The SORE report and a number of other smaller studies were produced subsequent to the WLEPS and have been accessed to provide the latest information available on the health of Wallaga Lake.

Trends have been given using one of the following four values:
⇔ = stable
 = improving
 = worsening
? = insufficient data.

Results of Report Card

From the Report Card shown following, it is evident that all 25 indicators of ecosystem health have been affected by human activity in the catchment or the lake. Most indicators are showing slight to moderate effects but none have reached a critical reference value. The trends are of greater concern as more than half of the trends in status are worsening as are most of the trends in pressure. While the system overall could be said to be in generally good condition, the effects of past human activity are being felt and the increasing pressures are causing deterioration in ecosystem health. What is also evident is the lack of data on the pressures and the processes by which pressures impact on the lake. Concurrently, the trends in pressures also lack reliable information and point to the need for a rigorous assessment of future data requirements.

Table 2 – Report card for Wallaga Lake

SEDIMENTS						
	STATE				PRESSURE	
INDICATOR	Current Value	Reference value	Status	Trend	Sources	Trend
Geomorphology						
Fluvial sedimentation rate	4,000 – 5,000 m^3/year on both Narira and Dignams Creek deltas	500 – 600 m^3/year over last 6,000 years	C	👍	Catchment clearing for agriculture particularly along creek lines	👎
Marine sedimentation rate	Flood tide delta growth concentrated upstream of bridge	Prior to causeway construction, delta growth extended over the full width of the inlet channel	C	👎	Presence of causeway, more frequent artificial entrance opening	⇔
Extent of foreshore and riparian bank erosion	Negligible foreshore erosion, <10% of Narira Creek banks actively eroding	Some bank erosion is part of the natural meander process	B	👎	Removal of vegetation, increased recreational activity, increased peak flood flow rates from catchment development	👎
Bank modification	22 structures mainly jetties, boat ramps and reclamations	57% increase in structures from 1995 to 1999	B	👎	Urban expansion and property improvement	👎
Sediment quality						
Toxicant levels (Arsenic, Chromium, Copper, Lead, Zinc)	no data available	Arsenic 20; Chromium 81; Copper 65; Lead 50; Zinc 200 (*mg/L*) [11]	?	?	Roads, agricultural chemicals	👎 (*slight*)
Total Phosphorus	500 mg/kg [2]	<420 mg/kg non-polluted [6] 420 – 650 mg/kg moderately polluted [6] >650 mg/kg contaminated [6] (typical in south coast estuaries)	B	👎	Sewage, rural and native animals, rural and urban fertilisers, catchment and creek bank erosion	👎 (*slight*)

Total Nitrogen	2000 mg/kg [2]	<1000 mg/kg non-polluted [6] 1000-2000 mg/kg moderately polluted [6] >2000 mg/kg contaminated [6] (typical in south coast estuaries)	B	👎		👎 (*slight*)
Total Organic Carbon	3.0% [2]	No specific criteria	?	?		?

WATER						
	STATE				**PRESSURE**	
INDICATOR	**Current Value**	**Reference value**	**Status**	**Trend**	**Sources**	**Trend**
Water flows						
Tidal prism	0.84×10^6 m^3	Natural prism ≅ 1.4×10^6 m^3	D	⇔	Presence of causeway, more frequent artificial entrance opening	⇔
Environmental flows	2 structures, 5 water extraction licences	No specific criteria	B	⇔	Irrigation needs	⇔
Water quality						
pH	7.2 – 8.3 [2]	<0.2 pH unit change [1], 6.5 – 8.0 [7]	B	⇔	Changing nutrient and algal levels, PASS, artificial entrance opening	⇔
Total Nitrogen	379 µg/L [2]	100 – 759 µg/L [12]	B - C	👎	Eutrophication, organic and inorganic pollution from elevated nutrients, contaminants and suspended solids from poor rural water quality, urban stormwater, sewage	👎
Total Phosphorus	32 µg/L [2]	10 – 100 µg/L [12]	B	👎		👎
Chlorophyll *a*	2.1 µg/L [2]	1 – 10 µg/L [1]	B - C	👎		👎

Total Suspended Solids	13 mg/L [3]	<5 NTU = Low [12] 5 – 25 NTU = Medium [12] 25 – 50 NTU = High [12] >50 NTU = Very High [12] <10% change in seasonal mean NTU[1]	B - C	👎	Sourced mainly from soil and stream bank erosion and run-off	👎
Turbidity	0.5 – 9.5 (*4.0 avg*) NTU [2]		B	👎		👎
Faecal coliforms (*fc*)	0 – 3000 orgs/100mL [3] (106, 82, 12, 143 average orgs/100mL, from 4 residential areas in dry conditions [5])	1° contact <150 fc/100 mL [1] 2° contact <1000 fc/100 mL [1] Edible seafood <14 fc/100 mL [1]	B - C	👎	Rural and native animals, urban stormwater, sewage	?
Salinity	34 g/L [3]	<5% change from background levels [1]	B	⇔	More frequent artificial entrance opening, altered tidal prism from both changed entrance regime and causeway, modified catchment runoff	⇔
Potential acid sulphate soils (*PASS*)	Low [2]	No specific criteria	B	⇔	Decrease in pH within the system as acid is released from PASS exposed during development on historic wetlands that have been drained	⇔

BIOTA						
	STATE				**PRESSURE**	
INDICATOR	**Current Value**	**Reference value**	**Status**	**Trend**	**Sources**	**Trend**
Aquatic and riparian flora						
Seagrass area, composition and distribution (*depth limits*)	Area = 1.343 km^2 Species composition = Zostera, Halophila sp., Ruppia sp.	Depth distribution shallower than comparable lakes in the region indicates impacted water quality [8]	B - C	👎	Possible localised dieback, decreased richness and complexity of seagrass meadows due to elevated	👎

	Depth = 1.0 – 1.4m [8] Secchi = 1.9 – 2.1 m [8]				nutrient levels, epiphyte growth, reduced light penetration and sedimentation	
Saltmarsh area and distribution	Area = 0.295km^2	No specific criteria	C	⇔	Possible localised losses from changes in salinity, tidal range, sediment supply, grazing, weeds	👎
Vegetation distribution and condition along tidal foreshores	55-60% dense cover [4] 35-40% sparse cover [4] 5% absent [4]	No specific criteria. Typical of other south coast estuaries [4]	B - C	👎	Vegetation threatened by clearing in urban areas and along creeklines, cattle grazing	👎
Aquatic fauna						
Macroinvertebrate distribution and abundance	No data available [9]	No specific criteria	?	?	Water quality degradation, destruction and modification of intertidal and subtidal habitats, sedimentation and altered tidal regimes are examples of pressures on local fisheries	?
Fish distribution and abundance	15 species, 1753 individuals, 0.245 Shannon diversity [10]	No specific criteria. Composition, diversity and abundance consistent with other south coast estuaries	?	?		?
Exotic fauna distribution and abundance (*known or likely to occur*)	17 species in far south New South Wales	No specific criteria	?	?	Almost all are unintentionally introduced species with the potential to compete/replace/exclude native species, damage local fisheries and aquaculture	?

1: ANZECC (1992)
2: EPA (1996) Catchment
3: FRI (1980)
4: Draft SORE (1999)
5: Patterson Britton & Partners (1996)
6: US EPA
7: Meade (1989) in ANZECC draft (1999)
8: Doherty *et al*. (1998)
9: Museum of Victoria (unpub. data)
10: West and Jones (1998)
11: ANZECC (1998)
12: EPA Water Quality Objectives, Bega River

3.4 STRENGTHS AND WEAKNESSES

The Report Card indicators chosen to show the state or health of Wallaga Lake are controlled by a number of physical, chemical and biological characteristics of the lake and its catchment and the effect of human settlement on those characteristics. For example, the rate of sedimentation can be influenced by soil type, topography, the extent of catchment clearing and stream bank erosion; water quality by catchment area, lake volume, tidal flushing, entrance condition and land use; biota by lake depth, turbidity, nutrient loads etc. An analysis can be conducted of these natural and anthropogenic characteristics to determine which ones assist in maintaining the health of the lake (ie. system strengths) and those that make the lake more susceptible to degradation (system weaknesses). Understanding the strengths and weaknesses of the system can then assist in targetting appropriate management plan strategies.

Strengths
The water quality of Wallaga Lake is variable temporally and spatially but testing shows that the water quality generally complies with the ANZECC guidelines. The lake exhibits acceptable water quality and supports valuable habitat and aquatic fauna for a number of reasons:

- the surrounding urban area which is likely to have a direct impact on the lake, is relatively small
- for the limited tidal range, flushing potential is good when the mouth is open and dominates fluvial inflows in respect of the water quality regime of the lake
- the shoreline is stable away from the entrance and is not suffering any significant erosion
- lake infilling is relatively slow, and although delta growth rates have increased considerably since European settlement commenced, the next 50 years should see the deltas advancing no more than 200 m.

The critical process which drives this state of relative good health, and resultant ecological and social amenity is the exchange of clean saline ocean water and lake water under tidal influence. When the entrance is closed, and no tidal exchange can occur, the health of the estuary is assisted by the relatively small ratio of catchment runoff volume to lake volume, ie. the lake has a high dilution capacity. However, the effect on lake water quality of entrance closures lasting several years, which has been observed during a number of droughts, is at present unknown. Secondary factors contributing to the relative good health of the estuary are the presence of lake foreshore and riparian vegetation and other aquatic and terrestrial habitats

Weaknesses
There are a number of factors that could potentially contibute to further adverse impacts on the lake and hence ecological sustainability of use. These include:

- high percentage (62%) of the lake catchment under agricultural use
- lower catchment agricultural land use concentrated along creek lines
- limited vegetation in catchment riparian zones
- Wallaga Lake urban development on clay based soils immediately adjacent to poorly flushed bays and Cobargo immediately adjacent to Narira Creek
- poor flushing of bays under either tidal or wind influence
- large increases in sediment/nutrient input since European settlement
- currently high nutrient and chlorophyll-a concentrations and low water clarity
- entrance closed for long periods of time and hence no flushing

- relatively shallow extent of seagrass beds
- epiphyte coverage of seagrass on eastern and western shore
- land clearing causing soil disturbance in the catchments and changes in the hydrologic regime.

The prime factors likely to have a deleterious impact are catchment runoff and generally associated nutrient inputs.

4 MANAGEMENT GOALS AND OBJECTIVES

4.1 GOALS AND OBJECTIVES OF THE ESTUARY MANAGEMENT PLAN

The goals of the Estuary Management Plan are:

ENVIRONMENTAL

- To conserve indigenous terrestrial flora and fauna and enhance habitats
- To conserve aquatic habitats and restore more natural water flows
- To reduce the impact of development and human activities on lake water quality
- To promote ecologically sustainable development.

ECONOMIC

- To improve fish stocks and achieve a sustainable recreational and commercial fishery
- To encourage low impact recreation and tourism.

SOCIAL

- To increase the understanding of the Lake's value and estuarine processes
- To recognise and protect natural and cultural heritage.

Management objectives associated with these goals, and accompanying strategies and actions to achieve these objectives are listed in **Section 5**. **Figure 5** provides a summary of the main strategies of the Estuary Management Plan.

A number of planning and policy strategies were identified during the preparation of the Estuary Management Plan. To achieve the goals and objectives of the Estuary Management Plan, these strategies would be implemented through environmental planning instruments prepared under the *Environmental Planning and Assessment Act 1979*, and through the preparation of local policy and guideline documents *(some of which are required under other NSW legislation).* Accordingly, it is proposed that a Development Control Plan (DCP) (or DCPs for each LGA) be prepared for Wallaga Lake and that the Eurobodalla and Bega Valley Local Environmental Plans (LEPs) be reviewed and amended, if appropriate, as part of this process. It is proposed that the DCP cover the lake bed itself (which is currently unzoned) and existing and potential urban areas around Wallaga Lake. Consideration could be given to a separate zoning category for Meads Bay to recognise the unique characteristics of Meads Bay compared to Wallaga Lake as a whole. Suggested objectives for the DCP are listed in **Section 4.2**.

Figure 5 – Wallaga Lake Estuary Management Strategies Plan

Where Wallaga Lake is mentioned in the following sections, this also refers to Meads Bay. As noted in **Section 3**, Meads Bay is flushed much less than the main body of the lake, is shallower, and data indicates some signs of reduced water quality compared to the main body of the lake. Accordingly, to meet the goals and objectives of the Estuary Management Plan and proposed DCP and amendments to the LEP, stricter guidelines and controls need to be formulated to address the potential impacts of development and other activities on Meads Bay.

4.2 DEVELOPMENT CONTROL PLAN OBJECTIVES

Suggested specific objectives for a Wallaga Lake DCP are listed below in relation to natural and visual environments; cultural heritage; and open space, recreation and tourism.

Natural Environment
Specific objectives in relation to the natural environment include:

- to recognise the unique characteristics of Meads Bay compared to Wallaga Lake as a whole
- to preserve identified areas of biological conservation value in the intertidal and subtidal zones, while also recognising the importance of the lake to the local recreational and commercial fishing and tourism industries
- to protect and enhance foreshore and wetland flora and fauna habitat areas, in a manner that is consistent with their conservation value and function as stormwater runoff filters, while also recognising the validity of other uses of the foreshores
- to maintain and improve the water quality of the lake to provide a healthy habitat for aquatic species and water birds and for water-based recreational activities, through the promotion of sustainable development and provision of appropriate infrastructure
- to encourage the protection and enhancement of remnant vegetation areas within the Wallaga Lake catchment.

Visual Environment
Specific objectives in relation to the visual environment include:

- to protect and enhance natural landscapes and natural features, and the special scenic qualities of the lake
- to maintain and promote the retention of views of the lake and natural foreshore areas from public land along the foreshores
- to ensure that adequate consideration is given to the visual impact of development.

Cultural Heritage
Specific objectives in relation to cultural heritage include:

- to recognise the continuous association of the local Koori community with Wallaga Lake
- to conserve and protect areas and items of Aboriginal and Non-Aboriginal cultural value which form part of the Wallaga Lake environs
- to encourage an appreciation of the role the lake and its resources have played in the history of Aboriginal occupation and Non-Aboriginal settlement
- To encourage an appreciation of the significance of the lake and its resources to contemporary Aboriginal people.

Open Space, Recreation and Tourism
Specific objectives in relation to open space, recreation and tourism include:

- To recognise that nature and cultural-based tourism associated with Wallaga Lake is of economic value to the local community
- To recognise the value of the lake as an outstanding location for recreational boating activities
- To recognise the role that existing foreshore open space areas have in providing access to the lake and in accommodating water-based recreational and cultural tourism activities
- To recognise the value of the lake to residents and tourists for passive recreation and environmental appreciation
- To provide and promote appropriate access to and around the lake, and from the lake to foreshore open space, consistent with the conservation of areas of natural and cultural heritage value
- To make provision for boating and other visitor and tourist facilities in appropriate locations and to standards such that they do not adversely impact on the visual, habitat, and water quality values of Wallaga Lake and the quality of life for local residents
- To give preference to low impact public and commercial recreational and tourism activities that are dependent on a foreshore location
- To facilitate, in appropriate circumstances, the provision of additional foreshore open space.

5 ACTION PLAN

Listed on the following pages are the goals, objectives, strategies and actions for the management of Wallaga Lake. Priorities and responsibilities are indicated for each action. The priorities were determined at a community workshop and are in terms of the importance of the issues to the community, and the resources available to implement actions in the short to medium term. Priorities are as follows:

- Priority 1 commencement in the 2000/2001 and 2001/2002 financial years
- Priority 2 commencement by the year 2005
- Priority 3 as resources become available in the longer term.

The following authorities or organisations are responsible for the implementation of various actions:

- BVSC Bega Valley Shire Council
- BPFC Bermagui Parks and Foreshores Committee
- DLWC Department of Land and Water Conservation
- DUAP Department of Urban Affairs and Planning
- EPA Environment Protection Authority
- ESC Eurobodalla Shire Council
- FISHERIES NSW Fisheries
- LG Landcare Groups
- LSCRSS Lower South Coast Regional Settlement Strategy
- MGMC Montreal Goldfields Management Committee
- MLALC Merrimans Local Aboriginal Land Council
- NPWS National Parks and Wildlife Service
- PWD Public Works Department (now NSW Dept of Public Works and Services)
- RFS Rural Fire Services
- SCWMC South Coast Water Management Committee
- SCT Sapphire Coast Tourism
- SECMB South East Catchment Management Board
- SF State Forests
- UCT Umbarra Cultural Tours
- RTA Roads and Traffic Authority
- WLEMC Wallaga Lake Estuary Management Committee
- WA Waterways Authority

Other acronyms used in this Plan are:

ANZECC - Australian and New Zealand Environment and Conservation Council
DCP - Development Control Plan
ESD - Ecologically Sustainable Development
LALC - Local Aboriginal Land Council
LEP - Local Environmental Plan
LES - Local Environmental Study
LGA - Local Government Area
LSCRSS - Lower South Coast Regional Settlement Strategy
RFA - Regional Forest Agreement
SEPP - State Environmental Planning Policy.
SoE - State of the Environment Reporting

Costs are provided as budgetary estimates where consultants, contractors and/or materials are required to execute an action. Actions related to normal duties of Council and agency staff have not been costed. For those items which have been costed the costs are:-

Priority 1 $232,00 to $257,000 plus $12,000 p.a.
Priority 2 $145,000 to $325,000 plus $10,000 p.a.
Priority 3 $135,000 to $285,000.

The total cost of implementation of those actions is assessed at between $512,000 and $867,000 plus the annual items costed at $22,000.

The majority of the actions involve education, knowledge, monitoring, controls, policy, promotion, liaison etc where performance indicators are simply evidence of the task having been undertaken ie, correspondence, agreements, studies executed, signage installed, brochures prepared, etc or else can be measured in terms of community awareness. Some investigations recommended in the plan may lead to works which will require monitoring. In addition, the Councils and the State Government need to monitor ecosystem health for the following reasons:

- some of the actions in the Estuary Management Plan are monitoring
- as there are many processes operating in Wallaga Lake that are not well understood an adaptive approach to its management is required whereby the effectiveness of the proposed management regime is tested and modified as new information and understanding is gained
- Council State of the Environment Reports and annual Management Plans require environmental data
- the NSW EPA has released the water quality and river flow interim environmental objectives for waterways in NSW including Wallaga Lake and data will be needed to audit whether objectives are being achieved
- DLWC has recently prepared a draft State of the Rivers and Estuaries Report for far south coast estuaries including Wallaga Lake. The indicators used for the state of the lake include nutrient and chlorophyll concentrations; sediment contaminant levels; species and extent of seagrass, saltmarsh and mangrove; width and extent of riparian vegetation; and diversity and

abundance of fish communities. Most of the data used was only existing limited information except for riparian vegetation for which aerial photography was analysed.

A consistent set of parameters should be devised by all parties involved in the management of Wallaga Lake to monitor the ongoing environmental status and trends of the lake's estuarine ecosystems.

Table 3 Action Plan

Terrestrial Habitats

5.1 GOAL: TO CONSERVE INDIGENOUS TERRESTRIAL FLORA AND FAUNA AND ENHANCE HABITATS

Objective: To preserve areas of high conservation value

Strategy		Action	Priority	Responsibility	Cost
Provide legal protection to areas of high conservation value within the catchment of Wallaga Lake	**1.1**	Undertake flora and fauna surveys/assessment of natural areas outside the National Parks and State Forests system and identify areas of conservation significance in terms of biodiversity and threatened species (see also **Action 8.1**).	1	NPWS, DLWC, COUNCILS	$30K
	1.2	Add areas of Crown land which have high conservation value to the National Parks system.	1	NPWS, DLWC	n/a
	1.3	Negotiate voluntary conservation agreements for private lands of high conservation value.	2	NPWS, landowners	n/a
	1.4	Review LEP in light of flora and fauna assessment and consider whether additional areas should be rezoned environmental protection (see **Action 8.3**).	2	COUNCILS	n/a

Objective: To protect and enhance riparian and foreshore vegetation

Strategy		Action	Priority	Responsibility	Cost
Improve the condition of existing riparian and wetland vegetation	**1.5**	Include strategies for the management of riparian and foreshore vegetation around Wallaga Lake in the Proposed Regional Native Vegetation Management Plan.	2	COUNCILS	n/a
	1.6	Develop a weed control and bush regeneration program for foreshore lands.	2	COUNCILS, NPWS	n/a
	1.7	Encourage private landholders and Crown land lease holders to manage stock to minimise damage to riparian and wetland vegetation.	1	LANDCARE, DLWC	n/a
	1.8	Liaise with State Forests, RFS, NPWS and State Fisheries regarding management of riparian areas to protect native vegetation.	1	COUNCILS	n/a
Maintain foreshore vegetation around the lake	**1.9**	Identify appropriate foreshore buffer zone widths and building setbacks.	1	COUNCILS	n/a
	1.10	Establish appropriate controls including zoning over foreshore areas to protect vegetation.	2	COUNCILS	n/a
	1.11	As opportunities arise through rezoning or development, acquire foreshore land to add to publicly owned reserves (see **Action 8.3**).	2	BVSC	n/a
	1.12	Update the *Wallaga Lake Local Parks and Foreshores Plan of Management* accordingly.	2	BVSC	n/a
	1.13	Encourage the establishment of indigenous vegetation on private property by providing	1	BVSC/LG	$5K

		tube stock to foreshore property owners. Where possible plants should be propagated from local seed sources or vegetative stock.			
	1.14	Support the local Landcare groups in the revegetation and restoration of foreshore areas by supplying tube stock and other assistance.	1	COUNCILS	$5K
	1.15	Develop a bell miner dieback management program.	1	NPWS, SF, COUNCILS	n/a
	1.16	Liaise with farmers and the Landcare groups to develop vegetated buffer strips and fencing along creeklines.	1	COUNCILS, DLWC, SCWMC	n/a
	1.17	Continue to investigate and prosecute property owners for breaches of tree preservation orders and illegal clearing.	1	COUNCILS	n/a

Objective: **To protect, improve and increase habitat for native fauna**

Strategy		Action	Priority	Responsibility	Cost
Provide vegetated corridors to link conservation reserves (e.g.Goura Nature Reserve, Mt Dromedary Flora Reserve, western and eastern sections of Wallaga Lake National Park) and State Forests and other identified areas of remnant vegetation	**1.18**	Identify and protect existing and potential wildlife corridors. eg. foreshore land and 1c land on Narira Creek.	2	NPWS, COUNCILS	n/a
	1.19	Encourage owners of private and public land to participate in Landcare programs to improve/regenerate bushland for wildlife.	2	COUNCILS, DLWC, SCWMC	n/a
	1.20	Review leases for Crown land to ensure that uses are compatible with habitat conservation values.	2	DLWC	n/a
Protect native fauna and migratory birds from predation by introduced domestic and feral animals and other threats	**1.21**	Continue to support NPWS and landowners in the management of the Little Tern nesting area, eg protecting fencing and signs from vandalism, controlling dogs, assisting rangers to control access.	1	COUNCILS	n/a
	1.22	Review management needs for identified threatened species found in Wallaga Lake and its environs.	1	NPWS	n/a
	1.23	Provide information to residents on the impacts pets, particularly cats, can have on native fauna and measures they can take to protect their pets and native animals (see **Action 6.10**).	1	COUNCILS	n/a

Aquatic Habitats

5.2 GOAL: TO CONSERVE AQUATIC HABITATS AND RESTORE MORE NATURAL WATER FLOWS

Objective: To protect and conserve native aquatic species and habitats

Strategy		Action	Priority	Responsibility	Cost
Provide legal protection for areas of Wallaga Lake having significant conservation values	**2.1**	Compile information on seagrass beds, rocky habitats etc to identify areas of conservation significance (eg Meads Bay as a fish nursery). See also **Action 8.1**.	1	FISHERIES, BVSC, WLEMC	n/a
	2.2	Undertake a Crown lands assessment of the bed of Wallaga Lake.	1	DLWC	n/a
	2.3	Identify Meads Bay as a sensitive area with high conservation significance requiring special attention and regard to the precautionary principle.	1	WLEMC	n/a
	2.4	Based on the outcomes of **Actions 2.1** and **2.2** consider a combinatiion of - zoning areas of Wallaga Lake for environmental protection under the Bega Valley LEP, zoning terrestrial lands to reflect the sensitivity of receiving waters, extending the boundaries of Wallaga Lake National Park to include submerged lands, extending the boundaries of SEPP 14 wetlands, and/or establishing a Marine Park jointly managed by NPWS and Fisheries (see also **Action 8.3**).	2	BVSC, NPWS, DUAP, FISHERIES	n/a

Objective: To address human impacts on natural estuarine processes

Strategy		Action	Priority	Responsibility	Cost
Maintain and improve tidal exchange	**2.5**	Undertake detailed investigations to determine the environmental benefits and costs of opening up the causeway to increase tidal flushing.	1	BVSC	$40K
	2.6	Monitor the entrance to Meads Bay to identify any accelerated siltation and consider the impact of the removal of sediment to maintain tidal flow to Meads Bay.	2	DLWC, BVSC	$10K pa
	2.7	Ensure that the concept plan for bridge replacement at Wallaga Lake conforms with the hydrological and environmental goals and objectives of the Estuary Management Plan.	1	BVSC, RTA	n/a
	2.8	Strictly enforce erosion and sediment controls for urban development and other activities which have the potential to impact on areas of Wallaga Lake.	1	BVSC	n/a

Objective: To minimise entrance manipulation to mimic a more natural opening regime

Strategy		Action	Priority	Responsibility	Cost
Review entrance management regime	**2.9**	Survey low-lying property to ascertain the impacts of inundation and determine how the lake opening level can be raised.	1	BVSC	$5K
	2.10	Introduce detailed recording of each entrance opening.	1	BVSC	n/a

2.11	Prepare an Entrance Management Policy and associated Review of Environmental Factors to gain required approvals and community input/support.	1	BVSC	n/a

Objective: To achieve environmental flows that maintain estuarine ecosystems

Strategy		Action	Priority	Responsibility	Cost
Review environmental flow regime	**2.12**	Work in conjunction with the Water Management Committee to determine current hydrological characteristics.	2	WLEMC	n/a
	2.13	Determine the effect of altered flow regimes on the estuary.	2	WLEMC	n/a
	2.14	Provide input to the flow management rules.	2	WLEMC	n/a

Fisheries

5.3 GOAL: TO IMPROVE FISH STOCKS AND ACHIEVE A SUSTAINABLE RECREATIONAL AND COMMERCIAL FISHERY

Objective: To conserve and increase fish stocks for commercial and recreational fishing

Strategy		Action	Priority	Responsibility	Cost
Regulate commercial and recreational fishing	**3.1**	Based on adaptive management and the precautionary principle, enforce or increase controls on fishing eg, closures, commercial catch quotas, restrictions on fishing methods and regulation of travelling fishers and review after scientific assessment.	1	FISHERIES	n/a
	3.2	Enforce closures, restrictions on fishing methods, catch limits and the taking of undersized fish. Depending on the outcomes of **Action 2.3** further restrict or ban the taking of aquatic fauna in areas of high conservation significance.	1	FISHERIES	n/a
	3.3	Undertake creel surveys of recreational fish catches with facilitation by NSW Fisheries.	1	FISHERIES, Local Fishing Groups	n/a

Cultural Heritage

5.4 GOAL: TO RECOGNISE AND PROTECT NATURAL AND CULTURAL HERITAGE

Objective: To recognise the natural and cultural heritage values of Wallaga Lake and the surrounding landscape

Strategy	Action	Priority	Responsibility	Cost

Obtain formal recognition of the heritage values of Wallaga Lake	**4.1**	Prepare submissions to the NSW Heritage Commission and the National Trust requesting heritage listing of the lake, mountains, coast and Montague Island (Baranguba), based on landscape quality, biodiversity, Aboriginal and geological significance.	2	WLEMC	n/a
Promote an understanding of the spiritual values of Wallaga Lake and surrounding landscape to Aboriginal people	**4.2**	Investigate the introduction of interpretive signs and/or brochures as part of an education program on the spiritual significance of the Wallaga Lake area to Aboriginal people.	2	WLEMC, NPWS, MLALC, UMBARRA, COUNCILS, BPFC	n/a
Obtain recognition of the heritage significance of the Wallaga Lake Bridge	**4.3**	Advise the RTA of the heritage significance of the Wallaga Lake Bridge to the local community and the desire to see it preserved.	1	WLEMC	n/a

Objective: To conserve and protect areas and items of cultural heritage

Strategy		Action	Priority	Responsibility	Cost
Manage and address impacts at sites with high visitation rates	**4.4**	Prepare a Management Plan for Murunna Point to address issues including access, appropriate recreational use, weeds, erosion and fire hazard.	1	BVSC, DLWC	$15K
	4.5	Formalise access and parking to the Fairhaven midden to limit damage to the area from cars and visitors.	2	BVSC, NPWS, UMBARRA	$20K
Identify additional heritage sites	**4.6**	Assist in adding to the information contained in the NPWS Aboriginal sites data base through requirements for archaeological surveys as part of subdivision or development applications (see also **Action 8.1**).	2	COUNCILS, MLALC, NPWS	n/a
	4.7	Support the local Koori community in identifying and documenting Aboriginal sites.	2	COUNCILS, NPWS, MLALC,	n/a
	4.8	Compile information on Non-Aboriginal heritage and/or undertake a Non-Aboriginal heritage study (see **Action 8.1**).	2	BVSC	$20K

Objective: To formally recognise sites of Aboriginal and Non-Aboriginal heritage

Strategy		Action	Priority	Responsibility	Cost
Include/update heritage provisions in LEPs	**4.9**	List heritage sites and items in the LEPs, along with provisions for their conservation. In the case of sacred Aboriginal sites and environmentally sensitive sites, which may be damaged if their location is publicly known, liaise with the local Koori community as to the level of information appropriate for public release through the LEPs (see **Action 8.3**).	2	COUNCILS	n/a

Objective: To increase the understanding of the significance of cultural heritage sites

Strategy		Action	Priority	Responsibility	Cost
Make information on heritage sites accessible to the general public and visitors	**4.10**	Develop interpretive material (see **Action 6.12** Interpretive Strategy) which includes information on the Montreal Goldfields, Aboriginal sites to be managed for educational and tourism purposes, and the Wallaga Lake Bridge.	3	SCT, UCT, NPWS, MGMC, COUNCILS, RTA	$50K
	4.11	Education campaign on the special significance of and restricted access to Merrimans Island Aboriginal Place.	2	NPWS, MLALC	

Recreation and Tourism

5.5 TO ENCOURAGE LOW IMPACT RECREATION AND TOURISM

Objective: To encourage low-key recreation and tourism opportunities

Strategy		Action	Priority	Responsibility	Cost
Review impacts of recreational/commercial vessel operation within the lake.	**5.1**	Review existing boating controls.	1	WATERWAYS	n/a
	5.2	Identify existing or proposed sensitive areas to be protected for their ecological values.	1	WATERWAYS, FISHERIES, BVSC	n/a
	5.3	Implement appropriate boating controls.	1	WATERWAYS,	n/a
	5.4	Review effectiveness of boating controls.	1	WATERWAYS	n/a
Provide facilities for low-key recreational uses of the lake	**5.5**	Investigate demand, and appropriate locations for sailcraft launching facilities, walking trails, and other recreation and visitor facilities (see **Actions 8.1**).	3	BVSC	$10K
	5.6	Include development/acquisition of open space and facilities for public recreation in Section 94 contribution plans (see also **Action 8.12**).	2	BVSC	n/a
Support low-key tourism uses of the lake	**5.7**	Promote Umbarra Cultural Tours through Council and tourism publications.	1	COUNCILS, SCT	n/a
	5.8	Encourage cultural and ecotourism activities and hire craft operations (eg canoes, sailboards etc) through expressions of interest for leases or licences of appropriate sites. Update *Wallaga Lake Local Parks and Foreshores Plan of Management* as required.	2	BVSC	n/a
	5.9	Encourage tourism development of a scale and nature compatible with the natural values of	2	BVSC	n/a
	5.10	Wallaga Lake (see **Action 8.3** proposed DCP). Promote use of Wallaga Lake National Park through provision of appropriate brochures and facilities.	2	NPWS	n/a

Objective: To minimise the impacts of recreational use on conservation and local amenity values

Strategy		Action	Priority	Responsibility	Cost
Control pedestrian access	**5.11**	Formalise and signpost walking trails and construct boardwalks in sensitive wetland areas.	3	BVSC	$50-$200k
Control vehicle access	**5.12**	Install log barriers, where appropriate, to restrict cars to cleared parking areas, eg as per **Action 4.4** Fairhaven Point.	2	BVSC	$40-$100k
Provide information to the community and visitors on minimising recreational impacts	**5.13**	Install signs at watercraft launching locations indicating speed and zone restrictions and environmentally sensitive areas. Also see **Action 6.7** education brochure/handout.	2	WATERWAYS, BVSC	$5k
	5.14	Install markers in the lake to delineate zones and environmentally sensitive areas as appropriate.	2	WATERWAYS	$20k

Education and Research

5.6 GOAL: TO INCREASE THE UNDERSTANDING OF THE LAKE'S VALUE AND ESTUARINE PROCESSES

Objective: To gain a better understanding of factors affecting water quality, biota and physical processes in Wallaga Lake

Strategy		Action	Priority	Responsibility	Cost
Develop a water quality data base suitable for scientific interpretation and use as a management tool.	**6.1**	Adopt the Water Quality Interim Environmental Objectives published by the NSW EPA.	1	EPA, WLEMC	n/a
	6.2	Establish short and long term water quality targets for Wallaga Lake from the Water Quality Interim Environmental Objectives and in conjunction with the South Coast Water Management Committee.	1	BVSC, DLWC, SCWMC	n/a
	6.3	Develop a water quality monitoring program targeting sensitive areas, e.g. Meads Bay and the influence of catchment loads.	2	BVSC, DLWC	$10K pa
	6.4	Extend monitoring program to provide an understanding of water quality throughout Wallaga Lake and the influence of catchment loads.	2	BVSC, DLWC	$20K
	6.5	Seek opportunities for further research into key lake processes using Government agency and academic staff. eg Wollongong University Environmental Science students.	2	WLEMC, DLWC, BVSC	n/a
	6.6	Publicise the Estuary Processes Study Summary.	2	WLEMC, BVSC, ESC, DLWC	n/a
Investigate the impacts of the causeway on Wallaga Lake	**6.7**	As per **Action 2.5** undertake detailed investigations to determine the effects of the causeway on tidal flows and deposition patterns, and develop a strategy to improve tidal flushing.	1	BVSC	$40K

Objective: To encourage environmental awareness

Strategy		Action	Priority	Responsibility	Cost
Encourage greater participation in Total Catchment Management and other environmental programs	**6.8**	Enclose information on, and contacts for, Landcare, Coastcare and Farming for the Future Programs etc in rate notices to urban and rural landowners, as appropriate.	1	COUNCILS	$2K
	6.9	As per **Action 1.14** provide assistance to volunteer groups undertaking erosion control works and bush regeneration, eg provision of tools, rubbish pick-up, training days, provision of indigenous plants.	1	COUNCILS	$10K
Provide information on responsible environmental management	**6.10**	Develop a brochure/handouts on Wallaga Lake for distribution with rate notices and through tourist accommodation providers and tourism operators. Brochure/handouts to include information on the ecology of the lake and importance of maintaining riparian and foreshore vegetation. Brochure/handouts to contain actions individuals can take to protect the lake, eg composting grass and garden clippings; minimising use of fertilisers; using indigenous plants for landscaping; washing cars on the grass; control of pets; burying pet droppings; disposing of rubbish in bins or taking it home; and reporting dumped garden and other refuse, illegal tree and vegetation clearing and illegal pumpout of septic tanks.	1	WLEMC, COUNCILS, SCWMC	$5-10K
	6.11	Hold briefing sessions/develop training programs for Council staff and contractors involved in maintenance works in, or near foreshore and other sensitive areas. This could include information on plant identification, bush regeneration and silt and sediment controls.	1	COUNCILS, NPWS, DLWC	n/a
Increase the level of understanding of the natural and cultural values of Wallaga Lake	**6.12**	Develop an interpretive sign strategy to include information on Aboriginal middens, the Montreal Goldfield, the Wallaga Lake Bridge and the flora and fauna of Wallaga Lake. Seek assistance from NPWS in developing an integrated strategy for the area.	3	COUNCILS, UCT, NPWS, BHS, MGMC, SCT, RTA	n/a
	6.13	As a first step, develop signs and other interpretive material on the Little Tern nesting area.	1	NPWS	$15K

Water Quality

5.7 GOAL: TO REDUCE THE IMPACT OF DEVELOPMENT AND HUMAN ACTIVITIES ON LAKE WATER QUALITY

Objective: **To reduce or eliminate seepage from septic tank systems**

Strategy		Action	Priority	Responsibility	Cost
Improve the performance of existing septic tanks	**7.1**	Provide landholders with brochure detailing septic tank maintenance, common problems and remedies and water conservation information.	1	COUNCILS	n/a
	7.2	Complete environmental audits of septic tanks to identify poor performance and illegal discharges and determine appropriate inspection regime.	1	COUNCILS	n/a
	7.3	Conduct an education campaign for owners covering effective operation, maintenance, legal requirements and penalties.	2	COUNCILS	n/a
	7.4	Advise owners of maintenance works required to improve performance.	2	COUNCILS	n/a
	7.5	Assist owners, as appropriate, with measures to improve performance, eg desludging, and alternative effluent disposal strategies, eg septic tank pumpout.	2	COUNCILS	n/a
	7.6	Continue to investigate and prosecute owners/occupiers where there is evidence of illegal septic tank discharges.	1	COUNCILS	n/a
Determine long-term solutions to address sewerage issues	**7.7**	Investigate options for sewering Cobargo to reduce bacterial and nutrient input to waterways.	2	BVSC	$40-60K
	7.8	Set criteria for the investigation of sewerage options for the Wallaga Lake urban area. These criteria should include:- • identified problems (see also **Action 7.2**) • LSCRSS recommendations re urban development and servicing infrastructure • desirable maximum population • acceptable costs to the community • and total water cycle management principles, eg common effluent drainage systems, dual reticulation for new development areas, treated effluent re-use and water use minimisation (ie water saving devices in new homes) • community consultation and willingness • minimising environmental impacts of infrastructure • high standard of final treatment • waste disposal option constraints • evaluation of alternative solutions	1	BVSC, DLWC	$20-40K

		Update *Bermagui-Wallaga Lake Sewerage Strategy Study Report* in light of agreed criteria.		
	7.9	Develop a sewerage strategy for Wallaga Lake, based on the outcomes of **Action 7.8**.	2	BVSC, DLWC	n/a
	7.10	In rural areas, development applications to be accompanied by information on soils and drainage, proposed effluent disposal methods and an assessment of environmental impacts on ground and surface waters.	1	COUNCILS	n/a

Objective: To improve the quality of run-off from rural, urban and forested areas

Strategy		Action	Priority	Responsibility	Cost
Maintain and enhance vegetation around the lake and along creek and drainage lines	**7.11**	As per **Actions 1.9** to **1.11** establish foreshore buffer zones around the lake based on an assessment of the width required to effectively filter runoff, and habitat requirements (see also **Action 8.3**).	2	COUNCILS, NPWS, DLWC	n/a
	7.12	As per **Action 1.15** liaise with farmers, foreshore landowners and the Landcare groups to develop vegetated buffer strips along creeklines and drainage lines.	1	COUNCILS, SCWMC, LG	n/a
Improve the quality of urban stormwater entering the lake	**7.13**	Ensure stormwater drainage designs incorporate vegetation filters and other 'soft' water quality control measures.	1	COUNCILS	n/a
	7.14	Wallaga Lake to be the first catchment investigated for the proposed Stormwater Management Plans for Bega Valley and Eurobodalla LGAs.	1	COUNCILS	n/a
	7.15	Provide information to the community on how to prevent pollution of waterways (see **Action 6.10** information brochure/handout)	1	WLEMC, SCWMC, COUNCILS	n/a
Manage building and development sites to control erosion and sedimentation	**7.16**	Soil and water management plans to be submitted with subdivision and development applications, addressing both construction and post construction sediment and nutrient controls (see **Action 8.5**). Site inspections during construction to be undertaken to ensure compliance with plans with action taken on non-compliances.	1	COUNCILS	n/a
Improve the quality of water runoff from rural and forested areas	**7.17**	Ensure that new roads in rural and forested areas are constructed and that existing roads are progressively upgraded to best management practice standards consistent with the relevant conditions in Environment Protection licences issued to SFNSW by EPA.	1	SF/NPWS/COUNCILS	
	7.18	Review soil types and hydrology to determine future impacts of agriculture, fire management practices, private forestry, land clearing and roading on the movement of sediment and nutrients within the catchment.	2	DLWC	n/a
	7.19	Review current water quality controls and advise on activities identified in 7.18.	2	DLWC	n/a

	7.20	Initiate monitoring of water runoff entering the lake catchment from rural and forested areas.	2	EPA, DLWC	n/a

Policy and Planning

5.8 GOAL: TO PROMOTE ECOLOGICALLY SUSTAINABLE DEVELOPMENT

Objective: To guide and control development in the catchment by applying the principles of ecologically sustainable development.

Strategy		Action	Priority	Responsibility	Cost
Undertake a Local Environmental Study (LES) for existing 2(a) zoned areas around Wallaga Lake in Bega Valley Shire.	**8.1**	The LES would include information on and evaluation of such matters as:- • vegetation (eg mapping of remnant terrestrial vegetation and seagrass beds, identification of rare of threatened plant species) • terrestrial fauna (eg identification of habitats utilised by threatened fauna) • ecological significance of above • drainage and inundation • soil types and slopes • landscape/scenic quality and character • historic, archaeological and mythical Aboriginal sites • fire hazard • demand for tourist accommodation • demand for open space, community and recreational facilities servicing and related costs • access and traffic • social and economic impacts of development • impacts on adjoining development • impacts on waterways and wetlands (sensitivity of receiving waters) • conservation of environmental resources such as fisheries and productive agricultural land • demand for housing (LSCRSS housing monitor) • need for public utilities e.g. sewage effluent disposal area • public aspirations re areas for development • government policies, plans and strategies • preferred sewerage resolution for Wallaga Lake • remnant vegetation.	1	BVSC, DUAP	$40K
	8.2	Liaise with both Councils re problems that arise with Wallaga Lake and encourage both Councils to implement appropriate controls and policies to protect the Wallaga Lake	1	WLEMC	n/a

		environment.			
Prepare a Development Control Plan(s) (DCPs) for Wallaga Lake and surrounding urban areas and review Local Environmental Plans and the Eurobodalla Rural Subdivision DCP	**8.3**	Refine aims and objectives for the DCP(s) - preliminary objectives are contained in **Section 4.2**.	1	COUNCILS, DUAP	n/a
	8.4	Based on the findings of the LES establish: • areas to be designated for environmental protection • appropriate scales of development for lands near sensitive environments • methodologies to protect sensitive environments including water sensitive urban design principles. • foreshore building setbacks or guidelines • areas to be dedicated to Council upon subdivision or development • areas for specific urban purposes, eg single dwellings, dual occupancy, tourist accommodation, retirement villages, open space • the number of lots and thus how many people could be accommodated within the Wallaga Lake area • establish maximum accommodation densities in tourist areas. Include provisions in LEP or DCP(s) as appropriate[1]. Development would also be guided by several of the guidelines and policy statements listed in **Actions 8.4** to **8.6**.	2	BVSC, DUAP	n/a
	8.5	As part of the rural review and urban zoning review adopt appropriate measures from **Action 8.4** in Eurobodalla Shire.	2	ESC, DUAP	n/a
	8.6	Incorporate best practice neighbourhood urban design principles into urban development areas at Wallaga Lake.	2	ESC, BVSC, DUAP	n/a

Objective: To provide specific controls for the protection of Meads Bay

Strategy		Action	Priority	Responsibility	Cost
Include sections in the Wallaga Lake DCP of specific relevance to Meads Bay	**8.7**	For the 1(c) land east of Meads Bay retain the existing 1(c) zoning, control development in line with the previous DCP No 25 and investigate this area for potential acquisition as a Nature Reserve.	2	BVSC, DUAP	n/a
	8.8	Land on the south shore of Meads Bay - review zoning given Meads Bay protection objectives and encourage revegetation, particularly of the foreshore areas.	2	BVSC, DUAP	n/a
	8.9	Retain strict limits on density, vegetation clearing and runoff on the southern shore of Fairhaven Point.	1	BVSC, DUAP	n/a
	8.10	Limit access from Fairhaven Point to Meads Bay to pedestrian access.		BVSC	n/a

Objective: To minimise the impacts of catchment activities, construction works and urban development on Wallaga Lake

Strategy		Action	Priority	Responsibility	Cost
Prepare/review guideline documents/policy statements[2]	**8.11**	Prepare policy on stormwater management in areas surrounding Wallaga Lake as part of Shire wide Stormwater Management Plans.	1	COUNCILS	n/a
	8.12	Prepare policy on soil and water management for construction sites around Wallaga Lake.	2	COUNCILS	n/a
	8.13	Prepare policy on total water cycle management, including sewerage strategies and recognising the need for stricter controls around Meads Bay.	2	COUNCILS	n/a
	8.14	Prepare a recreation and open space strategy(s).	3	COUNCILS	n/a
	8.15	Prepare Habitat Management Plan for Wallaga Lake.	2	FISHERIES	n/a
	8.16	Prepare Regional Nature Conservation Plan.	2	COUNCILS	n/a
	8.17	Prepare Section 94 plan relating to future development.	2	BVSC	n/a

Notes:

- 1 - Absolute restrictions or prohibition of development would be included in LEPs, eg 50 m environmental protection zone around lake foreshore with DCP(s) containing variable standards relating to matters such as setbacks, heights, density and open space depending on, for example, type of development (tourist accommodation, residential accommodation), site slopes and proximity to ecologically 'sensitive' areas.
- 2 - Many guidelines and policies that are relevant to Wallaga Lake have been produced by State Government authorities and are listed in **Appendix B**.
- 3 - Harvesting Plans include prescriptions for flora and fauna protection and soil erosion and water pollution control conditions.

Objective: To adaptively manage the lake through monitoring implementation of the plan's strategies and the environmental status and trends of the lake

Strategy		Action	Priority	Responsibility	Cost
Prepare a lake monitoring program	**8.19**	Collate monitoring programs recommended elsewhere in the plan.	1	BVSC, DLWC, SECMB	n/a
	8.20	Review existing information and programs detailed in State of the Environment reports, Council annual management plans and monitoring programs.	1	BVSC	n/a
	8.21	Define a monitoring program that allows assessment of the effectiveness of individual plan strategies and provides information on the environmental status and trends of the lake ie. ecosystem health. Seek additional funds if not already budgeted elsewhere in the plan and implement monitoring program.	1	BVSC, DLWC, EPA, FISHERIES	n/a

Objective: To promote information sharing and ongoing learning about Wallaga Lake and its catchment

Strategy		Action	Priority	Responsibility	Cost
Collate and distribute information material	**8.22**	Collate existing educational information relevant to Wallaga Lake together with new information to be produced under various strategies within this plan and distribute.	1	COUNCILS	n/a
	8.23	Publish an annual newsletter on progress of plan implementation and on the results of new studies and monitoring.	1	WLEMC	$2K
	8.24	Use the local media to publicise the management plan, results of the monitoring program and issues of concern as they arise.	1	COUNCILS	n/a
	8.25	Develop an Internet web site with all the above educational material.	3	BVSC	$5K

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APPENDIX A

SUMMARY OF ESTUARY PROCESSES STUDY

FOREWORD

This Processes Study was completed in June 1997. Since that time there have been changes and some of these changes are:

- Commercial Fishing - page 7 - the entrance area is permanently closed to the use and possession of commercial nets (with exceptions)
- Oyster harvesting - page 7 - the 2 oyster leases are currently operational but not being cultivated.

APPENDIX B

COMMITTEE AND COMMUNITY INPUT TO THE MANAGEMENT PLAN

- BACKGROUND CONSIDERATIONS, OPPORTUNITY AND CONSTRAINTS
- MANAGEMENT OBJECTIVES FRAMEWORK PLAN
- INITIAL MANAGEMENT STRATEGIES PLAN - PLANNING AND DEVELOPMENT CONTROLS
- INITIAL MANAGEMENT STRATEGIES PLAN- WORKS AND EDUCATION
- URBAN AND RURAL RESIDENTIAL DEVELOPMENT PLAN
- VEGETATION COVER
- ACTIVITY IMPORTANCE AND PRIORITY FOR IMPLEMENTATION