

# Wonboyn Lake and Estuary Management Plan

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<b>Synopsis:</b>	This Plan presents the details for management of the Wonboyn Lake and Estuary through a series of strategies and actions to maintain and enhance the various values of the system.	

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# 1 INTRODUCTION

## 1.1 Introduction

Wonboyn Lake and Estuary (hereafter referred to as Wonboyn estuary) is located on the far south coast of NSW near the township of Wonboyn, approximately 30 km south of Eden. The estuary is situated within a number of biogeographical provinces. Under the Interim Marine Coastal Regionalisation of Australia (IMCRA), the estuary adjoins the Twofold Shelf region, which extends from far southern NSW to Bass Strait. From a terrestrial perspective, the estuary lies in the South East Corner region under the Interim Terrestrial Biogeographic Regionalisation of Australia (IBRA).

Wonboyn estuary is located within a temperate climatic zone, and experiences warm to hot summers and cool to cold winters, with relatively uniform rainfall throughout the year, but no consistency from one year to the next. The estuary and surrounding environs contain a number of notable ecological features. Seagrasses are present in the Inlet Channel to the Lake and River and several significant saltmarsh species and regionally significant wetland areas protected under the *Coastal Wetlands (State Environmental Planning Policy No. 14)* (SEPP-14) are also found fringing the lake, while large areas of saltmarsh fringe sections of the Inlet channel and Lake. The surrounding environs support a diverse range of habitats such as rocky shores, sand shoals, deep lake sediments and estuarine wetlands. The lake has a maximum depth of some 6 m, with the deepest location being within Wonboyn Lake. It is classified as a barrier estuary with a permanently open entrance.

The location and salient characteristics of Wonboyn estuary are illustrated in Figure 1-1. The estuary has a waterway area of 3.5 km<sup>2</sup> and drains a catchment area of 330 km<sup>2</sup>, which provides habitat for numerous significant flora and fauna species. Ninety percent of this catchment lies within the East Boyd, Nadgee and Timbillica State Forests, with a further 4% of the catchment in the Nadgee Nature Reserve and Mount Imlay National Park.

Unlike many NSW estuaries, Wonboyn estuary is not presently under significant pressure from human settlement (i.e. there is limited industrial, urban or agricultural development). The catchment is well vegetated, but has experienced considerable logging (woodchip clear-felling) over the last 30-40 years. Some clearing has also taken place for urban development, which is mainly centred around Wonboyn Village, located on the south western shoreline of Wonboyn Lake. Oyster cultivation racks are a conspicuous feature across most of the foreshore of the lower estuary, and recreational fishing is a popular pastime for residents and tourists.

The draft Estuary Management Manual (NSW Government, 1992) sets out the *Estuary Management Policy* of the NSW Government, outlining a structured management process to enable the development and implementation of balanced long term management plans for the ecologically sustainable use of estuaries and their catchments in which all values and uses have been considered. On 12<sup>th</sup> December 1996, Bega Valley Shire Council established the Wonboyn Estuary Management Committee for the purpose of assisting in the preparation of a Management Plan for the estuary in accordance with the NSW Government's *Estuary Management Policy*.

This report presents the culmination of the series of investigations that has ultimately led to the development of the Estuary Management Plan for the lake and river.

**Figure 1-1 Location of Wonboyn Estuary**

## 1.2 NSW Government's Estuary Management Program

The NSW State Government introduced an *Estuary Management Policy* in 1987, aimed at managing the growing pressures on estuarine ecosystems. The policy is implemented through an Estuary Management Program, which is co-ordinated by the Department of Infrastructure, Planning and Natural Resources (DIPNR), in co-operation with local government and the community.

In accordance with this Policy, the process of managing an estuary is initiated by the establishment of an Estuary Management Committee. This Committee is responsible for the development of an Estuary Processes Study, which outlines all the hydraulic, sedimentation, water quality and ecological processes within the estuary and the impacts of human activities on these processes.

The Estuary Processes Study provides the necessary understanding of physical and biological processes for an Estuary Management Study. The essential features and the current uses of the estuary are identified in the Management Study and the overall objectives required for management of the estuary are determined. The Management Study also identifies options for meeting these objectives, and determines hydraulic and ecological impacts of the proposed options.

The Estuary Management Plan is then prepared from the findings of the Management Study. The Plan describes how the estuary will be managed, gives recommended solutions to management problems and details a schedule of activities for the implementation of the recommendations. When the Plan is accepted by both the Community and the relevant Government departments, the Plan can be implemented through planning controls, works programs, monitoring programs, and education services.

The NSW Government's general estuary management process is illustrated in Figure 1-2.

This Estuary Management Plan documents the approach to be taken to manage the Wonboyn Lake and Estuary. For each management option identified in the Estuary Management Study (WBM, 2002), the Plan identifies the recommended solution and implementation procedures. This includes the entity responsible for the recommended solution and the method, cost and timeframe of implementation.

## 1.3 NSW Coastal Policy 1997

The *NSW Coastal Policy* is the State Government's response to the challenge of achieving a sustainable future for the NSW coastline while balancing environmental, economic, cultural and recreational needs. The policy is based on two fundamental principles: ecologically sustainable development (Section 1.4); and integrated coastal zone management.

The *NSW Coastal Policy 1997* applies to urban and non-urban areas along the NSW Coast, covering land:

- Three nautical miles seaward of the mainland and offshore islands;
- One kilometre landward of the open coast high water mark; and
- One kilometre around all bays and estuaries.

As such, the Wonboyn estuary and its foreshores fall within the jurisdiction of the *Coastal Policy*.

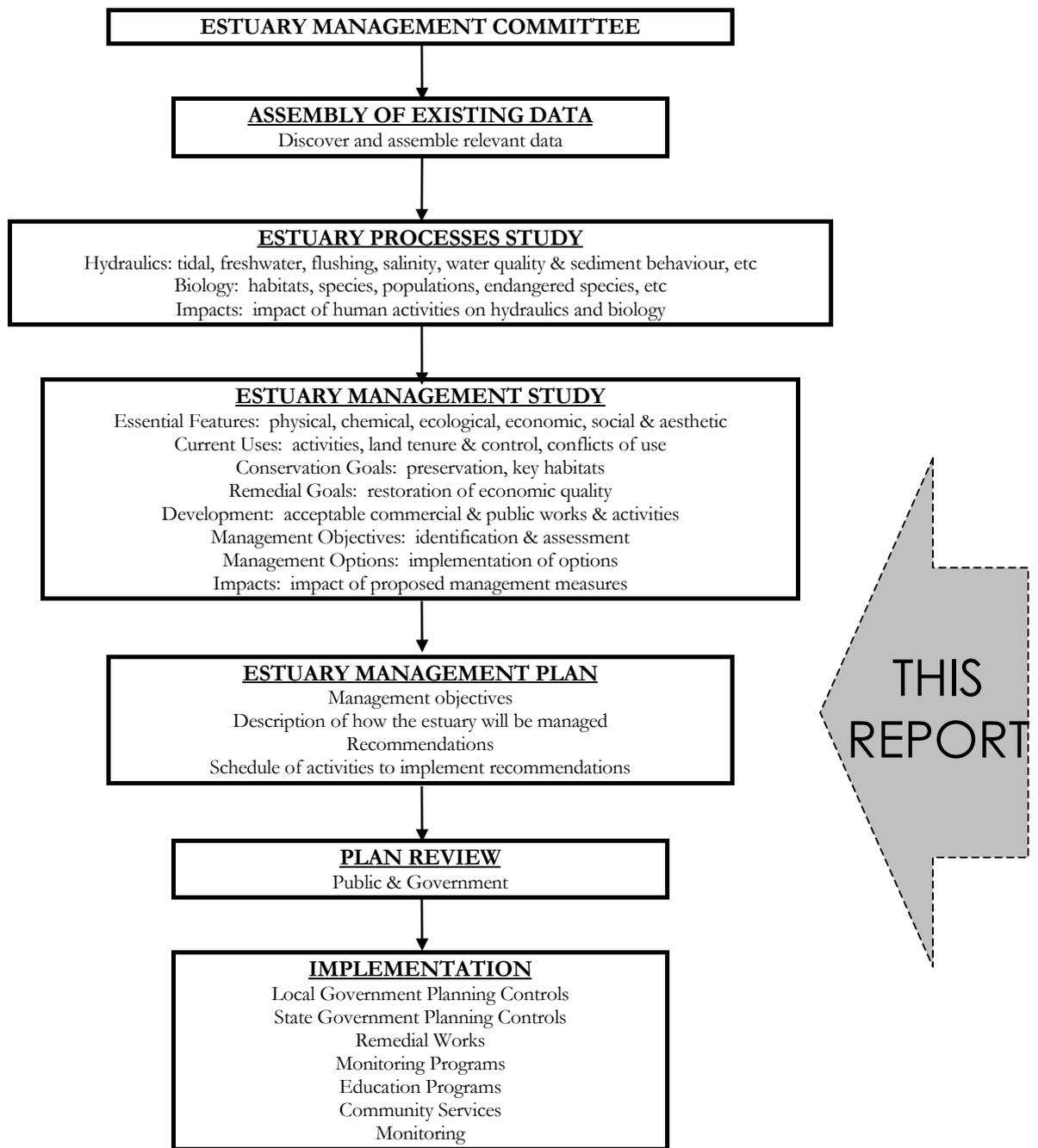


Figure 1-2 NSW Government's Estuary Management Process

The *Coastal Policy* has nine goals, each underpinned by objectives that are to be achieved by strategic actions. Responsibilities for these actions have been assigned to appropriate agencies, councils and other bodies. Whole or part responsibility for nearly half of the strategic actions in the *Coastal Policy* lies with DIPNR, with many of these involving a partnership with local councils.

The nine goals of the *NSW Coastal Policy 1997* are:

1. To protect, rehabilitate and improve the natural environment;
2. To recognise and accommodate natural processes and climate change;
3. To protect and enhance the aesthetic qualities;
4. To protect and conserve cultural heritage;
5. To promote Ecologically Sustainable Development;
6. To provide for ecologically sustainable human settlement;
7. To provide for appropriate public access and use;
8. To provide information to enable effective management; and
9. To provide for integrated planning and management.

With regard to estuaries, the *Policy* specifically recommends that detailed management plans be prepared for estuaries and implemented in accordance with the NSW Government's Estuary Management Manual (Strategic Actions 1.4.3, 1.4.6, and 2.1.1) (NSW Government, 1992).

## 1.4 Ecologically Sustainable Development

The four principles of Ecologically Sustainable Development (ESD) are:

- *The precautionary principle*: The lack of full scientific evidence should not be used as a justification for the postponement of the introduction of measures to prevent or mitigate environmental degradation. This principle is fundamental to adaptive management. Monitoring and prevention are central to the precautionary principle – monitoring to measure progress, and prevention to minimise costs and risks. Decisions can and should be refined as ongoing monitoring and research provides better understanding;
- *Intergenerational equity*: Each generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for future generations. This principle points to institutional and community responsibilities for integrated management, to ensure quality of life is maintained and enhanced;
- *Conservation of biological diversity and ecological integrity*: Measures should be taken to prevent and protect against the extinction or loss of viability of plant and animal species due to human activities; and
- *Improved valuation and pricing of environmental resources*: The quality and value of environmental resources should be maintained and enhanced through appropriate management and pricing, preventing degradation and damage.

As the *NSW Coastal Policy 1997* applies to the Wonboyn Lake and estuary, Council is required to reflect the above principles of ecologically sustainable development in planning and management decisions. When the Wonboyn Lake and Estuary Management Plan is complete, it will provide the framework for implementing these principles as they apply to the Wonboyn estuary and associated catchment.

## 1.5 Crown Land Management

The bed and banks of the Wonboyn estuary are Crown Land (submerged Crown Land) to mean high water mark. Similarly, much of the foreshore is Crown Land. As such, this land comes under the control of the *Crown Lands Act 1989* and is administered by Department of Lands or appointed reserve trust managers.

There is a requirement under the Act for a 'land assessment' to be undertaken over any Crown land that is subject to an application for sale, lease, exchange, easement, licence or permit, or the subject of a proposed dedication of reservation. This assessment aims to ensure that all decisions on the allocation and future management of Crown land in NSW :-

- Are based on adequate biophysical and socio-economic information;
- Are carried out in an open and accountable manner;
- Result from a rigorous, objective and repeatable methodology;
- Allow for community consultation; and
- Have regard for the principles of Crown land management (Section 11 *Crown Lands Act 1989*).

While it is not the specific purpose of this Management Plan to provide a land assessment for all crown lands associated with the Wonboyn Estuary, the information contained within the Estuary Management Study and Plan, and the associated Estuary Processes Study (WBM, 2001), can be used to assist in the preparation of a formal land assessment in accordance with the *Crown Lands Act 1989*. The approach taken in developing this Plan is similar to that taken when preparing a land assessment. That is, in devising management objectives and options/strategies related to navigation, river usage and waterway development (e.g. piers, jetties etc), consideration will be given to the capability of the land and the suitability of such developments.

The draft Crown Waterways Assessment Manual (DLWC, 2000) indicates that depending on the level of detail provided, Estuary Management Plans could form the basis of a waiver for a land assessment and could eventually replace the need for a formal land assessment altogether.

## **2 WONBOYN LAKE AND ESTUARY PROCESSES STUDY REVIEW**

### **2.1 Overview**

The Estuary Processes Study for the Wonboyn Lake and estuary was carried out by WBM (2001). The Wonboyn Estuary Processes Study provides information on the major physical, chemical and biological processes that occur within the estuary. These processes include hydrodynamics, sedimentation, water quality and ecology. In addition, topics such as cultural values and acid sulfate soils were discussed, while interactions between the key processes and issues were identified and documented.

A summary of the findings of the Estuary Processes Study is provided below.

### **2.2 Summary of Findings**

#### **2.2.1 Hydrodynamics**

- The hydraulic processes occurring within the Wonboyn Estuary appear to be close to the ‘natural’ processes that would have occurred prior to European settlement of the area.
- There are no major flow abstractions from the upstream catchment and the estuary entrance has not been manipulated in the past. ‘Within estuary’ effects on hydraulic processes (eg oyster leases, dredging) are minimal.

#### **2.2.2 Sedimentation Rate Processes**

- Existing estuarine sedimentation rates are low, being (conservatively) estimated as approximately 0.75 mm per year. The potential increase in sedimentation due to historical (and ongoing) catchment logging is considerable in relative terms (between a 17% and 93% increase), however less significant in absolute terms (between 0.88 and 1.45 mm per year, as opposed to 0.75 mm per year).

#### **2.2.3 Sediment Quality Processes**

- Sediment quality in the Wonboyn Estuary is typical of an undisturbed estuary with low rates of tidal flushing and low tidal velocities.
- Fine sediments from the catchment have accumulated in the estuary, especially in Wonboyn Lake, where the low tidal velocities and similarly low flood velocities allow such deposition and accumulation.
- There appears to be no significant influence on sediment quality in the estuary due to the presence of extensive oyster leases in the area.

#### **2.2.4 Water Quality**

- The waters of the Wonboyn Estuary exhibit excellent chemical water quality attributes, indicative of the near pristine nature of the catchment and minimal sources of pollutant input.

- Localised water quality impacts are evident in Myrtle Cove due to stormwater runoff and septic leachate inflows from the township of Wonboyn. This issue would require careful management if there is further urban growth in Wonboyn and also requires some immediate attention due to the commercial and recreational uses that occur in Myrtle Cove.

### 2.2.5 Marine and Terrestrial Flora

- Six main types of terrestrial vegetation exist in the Wonboyn catchment. These are: regrowth forest, moist eucalypt forest, moist forest/dry open forest, dry open forest, dry open forest/moist forest and melaleuca woodland.
- SEPP-14 wetlands, National Parks, woody vegetation and cleared areas occur directly adjacent to the Wonboyn Estuary.
- The dominant species of seagrass is *Zostera spp.*, with limited cover of *Halophila spp.* The significant loss of seagrass from the estuary between 1962 and the early 1980's is a concern, and may be due to major flood events between these two periods of time. The lack of any significant recovery of the seagrass since the early 1980's is surprising given the near pristine nature of water in the estuary. Ongoing monitoring is required to track seagrass recovery over time.
- Saltmarsh communities are relatively well developed throughout the lower reaches of the estuary. Wonboyn has the fifth largest area of saltmarsh in southern NSW estuaries, totalling 0.483 km<sup>2</sup>. Sedges dominate the saltmarsh community. Two important species in this area are the Australian saltgrass (*Distichlis distichophylla*) and *Myoporum insulare*.
- Only a single species of mangrove occurs within the Wonboyn Estuary, the Grey mangrove (*Avicennia marina* var. *australasica*). The species was considered to be poorly developed within the estuary, with a coverage of <0.01 ha. Historically, they have been a conspicuous component of the Wonboyn Estuary.

### 2.2.6 Marine and Terrestrial Fauna

- Studies of zooplankton communities have recorded at least 28 taxa. These communities are numerically dominated by an unknown type/s of nauplii (a juvenile stage of crustacean), comprising 14 to 51% of total number of individuals at each sampling station. Protozoan ciliates from the order Tintinnida were also dominant, comprising between 8 to 33% of total abundance.
- Intertidal assemblages included gastropod molluscs (snails) *Bembecium nanum*, *Monodonta constricta*, and the Sydney rock oyster *Saccostrea commercialis*.
- An examination of the soft sediments indicated high levels of bioturbation activity across the shallow sandy flats in the lower reaches of the estuary. The sand flats and seagrass beds contain holes formed by ghost nipper/yabby (*Trypaea australiensis*). Seagrass beds contain a range of molluscs, including mudwhelks *Pyrazus ebenius* and *Battillaria australis* and the neritid *Bembecium auratum*.
- There are no available data on fish species in the Wonboyn Estuary, although major species caught by anglers were Jewfish (*Argyrosomus japonicus*), Flathead (*Platycephalus spp.*), Bream (*Acanthopagrus spp.*), Tarwhine (*Rhabdosargus sarba*), Luderick (*Girella tricuspidata*), Whiting (*Sillago spp.*) and Tailor (*Pomatomus saltatrix*).

- A total of 33 rare and threatened fauna species, listed as *endangered* or *vulnerable* under the NSW *Threatened Species Conservation Act 1995*, have been recorded within the Wonboyn catchment and adjacent areas.

### 2.2.7 Waterway and Foreshore Usage

- The Wonboyn Lake and estuary is mostly utilised by boats for the purpose of recreational fishing. Only one boat ramp is available for the launching of boats located at Myrtle Cove. Other uses include canoeing and sightseeing.
- There is limited public usage of the foreshores, predominantly due to lack of access, alienation due to the nearshore presence of oyster leases and uncertainties/disputes as to the tenure of the foreshore land. There is a strong desire in the local community for greater possible public usage of estuary foreshores, especially in the areas extending between Wonboyn House, Myrtle Cove and Jewfish Beach
- Aquaculture activities are restricted to the culture of the Sydney Rock Oyster (*Saccostrea commercialis*). The methods of oyster cultivation used in the Wonboyn Estuary are:
  - Stick culture – method used to capture spat.
  - Tray/basket – large juveniles caught on sticks are placed into trays or in baskets for grow-out and harvested when they reach a marketable size.
  - Deep water culture.

### 2.2.8 Human Impacts

- The principal human usages of the Wonboyn Estuary are oyster production and recreational fishing, neither of which seems to be having a major effect on estuarine health.
- Wonboyn Estuary is not presently under extensive pressure from human settlement (i.e. no/limited industrial, urban or agricultural development) and remains a relatively pristine environment.
- The Wonboyn River catchment is well vegetated, but has experienced considerable logging pressure (woodchip clear-felling) over the last 30-40 years. Some clearing has also taken place for urban development, mainly centred around Wonboyn Village.
- Oyster leases are a conspicuous feature across most of the foreshore of the lower and middle estuary.
- Issues that will require careful attention in the future are the ‘alienation’ of foreshore areas to recreational fishers by nearby oyster leases and access to such foreshore areas through Crown Land around the lake that is inappropriately ‘claimed’ by residents of foreshore blocks.

### 2.2.9 Ecosystem Health and Conservation Status

- The health of the ecosystem of the Wonboyn Estuary can be ranked as good to moderate.
- The key issue of concern is the loss of significant areas of seagrass from the estuary in recent years. This loss may be due to natural processes (e.g. flooding), as there are no apparent manifestations of the ‘usual’ causes of seagrass loss (e.g. degraded water quality, excessive catchment sediment loads)

- Due to the largely undisturbed nature of the estuary and its constituent habitats, the study area can be considered to have high conservation and environmental values.

## 2.3 Outcomes of the Estuary Processes Study

Wonboyn Estuary is one of the more pristine waterways of the Far South Coast of New South Wales. Levels of water quality and ecosystem health appear to reflect the extremely low levels of pollutant input and minimal general disturbance/pressure on the estuary.

However, there are desires to enhance local resident and tourist access to the estuary that may introduce additional pressures to the area by way of:

- larger populations/pollution loads;
- greater estuarine disturbance by way of boating traffic and recreational fishing; and
- conflicts between users of the estuary.

### 3 WONBOYN LAKE AND ESTUARY MANAGEMENT STUDY REVIEW

#### 3.1 Overview

The Wonboyn Lake and Estuary Management Study was carried out by WBM (2002) and was designed to develop a number of management options that would be used to manage the values of the estuary.

#### 3.2 Issues/Values of Wonboyn Lake and Estuary

Values of the estuary were derived from background material on the Wonboyn estuary system. In addition, key values and issues were derived from community members and government agencies through a Community Questionnaire. Issues compiled were prioritised based on an appreciation of the estuary processes following completion of the Estuary Processes Study and the level of concern within the community (see Table 3.1).

**Table 3.1 Priority of Issues**

<b>Very High Priority Issues</b>	
VHi-1	Protection of water quality in the Wonboyn Lake and estuary
VHi-2	Non-motorised access (pedestrian, canoes/kayaks, etc) to Wonboyn Lake and estuary foreshores
VHi-3	Impacts of oyster leases (water quality, estuary processes, amenity, navigation, access, litter, etc)
VHi-4	Management of entrance bar
VHi-5	Impacts of future urban development
<b>High Priority Issues</b>	
Hi-1	Impacts of motorised watercraft
Hi-2	Impact of future industry (e.g. forestry)
Hi-3	Impact of tourism and physical limitations
Hi-4	Impacts of existing catchment activities (including both urban and industry; eg. septic leachate, stormwater runoff, forestry, etc)
<b>Medium Priority Issues</b>	
Med-1	Recreational use/user conflicts including motorised watercraft
Med-2	Impacts of increasing population/residential development
Med-3	Motorised access (speed boats, jet skis, etc) to Wonboyn Lake and estuary foreshores
<b>Low Priority Issues</b>	
Lo-1	Impact of domestic species (eg. cats and dogs) on native fauna

### 3.3 Management Objectives

Very high, high and medium priority issues (from Table 3.1) were addressed in the Estuary Management Study. Fifteen management objectives were outlined under 7 categories: (1) habitat and species conservation; (2) water quality; (3) river flow; (4) sedimentation and erosion; (5) cultural and natural heritage; (6) recreation; and (7) future development information/education. Management objectives were ranked to reflect the importance of the objectives in addressing various issues by considering the priority of issues (using an appropriate weighting factor), the number of different issues each objective satisfies, the views of the review committee and the consultants (WBM). The final priority ranking of management objectives can be seen in Table 3.2.

**Table 3.2 Priority Ranking of Management Objectives**

Priority Ranking	Objective Description	Objective No.	Category
1	Promote and encourage ecologically sustainable development (ESD) principles	15	Education
2	Prevent water quality degradation and satisfy water quality criteria	4	WQ
3	Improve recreational facilities and provide waterway access around the estuary	9	Recreation
4	Protect and enhance existing areas of significant terrestrial and aquatic habitat, and preserve communities and species of particular significance	1	Habitat
5	Minimise potential conflicts between different users of the estuary	11	Recreation
6	Prevent loss of seagrass and saltmarsh from Wonboyn Lake and estuary	3	Habitat
7	Maintain (and if practical enhance) tidal exchange and flow within the estuary	5	Flow
8	Protect environment from existing/future recreational use	10	Recreation
9	Minimise diffuse pollutants entering the estuary from the local catchment (eg. <i>nutrients, sediment</i> )	7	Sediment
10	Prevent future development reducing the current high visual amenity of the estuary	12	Development
11	Protect the estuarine habitats from future industry or urban development	13	Development
12	Reduce impacts on the Wonboyn estuary which prevent the <i>natural</i> flow	6	Flow
13	Protect native terrestrial vegetation from future degradation	2	Habitat
14	Increase awareness and protection of significant cultural sites and traditions	8	Cultural
15	Increase public awareness on values of the estuary	14	Education

### 3.4 Management Options

A range of management options were formulated to address the management objectives as outlined in Section 3.3, and were grouped under the same 7 categories as the management objectives. Options were assessed for overall feasibility based on cost (capital and operational), practicality of implementation, environmental impact and social acceptability.

Final evaluation of each option was achieved through assessment of the effectiveness of the option in addressing each management objective, combined with the priority ranking of each management objective (for further detail see WBM, 2002). The result was the prioritisation all management options, with the top twenty management options (Table 3.3) to be considered in the Estuary Management Plan.

On further consideration of the options with Bega Valley Shire Council and the local community, Option S-2 has been rejected as a possibility due to environmental, social and economic considerations. Reflection on the option by WBM has found that the benefits of dredging the entrance do not outweigh the detriments of keeping the entrance in its natural state. Water quality in Wonboyn estuary does not suggest the need for dredging of the entrance, nor does the estuary have a significant need for dredging for navigation purposes. Thus the entrance should remain in its natural form and should wait for floods to remove accumulated sand.

**Table 3.3 Top Twenty Estuary Management Options**

<b>Highest Priority Options</b>	D-1	Environmental strategies in Development Control Plan
	Q-2	EMPs for all development applications
	D-2	Foreshore reservations
<b>Next Priority Options</b>	Q-5	Management Plan for future of oyster leases
	F-1	Management Plan for flow within estuary
	H-6	Rezone important habitats
	S-2	Assess dredging of entrance
	Q-3	Implement Stormwater Management Plan
	S-1	Maintain riparian vegetation
	R-1	Walkway along foreshore
	Q-4	Management Plan for recreational use
	S-4	Reduce sediment flow from road runoff
	H-7	Restrict future urban development
	C-1	Cultural interpretative signage
	H-4	Channel markers and signs
	Q-1	Develop water quality guidelines
	H-2	Restrict/control foreshore access
	H-3	Recovery plan for seagrasses
R-3	Non-motorised access points	
H-8	Fish Habitat Protection Plan	

## 4 PROCESS AND METHODOLOGY OF PLAN

The final management options identified in the Wonboyn Lake and Estuary Management Study are a scheduled sequence of recommended actions that are dealt with in this Plan.

The principal objectives of this plan are as follows:

- Provide a process to maintain and improve the environmental values of the lake and estuary; and
- Present management options developed and agreed upon in the Estuary Management Study in the appropriate form, with consideration of associated issues such as
  - discussion and justification of the option;
  - with whom the responsibility lies for implementing the option (agencies and groups with primary and secondary responsibilities for implementing the recommended options);
  - specific actions required to implement each option (required monitoring works and activities to ensure that the proposed works program is moving towards desired environmental outcomes and to enable the progressive refinement of the works program if necessary);
  - costs of implementation; and
  - timeframe for the completion of option implementation.

Sources of funding for the recommended works program and other issues will also be considered.

To be successful, the implementation of the Wonboyn Estuary Management Plan is reliant upon the following factors:

- Agreement on the objectives, strategies and actions associated with the Plan by all state and local government agencies, stakeholder groups and the general community;
- Understanding and acceptance of responsibilities by the various organisations who will implement the Plan;
- Commitment by those organisations involved to dedicate time and resources necessary to implement the Plan;
- Sourcing of appropriate funding, through grants, levies, industry contributions and in-kind contributions from the community.

The information provided in this Section should be read in conjunction with the Wonboyn Lake and Estuary Management Study, which provides justification for the chosen strategies and which also gives a more detailed description of the various options and any potential conflicts or impacts associated with the option.

## 4.1 Concurrent Management Plans and Strategies

There are a number of existing plans and strategies related to the Wonboyn estuary and catchment which overlap the general objectives of this Estuary Management Plan. Continued implementation of these other management plans is essential to the long-term sustainable management of the unique ecological and social values of the Wonboyn estuary.

These plans and strategies include (WBM, 2002, Appendix B):

- **Bega Valley Local Environment Plan 2002** (Gazetted 14 June 2002, the plan aims to establish the framework for future development within the local government area of Bega Valley).
- **The Nadgee Nature Reserve Draft Plan of Management** (outlines the values of Nadgee Nature Reserve and the policies and framework for managing the Reserve).
- **Wonboyn Village Fire Protection Plan** (prepared by Wonboyn Village Bush Fire Brigade, Eden District National Parks and Wildlife Service, State Forests of New South Wales and Bega Fire Control – Eden Management Area – June 1999).
- **Development Control Plan 99: On-Site Sewage Management** (prepared by Bega Valley Shire Council 2000).
- **Community Social Plan** (prepared by Bega Valley Shire Council 2000; the Social Plan was developed to improve the quality of life for all residents in Bega Valley, and enable the community to identify and respond to community challenges).
- **Community Safety Plan** (prepared by Bega Valley Shire Council 2000; this forms part of the Community Social Plan).
- **Management Plan 2000/2001** (prepared by Bega Valley Shire Council 2000).
- **Management Plan 2001/02- 2003/04** (prepared by Bega Valley Shire Council, adopted 26 June 2001. The Plan is intended to identify clearly the detailed vision of the Council for the next twelve months and in general terms for the following two years. Major goals and initiatives to be introduced in the next 10 years are also identified. Activities and responsibilities come under the three broad activity areas of environment, organisation and community).
- **Eden Regional Forest Agreement** (involved consultation with all stakeholders with regard to various forestry and other issues).

The Estuary Management Plan will not override any specification in these plans, but will operate concurrently with features and requirements of the above listed plans and strategies for each option. All plans and strategies will be considered during the implementation of this Plan.

## 4.2 Management Strategies

### 4.2.1 Development in the Wonboyn Area

<b>Options</b>	<p><b>D-1</b> - INCORPORATE REFERENCE WITHIN DEVELOPMENT CONTROL PLANS (DCPs) FOR WONBOYN VILLAGE FOR LOT-BASED AND DEVELOPMENT-BASED ENVIRONMENTAL MANAGEMENT STRATEGIES, AND DEFINE MINIMUM PERFORMANCE STANDARDS FOR THESE STRATEGIES</p> <p><b>Q-2</b> - ENVIRONMENTAL MANAGEMENT PLANS TO ACCOMPANY ALL DEVELOPMENT APPLICATIONS FOR DEVELOPMENTS LIKELY TO HAVE AN IMPACT ON THE ESTUARY</p> <p><b>H-7</b> - CONSIDER OPTIONS FOR RESTRICTING FUTURE URBAN/INDUSTRY DEVELOPMENT WITHIN THE WONBOYN ESTUARY CATCHMENT</p>
<b>Objectives Satisfied</b>	<p>1 – Promote and encourage ecologically sustainable development (ESD) principles</p> <p>2 – Prevent water quality degradation and satisfy water quality criteria</p> <p>3 – Improve recreational facilities and provide waterway access around the estuary</p> <p>4 - Protect and enhance existing areas of significant terrestrial and aquatic habitat, and preserve communities and species of particular significance</p> <p>5 – Minimise potential conflicts between different users of the estuary</p> <p>6 – Prevent loss of seagrass and saltmarsh from Wonboyn Lake and estuary</p> <p>7 – Maintain (and if practical enhance) tidal exchange and flow within the estuary</p> <p>9 – Minimise diffuse pollutants entering the estuary from the local catchment (<i>eg. nutrients, sediment</i>)</p> <p>10 – Prevent future development reducing the current high visual amenity of the estuary</p> <p>11 – Protect the estuarine habitats from future industry or urban development</p> <p>12 – Reduce impacts on the Wonboyn estuary which prevent the <i>natural</i> flow</p> <p>13 – Protect native terrestrial vegetation from future degradation</p> <p>14 – Increase awareness and protection of significant cultural sites and traditions</p> <p>15 – Increase public awareness on values of the estuary</p>
<b>Discussion</b>	<p>The Wonboyn estuary shoreline contains areas of high visual amenity, associated with native vegetation, views of the waterway and the proximity of the National Parks (WBM, 2002). Future developments and redevelopments (urban/rural/industry) have the potential to impact on estuarine amenity, and also health, through increased pollutant and sediment loads from urban construction and industrial activities within the catchment. Future development in the catchment should be under strict regulation to ensure the environmental values of this pristine estuary are not compromised, and further development should be restricted to prevent any further usage that results in high pollutant loads to the estuary.</p>
<b>Responsibility</b>	Bega Valley Shire Council
<b>Specific Actions</b>	<ul style="list-style-type: none"> <li>• The Local Environment Plan 2002, implemented by the Bega Valley Shire Council, deals with some aspects outlined above. However, Council envisages a revision of Wonboyn's DCP No. 36 within the next 3 years which will ensure lot-based and development-based environmental management strategies are used for developments within the Wonboyn catchment to ensure that estuary environs are protected from further development. This includes industry-based developments (i.e. logging). The DCP should impose minimum criteria for the various Strategies to ensure that receiving waters are suitably protected.</li> <li>• On application to the Council for a development (to be defined by Council as "relevant developments"), an Environmental Management Plan should be drawn up by the developer to ensure that there will be no net increase in pollutant loads to the estuary, both during construction and during the life of the development. The level of detail in the EMP should be proportional to the size and the scope of the project.</li> <li>• Develop Strategies and controls in relation to logging and clearing of freehold land in the strategic planning process.</li> </ul>
<b>Cost</b>	\$3,000
<b>When</b>	2003-2006

### 4.2.2 Oyster leases

<b>Options</b>	<p><b>Q-5</b> - DEVELOP AND IMPLEMENT A MANAGEMENT PLAN FOR THE CONTINUATION OF OYSTER LEASES IN THE WONBOYN LAKE AND ESTUARY</p> <p><b>F-1</b> - DEVELOP AND IMPLEMENT A MANAGEMENT PLAN TO MINIMISE THE EFFECT OF OYSTER LEASES ON FLOW OF THE WONBOYN ESTUARY</p>
<b>Objectives satisfied</b>	<p>1 – Promote and encourage ecologically sustainable development (ESD) principles</p> <p>2 – Prevent water quality degradation and satisfy water quality criteria</p> <p>3 – Improve recreational facilities and provide waterway access around the estuary</p> <p>4 – Protect and enhance existing areas of significant terrestrial and aquatic habitat, and preserve communities and species of particular significance</p> <p>5 – Minimise potential conflicts between different users of the estuary</p> <p>6 – Prevent loss of seagrass and saltmarsh from Wonboyn Lake and estuary</p> <p>7 – Maintain (and if practical enhance) tidal exchange and flow within the estuary</p> <p>11 – Protect the estuarine habitats from future industry or urban development</p> <p>12 – Reduce impacts on the Wonboyn estuary which prevent the <i>natural</i> flow</p> <p>13 – Protect native terrestrial vegetation from future degradation</p> <p>14 – Increase awareness and protection of significant cultural sites and traditions</p> <p>15 – Increase public awareness on values of the estuary</p>
<b>Discussion</b>	<p>The operation and management of oyster leases is becoming an issue of increasing concern to the residents of Wonboyn. Water quality and tidal flows are both concerns that were voiced in the Community Questionnaire.</p> <p>Although hydraulic effects of the oyster leases on the Wonboyn estuary at present are minimal, the effect of future development of oyster leases on estuary flow should be considered. The management plan would strictly regulate the granting of any future oyster leases within the estuary and examine placement of leases within the estuary to ensure minimal impact on flow. NSW Fisheries would be responsible for production and implementation of the Plan.</p>
<b>Responsibility</b>	NSW Fisheries and local oyster farmers
<b>Specific Actions</b>	<ul style="list-style-type: none"> <li>• NSW Fisheries and local oyster farmers to produce and implement an oyster management strategy for Wonboyn Lake and estuary</li> <li>• Involve consultation with oyster farmers and local community</li> <li>• The Strategy will examine: <ul style="list-style-type: none"> <li>▪ Management and placement of current oyster leases</li> <li>▪ Day-to-day maintenance of leases</li> <li>▪ Impacts of new oyster leases (ensuring minimisation of impact on flow through placement)</li> <li>▪ Basis of impacts</li> <li>▪ State the number of new leases (if any) to be allowed</li> </ul> </li> </ul>
<b>Cost</b>	\$6,000
<b>When</b>	2003-2005

### 4.2.3 Water Quality

Option	Q-3 - DEVELOP A STORMWATER (INCLUDING SEPTIC AND WASTE LEACHATE) MANAGEMENT PLAN FOR WONBOYN VILLAGE
<b>Objectives satisfied</b>	1 – Promote and encourage ecologically sustainable development (ESD) principles 2 – Prevent water quality degradation and satisfy water quality criteria 3 – Improve recreational facilities and provide waterway access around the estuary 4 - Protect and enhance existing areas of significant terrestrial and aquatic habitat, and preserve communities and species of particular significance 7 – Maintain (and if practical enhance) tidal exchange and flow within the estuary 10 – Prevent future development reducing the current high visual amenity of the estuary 11 – Protect the estuarine habitats from future industry or urban development 12 – Reduce impacts on the Wonboyn estuary which prevent the <i>natural</i> flow 13 – Protect native terrestrial vegetation from future degradation 14 – Increase awareness and protection of significant cultural sites and traditions 15 – Increase public awareness on values of the estuary
<b>Discussion</b>	<p>Water quality degradation in Myrtle Cove is indicative of the effects of largely unmanaged stormwater runoff and septic leachate from the township of Wonboyn. Commercial and recreational uses of Myrtle Cove mean that immediate attention of this issue is required. Future increases in urban development will require careful management of both septic systems and stormwater runoff. Ideally these would be managed under a Stormwater (and Septic and Waste Leachate) Management Plan. The Plan would present strategies and options to reduce the impacts of urban stormwater on receiving waters and to prevent further degradation of water quality due to future urban development. It would also address issues regarding the septic and waste leachate from Wonboyn Village that is entering Myrtle Cove. Key outcomes of the Management Plan will include:</p> <p>Incorporating SWMP objectives into Council's planning and approval process;            Internal audits of waste collection activities, erosion and sediment controls during Council maintenance, stormwater outlets and drain maintenance regime and drain maintenance activities in regards to Acid Sulfate Soil disturbance ; and            Community education regarding stormwater.</p>
<b>Responsibility</b>	Bega Valley Shire Council
<b>Specific Actions</b>	Develop an appropriate management plan.
<b>Cost</b>	\$8,000 – \$10,000
<b>When</b>	2003 – 2004

Option	S-4 - REDUCE SEDIMENT FLOW FROM ROADS IN THE CATCHMENT
<b>Objectives satisfied</b>	1 – Promote and encourage ecologically sustainable development (ESD) principles 2 – Prevent water quality degradation and satisfy water quality criteria 3 – Improve recreational facilities and provide waterway access around the estuary 4 - Protect and enhance existing areas of significant terrestrial and aquatic habitat, and preserve communities and species of particular significance 5 – Minimise potential conflicts between different users of the estuary 6 – Prevent loss of seagrass and saltmarsh from Wonboyn Lake and estuary 7 – Maintain (and if practical enhance) tidal exchange and flow within the estuary 11 – Protect the estuarine habitats from future industry or urban development 12 – Reduce impacts on the Wonboyn estuary which prevent the <i>natural</i> flow 13 – Protect native terrestrial vegetation from future degradation 14 – Increase awareness and protection of significant cultural sites and traditions 15 – Increase public awareness on values of the estuary
<b>Discussion</b>	<p>Currently runoff (particularly road runoff) is largely discharging directly to the estuary at Myrtle Cove and elsewhere in the catchment without any minimal treatment. As such, pollutants (sediments) would be discharged to the lower estuary, potentially affecting sensitive aquatic ecosystems.</p>
<b>Responsibility</b>	Bega Valley Shire Council

<b>How</b>	<ul style="list-style-type: none"> <li>▪ Identify areas of sediment runoff and prioritise according to sediment accumulation/increased turbidity in estuary (e.g. high priority: Wonboyn Road)</li> <li>▪ For high priority areas, as a short term response, construct sediment fences and apply 'best' practice techniques.</li> <li>▪ Long term, identify actions needed for each area, such as seal unsealed road sections, construct sediment fences and revegetate affected areas.</li> </ul>
<b>Cost</b>	\$30,000 (for preliminary works)
<b>When</b>	2003-2004

<b>Option</b>	<b>Q-1 - DEVELOP AND ADOPT WATER QUALITY CRITERIA SPECIFIC TO THE WONBOYN ESTUARY</b>
<b>Objectives satisfied</b>	<p>1 – Promote and encourage ecologically sustainable development (ESD) principles</p> <p>3 – Improve recreational facilities and provide waterway access around the estuary</p> <p>4 – Protect and enhance existing areas of significant terrestrial and aquatic habitat, and preserve communities and species of particular significance</p> <p>7 – Maintain (and if practical enhance) tidal exchange and flow within the estuary</p> <p>9 – Minimise diffuse pollutants entering the estuary from the local catchment (eg. <i>nutrients, sediment</i>)</p> <p>10 – Prevent future development reducing the current high visual amenity of the estuary</p> <p>13 – Protect native terrestrial vegetation from future degradation</p> <p>14 – Increase awareness and protection of significant cultural sites and traditions</p> <p>15 – Increase public awareness on values of the estuary</p>
<b>Discussion</b>	<p>To ensure that the pristine qualities of the estuary are maintained and impacts on the natural ecosystems of the estuary are minimized, it is important to develop appropriate water quality criteria for management purposes. Site specific water quality criteria should be defined, as national guideline values set by the Australian and New Zealand Environment and Conservation Council (ANZECC) (eg ANZECC 1992, 2000) do not consider features of the environment specific to the estuary, such as flushing times and pollutant assimilation capacities (although the ANZECC (2000) guidelines stress the importance of site specific criteria).</p> <p>Appropriate water quality criteria will be defined through a Water Quality Monitoring Program to ensure that the pristine qualities of the estuary are maintained and impacts on the natural ecosystems of the estuary are minimised. In the case that the Water Quality Monitoring Program cannot be followed, the conservative criteria of the ANZECC (2000) guidelines should be adopted.</p>
<b>Responsibility</b>	Bega Valley Shire Council
<b>Specific Action</b>	<p>Collect water from 2 sites (</p> <ul style="list-style-type: none"> <li>▪ Figure 4-1) monthly, and in the case of events (flooding). From this, appropriate water quality criteria can be developed for a long term water quality monitoring program.</li> <li>▪ Periodically (6 monthly) integrate all water quality data and review results to ascertain trends and correlation in data, make comparisons and identify any gaps in the data</li> <li>▪ Use ANZECC (2000) values as baseline values for comparison if no community/local baseline data is available</li> </ul>
<b>Cost</b>	\$4,000 annually
<b>When</b>	Start 2003. Ongoing

**Figure 4-1 Recommended Water Quality Monitoring Locations**

#### 4.2.4 Foreshore

<b>Option</b>	<b>D-2 - CHANGE RESERVATION OF CROWN LANDS AROUND THE WONBOYN LAKE FORESHORE TO INCLUDE ENVIRONMENT PROTECTION AND NATURE CONSERVATION AS WELL AS RECREATION.</b>
<b>Objectives Satisfied</b>	<p>1 – Promote and encourage ecologically sustainable development (ESD) principles</p> <p>2 – Prevent water quality degradation and satisfy water quality criteria</p> <p>3 – Improve recreational facilities and provide waterway access around the estuary</p> <p>4 – Protect and enhance existing areas of significant terrestrial and aquatic habitat, and preserve communities and species of particular significance</p> <p>8 – Protect environment from existing/future recreational use</p> <p>9 – Minimise diffuse pollutants entering the estuary from the local catchment (<i>eg. nutrients, sediment</i>)</p> <p>10 – Prevent future development reducing the current high visual amenity of the estuary</p> <p>11 – Protect the estuarine habitats from future industry or urban development</p> <p>12 – Reduce impacts on the Wonboyn estuary which prevent the <b>natural</b> flow</p> <p>13 – Protect native terrestrial vegetation from future degradation</p> <p>14 – Increase awareness and protection of significant cultural sites and traditions</p> <p>15 – Increase public awareness on values of the estuary</p>
<b>Discussion</b>	At present, the only area provided for waterfront recreation (such as swimming, fishing, etc) is within the Nadgee National Park at Jewfish Beach. As well as increasing access points to the lake for recreation, the reservation of Crown Land could be changed to include Environmental Protection and Nature Conservation. This would focus on areas adjacent to the estuary foreshore.
<b>Responsibility</b>	Bega Valley Shire Council
<b>Specific Actions</b>	Change reservation of Crown land around Wonboyn Lake to include environmental Protection and Nature Conservation as well as recreation (Figure 4-2).
<b>Cost</b>	Negligible
<b>When</b>	2003-2005

<b>Option</b>	<b>R-1 - BUILD A WALKWAY/PATH ALONG THE LAKE FORESHORE (ESPECIALLY BETWEEN WONBOYN VILLAGE AND JEWFISH BEACH), AND ERECT SIGNS ALONG THE PATH TO INFORM RESIDENTS/TOURISTS OF BOUNDARY BETWEEN PRIVATE LAND AND CROWN LAND</b>
<b>Objectives satisfied</b>	<p>1 – Promote and encourage ecologically sustainable development (ESD) principles</p> <p>2 – Prevent water quality degradation and satisfy water quality criteria</p> <p>5 – Minimise potential conflicts between different users of the estuary</p> <p>7 – Maintain (and if practical enhance) tidal exchange and flow within the estuary</p> <p>9 – Minimise diffuse pollutants entering the estuary from the local catchment (<i>eg. nutrients, sediment</i>)</p> <p>10 – Prevent future development reducing the current high visual amenity of the estuary</p> <p>11 – Protect the estuarine habitats from future industry or urban development</p> <p>12 – Reduce impacts on the Wonboyn estuary which prevent the <b>natural</b> flow</p> <p>13 – Protect native terrestrial vegetation from future degradation</p> <p>14 – Increase awareness and protection of significant cultural sites and traditions</p> <p>15 – Increase public awareness on values of the estuary</p>
<b>Discussion</b>	The foreshore land around the lake has been inappropriately 'claimed' in many cases by residents of foreshore blocks. This is prohibiting other residents and visitors from accessing the lake for fishing, swimming and other recreational activities.
<b>Responsibility</b>	Bega Valley Shire Council
<b>Specific Actions</b>	<ul style="list-style-type: none"> <li>▪ Identify opportunities for walkway location around lake, given title of land (private/Crown land), existing habitats and areas of significant conservation (for example, see Figure 4-2).</li> <li>▪ In consultation with adjacent landowners, prepare conceptual designs and obtain approvals from relevant consent authorities</li> <li>▪ Prepare detailed design drawings, as necessary and construct walkways and erect signs in accordance with plans and specifications</li> <li>▪ Monitor usage and conduct periodic (5-10 years) surveys to ensure access remains adequate</li> </ul>

<b>Cost</b>	\$65,000
<b>When</b>	2003-2006

<b>Option</b>	<b>C-1 - ERECT INTERPRETIVE SIGNAGE AT KEY CULTURAL HERITAGE SITES AND AT HIGH USAGE RECREATION AREAS</b>
<b>Objectives satisfied</b>	8 – Protect environment from existing/future recreational use 9 – Minimise diffuse pollutants entering the estuary from the local catchment ( <i>eg. nutrients, sediment</i> ) 10 – Prevent future development reducing the current high visual amenity of the estuary 11 – Protect the estuarine habitats from future industry or urban development 12 – Reduce impacts on the Wonboyn estuary which prevent the <i>natural</i> flow 13 – Protect native terrestrial vegetation from future degradation 15 – Increase public awareness on values of the estuary
<b>Discussion</b>	There is generally a lack of understanding and appreciation of Aboriginal culture amongst non-indigenous communities, which can lead to degradation or destruction of sites, whether intentionally or through ignorance. Knowledge of European history is also lacking.
<b>Responsibility</b>	National Parks and Wildlife Service (NPWS); Heritage Trust
<b>Specific Actions</b>	<ul style="list-style-type: none"> <li>▪ Identify key cultural heritage sites for signage (consider opportunities for amalgamating signage with foreshore walkway project).</li> <li>▪ Prepare sign designs, including information on the significance of the site, accompanied by old photographs or artistic sketches of past usage.</li> <li>▪ Detail design drawing, obtain approvals from relevant consent authorities.</li> <li>▪ Erect signs in accordance with plans and specifications.</li> </ul>
<b>Cost</b>	\$10,000
<b>When</b>	2003-2005

#### 4.2.5 Conservation

<p><b>Option</b></p>	<p><b>H-6 - REZONE IMPORTANT FORESHORE AND WATERWAY HABITAT</b></p> <p><b>H-2 - Restrict/control resident/tourist access to riparian lands, particularly the SEPP 14 areas</b></p> <p><b>H-4 - ERECT CHANNEL MARKERS AND SIGNS TO KEEP RECREATIONAL BOATS AND THE GENERAL PUBLIC AWAY FROM SIGNIFICANT HABITAT AREAS, SUCH AS INTERTIDAL AND SHALLOW SUBTIDAL SHOALS AND SEAGRASS MEADOWS</b></p>
<p><b>Objectives satisfied</b></p>	<p>1 – Promote and encourage ecologically sustainable development (ESD) principles</p> <p>2 – Prevent water quality degradation and satisfy water quality criteria</p> <p>3 – Improve recreational facilities and provide waterway access around the estuary</p> <p>4 - Protect and enhance existing areas of significant terrestrial and aquatic habitat, and preserve communities and species of particular significance</p> <p>7 – Maintain (and if practical enhance) tidal exchange and flow within the estuary</p> <p>9 – Minimise diffuse pollutants entering the estuary from the local catchment (eg. nutrients, sediment)</p> <p>10 – Prevent future development reducing the current high visual amenity of the estuary</p> <p>11 – Protect the estuarine habitats from future industry or urban development</p> <p>12 – Reduce impacts on the Wonboyn estuary which prevent the <i>natural</i> flow</p> <p>13 – Protect native terrestrial vegetation from future degradation</p> <p>14 – Increase awareness and protection of significant cultural sites and traditions</p> <p>15 – Increase public awareness on values of the estuary</p>
<p><b>Discussion</b></p>	<p>The Wonboyn Lake Estuary Processes Study (WBM 2001) highlighted habitats within and around the Wonboyn Estuary that were the most valuable to aquatic and terrestrial fauna. These are:</p> <ul style="list-style-type: none"> <li>• Saltmarshes – protected under SEPP-14; and</li> <li>• Seagrass meadows – protected under the <i>Fisheries Management Act 1994 (NSW)</i>.</li> </ul> <p>Saltmarsh area in the Wonboyn estuary is the fifth largest area of saltmarsh in southern NSW estuaries, totalling 0.483km<sup>2</sup> (West <i>et al.</i> 1985). This area is dominated by sedges. The saltmarsh include significant plant species whose conservation must be ensured through management of areas essential for their preservation, and restriction to certain designated areas. Other important areas include seagrass meadows, intertidal flats, and shallow subtidal flats. These areas are primary habitat for a wide range of aquatic avifauna species. The presence of humans within these habitat areas restricts their value, as they cannot be utilized to their full potential by fauna species. Rezoning, restriction of access, and signage can be used to protect against impacts.</p>
<p><b>Responsibility</b></p>	<p>Bega Valley Shire Council/ NSW Waterways</p>
<p><b>Specific Actions</b></p>	<ul style="list-style-type: none"> <li>• Have SEPP-14 areas examined for level of protection needed for habitat preservation (eg. Complete exclusion, partial exclusion – certain activities allowed, no exclusion) (Figure 4-2) and have areas incorporated into planning instruments</li> <li>• Review current channel marker locations and signs around the lake for condition and correctness. Identify additional sites of significant habitat in need of protection from recreational boats and the general public (eg. In the vicinity of most popular fishing areas as well as areas to be protected). Prepare and erect new signs and channel markers</li> <li>• Install marker buoys and signage around habitat protection areas to prevent damage by mooring/anchoring and powerboating.</li> </ul>
<p><b>Cost</b></p>	<p>\$50,000</p>
<p><b>When</b></p>	<p>2003-2005</p>

<b>Option</b>	<b>H-3 - PREPARE AND IMPLEMENT A RECOVERY PLAN FOR THE SEAGRASSES WITHIN THE WONBOYN LAKE AND ESTUARY</b>
<b>Objectives satisfied</b>	<p>1 – Promote and encourage ecologically sustainable development (ESD) principles</p> <p>2 – Prevent water quality degradation and satisfy water quality criteria</p> <p>3 – Improve recreational facilities and provide waterway access around the estuary</p> <p>4 - Protect and enhance existing areas of significant terrestrial and aquatic habitat, and preserve communities and species of particular significance</p> <p>7 – Maintain (and if practical enhance) tidal exchange and flow within the estuary</p> <p>10 – Prevent future development reducing the current high visual amenity of the estuary</p> <p>13 – Protect native terrestrial vegetation from future degradation</p> <p>15 – Increase public awareness on values of the estuary</p>
<b>Discussion</b>	Although the Wonboyn estuary remains in a relatively pristine condition, seagrass within the Wonboyn Lake and estuary has declined by approximately 70% since 1962. The reasons for the extent of this decline are unclear, considering the pristine nature of the water quality.
<b>Responsibility</b>	Bega Valley Shire Council / NSW Fisheries
<b>How</b>	<ul style="list-style-type: none"> <li>▪ Map seagrass areas and historical events of seagrass within Wonboyn Lake and estuary based on air photos, and identify areas of permanent seagrass loss.</li> <li>▪ Conduct investigations in these areas to determine the limiting factors of seagrass growth within the estuary, e.g. light penetration, turbidity, water quality (see WBM, 2001 and MHL, 1999).</li> <li>▪ Formulate and implement strategies (including consideration of future catchment clearing for forestry and urbanisation) that address the limiting factor(s) so that seagrass can re-establish to former conditions in these areas.</li> </ul>
<b>Cost</b>	\$30,000
<b>When</b>	2003-2005

<b>Option</b>	<b>H-8 - APPLY FISH HABITAT PROTECTION PLAN 1995 TO THE WONBOYN ESTUARY</b>
<b>Objectives satisfied</b>	<p>1 – Promote and encourage ecologically sustainable development (ESD) principles</p> <p>3 – Improve recreational facilities and provide waterway access around the estuary</p> <p>4 - Protect and enhance existing areas of significant terrestrial and aquatic habitat, and preserve communities and species of particular significance</p> <p>7 – Maintain (and if practical enhance) tidal exchange and flow within the estuary</p> <p>10 – Prevent future development reducing the current high visual amenity of the estuary</p> <p>11 – Protect the estuarine habitats from future industry or urban development</p> <p>13 – Protect native terrestrial vegetation from future degradation</p> <p>14 – Increase awareness and protection of significant cultural sites and traditions</p> <p>15 – Increase public awareness on values of the estuary</p>
<b>Discussion</b>	<p>NSW Fisheries has prepared two Management Plans for the Protection of Fish Habitats (<i>Fish Habitat Protection Plan No. 1: General, 1995</i> and <i>Fish Habitat Protection Plan No. 2: Seagrasses, 1997</i>).</p> <p>The Plans address dredging and reclamation activities, fish passage requirements, the protection of mangroves, seagrasses and other marine vegetation, and the importance of snags. The overriding objective is to provide protection for all fish habitats including:</p> <ul style="list-style-type: none"> <li>• Quantity and quality of waters;</li> <li>• Mangroves;</li> <li>• Seagrasses;</li> <li>• Saltmarshes;</li> <li>• Wetlands;</li> <li>• Mudflats;</li> <li>• Sand and gravel substrate;</li> <li>• Rocky reefs;</li> <li>• Reed beds and other aquatic plants; and</li> <li>• Snags, including primarily fallen trees and rocks.</li> </ul> <p>Of particular relevance to Wonboyn in regard to this plan is the preservation of saltmarshes and the pristine quality of the water.</p>
<b>Responsibility</b>	NSW Fisheries

<b>How</b>	NSW Fisheries to implement: <ul style="list-style-type: none"><li>▪ Fish Habitat Protection Plan No. 1: General, 1995; and</li><li>▪ Fish Habitat Protection Plan No. 2: Seagrasses, 1997,</li></ul> created under the <i>Fisheries Management Act 1994 (NSW)</i> , to the Wonboyn Lake and estuary (see NSW Fisheries, 1999).
<b>Cost</b>	Negligible
<b>When</b>	2003-2005

**Figure 4-2 Foreshore and Habitat Protection and Conservation**

#### 4.2.6 Vegetation

<b>Option</b>	<b>S-1 - MAINTAIN VEGETATION IN RIPARIAN AREAS TO PREVENT SEDIMENTATION OF THE ESTUARY, AND EROSION OF RIVER BANKS</b>
<b>Objectives Satisfied</b>	<p>1 – Promote and encourage ecologically sustainable development (ESD) principles</p> <p>2 – Prevent water quality degradation and satisfy water quality criteria</p> <p>3 – Improve recreational facilities and provide waterway access around the estuary</p> <p>4 - Protect and enhance existing areas of significant terrestrial and aquatic habitat, and preserve communities and species of particular significance</p> <p>7 – Maintain (and if practical enhance) tidal exchange and flow within the estuary</p> <p>10 – Prevent future development reducing the current high visual amenity of the estuary</p> <p>12 – Reduce impacts on the Wonboyn estuary which prevent the <i>natural</i> flow</p> <p>13 – Protect native terrestrial vegetation from future degradation</p> <p>14 – Increase awareness and protection of significant cultural sites and traditions</p> <p>15 – Increase public awareness on values of the estuary</p>
<b>Discussion</b>	<p>Little vegetation has been disturbed or degraded in areas surrounding the Wonboyn estuary. However, maintenance of the riparian vegetation is important to protect the vegetation from future degradation and to ensure the maintenance of the pristine qualities of the area. Further development in the area must not entail removal of riparian vegetation. In areas where vegetation has been removed, access should be limited, or prohibited, and native species planted to stabilise the banks. Myrtle Cove is an area requiring immediate attention with respect to this issue.</p>
<b>Responsibility</b>	Bega Valley Shire Council / NSW Department of Infrastructure, Planning and Natural Resources
<b>Specific Actions</b>	<ul style="list-style-type: none"> <li>▪ Identify areas in need of stabilisation, characterised by eroding foreshores/bank erosion, to prevent further sedimentation/erosion and determine priority areas based on degree of degradation of physical and biological conditions.</li> <li>▪ Use existing native vegetation in adjacent areas as vegetative/seed stock for revegetation.</li> <li>▪ Planted areas to be fenced off and signed as rehabilitation areas while vegetation becomes established.</li> <li>▪ Monitor progress and remove fencing when plants have established and foreshore areas are stabilised.</li> <li>▪ Long term monitoring should be conducted to ensure no loss of riparian and nearshore vegetation, inappropriate access to waters' edge, wind waves, boat wake and increased tidal flow. It should be carried out on a quarterly basis using land-based surveys.</li> </ul>
<b>Cost</b>	\$15,000
<b>When</b>	2003-2005

### 4.2.7 Recreation

<p><b>Option</b></p>	<p><b>Q-4</b> - DEVELOP AND IMPLEMENT A MANAGEMENT PLAN FOR INCREASED RECREATIONAL USE OF THE ESTUARY</p> <p><b>R-3</b> - FUTURE DEVELOPMENT OF NON-MOTORISED (CANOES, KAYAKS, ETC) ACCESS POINTS ON THE NORTH EASTERN AND EASTERN SHORES OF THE LAKE, AND ALONG THE ESTUARY TO THE NORTH OF THE LAKE</p>
<p><b>Objectives satisfied</b></p>	<p>1 – Promote and encourage ecologically sustainable development (ESD) principles                  2 – Prevent water quality degradation and satisfy water quality criteria                  3 – Improve recreational facilities and provide waterway access around the estuary                  4 - Protect and enhance existing areas of significant terrestrial and aquatic habitat, and preserve communities and species of particular significance                  8 – Protect environment from damage by existing/future recreational use                  9 – Minimise diffuse pollutants entering the estuary from the local catchment (eg. <i>nutrients, sediment</i>)                  10 – Prevent future development reducing the current high visual amenity of the estuary                  11 – Protect the estuarine habitats from future industry or urban development                  12 – Reduce impacts on the Wonboyn estuary which prevent the <i>natural</i> flow                  13 – Protect native terrestrial vegetation from future degradation                  14 – Increase awareness and protection of significant cultural sites and traditions                  15 – Increase public awareness on values of the estuary</p>
<p><b>Discussion</b></p>	<p>While recreational usage levels of the river are generally low (except for school holiday periods), a number of activities can have adverse impacts on the estuary. Public access around the lake and estuary foreshores is limited, which concentrates the impacts in certain areas of the lake. The provision for foreshore public access at a number of different locations would ease the intensity of usage pressure at one location and allow for recreation at different locations.</p> <p>By providing for additional access points to the estuary, it is envisaged the use of the area will increase. It is important that the increase in use be planned for, to prevent/minimize damage to the environment.</p>
<p><b>Responsibility</b></p>	<p>Bega Valley Shire Council</p>
<p><b>How</b></p>	<p>Council, in conjunction with the review committee, to write and implement a Management Plan which considers</p> <ul style="list-style-type: none"> <li>▪ Whether access to the lake and estuary is adequate for current and future recreational uses (including monitoring of adequacy) For non-motorised access, identify appropriate sites (for example, see Figure 4-3; survey residents for additional site locations). Prepare conceptual designs, obtain approvals from relevant consent authorities, and construct accesses in accordance with plans and specifications. It may be pertinent to add steps to some access points for access to swimmers.</li> <li>▪ Protection and maintenance of conservation and habitat areas</li> <li>▪ Maintenance/enhancement of ecological aspects of the estuary</li> <li>▪ Foreshore structures: ownership, dilapidation survey by registered engineer/surveyor, identification of structures that are unauthorised/poorly constructed/public hazard (discuss with owners of structures for repair/removal).</li> <li>▪ Further issues to be included in the Management Plan should be determined through discussion between the Council and the review committee.</li> </ul>
<p><b>Cost</b></p>	<p>\$50,000</p>
<p><b>When</b></p>	<p>2003-2006</p>

**Figure 4-3 Recreational Access Points**

### 4.3 Funding Requirements

The funding requirements for full implementation of the Estuary Management Plan is expected to be in the range \$250,000 to \$300,000, with a further \$2,000 to \$5,000 required annually to maintain the effectiveness of strategies.

### 4.4 Possible Funding Sources

There are a number of Federal and State government grants that can be obtained for works relating to Estuary Management. These include:

- NSW Government Stormwater Trust grants;
- National Heritage Trust (NHT) grants, including
  - Coasts and Clean Seas
  - Bushcare
  - Coastcare
  - Fisheries Action Program;
- DIPNR Estuary Management grants;
- DIPNR Coastline Management grants;
- DIPNR Waterways grants;
- Department of Agriculture grants; and
- NSW Waterways grants.

Funding for works can also be obtained from annual budgets for various different government departments, including NSW Fisheries, NPWS, NSW Waterways and DIPNR. These departments may also be able to provide in-kind contributions, where works/tasks are carried out by government department employees, at little, or no, cost to the project.

Other in-kind contributions could also come from various educational institutions (such as universities, who could use the estuary for specific projects), as well as volunteer community groups, such as local Bushcare / Coastcare groups.

Other than grants for specific projects, it is expected that the majority of funds for the implementation of the Wonboyn Lake and Estuary Management Plan will need to be provided by Bega Valley Shire Council.

Eligibility for funding under either State or Federal Government grants programs, outlined above, should also be examined. In addition to these, all works outlined in this Estuary Management Plan are eligible for part funding under the NSW Government's Estuary Management Program, administered by DLWC.

## 4.5 Accountability and Reporting

It is suggested that the Wonboyn Lake and Estuary Management Committee should prepare a report on progress of implementation of this Plan on an annual basis to ensure accountability and progress of reporting of implementation of the Estuary Management Plan. The progress report would be presented to the Bega Valley Shire Council, with a discussion of the Plan implementation progress provided in the Council's annual State of Environment Report.

The progress of the Plan implementation should be reported back to the community to reinforce the commitment of the Council in establishing and maintaining an ecologically sustainable natural resource that is both highly valued and highly utilised by the local community.

A comprehensive review of the Estuary Management Plan, including re-consideration of the various strategies and options being adopted at this stage, should be carried out after 4 years. The purpose of this review is to ensure that most of the actions have been completed and continuing strategies are still 'best practice' and target the most appropriate threats to the values of the Lake and estuary.

## 5 REFERENCES

- ANZECC (1992) *Australian Water Quality Guidelines for Fresh and Marine Waters*.
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