Report No. 1287/R04/V2

Prepared for:

PORT STEPHENS AND MYALL LAKES ESTUARY MANAGEMENT COMMITTEE

PORT STEPHENS AND MYALL LAKES ESTUARY MANAGEMENT PLAN

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A GUIDE TO THE ESTUARY MANAGEMENT PLAN

This document presents a plan for managing the Port Stephens and Myall Lakes estuary over a period of five to ten years.

The Estuary Management Plan is intended to guide the use and development of the estuary and its surroundings, so that the environment and lifestyle that are highly valued by the local community are protected and enhanced.

The Estuary Management Plan contains five sections.

Section 1 provides background information, explains the purpose of the Plan and how the Plan fits with other local and regional planning projects.

Section 2 explains how the Plan will be implemented.

Section 3 identifies the most important actions that will be the focus of combined Government and community action in the first two years of the Plan.

Section 4 provides a brief status report for each of eight local management zones around the estuary. It outlines issues and responses for each of these zones.

Section 5 is the Action Plan for 2001 and 2002 and Action Plan for 2003 to 2005.

Progress in implementing the Plan will be reviewed annually, and the Plan will be updated after three years.

The **Action Plans** present actions in relation to seven themes that have been developed with community input:

1. Integrated and Co-ordinated Management (see **Section 5.1**)
2. Conservation of Significant Natural and Cultural Values (see **Section 5.2**)
3. Managing Catchment Development Inputs (see **Section 5.3**)
4. Managing Estuary Dynamics (see **Section 5.4**)
5. Managing Estuary Productivity (see **Section 5.5**)
6. Waterway Access and Community Facilities (see **Section 5.6**)
7. Community Lifestyle (see **Section 5.7**)

REFERENCE DOCUMENTS

If you would like to find out more about the background to the Estuary Management Action Plans, please consult the three detailed reference documents that support the Plan. These are:

- Reference Document 1: Management Concepts, Principles and Framework for Port Stephens and Myall Lakes
- Reference Document 2: Estuary Management Issues, Themes and Options for Port Stephens and Myall Lakes
- Reference Document 3: Community Feedback - Port Stephens and Myall Lakes

All three of these Reference Documents can be viewed in Council libraries and on Port Stephens and Great Lakes Councils' web sites.

1.0 BACKGROUND TO THE ESTUARY MANAGEMENT PLAN

1.1 THE NSW COASTAL POLICY AND NSW ESTUARY MANAGEMENT POLICY

The NSW Coastal Policy (1997) and the NSW Estuary Management Policy (1992) are two key parts of the Statewide approach to achieving ecologically sustainable development of the coastline. The estuarine waterways of NSW are a precious community asset that provides livelihood and lifestyle values for a high proportion of the population.

Many different government authorities share responsibility for sound management of estuaries and their catchment areas with local and regional businesses and residents.

The Coastal Policy and Estuary Management Policy provide a program of plans and actions to assist all these groups to work together to maintain and enhance healthy waterways, robust economies and vibrant growing communities.

This Estuary Management Plan for Port Stephens and Myall Lakes has been prepared on behalf of Port Stephens Council, Great Lakes Council and their communities as represented on the Estuary Management Committee, to fulfil the requirements of the Estuary Management Policy and Coastal Policy.

1.2 WHO IS INVOLVED IN MANAGING THE PORT STEPHENS AND MYALL LAKES ESTUARY?

The preparation of the Estuary Management Study and Estuary Management Plan is supervised by the Port Stephens and Myall Lakes Estuary Management Committee, which is a joint committee of Port Stephens and Great Lakes Councils.

The committee was established to provide broad representation of local and State Government authorities, estuary user groups and community conservation interests, in planning for the sustainable use of the estuarine waterway and its immediate hinterland. The committee comprises the following groups:

- Chairperson: Councillor John Nell (Port Stephens Council);
- Department of Land and Water Conservation (Rick Slatter);
- NSW Waterways (John Fisher and John Thompson);
- National Parks and Wildlife Service (Robert Quirk);
- Port Stephens Council (Rick Harris);
- Great Lakes Council (Gerard Tuckerman);
- Great Lakes Council (Councillor Bob Stuart);
- NSW Fisheries (Michelle Perry);
- Environment Protection Authority;

- Hunter Water Corporation (Bruce Petersen);
- Aboriginal Community (position currently vacant);
- Myall Lakes Yacht Club (Kevin Collinson);
- NSW Oyster Quality Assurance Program (Port Stephens Branch) (Rod Moffatt, Guy Holbert);
- Commercial Fishermens Co-operative (Ross Fidden);
- EcoNetwork (Darrell Dawson);
- Myall Lakes residents (Peter Kendall);
- Karuah and Great Lakes CMC (Kevin Watson);
- Port Stephens Tourism Ltd (Peter Dawson);
- Myall Waterways Chamber of Commerce (Rick Wraight);
- Regional Recreational Fishing Advisory Council;
- Marina Owners (Robert Bailey).

During the project, diverse additional stakeholders have also expressed interest in participating in the planning for the future of Port Stephens and Myall Lakes. Each individual or group has been added to the mailing list for the project, to ensure that they are kept updated on progress, and that they can provide feedback on management concepts and options. These stakeholders include:

- Precinct committees (eg for Nelson Bay, Salamander Bay)
- Individual charter boat operators
- Individual Real Estate agents
- Individual marina owners
- Individual land owners
- Residents of Bobs Farm, Tanilba Bay, Anna Bay, Hawks Nest, Tea Gardens and Pindimar
- North Arm Cove Progress Association
- Nerong Progress Association
- Pindimar Community Association
- Hawks Nest/Tea Gardens Progress Association
- Tea Gardens RSL Club
- Tea Gardens Primary School
- National Parks Association of NSW (Inc)
- Karuah Local Aboriginal Land Council
- Worimi Local Aboriginal Land Council
- Maiangal Cultural Heritage Inc.
- Myall Koala and Environment Support Group

- Friends of Fame Cove
- North Arm Cove Environment Group
- AMP Regional Development Manager
- Port Stephens Tourism Ltd
- Great Lakes Tourism Organisation Centre
- Game Fishing Clubs - eg Maitland City Fishing Club

Many of these individuals and groups will have a direct role in the implementation of the Estuary Management Plan.

1.3 OBJECTIVES AND SCOPE OF THE ESTUARY MANAGEMENT PLAN

The Estuary Management Plan is part of the strategy by Port Stephens and Great Lakes Councils to implement the principles of ecologically sustainable development. These principles are set out in the Local Government Act, the NSW Coastal Policy and the NSW Estuary Policy.

- *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.
- *Intergenerational equity*: Each generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for future generations.
- *Conservation of biological diversity and ecological integrity*: Measures should be taken to prevent and protect against the extinction of plant and animal species due to human activities.
- *Improved valuation and pricing of environmental resources*: The quality and value of environmental resources should be maintained and enhanced through appropriate management, preventing degradation and damage.

The specific objectives of the Estuary Management Plan are:

- to develop a decision making process to assist the community in evaluating the potential impacts of future development on the environmental and socio-economic values of the estuary;
- to recommend actions that are consistent and integrated with other current strategic planning and policy initiatives in the region;
- to provide for structured and prioritised management of key issues in the estuary, identify responsible stakeholders and properly assess the costs and benefits of management actions;
- to provide detailed and practical advice on management actions for local areas;
- to increase community awareness and understanding of estuary management issues and natural estuarine processes, and provide opportunities for the community to engage in decision making about estuary management issues; and
- to provide community groups with a strategic context for their work.

1.4 THE STUDY AREA

This Estuary Management Plan covers the following areas:

- the waterways of Port Stephens and Myall Lakes;
- the Myall River, Karuah River and their tributaries, up to the limit of tidal influence;
- the foreshore and other lands adjacent to the estuary, including all wetlands that are functionally related to the estuary;
- the catchment area of these water bodies, in relation to the impacts of catchment processes on the estuarine environment.

Port Stephens and Myall Lakes collectively have a water area of approximately 300 km^2, making them one of the largest estuarine waterways in NSW. The total catchment of the waterway is some 3700 km^2.

The extent of the study area is shown in **Figure 1.1**. (Note: The northern part of Myall Lakes National Park is only shown in **Figure 1.2**.)

The Outer or Lower Port includes the estuarine waters and shoreline east of Soldiers Point, to the heads (Tomaree and Yacaaba Headlands). The Inner or Upper Port includes the estuarine waters and shoreline that are west of a line between Soldiers Point and Fame Point. The Inner Port includes Tilligerry Creek and the Karuah River, upstream to their tidal limits.

Different parts of the Port Stephens and Myall Lakes estuary have different environmental and community values, although some values also apply to the entire estuary. To facilitate the planning process and discussion of issues and options, the estuary has been divided into a series of Management Zones. The zones presented in **Figure 1.2** reflect the outcomes of community input.

Eight main zones have been identified, with some subdivided to facilitate discussion of complex issues. The zones are as follows:

Zone A: Tomaree Headland to Soldiers Point, and the waters of the lower Port
A1 Tomaree headland to Corlette
A2 Corlette to Soldiers Point
A3 - waters of lower Port Stephens

Zone B Cromartys Bay (B1), Tilligerry Creek (B2) and Lemon Tree Passage (B3)

Zone C Southern shore and wetland catchment of the Inner Port
C1 Mallabula and Tanilba Bay
C2 Big Swan Bay, Twelve Mile Creek, Little Swan Bay and Reedy Creek
C3 Waters of Upper Port Stephens

Zone D Karuah River upstream of Karuah Bridge

Zone E Northern shore of Inner Port Stephens, from Yallimbah Creek to Pindimar, and including North Arm Cove and Fame Cove

Zone F Northern Shore of Outer Port
F1 Corrie Island and Corrie Channel
F2 Jimmys Beach and Yacaaba headland
F3 Lower Myall River, outside Myall Lakes National Park (including Hawks Nest and Tea Gardens

Zone G Catchment tributaries of Myall Lakes National Park - G1 Nerong Inlet, G2 upper Myall River and Boolambayte Creek

Zone H Myall Lakes National Park.

Port Stephens Local Government Area had a population of 51288 in 1996, and was growing at a rate of 3.6% per annum. The population is expected to grow to about 92000 by 2020. Most of the urban areas of Port Stephens have grown from foreshore villages such as Nelson Bay, Shoal Bay, Salamander Bay, Tanilba Bay and Karuah. Some 24000 people lived in these centres in 1996.

The population of villages on the northern shore of Port Stephens (Tea Gardens, Hawks Nest, Pindimar and North Arm Cove), in the Great Lakes Council area, is currently much lower than those on the southern shore (eg 2000 people currently live in Tea Gardens and Hawks Nest). However, the signs of increasing pressure for further urban development are clearly apparent in this area, and can be expected to increase as travelling times to Sydney are reduced by improvements to the Pacific Highway.

Port Stephens local government area is also the fastest growing tourist destination in the lower Hunter, with some 760000 visitors annually. The principal tourist attractions are the sandy beaches and the large scenic estuarine waterways. These destinations are estimated to draw approximately 500000 visitors annually. Waterway usage for recreational boating activities has increased significantly over the last ten years, although actual numbers of waterway users are not well documented.

The Myall Lakes are the only National Park in NSW that includes the entire waterway as well as the shoreline. Myall Lakes provides a water based bushland recreational experience that is unique on the NSW central and mid north coasts. Physically, in terms of its conservation value, and in terms of the social/recreational experience it provides, Myall Lakes National Park is regarded as having high regional significance, and also State significance.

The Myall Lakes are often dominated by fresh water. Recent blooms of blue green algae in Myall Lakes have highlighted the extreme sensitivity of this rare estuary type, with retention times of 400 to 800 days, for runoff and nutrients from all catchment sources.

Numbers of visitors to the Myall Lakes National Park have also increased, with estimates of around 250000 visitors annually (NPWS figures). This has created the potential for significant conflicts between the conservation management and recreational values of the National Park. Visitor numbers have been severely affected by recent blue green algae events.

Ten years ago, Port Stephens was the largest supplier of Sydney Rock Oyster in NSW. Although production declined dramatically in the 1990s, due to a variety of causes, the waterway has great potential for renewed sustainable aquaculture, including shellfish, fin fish and pearl oysters. Production of both Sydney Rock Oyster and Pacific Oyster has stabilised and is beginning to increase. Aquaculture in Port Stephens now co-exists with expanding urban areas and growing commercial activity.

The current status of development around Port Stephens and the Myall Lakes, and the likely growth of development pressure in this area, makes it a case study in the management of escalating development pressure around a waterway that is highly valued for its natural attributes. The development that will unfold over the next ten years will be based largely on the aesthetic and ecological values of the waterways. There is clear evidence from other estuaries that these values are at risk if new development is not very carefully managed.

1.5 SUPPORTING DOCUMENTATION AND RELATED STUDIES

1.5.1 What has been achieved so far

Although many agencies have a role in managing Port Stephens and Myall Lakes, Port Stephens and Great Lakes Councils and National Parks and Wildlife Service (NPWS) have the principal responsibility for managing the environmental and socio-economic health of the waterway.

Port Stephens Council, Great Lakes Council and National Parks and Wildlife Service recognise the high natural, socio-economic and cultural values of Port Stephens and Myall Lakes. They also recognise the need for careful planning and management if those values are to be sustained in the context of a growing resident and visitor population.

To this end, all three managers have initiated a range of planning strategies that will provide the baseline information, or the appropriate framework for sustainable management of local natural and cultural resources. A number of important studies are current, including:

- Review of the Myall Lakes National Park Plan of Management;
- Coastline Management Study and Plan for Shoal Bay;
- Coastline Management Study and Plan for Jimmys Beach;
- Conservation and Development Strategy for Tea Gardens and Hawks Nest;
- Aquaculture Industry Development Plan (NSW Fisheries).

Several other plans and strategies that will contribute to the management of the estuary have recently been completed, including:

- Stormwater Management Plan for Port Stephens;
- Catchment Assessment (Port Stephens and Karuah River);
- Regional Biodiversity Study (Port Stephens) and Habitats Study (Great Lakes);
- Draft Koala Management Plan (Port Stephens);
- Strategic water quality assessment of the Karuah River (Catchment Management Committee);

- Acid sulphate soil management strategy;

- Review of the Port Stephens Local Environment Plan.

The Estuary Management Process set out by the NSW government includes seven stages. After the Estuary Management Committee has been established by local government, a series of studies are required to be carried out to build up a picture of the physical and ecological processes of the estuary, how those processes relate to human activities, conflicts, risks and opportunities.

The Estuary Management Plan flows from these studies.

For Port Stephens and Myall Lakes, the following studies have been completed:

- Data Compilation Study (Manly Hydraulics Laboratory 1997);

- Estuary Processes Study (Manly Hydraulics Laboratory 1999);

- Estuary Management Concepts and Issues, Discussion Paper (Umwelt 1999);

- Draft Estuary Management Study (Umwelt 2000). The draft Estuary Management Study was exhibited for community feedback in February 2000.

The Estuary Management Study, and the community comments and feedback that have been received during its preparation, are important background information that explains and justifies the actions and priorities in the Estuary Management Plan. To make reference to this material as easy as possible, the Estuary Management Study has been reproduced as three reference documents. These are:

- Port Stephens and Myall Lakes - Management Concepts, Principles and Framework. This document explores the planning and policy background that guides the actions in the Estuary Management Plan.

- Port Stephens and Myall Lakes - Estuary Management Issues, Themes and Objectives. This document contains the core information about the natural process and socio-economic development interactions that are of concern in Port Stephens and Myall Lakes. It reviews previous studies and is as up to date as possible at the time of printing.

- Port Stephens and Myall Lakes - Community Input and Feedback. The information provided, and comments made by the community have been incorporated throughout the first two reference documents. This third document provides a separate summary of all community responses received at discussion meetings, in written correspondence, and in response to the exhibition of the draft Estuary Management Study.

These reference documents are available in Council libraries, and on the web sites of Port Stephens and Great Lakes Councils.

1.6 COMMUNITY AND GOVERNMENT PARTNERSHIP

Effective estuary management depends on a strong partnership between:

- Federal Government - National policy, programs and funding schemes;
- State Government - legislation and policy; regulatory, management and extension agencies, funding programs;
- Local Government - environmental and planning controls, management plans and programs, structural and partnership programs, funding; and
- Local communities - businesses and industries, tourism and recreation, landowners, residents and visitors, environmental and conservation interests - users who manage the estuary with their day to day activities.

The actions proposed in the Estuary Management Plan are designed to maximise the opportunities for constructive interaction between the local community and the government authorities that share responsibility for protecting and fostering the natural, cultural, economic and social values of the estuary.

The actions directed at smooth implementation of the Plan particularly focus on this shared responsibility and partnership.

The actions that call for further detailed planning studies all involve community consideration of how to provide the best facilities and guidance for those who use or enjoy the waterway.

2.0 HOW THE ESTUARY MANAGEMENT PLAN WILL BE IMPLEMENTED

2.1 GOVERNMENT COMMITMENT AND CO-ORDINATION

The effective implementation of the Estuary Management Plan depends on:

- All levels of government and the community agreeing on the objectives, priorities and principal actions of the Plan;
- All levels of government and the community understanding their responsibilities under the Plan;
- Commitment from all involved to work together to implement the plan, and to review progress, to ensure strong and sustainable outcomes;
- Excellent communication within Councils and Agencies, between Councils and Agencies, and with the broader community; and
- Appropriate and ongoing funding.

The implementation of the Port Stephens and Myall Lakes Estuary Management Plan will be facilitated by:

Statement of Joint Intent

This is a public commitment by Port Stephens and Great Lakes Councils, government agencies such as NPWS, Waterways Authority, the Department of Land and Water Conservation (DLWC), NSW Fisheries, NSW Agriculture, Environment Protection Authority (EPA), industry (eg oyster and fishing industries, Marina Owners, Tourist Association) and community groups, that they support the action plan identified in the Estuary Management Plan, and will work together to implement it. An example of a Statement of Joint Intent (SOJI) is provided in **Appendix 1**.

Estuary Management Implementation Committee

The Estuary Management Committee that has supervised the preparation of the Estuary Management Plan will be disbanded and nominations called for a new committee that will guide and monitor the implementation of the Plan. It is expected that there will be some continuity in membership, but that new groups whose input is important to the future management of the estuary will also be represented. More information about the committee is provided in **Section 5.1**.

Port Stephens and Great Lakes Councils Natural Resource Co-ordination Team

Throughout the preparation of the Estuary Management Plan, community input has stressed the importance of co-ordinated action, and the importance of recognising and dealing with catchment related drivers of estuary health, rather than only addressing the resulting issues in the estuary.

Port Stephens and Myall Lakes receive flows from three main catchments, as well as numerous small catchment areas. The main catchments are the Karuah River, Myall River and Tilligerry Creek/Tomago Sandbeds.

The Estuary Management Plan includes recommendations for the preparation of catchment studies, particularly in relation to nutrient loads and biological contaminants, in each of the main catchment areas. These studies would be followed by the preparation of catchment plans, that bring together the diverse actions that are already happening, and still need to happen in the catchment areas to ensure that catchment runoff does not adversely impact on the health and productivity of the estuary. The Estuary Management Plan suggests that the highest priority catchment for these studies and plans is the Myall River (see **Section 5.3.1**). The Karuah River catchment studies and plan should be commenced as soon as substantial progress has been made on the Myall Catchment Plan.

The Estuary Management Plan also recommends that the Estuary Management Implementation Committee develop close links with the Catchment Board, to promote the findings of the Estuary Management Plan, and to promote co-ordination of priority actions in the allocation of scarce funds (see below).

In addition to the integration of catchment and estuary planning, the Estuary Management Plan recommends actions to enhance co-ordinated management of natural resource issues, both within the individual Councils, and between Port Stephens and Great Lakes Councils. The Plan suggests that in addition to the co-ordination that can be achieved through regular meetings of the Estuary Management Implementation Committee, a joint council working group be established to plan and monitor the integrated implementation of catchment, stormwater, floodplain, biodiversity and estuary management projects. Whilst this group will have greatest relevance to the management of the Karuah River catchment and the northern shoreline of the estuary, it will also enhance management of other parts of the estuary and its immediate catchment areas.

Appoint a Co-ordinator

The Estuary Management Plan proposes that a Catchment and Estuary Management Co-ordinator be appointed jointly by Great Lakes and Port Stephens Councils. The co-ordinator would be responsible for the day to day project management tasks of implementing the Estuary Management Plan, including work schedules, community, agency, Council and Committee liaison, funding submissions, monitoring and reporting. The co-ordinator's position would be funded jointly by Port Stephens and Great Lakes Council, with funds supplemented by Natural Heritage Fund grants if possible. The co-ordinator would be based at either Port Stephens Council or Great Lakes Council and would report to the Environmental Managers of the two Councils.

Develop a close relationship with the Catchment Board

The Catchment Board is a regional group, appointed by the Minister for Land and Water Conservation, with responsibilities for regional scale strategic planning and co-ordination of natural resource management. The Board will, for instance, make recommendations and/or decisions about the relative priority of actions across the three main catchments and estuaries in the region, in terms of allocation of funds sourced from Natural Heritage Trust (NHT) and other grant programs. NHT funds are particularly important for the preparation of catchment studies and plans, and for assisting landholders to modify their management practices to achieve a stronger environmental focus.

2.2 MONITORING, REPORTING AND REVIEW

The Estuary Management Plan recommends an ongoing program of monitoring, reporting and review, to enhance awareness, accountability and continuing improvement in the management of the estuary. A comprehensive set of indicators of the sustainable

management of the estuary is described in **Section 5.1.2**. It is proposed that progress in implementing the Estuary Management Plan will be reviewed annually by the Estuary Management Implementation Committee, and that the plan will be publicly reviewed each three years.

2.3 COMMUNITY INFORMATION AND PARTICIPATION

The effective management of Port Stephens and Myall Lakes depends on a strong partnership between government stakeholders and the broader community. To enhance this partnership, the Estuary Management Plan proposes several important actions:

- Nominations will be called for community representatives in the Estuary Management Implementation Committee shortly after the Plan is adopted by the Councils. It is anticipated that the Implementation Committee will provide opportunities for greater participation of some community groups who have not been represented to date.

- The Plan proposes an integrated set of ecological and socio-economic indicators for the estuary. It also proposes that the results of monitoring of these indicators will be reported widely and regularly. Full reporting will be linked to the Council State of the Environment Reports. However, several other reporting strategies are also recommended, including local newspaper reports/features, Council Web sites, community newsletters and frequent graphic reporting of some parameters (eg water quality at key or high profile locations).

- The Estuary Management Plan has built into it a review cycle, with annual reporting of achievements against the management program and full reviews of progress at three yearly intervals. It is proposed that the three yearly review incorporate a variety of community input mechanisms (see **Section 5.1.3**).

2.4 FUNDING

The Estuary Management Plan recognises that funds for natural resource management projects are scarce, and must be spent effectively and accountably. A number of the actions proposed for Port Stephens and Myall Lakes require substantial capital and/or maintenance costs. Relatively high capital costs are, for instance, associated with dredging and beach nourishment works ($800000 for the dredging of the Corrie Channel), and for any structural controls that may be required to protect residences and infrastructure from shoreline erosion or flooding.

Relatively high maintenance costs will be incurred in carrying out an integrated estuary health monitoring and reporting program.

Funds for estuary management actions are available from several sources, and these are discussed in detail in Reference Document 2. The actions that are proposed for urgent implementation in the Estuary Management Plan will require funds from Port Stephens and Great Lakes Council budgets, from the recurrent funds in DLWC, NPWS, Waterways Authority, NSW Fisheries and NSW Agriculture budgets, special Treasury Enhancement funds, from NHT grants, Coast and Clean Seas grants, Acid Sulphate Soil grants, industry contributions and in-kind contributions from the community.

The Plan does not suggest a special funding levee within local government, although Councils may consider this option to progress a package of environment protection measures that includes the Estuary Management Plan.

2.4.1 Indicative Cost Implications for Councils and Agencies (High Priority Actions)

The indicative costs provided in the action plans, and the total cost implications for Councils and agencies, are estimates only, based on the currently available information and definition of the scope of work involved. They are provided to give an indication of the budgetary implications of the Estuary Management Plan. All cost estimates will be subject to a detailed review in the process of developing a work program to be implemented under the guidance of the Estuary Management Implementation Committee.

3.0 PRIORITY ACTIONS

The Estuary Management Plan recommends a wide range of actions to promote the environmental and socio-economic health of the estuary. The types of actions that are generally available for sustainable estuary management include:

- State and local government planning controls, such as State Environmental Planning Policies, Local Environmental Plans, Development Control Plans, Statutory Plans of Management (Crown Land and National Park) and pollution control regulations;
- Remedial works - these can be structural (such as training walls and bank protection structures), or ecological (such as rehabilitation of riparian vegetation and wetlands);
- Monitoring programs;
- Education programs;
- Community services - foreshore facilities such as boat ramps, wharves and jetties etc.

3.1 HOW HAS PRIORITY BEEN DETERMINED

The highest priority actions for Port Stephens and Myall Lakes reflect the following special characteristics of this estuary:

- Port Stephens and Myall Lakes is a very large and complex estuary system, about which relatively little baseline environmental data is available. This was highlighted by the Estuary Processes Study and again by recent work on the water quality and health of the Karuah River (MPR 1999) and Myall Lakes. This baseline status information data is an essential component of any environmental management system. The community needs to understand the starting point, so that progress (costs and benefits) can be assessed.
- On the basis of the information that is available, much of the estuary is in good condition, although there are some indications that catchment and waterway usage are having a discernible impact on water quality and community satisfaction with lifestyle. This is particularly evident in Myall Lakes, parts of the Karuah River, and adjacent to the more urbanised areas. In this sense, the Plan includes relatively few urgent remediation actions. The Estuary Management Plan focuses on minimising future needs for urgent remediation, which is almost always very expensive. The costs of urgent remedial works are often difficult to allocate in a fair and equitable manner.
- The geographical location of Port Stephens and Myall Lakes means that the area faces unprecedented growth pressure over the next ten years. Rapid growth has occurred in the Port Stephens LGA for several years, but improvements in transport times to the northern shore of the estuary from the Sydney metropolitan area can be expected to create further development pressure there. In this context, the local community faces major decisions about the environmental quality and lifestyle that it wants to sustain into the future. Careful planning for the management of social and economic growth is essential. The actions for the first two years of the plan require a significant effort directed to put in place effective planning strategies and actions to safeguard community and environmental values.

- The actions recommended by the Estuary Management Plan will not be realised unless there is government and community commitment to its implementation, and a policy and administrative framework that facilitates whole of community participation in the process. Several of the actions suggested for high priority implementation are directed at getting this framework of shared responsibility and commitment right for this estuary. These include appointment of a co-ordinator to ensure the smooth organisation of the actions that are the responsibility of multiple groups and organisations.

In the framework of an environmental management system approach for the estuary, the urgent actions also include establishing a monitoring, reporting and review process that will provide the broad community with information about the achievements of the plan, and opportunities to contribute to assessment and review of the management strategy.

The Estuary Management Plan identifies two broad levels of priority:

- High priority actions, 2001/2002 Action Plan;

- Medium priority actions, 2003/2005 Action Plan.

The Plan does not suggest specific action for longer time frames; rather it suggests a plan review process, with community input, after three years.

The two year time frame identified for high priority actions is intended as a guide as to which actions need to be given consideration first. Some of these actions relate to the completion of current detailed studies that will refine the scope of actions identified in the Estuary Management Plan. Where funds are available, the Estuary Management Plan recommends that actions within the high priority category be commenced within the two year time frame. The Plan also acknowledges that Council and agency funds are limited. Part of the responsibility of the Implementation Committee and Co-ordinator will be to promote the significance of estuary management actions. Where funds are required from external sources (eg grant schemes), applications should be made within the two year time frame, although they may not be immediately available. Successful funding of many actions will require co-ordination of funds from multiple sources, and vigilant and opportunistic use of grant sources.

The three to five year time frame indicates medium priority. As for the high priority actions, implementation will depend on the availability of funds for key projects.

3.2 2001/2002 PRIORITIES

This section provides a summary of the priority actions for sustainable management of Port Stephens and Myall Lakes. Details about these actions and other longer term strategies are provided in **Section 5**.

Priority actions to improve baseline information

Details about these actions are presented in the 2001/2002 Action Plan for Conservation of Significant Natural and Cultural Values

- Conduct a catchment assessment for Myall Lakes (including sediments in the lake bed).
- Conduct an aquatic vegetation survey for Myall Lakes National Park.
- Establish a seagrass monitoring program for the whole estuary.
- Establish an integrated estuary water quality and ecological health monitoring program.
- Initiate research into the impacts of algal biotoxins on oysters.
- Conduct a baseline survey of recreational fishing catches.
- Finalise the Jimmys Beach Coastline Management Study.
- Monitor the rate of infilling of the Corrie Channel.
- Investigate causes of shoreline erosion at Pindimar.

Priority actions to provide a robust planning framework

Details about these actions are presented in the 2001/2002 Action Plans for Waterway Access and Community Facilities, Estuary Productivity, Conservation of Natural and Cultural Values, and Community Lifestyle

- Complete the Tea Gardens and Hawks Nest Conservation and Development Strategy.
- Finalise the review of the Port Stephens LEP, to include measures to enhance protection of foreshore vegetation, and to require consent for certain waterway uses.
- Finalise the Aquaculture Industry Development Plan.
- Prepare and implement a management plan for Nelson Bay Harbour.

- Prepare comprehensive and complete Foreshore Management Plan for the whole estuary.
- Prepare a Fish Habitat Management Plan for the whole estuary.
- Prepare a Catchment Plan for the Myall Lakes catchment. Catchment Plans for the Karuah River and Tilligerry Creek will be prepared within the 3 to 5 year time frame.
- Prepare a Boating Management Plan for Port Stephens and Myall Lakes, including moorings, waste management, zonings, access and facilities, navigation.
- Prepare an Aboriginal sites management strategy for the estuary foreshore.
- Implement the recommendations of the Acid Sulphate Management Strategy, and adopt an acid sulphate LEP and DCP.

Priority actions to address existing problems

Details about these actions are presented in the 2001/2002 Action Plans for Catchment Development Inputs, Estuary Productivity, Estuary Dynamics, and Waterway Access and Community Facilities

- Remove priority derelict oyster leases.
- Carry out maintenance dredging in the Corrie Channel.
- Install stormwater controls in Nelson Bay, Shoal Bay, Little Beach and Cromartys Bay.
- Commence beach renourishment at Shoal Bay, as recommended by the Coastline Management Study.
- Implement Septic✓safe Program for all non sewered areas, particularly low lying, poorly drained locations such as Bobs Farm, and sites where septic effluent may flow directly to the estuary (eg North Arm Cove and Pindimar).
- Complete and maintain pumpout facilities at six locations and maintain the collection barge in Myall Lakes.
- Amend Regulation to prohibit discharge of raw or treated sewage from vessels within Port Stephens and Myall Lakes.
- Implement priority recommendations of the Catchment Assessment Program.
- Follow up on compliance audits of marinas and slipways.

- Assess the impacts of sediment accumulation at stormwater drains on seagrass.

- Review and implement the recommendations of the Tanilba Bay Erosion Management Study.

Priority actions to maintain government and community commitment to plan implementation

Details about these actions are presented in the 2001/2002 Action Plan for Integrated and Co-ordinated management

- Achieve sign off of Statement of Joint Intent by Council, Agency and community stakeholders. Consider a joint Council, agency and community launch of the Plan at the signing of the SOJI.

- Appoint an Estuary Management Implementation Committee.

- Establish a Port Stephens Council and Great Lakes Council co-ordination group to ensure integrated implementation of actions managed within different divisions of the two Councils.

- Appoint a catchment and estuary management co-ordinator.

- Establish a program for community reporting of environmental and socio-economic performance measures for the estuary. This will include Councils State of the Environment reports, local newspapers, radio, and Internet (Council web sites).

- Establish a management review process, with clear community involvement.

- Establish and maintain strong communication with the Catchment Management Board.

4.0 ESTUARY STATUS REPORT AND KEY ISSUES

This section provides an outline of the main physical and socio-economic features of each management zone in Port Stephens and Myall Lakes. It describes the key management issues for each zone and how the Plan responds to those issues.

4.1 MANAGEMENT ZONE A – SOUTHERN SHORES AND WATERS OF OUTER PORT STEPHENS

The main features of this zone are shown in **Figure 4.1**.

The most important management themes for Management Zone A are:

- **Waterway access and community facilities**
- **Managing estuary dynamics**
- **Managing catchment development inputs**
- **Conservation of natural and cultural values**

Status and issues

This management zone extends from the Tomaree Headland on the southern shore of Port Stephens to Soldiers Point. It also includes the waters of the Outer Port. Physically this zone is characterised by sandy beaches with high aesthetic value. There are also large shoals within the waterway which influence the direction and strength of wave energy onto the shoreline. The shoreline at Shoal Bay (see **Plate 1**) needs careful management to maintain recreational value and to protect infrastructure.

This zone includes the main commercial and tourist developments of Port Stephens, together with long standing residential areas. Medium density residential/tourist development is located immediately adjacent to the foreshore. Of some 15000 tourist beds that are located in the Port Stephens Local Government Area, most of the motel and unit accommodation (4500 beds) are in Management Zone A.

Port Stephens Council currently has before it proposals for over $100 million in new tourist facilities in this zone.

The zone includes the Nelson Bay harbour and the Corlette Marina. Nelson Bay harbour is the main fishing port for the estuary, including the location of the Fishermens Co-operative, the main berthing facility for commercial cruising and charter vessels, the 180 berth d'Albora Marina, pumpout and refuelling facilities (see **Plate 2**).

Boat launching ramps are located at Shoal Bay, Little Beach, and Salamander Bay.

West of Corlette Point, the Salamander Bay area is the major urban growth area within the immediate catchment of Port Stephens. The Salamander Bay foreshore is backed by Mambo wetland (SEPP14). A small number of oyster leases remain in the nearshore area, but are currently under consideration for removal.

There is high recreational demand along all beaches, foreshore reserves, and nearshore waters in this zone, with uses including swimming, scuba diving, fishing, sailing, paddle boats, power boats and picnic activities.

The key management issues, and proposed actions for Zone A are outlined in **Table 4.1**.

Table 4.1 - Estuary Management Issues and Actions, Zone A
Southern Shore, Outer Port Stephens

Zone	Issues	Actions
A1	• Severe shoreline erosion at Shoal Bay	• Complete and implement Shoal Bay Coastline Management Plan
A1	• Adequacy (capacity) of boat ramp at Little Beach, and ease/safety of water access • Adequacy of carparking space at Little Beach	• Prepare boating management plan (provide alternative parking, safety awareness program for Little Beach)
A1, A2	• Impacts of urban stormwater on nearshore water quality	• Implement stormwater controls for Nelson Bay, Shoal Bay and Little Beach
A1	• Potential for pollution from marina operations (Little Beach)	• Follow up on audits of marinas and slipways
A1	• Protection of Fly Point Marine Reserve, need for others?	• Review and monitor usage levels of marine reserve
A1/A3	• Boating safety issues in entrance channel	• Boating management plan
A1	• Deteriorating water quality in Nelson Bay harbour area – conflicts between swimming and boating water quality objectives	• Management Plan for Nelson Bay Harbour
A1	• Flushing capacity of harbour	
A1, A2	• Waste management on foreshore	
A1	• Waste management at Fishermens Co-op	
A1	• Refuelling management at d'Albora Marina and Fishermens Co-op, including spill management protocols	
A1	• Provision of pump out facilities for commercial charter vessels – co-ordination with publicly funded facility	• Maintain public pumpout facilities at six locations. Complete and maintain charter boat pumpout facility on Eastern Groyne
A1	• Encroachment of moored vessels on public water (navigation space) during peak boating season	• Management Plan for Nelson Bay Harbour.
A1	• Adequacy of space for public moorings	
A1	• Reduction in sea grass within harbour – boating impacts?	
A1/A2	• Clarification of foreshore management responsibility – Council and DLWC	• Review of land zonings and tenure in preparation of comprehensive foreshore management plan.
A2	• Extensive development pressure in immediate catchment area – impacts on wetlands • Urban runoff impacts on nearshore water quality – nutrients	• Prepare wetland management and protection plan. Implement stormwater management plan, including erosion and sediment control plans, stormwater structures, education and monitoring.

**Table 4.1 - Estuary Management Issues and Actions, Zone A
Southern Shore, Outer Port Stephens (cont)**

Zone	Issues	Actions
A2	• Sediment in stormwater smothering sea grass near drains	• Assess impacts of sediment at southwest drains on seagrass health. • Prepare Fish Habitat Management Plan.
A1/A2	• Need for a mooring management plan and boating access management plan – Salamander ramp has no parking, the jetty and ramp are difficult to use in many weather conditions	• Prepare mooring management plan • Prepare boating management plan (particularly survey re user needs)
A2	• Appropriate uses for foreshore lands – dinghy storage?	• Prepare foreshore management plan.
A3	• Interaction of commercial and private recreational vessels • Interaction of cruise boats and dolphins, other ecological features	• Prepare boating management plan. Maintain signage about marine fauna at boat ramps.
A3	• Navigation hazards – oyster leases	• Remove priority derelict oyster leases from estuary.

4.2 MANAGEMENT ZONE B - CROMARTYS BAY AND TILLIGERRY CREEK – INNER PORT

This Zone includes the sheltered waterways on the southern side of the Inner Port. The physical and socio-economic features of Management Zone B are illustrated in **Figure 4.2**.

The most important management themes for this area are:

- **Managing estuary productivity**
- **Managing catchment development inputs**
- **Conservation of natural and cultural values**
- **Community lifestyles**

Status and issues

The Soldiers Point ridgeline separates the open estuarine bay of the Outer Port from the more confined estuary waters of the Inner Port, and flushing times increase from less than one day in the Outer Port to 10-12 days. Water quality in the sheltered bays of the Inner Port is significantly affected by catchment runoff, and is also often turbid because of a combination of catchment inputs after rain, and resuspension of fine sediments by wind waves and tidal currents (see **Plate 3**).

Cromartys Bay is a shallow embayment with sea grass beds extending across most of the waterway. The western shoreline of the Bay is mangrove wetland which is periodically inundated.

Oyster growing has been important in this bay since the mid nineteenth century.

The Soldiers Point Marina and boat launching ramp are located at the northern end of the Bay. Urban development extends along the eastern shoreline of Cromartys Bay for about a hundred metres, but the shoreline of much of the bay is in natural condition.

The Salamander Bay landfill is located in a former wetland at the head of the bay, and has grown considerably over the last 15 years. A decommissioning plan has now been prepared for the landfill, and a waste transfer station will be established on this site.

Tilligerry Creek is a long narrow channel occupying a depression between the Pleistocene and Holocene sandy barriers of Newcastle Bight. The Creek has very restricted water circulation.

Much of the land surrounding Tilligerry Creek is mapped as having a high potential for acid sulphate soils. Significant areas are low lying and flood prone (eg Bobs Farm). These areas are often used for rural residential settlement and small scale agricultural enterprises, with on site wastewater management systems. There is a very high potential for these systems to fail in this environment.

Much of the catchment of Tilligerry Creek has agricultural land uses, which traditionally included orchards and market gardens, as well as grazing. This area is also a major supplier of mineral sand and construction sand. Both rural residential development and tourism activities have increased in recent years. Development in the upper catchment of Tilligerry Creek is not connected to reticulated sewage.

Tilligerry Creek is a traditional oyster growing area with about 300 hectares of leases (178 hectares now derelict), and processing/packing facilities on the foreshore. The expired, derelict leases are being considered for removal over the next four years with special funding obtained by NSW Fisheries.

Lemon Tree Passage is a long established small urban area at the mouth of Tilligerry Creek. It provides public marina and boat ramp facilities for the western part of Port Stephens.

The key management issues and proposed actions for Management Zone B are outlined in **Table 4.2**.

Table 4.2 - Estuary Management Issues and Actions, Zone B
Cromartys Bay, Tilligerry Creek and Lemon Tree Passage

Zone	Issues	Actions
B1	• Appropriate management of Taylors Beach to Mud Point wetlands – aquaculture?	• Foreshore management plan, including wetland protection plan.
	• Impact of Salamander landfill on water quality in Bay – direct and indirect – need to address faecal coliform contributions from birds when designing transfer station. Also runoff from mulching process. • Nutrient contributions from Horizons golf course and other urban sources in the catchment	• Implement recommendations of Catchment Assessment Program.
	• Need for regulation/inspection of activities in industrial estate re stormwater quality	• Implement recommendations of Catchment Assessment Program. • Implement Stormwater Management Plan.

**Table 4.2 - Estuary Management Issues and Actions, Zone B
Cromartys Bay, Tilligerry Creek and Lemon Tree Passage (cont)**

Zone	Issues	Actions
B1	• Sediment in stormwater burying sea grass near urban development	• Assess and report on impacts of sediment at stormwater drain on seagrass. • Prepare Fish Habitat Management Plan.
B2	• Acid sulphate soil management (Anna Bay and Bobs Farm area), drains in low lying land.	• Complete acid sulphate soils strategy and implement.
	• Effluent management in low lying areas such as Fenninghams Island caravan park, Bobs Farm.	• Implement Septic✓ Safe program.
	• Oyster lease management	• Maintain Oyster QAP, remove derelict leases.
	• Rural and urban land use impacts on water quality	• Implement catchment assessment recommendations.
B3	• Waste management at slipway (marina) – impacts on seagrass etc	• Follow up on audits of marinas and slipways.
	• Adequacy of parking and access to Lemon Tree Passage boat ramp	• Boating management plan.
	• Sediment in stormwater burying sea grass and reducing water depth for navigation	• Assess impact of sediment at stormwater drains on seagrass. Implement stormwater management plan.

4.3 MANAGEMENT ZONE C – WESTERN PART OF THE UPPER PORT

- Mallabula and Tanilba Bay
- Big Swan Bay, Twelve Mile Creek, Little Swan Bay and Reed Creek
- Karuah, the mouth of the Karuah River and the waters of the Inner Port

The key physical and socio-economic features of this zone are illustrated in **Figure 4.3**.

The most important management themes for this part of the estuary are:

- **Managing estuary productivity**
- **Managing catchment development inputs**
- **Conservation of natural and cultural values**

Status and issues

This zone comprises the open and closed embayments on the southern shore of the Inner Port, which are primarily within low lying alluvial/wetland terrain.

The southern shoreline of the Inner Port faces a long fetch, and is subject to relatively high energy wind waves. Wave attack has particularly affected shoreline stability in the Tilligerry habitat (between Tanilba Bay and Lemon Tree Passage) / Tanilba area, causing loss of riparian vegetation (potential koala habitat). Local stormwater drains also affect sediment distribution in the shallow nearshore and local shoreline stability. The wetlands

in Twelve Mile Creek and Reedy Creek are gazetted under SEPP 14 and have a high conservation value.

The water of the Inner Port is frequently turbid, reflecting both the resuspension of fine sediments by wind waves and the effects of discharges from the Karuah River catchment in wet weather. Flushing time in the Inner Port is 10-12 days and is considered long enough to permit algal blooms to occur after pulses of nutrients from the catchment. The nutrient load needed to trigger algal blooms is not known. There are no formal records of toxic algal blooms in the Upper Port to date, although there are anecdotal reports that blooms have occurred.

There are currently approximately 500 hectares of oyster leases in this management zone, of which approximately 430 hectares has been classified as derelict (see **Plate 4**). Two of the largest oyster processing operations are also located in this zone, as is the only marina facility in the Upper Port.

Tourist development is relatively restricted, with caravan parks at Tanilba Bay and Karuah. Tourist activity linked to the oyster industry is also located in this area. There is extensive foreshore reserve in this zone, (eg Tanilba Bay and Tilligerry Habitat area). The Tilligerry Habitat area includes koala habitat and littoral vegetation that is in good condition, despite some recent shoreline erosion.

There are large areas of seagrass off Tanilba Bay and in Big Swan Bay, but very restricted seagrass distribution in Little Swan Bay.

Key management issues, and proposed actions to address them are summarised in **Table 4.3**.

Table 4.3 - Estuary Management Issues and Actions, Zone C
Tanilba Bay, Big and Little Swan Bay, Twelve Mile Creek and Reedy Creek

Zone	Issues	Actions
C1	• Shoreline erosion at Tanilba Bay - impacts on riparian vegetation, recreational amenity and Koala habitat on foreshore	• Review and implement priority actions of Tanilba shoreline erosion plan. • Riparian vegetation assessment for foreshore management plan (protection plan).
C2 & C3	• Oyster lease management	• Remove priority derelict oyster leases
	• Marina facilities and waterway access, Inner Port Stephens	• Prepare boating management plan. • Follow up on audits of slipways and marinas.
C3	• Effluent management at Karuah and small rural villages - impacts on water quality	• Implement Septic✓ safe program.
	• Catchment runoff - impacts on water quality in the Inner Port in wet weather	• Prepare catchment plan for Karuah River.
	• Relatively long flushing time - sufficient for algal blooms to develop if nutrient load not controlled	• Recognise in catchment plan for Karuah River.

4.4 MANAGEMENT ZONE D - KARUAH RIVER

The main features and issues for this zone are illustrated in **Figure 4.4**.

The most important management themes for this area are:

- **Management of catchment development inputs**
- **Managing estuary productivity**
- **Conservation of natural and cultural values**

Status and issues

The Estuary Processes Study (MHL 1998) notes that the Karuah River has a catchment area of 1500 km^2. The tidal limit of the river is situated 4 km upstream of Allworth, 52 km from the ocean and 24 km upstream of Karuah.

Tidal influence in this upper section of the estuary is much attenuated, with both ebb and flood volumes being about 8% of the volumes at the entrance to the estuary, and 10% of the volume at Soldiers Point. Flushing times in the Karuah River are not well documented, but would increase upstream to be well in excess of the 10-12 days that has been modelled for the Upper Port.

The floodplain of the Karuah River is underlain by acid sulphate soils and gravel deposits (eg at Allworth).

Settlement upstream of Karuah comprises small rural villages within a generally rural landscape in which there are also significant areas of State forest. None of the small villages in the estuarine reaches of the river are sewered.

Although significant sections of intact riparian vegetation are present in the Karuah River, part of the estuary, their characteristics are poorly documented. This is also the case for the freshwater reaches of the catchment. Similarly there is very little systematic geomorphic information (including information about the distribution of processes affecting bank erosion) for the Karuah River, for either its fresh or estuarine reaches.

Intensive chicken production is a major agricultural land use. The Catchment Assessment Program (CAP) estimates there are at least 2 million chickens in sheds in the Karuah River catchment at any one time. Although chicken farmers are generally aware of good management practices, management of organic wastes remains a land use issue.

Dairying and beef cattle are also important rural land uses.

Catchment flows from the Karuah River into the estuary may convey pollutants from a number of sources, including;

- Stroud Sewage Treatment Plant, and
- Runoff from rural lands and forestry practices, local urban, tourist and recreational areas.

Key management issues, and proposed actions to address them are summarised in **Table 4.4**.

Table 4.4 - Management Issues and Actions - Zone D
Karuah River

Zone	Issues	Actions
D	• Management of catchment nutrient loads and biological pollutants	• Implement recommendations of catchment assessment program and strategic water quality assessment of Karuah River re riparian vegetation, bank erosion, chicken shed and dairy waste. • Agricultural industry audits, farm management plans, best practice guidelines. • Integrated monitoring program and centralised water quality and ecological data base. • Prepare Catchment Plan for Karuah River
	• Management of impacts on main transport corridor on natural and cultural values	• Ensure compliance with consent conditions and plans of management. • Prepare Aboriginal sites management strategy for estuary foreshore
	• Some areas with bank erosion	• Control bank erosion in accordance with the catchment plan
	• Potential for ASS discharges	• Include in ASS management strategy implementation

4.5 MANAGEMENT ZONE E - NORTHERN SHORELINE OF INNER PORT STEPHENS, EXTENDING TO THE OUTER PORT IN THE PINDIMAR AREA

The main environmental and socio-economic features of this area, as they affect the estuary, are illustrated in **Figure 4.5**.

The most important management themes for this part of the estuary are:

- **Conservation of natural and cultural values**
- **Community lifestyle values**
- **Waterway access and community facilities**

Status and issues

In contrast to the low lying shoreline and hinterland of the southern side of the Port, the northern foreshore is relatively steep and rocky. Although almost all of the shoreline (other than a small area of National Park in Fame Cove) is in private ownership, there has been very little development to date. Great Lakes Council policy is that further urban expansion is precluded until wastewater management can be addressed in a sustainable manner. Minor new development / construction continues on zoned land at North Arm Cove, with localised potential for erosion (steep slopes, erodible soils) and deposition in the nearshore. Waterfront residences have absolute waterfront status, making public access to the shoreline an issue. Although development is currently low key, there has been intermittent discussion of major tourist/ecotourist development within this zone.

Public boat ramps are rare in this zone, although several private ramps have regular use. A small ramp is maintained by the community at Pindimar. In the Pindimar area, a sandy, mangrove lined shoreline is backed by low lying, flood prone land, at the base of steep slopes.

Erosion of the sandy shoreline and mobility of sediments in the nearshore are causing local community concern (see **Plate 5**). The village is not sewered and the high water table of low lying land raises risks of off-site discharge of wastewater.

There are 97 hectares of derelict oyster leases in North Arm Cove (and a similar area of active leases). There are 32 hectares of derelict oyster leases off Pindimar and in the lower Myall River.

The completion of the freeway connection from Sydney to Bulahdelah is expected to create significant pressure for further urban development along the northern shoreline of Port Stephens. An appropriate zoning strategy and Development Control Plan to protect vegetation in the foreshore and steep areas is an important planning priority.

Although Fame Cove is partially protected as National Park, its catchment and southern shoreline are in private ownership. DLWC is currently investigating options for a property agreement with the landowner.

The key management issues, and proposed actions to address them are summarised in **Table 4.5**.

Table 4.5 - Management Issues and Actions - Zone E
Northern Shoreline of Inner Port Stephens, and Pindimar Area

Zone	Issues	Actions
Whole of estuary, with particular attention to northern shoreline	• Protection of natural and cultural values of largely undeveloped foreshore and hinterland	• Prepare Aboriginal sites management plan for estuary foreshore • Prepare foreshore management plan (assess conservation value of riparian vegetation) • Maintain in conservation zonings until appropriate services can be provided • Consider acquisition of high conservation areas as community land
North Arm Cove	• Effluent management in unsewered area, plus timing of any new development	• Implement Septic✓ safe program
	• Potential for erosion from development sites affecting nearshore water quality and sedimentation	• Education and enforcement re erosion and sediment control plans
Fame Cove	• Recreational and commercial cruise boat interactions with natural environment - noise, lighting and waste management issues	• Prepare boating management plan
	• Heavy boat usage in summer months - waste management and impacts on water quality	• Amend Regulation to make Fame Cove a nil discharge area from vessels
	• Bitou bush infestation of foreshore - management to protect and restore habitat values	• Assess conservation values, implement bitou removal strategies

Table 4.5 - Management Issues and Actions - Zone E
Northern Shoreline of Inner Port Stephens, and Pindimar Area (cont)

Zone	Issues	Actions
Pindimar	• Appropriate level of urban development, given flooding, sedimentation and effluent management constraints	• Complete and implement Conservation and Development strategy • Implement Septic✓ safe program
	• Foreshore erosion - retreat and impact on mangroves.	• Assess causes of shoreline erosion at Pindimar • Conduct process study for the mouth of Myall River, prior to any long term dredging program

4.6 MANAGEMENT ZONE F - TEA GARDENS, HAWKS NEST AND CORRIE ISLAND

The main environmental and socio-economic features of this management zone are illustrated in **Figure 4.6**.

The most important management themes for this area are:

- **Managing estuary dynamics**
- **Conservation of natural and cultural values**
- **Community lifestyle values**

Status and issues

This zone includes the dynamic sedimentary environments of Corrie Island, Winda Woppa and Jimmys Beach. Sedimentary processes are dominated by storm waves and tidal currents (to lesser extent). Severe erosion of the Jimmys Beach shoreline post dates the destruction of Myall Point, by major storms in 1927 and 1929. The shoreline is exposed to wave attack both through the entrance to the Port, and from the west.

Recent beach nourishment programs (10 years) have failed to stabilise the beach and nearshore profile at Jimmys Beach, leading to threats to residences and reduced beach amenity (see **Plate 6**). Beach nourishment in its current form has become an unsustainable expense for Great Lakes Council.

Both the eastern and western channels around Corrie Island are extensively shoaled, making navigation into the Myall River hazardous. Because of the mobility of sediments, maintenance dredging presents significant funding problems for local government. Cost neutrality is the funding objective. Narrowing and shallowing of the navigation channel also presents significant costs in terms of relocation of channel markers, potential risk to commercial and recreational vessels and potential loss of water based tourist activity in Tea Gardens / Lower Myall River.

Corrie Island is a Nature Reserve, managed by NPWS.

The key management issues, and proposed actions to address them are summarised in **Table 4.6**.

Table 4.6 - Management Issues and Actions - Zone F
Corrie Island, Corrie Channel, Jimmys Beach and Lower Myall River

Zone	Issues	Actions
F1	• Location and maintenance of a safe navigation channel past Corrie Island	• Carry out channel maintenance dredging within carefully defined requirements
	• Cost of channel maintenance	• Continue to pursue options for cost neutral dredging
	• Waterway facilities and management to meet additional recreational demand (eg bank erosion and shoaling along lower Myall River)	• Conduct process assessment for lower Myall River and Corrie Channel to identify constraints and opportunities for a long term management plan
F2	• Ongoing severe beach erosion, not controlled by beach nourishment programs over last ten years - erosion threatens residences, infrastructure and recreational amenity	• Finalise and implement Jimmys Beach coastline management plan to provide more efficient beach renourishment program
	• Cost of beach nourishment programs	• Research cost neutral means of beach nourishment
F1/F2	• Appropriate level of urban and tourist development	• Complete and implement conservation and development strategy

4.7 MANAGEMENT ZONE G - UPPER MYALL RIVER, BOOLAMBAYTE CREEK AND NERONG INLET

The main environmental and socio-economic features of this part of the estuary are illustrated in **Figure 4.7**.

The most important management themes for this part of the estuary are:

- **Management of catchment development inputs**
- **Management of waterway access and community facilities**
- **Conservation of natural and cultural values**

Status and issues

This zone comprises the catchment of the Myall Lakes. Effective catchment management in this zone is essential to protect the water quality and recreational amenity of the National Park. Currently demonstrated risks include invasion by noxious weeds (Salvinia), and nutrient load/cycling sufficient to generate algal blooms during fresh water dominated periods in the Lakes (see **Plate 7**).

Bulahdelah, at the tidal limit of the Upper Myall River, is sewered. The small village at Nerong, which has limited growth potential, is not sewered. On-site effluent management on the shores of this very protected waterway needs very careful control. Efforts should also be made to access State subsidies for provision of reticulated sewage with land disposal for this area. Great Lakes Council is currently exploring both effluent management and funding options for the unsewered villages.

There is potential for significant increases in pressure on recreational boating facilities at both Bulahdelah and Nerong as travel times from Sydney decline. Both villages provide direct access to Myall Lakes National Park.

The key management issues, and proposed actions to address them are summarised in **Table 4.7**.

Table 4.7 - Management Issues and Actions - Zone G
Upper Myall River and Nerong Creek - Catchment of Myall Lakes

Zone	Management Issues	Actions
G2	• Impact of rural runoff on water quality in Myall Lakes system - nutrients, noxious weeds, pathogens	• Conduct catchment assessment re nutrient loads to Myall Lakes • Prepare catchment plan • Catchment eduction and incentive programs • Community awareness programs re nutrients, algae and noxious weeds
G1, G2	• Management of boating activity on narrow waterways with sensitive riparian vegetation communities - house boats and other craft	• Boating management plan for entire estuary (Myall River as priority area) • Complete review of Myall Lakes National Park Plan of Management
G1	• Potential impacts of further (limited) residential development at Nerong	• Implement Septic✓ safe program and continue to investigate and promote options for reticulated sewage.
G1	• Effluent management - unsewered villages	• Implement Septic✓ safe program and continue to investigate and promote options for reticulated sewage.
G1, G2	• Boating access to Myall Lakes National Park - potential for increased demand for access from Nerong, Bulahdelah and Tea Gardens	• Boating management plan • Complete Myall Lakes National Park Plan of Management • Amend Regulation re nil discharge of raw or treated sewage

4.8 MANAGEMENT ZONE H - MYALL LAKES NATIONAL PARK

The main environmental and socio-economic features of the Myall Lakes National Park are illustrated in **Figure 4.8**.

The most important management themes for this part of the estuary are:

- **Conservation of natural and cultural values**
- **Management of waterway access and community facilities**
- **Community lifestyle values**

Status and Issues

Myall Lakes National Park was gazetted in 1972, and now has an area of more than 44000 hectares. The estuarine areas of the park include Bombah Broadwater, Boolambayte Lake and Myall Lake, Nerong Creek, Two Mile Lake, and sections of the upper and lower Myall River and Boolambayte Creek. Fame Cove on the northern shore of Port Stephens is also in the park. The lakes are a RAMSAR listed wetland of international importance. The extensive shallow areas of the lake system provide prime

waterbird habitat. These areas are used by large numbers of water birds, including species that are endangered or vulnerable in NSW, and wader species covered by international migratory wader agreements.

Myall Lakes also has a long history of European land uses including timber cutting and fishing, and more recently mining and tourism. Mungo Brush and Legges Camp have existed as bush camping areas since the early 20th Century.

The park is heavily used for recreation, including various boating activities, swimming, fishing and walking. NPWS estimates that around 250000 people visit the park each year. These visitor numbers have been severely affected by recent blue green algae blooms.

Extremely long freshwater retention times in the lakes creates a very sensitive water quality environment. The catchment of the lakes is outside the management of NPWS, but catchment management has a major effect on the health of the lakes, such as through water quality (nutrients, bacterial contamination and clarity), algal blooms, weed infestation and water levels. There have been almost continuous blue green algae blooms in the Broadwater since mid 1999.

The key management issues, and proposed actions to address them are summarised in **Table 4.8**.

Table 4.8 - Management Issues and Actions - Zone H
Myall Lakes National Park

Zone	Management Issues	Actions
H	• Very high recreational demand - shore based facilities and waterway uses - pressure on water quality and littoral vegetation; conflicts between user groups	• Review of Myall Lakes National Park Plan of Management
	• Compatibility of commercial fishing, recreational fishing and conservation values	• Review of Myall Lakes National Park Plan of Management
	• Blue green algae outbreaks - understanding and managing causes	• See Actions in **Table 4.7** in relation to controlling the quality of catchment runoff into the lake system.
	• Management of outbreaks of noxious weeds (Salvinia) - prevention and cure	
	• Waste management by recreational users	• Myall Lakes National Park Plan of Management
	• Managing costs of environmental protection (waterways) in the Park	
	• Interaction of recreational vessels and ecology - moorings, access, speed limits, effluent management	• Boating management plan for whole estuary - Myall River as priority area, and review of Plan of Management • Include in Fish Habitat Management Plan.
	• Management structure to protect waterway values - role of boating groups	• Review of Plan of Management
	• Aboriginal access and usage, protection of Aboriginal archaeological sites on the estuary shoreline	• Myall Lakes National Park Plan of Management review

4.9 MANAGEMENT OF THE WHOLE OF THE ESTUARY

The most important management theme for the estuary as a whole is:

- **Integrated and co-operative management, but all other management themes are relevant to sustainable management of the estuary as a whole.**

Status and Issues

Sustainable management of the Port Stephens and Myall Lakes estuary depends not only on the preparation of an appropriate series of management actions, but also on the adoption of a management structure by the key stakeholders, that can maintain focus on environmental, economic and social outcomes.

Port Stephens and Myall Lakes currently have several different managers, who have some responsibility for all or part of the estuary.

Management responsibility for catchments and their estuaries is not yet fully integrated in NSW. A model for co-ordinated management is currently in place in Lake Macquarie, but the management program has only just commenced. New administrative arrangements for Catchment Management have recently commenced but the new Catchment Boards do not specifically address improved linkages between catchment and estuary management. The Port Stephens and Myall Lakes Estuary Management Implementation Committee will work closely with the new Catchment Board.

State and local organisations with important responsibilities in managing Port Stephens and Myall Lakes include:

- Port Stephens Council;
- Great Lakes Council;
- National Parks and Wildlife Service;
- Department of Land and Water Conservation;
- Waterways Authority;
- NSW Fisheries.

Other State agencies, such as the Department of Urban Affairs and Planning (DUAP), NSW Agriculture and the Environment Protection Authority (EPA) clearly have a role in setting the framework for environmental performance, both in the estuary and its catchment.

Effective management depends on a co-ordinated effort by these agencies, together with community, recreational and environmental groups.

Although it may not be possible to create a management structure that can deal with every contingency in sustainable management of the estuary, it is essential that the structure can

guide planning decisions in a consistent manner, maintain focus on key issues and respond appropriately and efficiently to emergency or unexpected situations.

Experience from other catchments and estuaries suggests that although a single management authority is not essential, it is important that the management plan focuses on co-ordinated effort, preferably through the appointment of a catchment and estuary management co-ordinator.

Some of the issues associated with the concept of integrated management, and actions to address them in this study area, are summarised in **Table 4.9**.

Table 4.9 - Issues and Actions for Integrated Management - Whole of Estuary

Zone	Management Issues	Actions
Whole of Estuary	• Co-ordinated and consistent incident response (eg algal blooms, oil spills)	• Clarify roles and responsibilities in blue-green algae management (Regional Algae Co-ordinating Committee) and other incidents
	• Co-operative resourcing of catchment and estuary work by all levels of government and the community	• Statement of Joint Intent • Relationship of Estuary Committee and Catchment Board
	• Consistent guidance and standards from agencies and Councils about good management practices	• Joint Council co-ordination group, Estuary Management Implementation Committee
	• Need for co-ordinated decision making and project supervision framework that draws on high level state agency commitment	• Appoint co-ordinator (catchment and estuary). Liaison with Catchment Board.
	• Ability of issues in this estuary to demonstrate priority compared with those in other regions	• Estuary Management Implementation Committee to prepare promotion material, liaison with Catchment Board and local political representatives.
	• Administrative arrangements to provide for effective community participation in decision making	• Estuary Management Implementation Committee • Reporting of integrated monitoring information (State of the Environment report, local media, Internet) • Public input to review of Plan

5.0 2001 TO 2005 ACTION PLANS

This section presents seven Action Plans, highlighting the important actions to be implemented in relation to each of the seven key estuary management themes. These are the actions that will be attached to the Statement of Joint Intent (see **Appendix 1**) to be signed by the key stakeholders. The time frame proposed for the initiation of each of these actions is the first two years after adoption of the Plan. The Plan acknowledges, however, that a variety of circumstances may affect the program.

Detailed guidance about certain actions is provided with each Action Plan.

The Action Plans provide an indication of the costs of actions, based on consultation with the responsible Council or agency. The lead or responsible agency is the organisation who will have primary responsibility for the implementation of each action. This responsibility may include identifying and sourcing new funds, preparing briefs, project management, etc. The proposed Co-ordinator will assist with these tasks. Because Port Stephens and Myall Lakes have two local Councils and NPWS sharing major management responsibilities, some actions identify multiple lead organisations.

The Action Plans also provide an indication of whether funds have already been allocated for these projects in Council and Agency budgets, and where applications have been made for funds from grant sources.

Abbreviations used in the Action Plans are as follows:

PSC	Port Stephens Council
GLC	Great Lakes Council
DLWC	Department of Land and Water Conservation
LGSA	Local Government and Shires Association
NPWS	National Parks and Wildlife Service
EPA	Environment Protection Authority
ESD	Ecologically Sustainable Development
DUAP	Department of Urban Affairs and Planning
CSIRO	Commonwealth Scientific and Industrial Research Organisation
NHT	Natural Heritage Trust
CCS	Coast and Clean Seas Funding Program
ASSMAC	Acid Sulfate Soils Management Advisory Committee
CASSAP	Coastal Acid Sulfate Soils Program
RTA	Roads and Traffic Authority
GPT	Gross Pollutant Trap
GIS	Geographic Information System
LEP	Local Environment Plan
DCP	Development Control Plan
SoE	Council prepared State of the Environment Reports
REF	Review of Environmental Factors
POEO Act	Protection of the Environment Operations Act

5.1 ACTION PLAN, INTEGRATED AND CO-ORDINATED MANAGEMENT

Management Objectives:

- *To create a plan that is easily understood, makes best use of currently available information, and incorporates a monitoring, reporting and review process to facilitate adaptation and refinement as more information becomes available*
- *To formulate a plan that is based on clear management objectives, performance targets and indicators for environmental, social and economic criteria, which can be monitored and reported*
- *To provide a framework for co-ordinated agency participation in the implementation of the plan –that recognises regional priorities for action*
- *To acknowledge that community environmental performance expectations will continue to evolve over time, as will political responses in terms of policy and regulation*
- *To maximise opportunities for community participation in estuary management*

Table 5.1 - Co-ordinated Management - 2 Years[1]

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**M1** Councils to allocate specific staff responsibility for co-ordinated implementation of catchment/ stormwater/ estuary management recommendations. Appoint co-ordinator to do this (across both Councils)	A single management authority is not essential for effective implementation and review of the plan, but vigilant co-ordination is essential.	PSC and GLC	Joint funds from PSC and GLC, supplemented by NHT.	$70000/year (split between Councils) (PSC estimates $60000 for stormwater Co-ordinator)	Potentially fundable through NHT for the first two years.	Role requires environmental and project management experience. No funds currently budgeted.
W	**M2** Establish implementation committee and secretariat.	Will provide a direct conduit for communication with key stakeholders during implementation of the plan	PSC, GLC	DLWC, NPWS, NSW Fisheries, Waterways Authority.	Covered by salary of Co-ordinator		Secretariat would be part of co-ordinator responsibilities if one appointed. Co-ordinator to be supported administratively by either Port Stephens or Great Lakes Council.

Table 5.1 - Co-ordinated Management - 2 Years[1]

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**M3** Achieve full stakeholder sign off on Statement of Joint Intent re fundamentals	Although a Statement of Joint Intent does not bind responsible stakeholders to non-negotiable timeframes, it does put commitment to the health of the estuary into the public domain.	PSC/GLC	DLWC, Premiers, EPA, NPWS, Waterways, NSW Fisheries, DUAP, NSW Agriculture, Industry and community representatives	Approximately $10000 plus event costs		Council and agency staff time for negotiations, Councillor/ Mayor time involved. Within existing roles of Council environmental managers, or could be part of Co-ordinator's role.
W	**M4** Establish integrated catchment and estuary water quality / ecological database and monitoring program, seagrass monitoring program. (See **N12)**	Fundamental information for adaptive management of the estuary.	Catchment Board	DLWC, landusers, PSC, GLC, EPA, (Work could be done in-house or by consultants.)	Initially $40000, then $30000/year		Needs long term commitment - project funds from NHT, CCS not appropriate. See **Section 5.1.2** for details of monitoring and reporting.
W (G/H)	**M5** Clarify management responsibilities and response procedures for incidents such as blue-green algae blooms	Ensures rapid management response to incidents, and clear communication with waterway users	Regional Algae Co-ordination Committee.	GLC, NPWS, EPA, NSW Fisheries, DLWC, Oyster growers, Fishermens Co-op, Tourist operators	$15000 (staff time)		Recurrent budget item for DLWC and other organisations represented on Regional Algae Advisory Committee. Currently in hand.
W	**M6** Complete revision of Port Stephens LEP, including waterway uses requiring consent		PSC		$20000 (staff time)		Part of Councils recurrent budget.

Table 5.1 - Co-ordinated Management - 2 Years[1]

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**M7** Establish a joint PSC and GLC planning working group to work towards consistent planning and environmental protection requirements for both shorelines of the estuary and timely co-ordinated implementation.	Consistent objectives and planning instruments will provide clear guidance to all about how the Councils are working to protect a shared natural resource.	PSC, GLC		$15000/year (staff time)		See also **M1** re appointment of Co-ordinator. Costs are from existing staff salaries.
W	**M8** Prepare and implement a community awareness and information strategy using local media.	Important to maintain flow of information to community about estuary management project and outcome	PSC, GLC	NPWS, DLWC, Tourist authorities, Precinct Committees, Department of Education, Community Radio	$20000	Future Council budgets.	No funds currently allocated specifically for estuary awareness.
W	**M9** Establish close liaison with Catchment Board	Influence regional priorities for catchment and estuary priorities	Estuary Committee	Catchment Board	Part of Co-ordinator's responsibility.	Not applicable	Cost is in Co-ordinator's or other representative's time.
W	**M10** Explore alternative funding options for major estuary works that benefit regional or state scale communities, or specific minority groups of users.	Estuaries program provides 50/50 funding for a portion of the actions needed to plan for and implement ESD in the estuarine context. Alternative models for funding may increase flexibility, and means to achieve ESD outcomes.	Local Government & Shires Association	DLWC, Coastal Council, Industry Groups	$50000	Funds may be available for commercial users of the sand.	Cost is in staff time for briefings, discussion and negotiation. This action is of relevance to whole of coastline.

Table 5.1 - Co-ordinated Management - 2 Years[1]

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**M11** Prepare strategy to promote special values and needs of Port Stephens with State government.	High profile of unique features and management issues will facilitate funding.	PSC/GLC	Local Members of Parliament	$10000 (staff time)		No funds currently allocated. Important in context of cross regional priorities.
W	**M12** Implement Plan review process	Review of the plan at regular intervals with community participation will facilitate continuing improvement to management actions and environmental performance.	PSC/GLC	Estuary Management Implementat-ion Committee	$15000	Future Council Budgets	Indicative budget allows for an action and outcomes review paper by the Co-ordinator, advertising, community meetings, etc. See **Section 5.1.3** for details about review process.
W	**M13** Detailed scoping, project planning, budget estimates etc. for high priority actions to establish work plan.	Provides accurate baseline for implementation and review process.	PSC/GLC	Estuary Management Implementat-ion Committee	Within costs for committee establishment and Co-ordinator		

Note:

1. The two-year time frame identified for high priority actions is intended as a guide as to which actions need to be given consideration first. Where funds are available, the Plan recommends that the implementation of actions be commenced in this time frame. The Plan also acknowledges that where funds are required from external grants, applications should be made within the two year time frame, but the funds may not be immediately available.

2. The indicative costs provided in this table are estimates based on currently available information and definition of the scope of each action. They are provided to give an indication of the budgetary implications of the Estuary Management Plan. All cost estimates will be subject to a detailed review in the process of developing a work program to be implemented under the guidance of the Estuary Management Implementation Committee.

5.1.1 The Estuary Management Implementation Committee

The current membership of the Port Stephens and Myall Lakes Estuary Management Committee is listed in **Section 1**. When nominations are called for the new Port Stephens and Myall Lakes Estuary Management Implementation Committee, attention should be paid to gaining and/or maintaining the direct involvement of the following stakeholders. The community stakeholders on the Implementation Committee should also participate in the signing of the Statement of Joint Intent.

Council and Agency representatives

- Port Stephens Council - elected representative;
- Great Lakes Council- elected representative;
- Port Stephens Council - environment manager/co-ordinator;
- Great Lakes Council - environment manager/co-ordinator;
- DLWC - Regional estuary program co-ordinator;
- NPWS - Regional Manager;
- NSW Fisheries - Regional Manager/co-ordinator, Office of Conservation and/or Aquaculture;
- Waterways Authority - Regional Manager.

Other agencies that should be kept informed of the progress of the committee in implementing the Plan, but do not necessarily need to be members of the Implementation Committee are:

EPA, Department of Urban Affairs and Planning (DUAP), NSW Agriculture, Hunter Water and NSW Premiers Department.

Community interests

- Catchment Management Board (cross representation by community representative)
- Oyster growers - Port Stephens Oyster QAP Committee
- Commercial Fishermen (including fin fish aquaculture) - Commercial Fishermen's Co-operative Limited (Nelson Bay)
- Regional Recreational Fishing Advisory Council
- Myall Lakes Yacht Club
- Marina Owners of Port Stephens (Division of Boating Industry Association of NSW)
- Port Stephens Tourism Inc
- Chamber of Commerce - Myall Waterways and/or Nelson Bay

- Karuah or Worimi Local Aboriginal Land Council (or other Aboriginal representative, to be selected in consultation with the Aboriginal community)

- EcoNetwork

- Precinct committees, or other local community representatives (should have a group affiliation) - Tea Gardens/Hawks Nest, Karuah, Nerong/Bulahdelah, Tanilba Bay/Lemon Tree Passage, Salamander Bay, Nelson Bay (total of four representatives, to be determined in consultation with the community groups)

Also consider: NSW Nature Conservation Council, Wilderness Society

This would provide for a representative Implementation Committee with 22 to 25 members.

5.1.2 Integrated Monitoring, Reporting and Review

Table 5.2 summarises the proposed indicators that would be monitored and reported to the Estuary Management Implementation Committee and the broader community.

Table 5.2 - Core Indicators for Ecologically Sustainable Estuary Management

Monitored indicator	**Parameters and sources**
Population of LGAs and population in catchment of the estuary	Census data by census district
Number of tourist visitors; Value of tourist economy	Numbers from visitor information centre, industry or census data
Number and value of DAs in the catchment of the estuary	Council records
Compliance of management activities with the NSW Coastal Policy	Coastal Council reviews
Rainfall and discharge (Karuah River and Myall River)	Bureau of Meteorology data, DLWC flow data
Proportion of foreshore with natural riparian vegetation extending more than 10 metres from the shoreline	Aerial photo interpretation and field checking on 3 yearly basis
Biophysical indicators of water quality at key sites Compliance of these results with Water Quality Objectives	Parameters to include pH, nutrients, turbidity or suspended sediments, faecal coliforms, algae, sea grass density/biomass at key sites;
Number, severity and duration of algal blooms	DLWC data (Regional Algae Co-ordinating Committee)
Oyster production (value and by plate/bag etc)	Industry statistics (NSW Fisheries)
Commercial and recreational fish catches, by fishing effort	NSW Fisheries data, including creel surveys for recreational fishing; annual data for commercial fishing, 3 yearly for recreational creel surveys. Potentially also use recreational fishing licence numbers
Value of production on estuary floodplains (dairy, beef, chickens, plantation forestry)	Industry statistics
Usage of foreshore facilities	Boat ramps and walkways - would require community surveys at agreed intervals (3 years)

Table 5.2 - Core Indicators for Ecologically Sustainable Estuary Management (cont)

Monitored indicator	Parameters and sources
Number of recreational vessels registered	NSW Waterways data
All licensed discharges to the estuary/catchment comply with licence requirements, and with trade waste agreements	Council and EPA data
Actions in Estuary Management Plan completed on time and within budget	Review by Estuary Management Committee - council, Agencies and other responsible stakeholders to provide information
Number of community responses to estuary management reviews	Council data in implementation phase
Community perceptions of the health of the estuary	Build into Council survey of community attitudes

It is proposed that reporting of the full suite of these core indicators would become part of the State of the Environment reporting by Port Stephens and Great Lakes Councils.

In addition to this reporting, it is proposed that information about the health of the estuary, and about the success of implementation of the Estuary Management Plan will be reported to the broader community in several ways. These include:

- Routine graphic or similar reporting of water quality information for key sites in local newspapers. The suggested sites are Nelson Bay Harbour, Salamander Bay, Cromartys Bay, Tanilba Bay, Karuah, North Arm Cove and Tea Gardens, plus three sites in Myall Lakes. This reporting would report ongoing water quality results in relation to compliance with selected parameters that are required by the Water Quality Objectives for that location. For most sites, these would be the parameters for Primary Contact Recreation and/or Protection of Aquatic Ecosystems. It is suggested that the information be reported monthly, in much the same way as Hunter Water currently reports water quality at Newcastle Beaches and for the Williams River.

- It is important that the Implementation Committee and subsequently the broader community have feedback on whether estuary management actions are being implemented in accordance with the priorities and timeframes in the Plan. The co-ordinator will provide a project update at each meeting of the Committee. The Committee will review progress against the program on an annual basis, and this information will be reported to the broader community. Options for reporting this information include Councils annual reports, an estuary management page on Council's Web site, and community newsletters.

- Where a major new project from the Action Plan is commenced, reaches an important milestone or is completed, information about the project and its objectives or achievements will be provided to the general community through the local media.

5.1.3 Plan Review Process

It is proposed that the Estuary Management Plan will be reviewed at three yearly intervals. The details of the review process will need to be resolved by the Estuary Management Implementation Committee, but should include the following:

- A summary of progress in implementing the actions identified in the Plan as priorities for that period (ie a status report on the Plan);

- A review of expenditure - Council funds, State agency funds, industry funds, and grants from the Commonwealth or other sources;

- An analysis of the monitoring results, with particular attention to trends in the health of the estuary, and in the socio-economic value that has flowed from the health of the estuary. This task would be part of the responsibility of the Catchment and Estuary Co-ordinator;

- A cost benefit analysis and review. Which actions have provided the expected results, less improvement than was expected etc. In which areas can improvements in economic viability or social values be linked to estuary management actions;

- Propose a program for the following three years;

- Provide a review report to the broader community, and invite community comment on the achievements and proposed priorities in the Action Plan. This report would be available via Council Web sites, and in Council libraries/offices in hard copy. A newsletter would be prepared at the time of the review;

- Report community feedback to the Estuary Management Implementation Committee before finalising the new program; and

- Renew commitment by the signatories to the Statement of Joint Intent.

5.2 ACTION PLAN, CONSERVATION OF SIGNIFICANT NATURAL AND CULTURAL VALUES

Management Objectives:

- *To protect and restore native riparian vegetation and wetland habitats (including rare or threatened species)*
- *To protect and restore native aquatic habitats within their natural range of variance*
- *To achieve and maintain an standard of water quality that protects the diversity and productivity of aquatic ecosystems, and allows recreational and aesthetic enjoyment of the estuary*
- *To manage catchment sediment loads so that deposition is maintained at a rate that is consistent with the protection of water quality and aquatic ecosystems*
- *To conserve scientifically and culturally significant Aboriginal sites*
- *To stabilise shoreline erosion and shoaling caused by the effects of human intervention in estuarine processes*
- *To recognise the variability of natural processes (magnitude and frequency) that may affect the estuary when planning for human uses/rehabilitation of the estuary and foreshore (this would include the potential for Greenhouse related climatic change and sea level rise)*
- *To protect groundwater quality and quantity*

Table 5.3a - Conservation of Significant Natural and Cultural Values - 2 Years[1]

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**N1** Prepare Aboriginal Sites Management Strategy for estuary foreshore	Without a co-ordinated strategy, development assessment is ad hoc, poor information available to potential developers, and high risk of confrontation about appropriate management.	NPWS	PSC/GLC, Karuah and Worimi Land Councils and traditional owners	$35000	National Estate	

Table 5.3a - Conservation of Significant Natural and Cultural Values - 2 Years[1]

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**N2** Complete baseline survey of riparian vegetation (whole of estuary including Myall Lakes).	Provide inventory of ecological value of remaining foreshore vegetation, identify areas where vegetation could be restored.	NPWS, PSC/GLC	DLWC	$40000	NHT and Clean Seas.	OK for Myall Lakes. GLC has done northern shoreline of the estuary and proposes to amend the LEP to protect high conservation areas. Port Stephens Council Biodiversity Study (REMS) and Bitou Bush Management Plan also relevant
W	**N3** Identify priority areas for restoring riparian vegetation	Some high conservation value areas have been degraded, but can be restored to enhance habitat value of shoreline	NPWS, PSC/GLC	DLWC	$10000	As above	Actions **N2** and **N3** will contribute to the preparation of a comprehensive foreshore management plan. PSC has $5000 allocated for implementation of the Bitou Bush Management Plan in 2000/2001 budget
W	**N4** Implement Acid Sulphate Soils Management Plan for PSC	Extensive areas of ASS, particularly around Tilligerry Creek, have potential to generate acid runoff with dramatic impact on health and productivity of the estuary. Local impacts in Port Stephens not as clearly demonstrated as estuaries to north (Manning and Hastings).	PSC	DLWC/ EPA/ NSW Fisheries and Community DUAP	$150000	Further planning and implementation work could be funded through ASSMAC. PSC has applied for $150000 additional funds (CASSAP) for extension officer (2 years)	Draft ASS study report presented to PSC in April 2000. Completion of Plan is funded, application made for new funds.

Table 5.3a - Conservation of Significant Natural and Cultural Values - 2 Years[1]

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**N5** Adopt (both Councils) ASS LEP/DCP	Extensive areas of ASS, particularly around Tilligerry Creek, have potential to generate acid runoff with dramatic impact on health and productivity of the estuary. Local impacts in Port Stephens not as clearly demonstrated as estuaries to north (Manning and Hastings). The LEP/DCP will reduce the risk of new development disturbing ASS.	PSC, GLC	DLWC/ EPA/ NSW Fisheries and Community DUAP	$150000		Other costs covered in agency staff time. ASS LEP and DCP will reduce risks of new development causing ASS impacts. Guidance available from DUAP and ASSMAC
W	**N6** Baseline survey of recreational fishing catches	Together with improved data on commercial fishing catches and effort, will provide data for informed management of the fishery.	NSW Fisheries	Recreational fishing clubs	$25,000 (local cost)		Initial survey is part of national creek survey program.
W	**N7** Review zoning, tenure and status of all foreshore lands and identify areas with potential to extend conservation management (see also N2 and N3).	The naturalness of the foreshore and nearshore is one of the estuary's greatest assets. Protection will meet community and ecological needs. This action will contribute to the preparation of a comprehensive foreshore management plan.	DUAP, PSC, GLC	PSC, GLC, NPWS, DLWC (Crown Lands)	$20000	Future Council budgets	RRA process is relevant, second round to be completed by early 2001. DUAP through RACAC – only deals with big pieces of Crown Land. Could be compiled from Council GIS systems aerial photos with limited fieldwork. No budget currently allocated.

Table 5.3a - Conservation of Significant Natural and Cultural Values - 2 Years[1]

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**N8** Assess sediment accumulation at stormwater drains in relation to impacts on seagrass (see **C14)**	Visual evidence that combination of sediment load and hydrologic processes are distributing excess sediment over sea grass beds - particularly in outer estuary. Impacts on navigation safety and habitat value / productivity.	PSC/GLC	NSW Fisheries	$25000	Future Council budgets, land care.	Could be set up as a local land care program with guidance from Estuary Co-ordinators.
W	**N9** Implement catchment controls to reduce sediment load to estuary from new development areas	Important that any estuary based actions are accompanied by actions to reduce sources from the catchment.	PSC, GLC	DLWC, Landcom, MBA, Urban Development Institute, Catchment Board	Ongoing component of development assessment	PSC has bid in to budget for stormwater officer for education	PSC has a new erosion and sediment policy. This action focuses on education, regulation and enforcement.
	Erosion and sediment control plans for all construction sites are required in both councils	As above	Individual developers	PSC, GLC, DLWC	As above		Enforcement should be part of routine responsibilities of planning and environment staff.
	Inspection and enforcement action, education	As above	PSC, GLC		$40000 for salary of erosion and sediment control officer ($20000 from each Council)	Council budgets, industry contributions, Coast care grants.	Augment existing Council allocations to environmental regulation.
	Monitor and review success.	As above	PSC, GLC				Important part of accountability and improvement process.

Table 5.3a - Conservation of Significant Natural and Cultural Values - 2 Years[1]

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
B, C, D, E	**N10** Implement recommendations of catchment assessment program, particularly pumpout, rather than on-site disposal at Bobs Farm (see **C2**)	Incidents involving discharges from on-site system have potential major health and economic impacts on the estuary. High groundwater levels make this area unsuitable for on-site disposal for health and environment reasons.	PSC, GLC	Landholders	See C2 (Stephen Sate program)		Council offices and research projects on suitable effluent management methods for low lying land.
A, B, F	**N11** Install signage at boat ramps (see W1) about marine fauna.	Large aquatic species are a major tourist draw card for the estuary, but need to be carefully protected from excess or careless visitors.	NPWS		$10000		Done. Now on every boat ramp on PSC side. NPWS will check Tea Gardens and supply as necessary
W	**N12** Establish seagrass, mangrove and saltmarsh monitoring program for whole of estuary, based on key sites, such as Salamander Bay (see M4).	Need to establish integrative indicators of the health of the estuary to inform community of success of management strategies.	NSW Fisheries	PSC, GLC Possibly community	$50000 / 2 years	Coast and Clean Seas grants	Fisheries to do seagrass, mangroves and saltmarsh
	Prepare a Fish Habitat Management Plan.	Will address concerns about declining fish stocks by protecting key habitat areas and reducing impacts of waterway users on fish habitat.	NSW Fisheries	PSC, GLC, Commercial and Recreational Fishermen	$30000	-	The Fish Habitat Management Plan will be co-ordinated with Boating Management Plans, seagrass monitoring and the Wetland Protection Plan, also zoning of sensitive habitat areas.

Table 5.3a - Conservation of Significant Natural and Cultural Values - 2 Years[1]

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
H	**N13** Aquatic vegetation survey for Myall Lakes NP	Need to draw together and update various special purpose studies to establish baseline for future monitoring of health of lake system	NPWS		$40000	Coast and Clean Seas program	
H	**N14** Conduct catchment assessment for Myall Lakes catchment and prepare Catchment plan (see C12) Appoint Catchment Planner for Myall River catchment.	CSIRO research indicates nutrient loads to low flushing freshwater systems should be kept as low as possible to prevent major changes in ecological character.	DLWC, GLC, NPWS, Catchment Board	Universities, CSIRO, EPA, NSW Fisheries, NSW Agriculture	$180000	NHT, Agency budgets, Council budgets	Catchment Planner and Community Consultant appointed by DLWC June 2000.
F, H	**N15** Conduct research into potential impacts of algal biotoxins on oyster, prawn and fin fish industries.	Recent algal bloom initially assessed as not toxic, but toxic outbreak would potentially threaten local fishing and oyster industries.	NSW Fisheries, Safe Foods	DLWC, EPA, NPWS, Universities, CSIRO, NSW Health NSW Oyster Farmers Association	$50000	Safe Foods, Fisheries Research Development Corporation.	Initial literature review urgent, then possibly PhD student with some financial support.
G, H	**N16** Conduct community awareness program about risks of aquatic weeds to Myall Lakes National Park.	NSW Agriculture described recent Salvinia outbreak in Myall Lakes National Park as the most significant in NSW. Presents a major risk to the water quality, ecological and recreational value of the park.	NPWS, GLC	GLC, DLWC, NSW Agriculture, Catchment Board	$20000		Partly funded from 1999/2000 DLWC budget

Table 5.3a - Conservation of Significant Natural and Cultural Values - 2 Years[1]

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
G, H	**N17** Conduct community awareness program about risks of blue-green algae to Myall Lakes National Park	Strong community concern about recreational, fishing and tourism impacts of blue green algal blooms. Catchment controls that are needed are not short term solutions.	NPWS, DLWC	GLC, NSW Agriculture, Catchment Board, Regional Algal Co-ordinating Committee	$30000		Temporary Community Consultant appointed by DLWC May 2000. Awareness program partly funded from 1999/2000 DLWC budget

Note:

1. The two year time frame identified for high priority actions is intended as a guide as to which actions need to be given consideration first. Where funds are available, the Plan recommends that the implementation of actions be commenced in this time frame. The Plan also acknowledges that where funds are required from external grants, applications should be made within the two year time frame, but the funds may not be immediately available.

2. The indicative costs provided in this table are estimates based on currently available information and definition of the scope of each action. They are provided to give an indication of the budgetary implications of the Estuary Management Plan. All cost estimates will be subject to a detailed review in the process of developing a work program to be implemented under the guidance of the Estuary Management Implementation Committee.

Table 5.3b - Further Actions - 3 to 5 Years[1]
Conservation of Significant Natural and Cultural Values

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**N18** Protect estuarine wetlands from development impacts: • Stormwater pollutants • Weed infestation • Hydrology • Filling with appropriate strategic planning and development assessment tools. Prepare wetland protection plan.	Wetland areas providing habitat, plus natural water quality improvements; also have aesthetic value, as part of 'naturalness' of the area that is valued by the community. The wetland protection plan should particularly address northern shoreline, Myall River and entire Inner Port.	PSC, GLC	Local community, DUAP, NSW Fisheries, Catchment Board	$50000 (wetland protection plan)	Future Council budgets.	Protection partly provided by SEPP 14, zoning options also possible. For GLC, results of Conservation and Development Strategy will guide this action. A combination of regulatory and education/planning tools will be necessary. Wetland protection plan not currently in budget allocations.
W	**N19** Ongoing sea grass monitoring program as a key indicator of the health and productivity of the estuary.	Need to establish integrative indicators of the health of the estuary to inform community of success of management strategies.	NSW Fisheries	PSC, GLC, NPWS	$25,000 / year		
W	**N20** Prepare zoning system for Port to designate levels of access and appropriate controls to protect sensitive habitats.	A system based on sustainable levels of water/ecological capability will provide clear guidance to users and protect key natural values, and facilitate efficient use of resources for economic development.	PSC, GLC, NPWS	Waterways, DUAP, DLWC, NSW Fisheries, waterway user groups	$40000	Funds available for Mooring Strategy (Waterways)	Basic protection is provided by existing Fisheries and planning legislation and policy. More detailed delineation will flow from Foreshore Management Plan, Conservation and Development Strategy and Port Stephens LEP, Mooring Strategy

Table 5.3b - Further Actions - 3 to 5 Years[1]
Conservation of Significant Natural and Cultural Values (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**N21** Follow up investigation of recreational fishing catches – species, size, numbers, location, effort in the estuary, at three and five year intervals after initial investigation.	Together with improved data on commercial fishing catches and effort, will provide data for informed management of the fishery.	NSW Fisheries	Recreational Fishing Clubs	$20000 per survey		
H	**N22** Ongoing water quality / health monitoring program for Myall Lakes - seagrass and microphytobenthos. (See **M4** and **N12**).	Baseline data on health and variability of Myall system very limited, so significance of current events difficult to assess.	NPWS	DLWC, NSW Fisheries Universities/ CSIRO	$30000/year		Follow up from establishment of monitoring and reporting program for whole estuary.
A, B, C, D	**N23** Ongoing integrated water quality / health monitoring program for Port Stephens, Tilligerry Creek and Karuah River. (See **M4** and **N12**).	Essential for providing the community and decision makers with information to determine priorities and assess success of current strategies.	PSC, GLC	DLWC, EPA, Waterway Users, Community	$30000/year		Some monitoring occurs now and is funded (eg. Oyster QAP and Stormwater). Results are not integrated.
G, H	**N24** Investigate suitable options for long term control of Salvinia in Myall Lakes, within constraints of fresh water, National Park, etc.	Options for control of Salvinia in reed beds - currently by hand, are extremely labour intensive, but risks of not controlling are enormous.	NPWS	DLWC, EPA	$30000		Potential research project for postgraduate student.

Table 5.3b - Further Actions - 3 to 5 Years[1]
Conservation of Significant Natural and Cultural Values (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
Princ-ipally A, B, C	**N25** Prepare drain dredging strategy to remove excess sediment where it impacts on aquatic habitat or safety of waterway users, ensuring that dredging does not increase the risk to seagrass or water quality.	Control of sediment deltas will reduce risks to navigation (indirect impacts on environment), plus protect habitat quality if properly managed.	PSC, GLC	DLWC, NSW Fisheries	$30000	Council budgets	
Princ-ipally A, B, C	**N26** Implement recommendations of PSC stormwater management plan, particularly in relation to quality controls at Shoal Bay, Little Beach, Nelson Bay, Cromartys Road and Tanilba Bay (Tilligerry Creek) (see **C10**).	Essential controls to reduce risk of water quality deterioration adjacent to established urban areas.	PSC	EPA	Shoal Bay $180000 Nelson Bay $200000		Council has allocated funds for Nelson Bay in 2000/2001 budget
D	**N27** Incorporate details of waste/fertiliser management into whole of farm management planning. (See **C6**).	Benefits to both production costs and the environment from effective use of organic materials.	NSW Agriculture	DLWC, NSW Dairy Farmers Association, Poultry Farmers Association, NSW Farmers	$60000 (salary for extension officer)	Agency budgets.	Farming for the future and farm planning advice available from DWLC/NSW Agriculture – budget for extension officer salary

Table 5.3b - Further Actions - 3 to 5 Years[1]
Conservation of Significant Natural and Cultural Values (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
D	**N28** Protect and restore riparian vegetation along estuarine banks in rural areas, in accordance with DLWC guidelines. Commence with demonstration projects.	Riparian vegetation helps to protect estuarine water quality from excessive nutrient, sediment and pathogen load. Also helps to maintain stable banks.	Catchment Board	DLWC, NSW Farmers, NSW Agricultural, Individual Landholders	$400000 (advisory time, fencing, tree planting)	Landcare	Cost will depend on actual works and amount of community participation.
D, G	Investigate incentive schemes to encourage rural land users to protect and enhance riparian vegetation along the estuary.	Provide incentives for rural land users to manage for environmental and economic gain. Shift balance of costs and benefits for fencing and planting of riparian zones to encourage high implementation rate. Healthy riparian vegetation provides habitat, protects water quality and reduces bank erosion.	Catchment Board	DLWC, NSW Agriculture, NSW Farmers, Dairy Industry Association, PSC, GLC, EPA, individual landholders	$25000 (review of options)		First step is to review current option Beal 1997.
F	**N29** Prepare stormwater management plans for Tea Gardens / Hawks Nest	Stormwater discharges have clear detrimental impacts on seagrass, nearshore water quality and sediment disturbance with cumulative significant costs.	GLC	Local Community	$40000	Council funds CPA stormwater funds	Part of State Stormwater Management Program. Moderately low priority when compared with urban areas on southern shoreline.

Note:

1. *The time frame of three to five years indicates that these actions are of medium priority. As with the high priority actions, the time frame is a guide to when these actions should be considered. For externally funded projects, actual implementation will depend on the success of grant applications that must compete with priorities from other regions.*

2. *The indicative costs provided in this table are estimates based on currently available information and definition of the scope of each action. They are provided to give an indication of the budgetary implications of the Estuary Management Plan. All cost estimates will be subject to a detailed review in the process of developing a work program to be implemented under the guidance of the Estuary Management Implementation Committee.*

5.2.1 A Management Plan for Riparian, Littoral and Wetland Vegetation

Healthy foreshore vegetation is important to the ecological and aesthetic health of the estuary, but is also very vulnerable to all types of development. Although a number of studies of plant communities and fauna habitat have recently been completed for Port Stephens, there is as yet, no comprehensive management plan designed to provide protection for remaining littoral, riparian and wetland vegetation around the estuary. The priority tasks for the preparation of a comprehensive protection and management plan for these communities are:

- review and synthesise existing information about the structure and conservation value of riparian, littoral and wetland habitats around Port Stephens;
- document and review land tenure for the foreshore of the estuary, including SEPP 14 wetlands and other wetland communities that may not be covered by SEPP 14;
- assess conservation priorities;
- assess the extent to which existing policy and legislation provides opportunities for the protection of high conservation value habitats;
- identify habitat areas that are a priority for rehabilitation.

These tasks should be completed within the first two years. The preparation of the Foreshore Management Plan would be a priority for year three of the Estuary Management Plan.

5.2.2 A Management Plan for Conservation of Aboriginal Cultural Values

The NPW Act provides blanket protection for all known Aboriginal sites, and gazetted Aboriginal Places in NSW. However, many Aboriginal sites that are of scientific value or cultural value to the local Aboriginal community have not been properly recorded, and are not listed in the NPWS Register. Many Aboriginal sites are known from the shores or Port Stephens and its immediate hinterland, including several sites that are considered to be highly significant because of their age, content and cultural value.

In planning for sustainable management of the estuary foreshore, a valuable tool would be a thorough regional scale management strategy for Aboriginal sites. The details of the project to deliver this strategy will need to be developed in partnership with the local Aboriginal community (Karuah LALC, Worimi LALC and other groups such as traditional owners). Aspects of the project would include the following:

- full partnership with the local Aboriginal community in designing the project and determining the general availability of information about site locations;
- review of up to date NPWS Site register data, together with local Aboriginal community knowledge where appropriate. This review should consider particularly the environmental content of occupation evidence, and the reliability of the recorded information;
- identification of any known sites of high conservation value in estuary foreshore areas;

- identification of localities that are considered to be sensitive in relation to Aboriginal heritage issues, and where conservation management should be a high priority;

- consideration of the links between high cultural conservation areas and high natural conservation value areas in terms of relevant planning tools and strategies.

This project will provide information to guide decisions about foreshore areas that should be considered for acquisition as community lands, where zoning needs to be reconsidered, and where other tools such as Voluntary Conservation Agreements may be appropriate.

5.2.3 Fish Habitat Management Plan

Port Stephens and Myall Lakes provide diverse and productive fish habitats. Increasing foreshore development and more intensive recreational and commercial use of the waterway have potential to degrade fishery habitat in a variety of ways, adding to the pressures on the resource from all types of fishing.

A Fish Habitat Management Plan would incorporate identification of high conservation habitat areas (species or total diversity, individual rare species, productivity).

This Plan would need to be integrated with several other strategies that are designed to protect and enhance the natural conservation values of the estuary.

The Plan could include measures such as:

- guidance for recreational boaters/anglers about navigation around seagrass beds;

- guidance about management of waste bait bags, lines, etc;

- creation of new marine reserve areas, or boating/fishing exclusion areas to protect rare or threatened habitat;

- clear mapping and reporting of high conservation value habitat.

5.3 ACTION PLAN, MANAGING CATCHMENT DEVELOPMENT INPUTS

Management Objectives:

- *To provide for integrated management of the estuary and its catchment*
- *To manage catchment derived sediment loads so that deposition is maintained within the range of natural levels in the estuary*
- *To achieve and maintain a standard of water quality in the estuary that protects the diversity and productivity of aquatic ecosystems and allows recreational and aesthetic enjoyment of the waterway*

Table 5.4a - Catchment Development Inputs - 2 Years[1]

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**C1** Follow up on compliance audits of marina and slipway operations (see **W13**).	Enhance awareness of risks of slipway operations to water quality.	PSC, GLC,	EPA Marina Owners	$20000		PSC has done an audit – it needs a follow up. Part funded in salary of Council Environment Protection Officers
W	**C2** Implement Septic✓ safe program in all unsewered areas including monitor pumpout volumes at Karuah.	The failure rate of on-site wastewater systems has been identified as a major threat to physical and biological health of streams and estuaries.	PSC, GLC	Land owners	$126500 (PSC) In PSC budget (fee structure to cover this)	$3.8 million available Statewide from Department of Local Government over 2 years to assist Councils	Intention is that Septic✓ safe program will be cost neutral to Councils. GLC and PSC, Applications for $17000 & $15000 to Department of Local Government, & joint project with Uni of Newcastle & Uni of West. Syd. (application for $30000, Council providing equivalent funds)

Table 5.4a - Catchment Development Inputs - 2 Years[1] (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
D	**C3** Audit dairy farm waste status.	Dairying and chicken sheds are important rural land uses, contributing significantly to the local economy. Unwise waste management has the potential to create severe off-site impacts.	NSW Agriculture	DLWC, PSC, GLC, NSW Dairy Farmers Association	$25000		Partly achieved through Catchment Assessment Program. DLWC partly funded in extension officer salaries
D	**C4** Prepare management plan	Dairying and chicken sheds are important rural land uses, contributing significantly to the local economy. Unwise waste management has the potential to create severe off-site impacts.	NSW Agriculture	DLWC, PSC, GLC, NSW Dairy Farmers Association	$25000		Partly achieved through Catchment Assessment Program. DLWC partly funded in extension officer salaries
D	**C5** Audit chicken farm and user group waste management	As above	NSW Agriculture	PSC, GLC, EPA, DLWC, PFA	$25000		Partly achieved through Catchment Assessment Program.

Table 5.4a - Catchment Development Inputs - 2 Years[1] (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
D	**C6** Prepare management plan (with guidelines)	Chicken wastes provide good soil conditioner/ fertiliser at reasonable application rates (and potentially with other organic wastes), but can have detrimental impact on water quality if not used carefully. Catchment audit suggests chicken waste is a significant potential pollutant.	NSW Agriculture	PSC, GLC, EPA, DLWC, PFA	$25000		DLWC partly funded in extension officer salaries
	C7 Ongoing small industry audits and best practice programs to reduce the risk of contaminated runoff to stormwater.	Development consent for older industry does not necessarily provide adequate direction on environmental performance. Joint industry and Council programs to enhance awareness, reduce waste, etc, and reduce risk of stormwater pollution (oil, grease, and chemicals).	PSC, GLC	Chamber of Commerce, Australian Business, EPA	$30000/year		General advice and case studies provided by Environment Protection Authority 1997. Partly funded in salaries of Council environment officers.
	C8 Councils to employ stormwater management officer, catchment assessment officer and estuary Co-ordinator to work in co-ordinated team (see **M1**).	Provides co-ordinated management of catchment and estuary programs. Without this, there is a high risk of program fragmentation.	PSC, GLC, Catchment Manage-ment Board	DLWC, EPA	$140000	Stormwater funds, NHT, future Council and Agency budgets.	DLWC has appointed Catchment Planner for Myall Lakes. No funds allocated to Karuah River (see **N14**). PSC has funded part-time stormwater education officer (see **C10**).

Table 5.4a - Catchment Development Inputs - 2 Years[1] (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**C9** Maintain catchment information in integrated database (see also co-ordinate management re monitoring program) (see **M4**)	Need to establish integrative indicators of the health of the estuary to inform community of success of management strategies.	DLWC	PSC, GLC, Catchment Board	$40000 to establish (see **M4**)		No planning at this stage. No budget allocation at this stage.
W	**C10** Implement highest priority actions of PSC stormwater management plan (Nelson Bay Harbour, Shoal Bay, Little Beach, Cromartys Bay)	Stormwater discharges have clear detrimental impacts on seagrass, nearshore water quality and sediment disturbance with cumulative significant costs.	PSC		Shoal Bay $180000 Nelson Bay $200000 Lemon Tree Passage $50000	Future Council budgets, Coast and Clean Seas program	Funds for stormwater controls to Nelson Bay Harbour in 2000/2001 budget.
H	**C11** Complete sediment study for Myall Lakes (See **N14**).	Nutrients that have accumulated in sediments may be released and lead to blooms of blue green algae.	DLWC	NPWS	$37000		Sediment flux studies to be conducted May-June 2000, funded by DLWC
H	**C12** Catchment assessment to identify priority nutrient sources to Myall Lakes, prepare catchment plan (see N14)	CSIRO research indicates nutrient loads to low flushing freshwater systems should be kept as low as possible to prevent major changes in ecological character.	Catchment Board	NPWS, GLC, DLWC	$180000 (see **N14)**	NHT, Council and Agency budgets.	Community Consultant and Catchment Planner appointed by DLWC May-June 2000.

Table 5.4a - Catchment Development Inputs - 2 Years[1] (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
B	**C13** Audit fuel and stormwater systems at Williamtown RAAF Base, and prepare spill contingency plan	Recent spill events have demonstrated the potential for major groundwater impacts and impacts on Tilligerry Creek, if more extensive controls and protocols not established.	RAAF, Tomago Tomaree Ground-water Manage-ment Committee	EPA, PSC, NSW Fisheries	$45000	Defence budgets	Part of RAAF base environmental review.
W	**C14** Assess sediment accumulation at stormwater drains in relation to impacts on seagrass (see action **N8**)	Visual evidence that combination of sediment load and hydrologic processes are distributing excess sediment over sea grass beds - particularly in outer estuary. Impacts on navigation safety and habitat value / productivity.	NSW Fisheries	DLWC, PSC, GLC	$25000		
B, C, D, E	**C15** Implement Catchment Assessment Program recommendations, particularly for poorly drained areas (Bobs Farm) (see **N10** and **C2**)	Incidents involving discharges from on-site system have potential major health and economic impacts on the estuary. High groundwater levels make this area unsuitable for on-site disposal for health and environment reasons.	PSC, GLC		See **N10** and **C2**.	See **C2**	Port Stephens Council currently auditing Bob's Farm, proposing yearly inspections. Trialling 2 new systems that may operate better in high water table areas, requirements to elevate drainage beds. See Septic✓ safe Program funding discussed in relation to Septic✓ safe Program in **C2**.

Note:

1. *The two-year time frame identified for high priority actions is intended as a guide as to which actions need to be given consideration first. Where funds are available, the Plan recommends that the implementation of actions be commenced in this time frame. The Plan also acknowledges that where funds are required from external grants, applications should be made within the two-year time frame, but the funds may not be immediately available.*

2. *The indicative costs provided in this table are estimates based on currently available information and definition of the scope of each action. They are provided to give an indication of the budgetary implications of the Estuary Management Plan. All cost estimates will be subject to a detailed review in the process of developing a work program to be implemented under the guidance of the Estuary Management Implementation Committee.*

Table 5.4b - Further Actions - 3 to 5 Years[1]
Catchment Development Inputs

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
D	**C16** Implement recommendations of strategic water quality monitoring plan for Karuah catchment (MPR) as they apply to the health of the estuary. These include: • Introduce pollution control measures for use of chicken waste on land in accordance with Rivercare guidelines; (See also **C5** and **C6**).	See **C3** and **C5**. Action M4 also addresses an urgent recommendation of the strategic water quality assessment and this to be commenced within 2 years.	PSC, GLC	NSW Agriculture, Poultry Farmers Association	See **C5** for plan; cost of pollution control measures will depend on Individual Property circumstances	Landholders, Landcare, NHT	The Strategic Water Quality Monitoring plan for the river also recommends an integrated monitoring program and database. This needs to be linked to the Estuary Program (see **M4**).
D	**C17** Prepare catchment plan for Karuah River	Karuah River is the main catchment of the estuary, with a strong influence over water quality.	Catchment Board	DLWC, PSC, GLC, River Management Committee (members)	$120000	NHT	Not currently budgeted. Multiple managers need to be consulted. Major project that include minor catchments on north shore (eg for North Arm Cove) in this plan will require up to 2 years. Should commence as soon as funds allow, but after progress has been made with Myall River plan.

Table 5.4b - Further Actions - 3 to 5 Years[1]
Catchment Development Inputs (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
D	**C18** Implement recommendations of PSC Stormwater Management Plan as they affect the estuary. These include:						
	C18a Installation of oil separation devices / GPTs / constructed wetlands at Cromartys Creek, Tanilba / Tilligerry Creek, Little Beach and Nelson Bay Harbour. (see **C10**)	Stormwater discharges have clear detrimental impacts on seagrass, nearshore water quality and sediment disturbance with cumulative significant costs.	PSC	EPA	Tanilba/ Tillingerry Creek $50000	Future Council budgets	Priority for stormwater places Nelson Bay and Shoal Bay at top of list. Other sites are in PSC forward program, not budgeted as yet.
	C18b LEP/DCP requirements for water sensitive urban design in new development areas - including stormwater infiltration in suitable areas.	Will implement best current practice for new development and should aim to achieve nil net increase in nutrient load from new development sites.	PSC, GLC	Urban development industry	$20000 (prepare DCP)	Future Councils budgets	Would also need budget for education and enforcement during implementation.
	C19 Catchment Plan for Tilligerry Creek	Tilligerry Creek drains floodplain areas used for agriculture, rural residential and increasingly residential/ tourist development. Potential for high nutrient loads and ASS discharges	PSC, Catchment Board	DLWC, PSC, Landholders.	$70000	NHT	Would link to ASS plan (**N4**). Also **N10, C2** (Catchment assessment and Septic✓ safe).

Note:

1. *The time frame of three to five years indicates that these actions are of medium priority. As with the high priority actions, the time frame is a guide to when these actions should be considered. For externally funded projects, actual implementation will depend on the success of grant applications that must compete with priorities from other regions.*

2. *The indicative costs provided in this table are estimates based on currently available information and definition of the scope of each action. They are provided to give an indication of the budgetary implications of the Estuary Management Plan. All cost estimates will be subject to a detailed review in the process of developing a work program to be implemented under the guidance of the Estuary Management Implementation Committee.*

5.3.1 Managing Nutrient Inputs to Myall Lakes

The prolonged bloom of blue green algae at the Broadwater and nearby parts of Myall Lakes National Park over the last twelve months has provided a strong incentive to reconsider the sensitivity of the lake system to even low nutrient loads, and to review the risks that algal blooms pose to the local economy, as well as the ecological health of the waterway. Improved understanding of the nutrient loads to Myall Lakes, and of the mechanisms that can be used to control nutrient availability is now considered to be one of the highest priorities for the estuary. Considerable progress has already been made, and the following actions have been programmed by the relevant State agencies and Great Lakes Council:

- The Regional Algae Co-ordination Committee is responsible for co-ordinating responses to algal blooms;

- A Catchment Planner has recently been appointed by DLWC with specific responsibility for assisting the local community to manage the catchment in a manner that minimises nutrient loads. The catchment planner will also assist community groups to obtain funds for on the ground works, in accordance with the regional catchment strategy;

- A flow meter will be installed at Bulahdelah to enhance information about nutrient loads from the agricultural catchment, particularly during wet years (event sampling);

- A study of nutrient cycling from lake sediments will be undertaken;

- Groundwater monitoring will continue at eight sites around the shoreline of the lakes;

- Great Lakes Council will implement the Septic✓safe program for all unsewered properties in the catchment area of the Lakes;

- Algal sampling will continue at agreed sites that are relevant to individual algal events;

- Field days will be run to enhance community skills in low nutrient yield property management - property planning, bank erosion, industry best practice guidelines for dairying, beef cattle and chicken sheds, including waste management;

- Regular updates will be provided to the community on the implementation of these actions, and the results that have been obtained;

- Funds will be sought for a study of the potential impacts of algal biotoxins on the oyster industry;

- A Coast and Clean Seas application for further nutrient investigation and data interpretation has been lodged by GLC, NPWS, DLWC and the Estuary Management Committee.

5.4 ACTION PLAN, MANAGING ESTUARY DYNAMICS

Management Objectives:

- *To recognise the variability of natural processes (magnitude and frequency) that may affect the estuary when planning for human uses/rehabilitation of the waterway and foreshore*
- *To manage dynamic processes in the estuary so that aesthetic, natural and social values are protected at reasonable cost to the community*

Table 5.5a - Estuary Dynamics - 2 Years[1]

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
A	**D1** Finalise coastline plan for Shoal Bay and commence beach nourishment program (see **D7**)	Shoal Bay has high economic value as a tourist attraction. Foreshore stabilisation works will protect recreational and aesthetic values, as well as infrastructure and buildings.	PSC	DLWC, Tourist Operators	Plan is funded	Coastline Management Program.	Management options presented to Council May 2000. Beach nourishment works are urgently needed to provide assurance to developers and recreational users.
F	**D2** Finalise Jimmys Beach Coastline Management Plan and implement urgent recommendations	Jimmys Beach has high economic value as a tourist and recreation destination. Current beach nourishment program is expensive, has not prevented further erosion and is not sustainable. Stabilisation of the beach would also protect valuable private real estate.	GLC	DLWC, Residents, PSC	Plan is funded	Coastline Management Program.	May be linked to **D4** and **D10** in terms of sediment supply.

Table 5.5a - Estuary Dynamics - 2 Years[1] (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
E	**D3** Investigate causes of shoreline erosion at Pindimar	Pindimar shoreline is part of the complex sedimentary processes at the mouth of the Myall River (including Corrie Island, Corrie Channel and Winda Woppa). Details of process relationship need to be resolved to ensure dredging and shoreline protection works are effective and cost efficient. Mangrove habitat along part of Pindimar foreshore.	GLC	DLWC, Residents	$5000	Possibly estuary or coastal program, Council budget.	May be linked to **D4** and **D10** in terms of sedimentary processes
F	**D4** Dredging Corrie Channel: Short term dredging and REF Monitor rate of infilling See also actions for 3-5 years (process study, dredging management plan) (**D10**)	The Corrie Channel is the main water access to Tea Gardens and Myall Lakes and is heavily used by private recreational vessels, charter and cruise boats. Currently not safe and becoming impassable at low tide. Significant economic benefits in keeping the channel navigable.	GLC	Waterways, DLWC, commercial boating operators, PSC	$800000 (approx) and recurrent maintenance	See Actions **D6** and **M10**	GLC discussing options for commercial use of sand, to cover dredging costs. Careful protocols re channel depth and width etc needed for commercial extraction.

Table 5.5a - Estuary Dynamics - 2 Years[1] (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
C	**D5** Review and implement recommendations of Tanilba Bay Erosion Management Study (see also conservation of natural and cultural values)	The Tanilba foreshore includes the Tilligerry Habitat area, comprising wetlands and koala habitat. This area is one of few remaining blocks of natural foreshore vegetation on the southern shore and should be protected. Parts of the Tanilba foreshore also have excellent recreational amenity.	PSC	DLWC, Local Community Groups	Estimated at $55000 in 1997	Future Council budgets.	Funds of $32000 currently allocated by DLWC and PSC.
W	**D6** Review options for funding of maintenance dredging - potential to make process cost neutral (see **M10**)	Maintenance dredging of major navigation channels in dynamic sedimentary environments places a large cost burden on local government, which may or may not result in significant local economic benefits.	Local government and Shires Association	DLWC, Treasury, Industry Groups, Coastal Council			See also notes for D4 in relation to commercial uses of sand.

Note:

1. *The two year time frame identified for high priority actions is intended as a guide as to which actions need to be given consideration first. Where funds are available, the Plan recommends that the implementation of actions be commenced in this time frame. The Plan also acknowledges that where funds are required from external grants, applications should be made within the two year time frame, but the funds may not be immediately available.*

2. *The indicative costs provided in this table are estimates based on currently available information and definition of the scope of each action. They are provided to give an indication of the budgetary implications of the Estuary Management Plan. All cost estimates will be subject to a detailed review in the process of developing a work program to be implemented under the guidance of the Estuary Management Implementation Committee.*

Table 5.5b - Further Actions - 3 to 5 Years[1]
Estuary Dynamics

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
A	**D7** Continue to implement recommendations of Coastline Management Study for Shoal Bay to create a stable shoreline.	Shoal Bay has high economic value as a tourist attraction. Foreshore stabilisation works will protect recreational and aesthetic values, as well as infrastructure and buildings.	PSC	DLWC	Less than $100000 for beach renourish-ment, plus ongoing maintenance	Coastline program	No funds currently allocated for implementation. Recommendations suggest cost is less than $100000 with ongoing maintenance.
F	**D8** Continue to implement priority actions of Jimmys Beach Coastline Management Plan and stabilise the shoreline. Options to include: Further beach nourishment; Profile dredging; Groynes; Reform wave protection structure over Myall Point; Property acquisition.	Jimmys Beach has high economic value as a tourist and recreation destination. Current beach nourishment program is expensive, has not prevented further erosion and is not sustainable. Stabilisation of the beach would also protect valuable private real estate.	GLC	DLWC	Likely costs will not be available until draft study is exhibited, August - September 2000	Coastline program	No funds currently allocated for implementation. Budget requirements will depend on recommended actions.

Table 5.5b - Further Actions - 3 to 5 Years[1]
Estuary Dynamics (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
E	**D9** Take appropriate rehabilitation actions to maintain a stable natural shoreline at Pindimar. Options to include restoration of riparian vegetation, and control of stormwater flows from steep catchment areas.	Pindimar shoreline is part of the complex sedimentary processes at the mouth of the Myall River (including Corrie Island, Corrie Channel and Winda Woppa). Details of process relationship need to be resolved to ensure dredging and shoreline protection works are effective and cost efficient. Mangrove habitat along part of Pindimar foreshore.	GLC	DLWC	Cost will depend on the results of action **D3**	Landcare, Council funds, Estuaries program	Information from **D4** and **D10** will also be relevant to appropriate actions. Significant potential for community participation.
F	**D10** Carry out process investigation for mouth of Myall River before additional maintenance dredging is carried out. (See also **D2, D3** and **D4**)	The Corrie Channel is the main water access to Tea Gardens and Myall Lakes and is heavily used by private recreational vessels, charter and cruise boats. Currently not safe and becoming impassable at low tide. Significant economic benefits in keeping the channel navigable.	GLC, Waterways Authority	DLWC, waterway users	Cost is partly dependent on results of urgent dredging program and on results of current process studies for Jimmys Beach. Likely to be in $10000 to $100000 range for process study, plus costs for implementing recommendations.	Waterways program	Dredging to maintain a safe channel currently urgent, but future works should be preceded by a process investigation that recognises the interlinked sediment dynamics of the outer estuary. This follows on from current discussions about dredging of channel (see **D4**).

Table 5.5b - Further Actions - 3 to 5 Years[1]
Estuary Dynamics (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
C	**D11** Review and implement recommendations of Tanilba Bay Erosion Management Study, with initial focus on measures to address local erosion. (See **D5**). Monitor the success of the measures implemented in Years 1-2 for at least one year before any other actions are considered.	The Tanilba foreshore includes the Tilligerry Habitat area, comprising wetlands and koala habitat. This area is one of few remaining blocks of natural foreshore vegetation on the southern shore and should be protected. Parts of the Tanilba foreshore also have excellent recreational amenity.	PSC	DLWC, local community and environmental groups	To be determined after completion of **D5**.	Estuaries program, Council funds, Landcare	See **D5**.

Note:

1. *The time frame of three to five years indicates that these actions are of medium priority. As with the high priority actions, the time frame is a guide to when these actions should be considered. For externally funded projects, actual implementation will depend on the success of grant applications that must compete with priorities from other regions.*

2. *The indicative costs provided in this table are estimates based on currently available information and definition of the scope of each action. They are provided to give an indication of the budgetary implications of the Estuary Management Plan. All cost estimates will be subject to a detailed review in the process of developing a work program to be implemented under the guidance of the Estuary Management Implementation Committee.*

5.4.1 Beach Renourishment at Shoal Bay and Jimmys Beach

The Shoal Bay Coastline Management Study was presented to Port Stephens Council by Manly Hydraulics Laboratory in May 2000, and the Jimmys Beach Coastline Management Study is due for completion later in 2000.

The principal recommendations of the Shoal Bay study are that gradual beach renourishment should be continued (with "regular diligent maintenance of trouble areas"). Sand is proposed to be relocated from the western end of the beach to the central section and eastern end. These recommendations have been adopted in the Estuary Management Plan, and urgent implementation is encouraged to maintain a stable beach profile and protect community and commercial assets and development potential.

If this process does not achieve the predicted stability, the Shoal Bay consultants recommend obtaining additional sand for a larger scale renourishment exercise from sources such as the shoals west of Tomaree Headland. Port Stephens Council is considering options to facilitate efficient transfer of substantial volumes of sand.

A more efficient beach renourishment process is likely to be the outcome of the Jimmys Beach study. The recommendations will be reported to the Estuary Management Implementation Committee and the local community, and will be included in the Estuary Management Plan when they are adopted by Great Lakes Council.

5.4.2 Understanding the Sediment Dynamics of the Corrie Channel and Lower Myall River

The third area with a dynamic sedimentary environment in the lower estuary incorporates the lower Myall River, Corrie Island/Corrie Channel and the Pindimar foreshore.

The Estuary Management Plan recommends urgent dredging of the navigation channel around Corrie Island, to maintain access into the Myall River. The Plan also recognises that it is unlikely that this channel can be maintained without ongoing dredging.

The Estuary Management Plan recommends that a shoaling and dredging management plan should be prepared for the Myall River mouth area. The tasks for this project would include, but not be limited to:

- Consultation with waterway users and residents of the Pindimar and Tea Gardens foreshore areas;
- Survey and monitoring of shoals and channels;
- A hydraulic study to predict and model sediment behaviour;
- A plan of management for the entire area;
- Consideration of funding arrangements that are affordable for Great Lakes Council, but also ensure that the dredging program focuses on the ecological and navigation outcomes, rather than commercial advantage.

5.5 ACTION PLAN, MANAGING ESTUARY PRODUCTIVITY

Management Objectives:

- *To promote sustainable estuarine aquaculture productivity*
- *To devise strategic planning and development assessment processes that encourage ecologically sustainable development and provide clear guidance to the development industry*
- *To promote integrated monitoring and reporting of economic and environmental indicators for the estuary*
- *To promote tourism and recreational activity that is consistent the protection of natural and cultural (including social) values*
- *To promote the location, scale and design of new urban and commercial development so that natural values and community lifestyle values are protected.*

Table 5.6a - Managing Estuary Productivity - 2 Years[1]

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**P1** Remove priority expired, derelict oyster lease material	Derelict leases affect productivity of active leases, also present navigation hazard and have aesthetic impacts in some areas.	NSW Fisheries	Oyster growers DLWC, PSC Community	$920000 per year	No additional funds needed for current program. Operator contributions for ongoing maintenance and waste management.	Funds available for four years. Funded (special treasury Enhancement grant through NSW Fisheries)
W	**P2** Prepare aquaculture industry development plan	Provide framework for sustainable aquaculture production in the estuary. Enhance potential for long term economic value of industry with environmental impacts recognised and controlled.	NSW Fisheries	Oyster growers		No funds needed for plan implementation. At least partly industry funded.	Funded, to be completed second half of 2000

Table 5.6a - Managing Estuary Productivity - 2 Years[1] (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**P3** Maintain oyster QAP	In conjunction with actions to control critical catchment inputs, will provide necessary controls to maintain confidence in the viability of the industry.	Safe Foods	NSW Fisheries, Oyster growers PSC, GLC NSW Health			Fully industry funded
W	**P4** Monitor incidence of arbovirus diseases and continue to investigate mosquito management strategies	Outbreaks of arbovirus (eg 1997) present significant community costs.	NSW Health, PSC, GLC	IMEC (Westmead hospital)	Monitoring is within existing Agency budgets.	Potentially Environmental Trust Funds	PSC has a research program in place focusing on a site near Karuah.
W	**P5** Complete revisions of Port Stephens LEP re zonings. Also review Great Lakes LEP and provide for consistent planning guidance on both sides of the waterway (see also M8).	Provide clear guidance to new developers about Council's objectives, requirements and standards. Provide appropriate protection for natural, cultural, social and economic values in all parts of the estuary.	PSC/GLC	DUAP	Within Council recurrent budgets.	Ongoing Council budgets	GLC will complete Conservation and Development Strategy second half of 2000, possibly leading to rezonings. Council advises it proposes to amend the LEP to enhance conservation options along the north shore.

Table 5.6a - Managing Estuary Productivity - 2 Years[1] (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**P6** Baseline survey of recreational fishing catches. (See **N6**)	Together with improved data on commercial fishing catches and effort, will provide data for informed management of the fishery.	NSW Fisheries	Recreational fishing clubs	**See** N6		NSW Fisheries advises a creel survey of recreational fishing will be carried out in Port Stephens in 2000-2001. This is part of a $4 million national survey.
	Prepare Fish Habitat Management Plan (see N12).	Directed at protecting estuary productivity by protecting fish habitat, rather than controls on user groups (eg catch limits)	NSW Fisheries	PSC, GLC, NPWS, Commercial and recreational fishing groups	$30000		See **Section 5.2.3**.
	P7 Conduct research into potential impacts of algal biotoxins on oyster, prawn and fin fish industries (see **N15**)	Recent algal bloom initially assessed as not toxic, but toxic outbreak would potentially threaten local fishing and oyster industries.	NSW Fisheries, Safe Foods	See **N15**	$50000 (see **N15**)	See **N15**	
	P8 Monitor and enforce compliance with Consent Conditions for new development.						

Note:

1. *The two year time frame identified for high priority actions is intended as a guide as to which actions need to be given consideration first. Where funds are available, the Plan recommends that the implementation of actions be commenced in this time frame. The Plan also acknowledges that where funds are required from external grants, applications should be made within the two year time frame, but the funds may not be immediately available.*

2. *The indicative costs provided in this table are estimates based on currently available information and definition of the scope of each action. They are provided to give an indication of the budgetary implications of the Estuary Management Plan. All cost estimates will be subject to a detailed review in the process of developing a work program to be implemented under the guidance of the Estuary Management Implementation Committee.*

Table 5.6b - Further Actions - 3 to 5 Years[1]
Managing Estuary Productivity

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**P9** Continue removal of expired, derelict oyster leases and remove, reuse, dispose of waste timber in an efficient and environmentally sound manner, over the next four years.	Derelict leases affect productivity of active leases, also present navigation hazard and have aesthetic impacts in some areas	NSW Fisheries	Oyster Growers	$3.6 million for current program, over 4 years	Fully funded	Current program provides ongoing funding for four years at $920000 per year
B, D	**P10** Implement best practice guidelines for chicken waste management. (See also Catchment Inputs - **C6** and **C16**)	Intensive chicken growing is a major rural land use. Chicken shed wastes commonly used as fertiliser, but care needed to prevent nutrient, biological, turbidity impacts on water quality.			Ongoing (see **C6** and **C16**)		See **C6** and **C16**
Princ-ipally C	**P11** Implement acid sulfate soil management plan for southern parts of the estuary and surrounding areas and implement recommendations (eg in relation to planning controls for ASS areas) (see **N4** and **N5**)	Extensive areas of ASS, particularly around Tilligerry Creek, have potential to generate acid runoff with dramatic impact on health and productivity of the estuary. Local impacts in Port Stephens not as clearly demonstrated as estuaries to north (Manning and Hastings).	PSC	EPA, DLWC, NSW Fisheries, DUAP, Drainage Unions, Waterway Users, NSW Farmers, Development Industry	Will depend on recommendations of ASS Management Plan	ASSMAC	PSC is close to completing ASS Plan (May 2000). Similar plan needed for GLC. PSC has applied for $150000 CASSAP funds over 2 years for an extension officer (see **N5**). Other agency contributions (eg DLWC) in staff time.

Table 5.6b - Further Actions - 3 to 5 Years[1]
Managing Estuary Productivity (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**P12** Monitor commercial fishing catches in Port Stephens and Myall Lakes	Improved information on catches and effort will facilitate an appropriate balance between commercial and recreational users.	NSW Fisheries and Fish Co-op		Ongoing	None	Information to be used with results of recreational creel surveys. Both types of data to be reported in SoE.
	P13 Prepare and implement a Landscape Master Plan (with design guidelines) for the Shoal Bay – Nelson Bay commercial area.	Provide consistent framework for intensity and style of development, retention of natural vegetation, etc.	PSC, DUAP	Local community/ businesses	$20000	Future Council budgets	Will contribute to preparation of a comprehensive foreshore management plan.
W	**P14** Continue to monitor incidence of arbovirus diseases and continue to investigate options to control the breeding of relevant mosquitoes, without impacting on other habitat values. (See **P4**)	Outbreaks of arbovirus (eg 1997) present significant community costs.	PSC, GLC, NSW Health	IMEC (Westmead Hospital)	Ongoing agency budgets for data collection. Actions re mosquito habitat and other controls will depend on results of current research projects.	Potentially Environmental Trust (Research)	See **P4**
A, F	**P15** Investigate the feasibility of vehicular ferry connection from south shore to north shore, taking into account all environmental, navigation and economic constraints and opportunities.	May provide economic benefits, but improved access needs to be considered in context of current major highway upgrades.	PSC, GLC, DUAP, RTA, Regional Tourist Authority	Private developers	$10000 for feasibility	Private industry, Council budgets.	Significant capital investment required to establish a suitable landing site on either side of estuary.

Table 5.6b - Further Actions - 3 to 5 Years[1]
Managing Estuary Productivity (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**P16** Ongoing vigilant education and enforcement of development controls to protect environmental values (see **N9**).	Enhance environmental performance of new development. Provide clear guidance about performance expectations.	PSC, GLC	Urban Development Institute, Master Builders Association	Ongoing, part of responsibility of Council Environment Officers (see **N9**).	Council budgets	Staff time for PSC and GLC for both education and enforcement.

Note:

1. *The time frame of three to five years indicates that these actions are of medium priority. As with the high priority actions, the time frame is a guide to when these actions should be considered. For externally funded projects, actual implementation will depend on the success of grant applications that must compete with priorities from other regions.*

2. *The indicative costs provided in this table are estimates based on currently available information and definition of the scope of each action. They are provided to give an indication of the budgetary implications of the Estuary Management Plan. All cost estimates will be subject to a detailed review in the process of developing a work program to be implemented under the guidance of the Estuary Management Implementation Committee.*

5.6 ACTION PLAN, WATERWAY ACCESS AND COMMUNITY FACILITIES

Management Objectives:

- *To ensure that fair and equitable public access to the waterway and its foreshores is managed, retained or improved*
- *To manage recreational demand so that the natural and social values of foreshore lands are also protected*
- *To maintain safe navigation on the waterway*
- *To manage waterway usage so that the potential for conflicts between users is minimised.*

Table 5.7a - Waterway Access and Facilities - 2 Years[1]

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W, A	Preliminary actions for boating management plan:		PSC/GLC	Waterways Authority, DLWC			These actions will contribute to the preparation of a boating management plan for the whole of the estuary. There are links to **L1** (Myall Lakes Plan of Management), **W2** (Mooring Management Plan), **W3** and **W4**. None of these preliminary actions are currently funded.
	W1 Survey user needs	Clarify real concerns and issues for specific user groups - (note conflicts between petitions and our first pass survey).	PSC/GLC	Waterways Authority and users recreational boating clubs.	$30000	Council budgets and Waterways program	
	W2 Signs at ramps and jetties	Reduce risk of minor accidents on boat ramps and boarding jetties.	PSC	Waterways Authority	$10000	Council budgets and Waterways program	
	W3 Safety awareness program for Little Beach	Improve efficiency of launching and reduce waiting times at Little Beach in peak periods.	PSC	Waterways Authority	$10000	Council budgets and Waterways program	
	W4 Review size and effectiveness of safe holding areas	Improve safety and amenity of ramps that are used by visitors not familiar with local conditions.	PSC/GLC	User groups, Waterways Authority	$10000	Council budgets and Waterways program	

Table 5.7a - Waterway Access and Facilities - 2 Years[1] (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
	W5 Alternative parking at Little Beach	Reduce car park congestion at Little Beach (peak periods). Shuttle could be for tourist users and reserve parking for trailers.	PSC	User groups, tourist organisations	Subject to options considered	Future Council budgets	
	W6 Assess impacts of illegal foreshore structures in North Arm Cove and elsewhere, (se also **N7**). Consider options for public launching ramp in this area.	Illegal structures may have an unacceptable impact on the ecological health of the shoreline. A public ramp facility could reduce congestion at busy ramps - especially for peak demand periods and major competitions.	GLC	User groups, NSW Waterways, DLWC	$25000	Future Council budgets, waterways program	Demand for a new ramp at North Arm Cove currently low, but needs to be considered as a future option.
	W7 Signs at ramps and jetties - marine fauna conservation	Enhances community understanding of needs of marine fauna	NPWS		Complete		Completed mid-2000.
	W8 Awareness program on potential impacts of recreational boating on waterway	High recreational boat usage is a significant contributor to regional economy, but some users seem unaware that the activities can degrade the resource.	Waterways Authority	PSC, GLC, User groups	$15000	Recurrent Waterway and Council budgets	GLC has waterway use – strategy for Wallis, Smiths, northern side of PS). This action links with the proposed user survey and could be used as part of introduction of **W11**.

Table 5.7a - Waterway Access and Facilities - 2 Years[1] (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W, A	**W9** Prepare Mooring Management Plan	Boat moorings may have negative ecological impacts (seagrass), and affect safe navigation, other recreational uses. Enhance habitat value of sea grass meadows – contribute to fish stocks and overall estuary productivity. Proactive management of recreational boating access	Waterways Authority	DLWC, PSC, GLC, NSW fisheries	$20000	Waterways Authority	To be undertaken in 2000/2001. Waterways Authority has allocated $15000 in current budget.
W	**W10** Complete and maintain pump out facilities at six locations and maintain collection in Myall Lakes	Reduce discharge of biological contaminants to waterway and remove excuse for recreational users not to have waste holding tanks.	PSC, GLC, Waterways	DLWC, Federal Government	Construction - $650000. Maintenance $100000/year, including barge. Contributions required from both Councils.	Future Council budgets	Current funds cover construction of 5 new facilities. Public facilities at Myall Shores, Tea Gardens, Nelson Bay and Soldiers Point, Lemon Tree Passage, Karuah. Port Stephens now best equipped estuary in NSW for pumpout facilities

Table 5.7a - Waterway Access and Facilities - 2 Years[1] (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**W11** Amend regulation to prohibit discharge of raw sewage from boats (POEO Act)	Reduce discharge of biological contaminants to waterway and remove excuse for recreational users not to have waste holding tanks.	Waterways Authority	EPA, Community feedback	Waterways $30000		Discussion Paper out for comment. Much of Port Stephens and Myall Lakes would meet criteria for nil discharge of raw or treated sewage from all vessels of 6 metres or more in length. Waterways Authority has funds for consultation and recommendation to government.
W	**W12** Minor maintenance dredging to maintain navigation channels, with appropriate environmental controls.	Maintain safe access for users around marinas, boat ramps and jetties.	PSC/GLC	Waterways, waterway user groups	$50000/year	Council budgets, Waterways Program	Program to be developed by Councils in consultation with users. Actual costs will vary with need and success of other measures to reduce sedimentation caused by catchment runoff.
W	**W13** Follow up environmental and compliance audit of marina and slipway operations (see **C1**)	Enhance awareness of risks of slipway operations to water quality.	PSC, GLC	EPA	See **C1**		See **C1**

Table 5.7a - Waterway Access and Facilities - 2 Years[1] (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**W14** Prepare a comprehensive and complete foreshore management plan for Port Stephens: Collate and review baseline survey information about foreshore vegetation distribution and health, prepare comprehensive mapping Confirm zoning and ownership of foreshore lands, Review all foreshore structures (see also N2, N3 and N7)	Provide inventory of ecological value of remaining foreshore vegetation, identify areas where vegetation could be restored, and which areas are most suitable for acquisition. Control loss of riparian vegetation, protect habitat values, reduce shoreline erosion. This review needs also to consider the needs of recreational users of the foreshore.	PSC, GLC,	DLWC	$100000	NHT	See Coastal Policy re acquisition of high conservation value lands.

Table 5.7a - Waterway Access and Facilities - 2 Years[1] (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
A	**W15** Prepare and implement management plan for Nelson Bay Harbour:		DLWC Likely to revert to PSC	Waterways, PSC, Marina Operators, Co-op, Charter Boats, Recreational Users	Implement $25000/year	Ongoing	See **Section 5.6.1**.
	Users working group		DLWC Likely to revert to PSC	Waterways, PSC, Marina Operators, Co-op, Charter Boats, Recreational Users	In kind contributions in staff time from various organisations.		
A	**W16** Water quality monitoring program Multi use - primary contact and recreational boating objectives	Limited data now available suggests non-compliance with primary contact guidelines is likely. Significant recreation/tourist implications. Will improve amenity and reputation of facility in peak user periods and assist consideration of need for further facilities in the future.	DLWC	PSC, Marina Operators Co-op, Waterways	$25000/year	DLWC, Council, Waterways and Users	Program could be reviewed after 3 years. Water quality monitoring program will provide information on suitability for primary contact.
A	**W17** Review requirements of co-op lease		DLWC	Co-op	Ongoing		

Table 5.7a - Waterway Access and Facilities - 2 Years[1] (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
A	**W18** Waste management from co-op (review and improve)		DLWC	Co-op			
A	**W19** Litter removal program (caretaker)		Waterways	DLWC/PSC	$6000		Part-time caretaker to be appointed for routine litter removal and small oil spills.
A	**W20** Implement stormwater controls (see **C18**)	Reduction in nutrient and BOD loads will reduce problem of poor flushing.	PSC	EPA	See **C18**		Stormwater controls for Nelson Bay harbour are in current Council budget.
A	**W21** Moorings/ berths	Maintain navigation safety and access. Ensure mooring arrangements do not impact on seagrass	DLWC				
A	**W22** Feasibility of improved circulation and flushing	Harbour is focus of economic activity in Port, with fishing, tourism, etc. Value to these industries dependent on high water quality and community amenity.	DLWC	PSC, waterways users.	$80,000		See Reference Document 2 for information on this issue.
W	**W23** Investigate feasibility of toilets/showers in highest priority foreshore reserves adjacent to ramps and maintain - 3 new sites.	Reduce potential for biological pollution of the estuary by small boat users by providing adequate and easily accessible on shore facilities.	PSC, GLC	DLWC and recreational user groups	$20000		Focus on facilities on north shore and west of Soldiers Point.

Note:

1. *The two year time frame identified for high priority actions is intended as a guide as to which actions need to be given consideration first. Where funds are available, the Plan recommends that the implementation of actions be commenced in this time frame. The Plan also acknowledges that where funds are required from external grants, applications should be made within the two year time frame, but the funds may not be immediately available.*

2. *The indicative costs provided in this table are estimates based on currently available information and definition of the scope of each action. They are provided to give an indication of the budgetary implications of the Estuary Management Plan. All cost estimates will be subject to a detailed review in the process of developing a work program to be implemented under the guidance of the Estuary Management Implementation Committee.*

Table 5.7b - Further Actions - 3 to 5 Years[1]
Waterway Access and Facilities

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
W	**W24** Introduce inspection system for private recreational vessels at registration (eg to address pumping of bilge water) – inspections potentially 1 in 3 years?	To reduce incidence of oily water discharges to Port. This action would need to be implemented state wide.	Waterways	Recreational boating community	Ongoing funding		
All Facilities in Estuary	**W25** Conduct an environmental and compliance audit of marina and slipway operations – regulated by EPA and Council.	Enhance awareness of risks of slipway operations to water quality.	EPA, PSC, GLC				
W	**W26** Foreshore management plan for Port Stephens:						
	Restore riparian vegetation in foreshore reserves, eg Lemon Tree Passage - will need public consultation program.		PSC, GLC	DLWC, local Landcare groups			
	Provide toilets/showers in foreshore reserves adjacent to ramps and maintain. (see **W23**)	Reduce potential for biological pollution of the estuary by small boat users by providing adequate and easily accessible on shore facilities.	PSC, GLC	DLWC, recreational user groups			Locations to be specified in the Plan when planning studies completed.

Note:

1. *The time frame of three to five years indicates that these actions are of medium priority. As with the high priority actions, the time frame is a guide to when these actions should be considered. For externally funded projects, actual implementation will depend on the success of grant applications that must compete with priorities from other regions.*

2. *The indicative costs provided in this table are estimates based on currently available information and definition of the scope of each action. They are provided to give an indication of the budgetary implications of the Estuary Management Plan. All cost estimates will be subject to a detailed review in the process of developing a work program to be implemented under the guidance of the Estuary Management Implementation Committee.*

5.6.1 A Management Plan for Nelson Bay Harbour

Nelson Bay Harbour is the port for the commercial fishing fleet, charter boat fleet, and visiting cruising yachts in Port Stephens. It is also the focus of the main tourist centre for Port Stephens so its appearance and ecological health are important to the image of the area for visitors.

Water circulation, flushing and resultant water quality have been issues for the harbour for several years, and have been noted in numerous community submissions. The organisations with management responsibilities for the harbour include:

- Port Stephens Council;
- Waterways Authority;
- Department of Land and Water Conservation;
- Fishermens Co-op;
- D'Albora Marina.

A plan to improve day to day management of the harbour, and to improve water quality has been developed by the stakeholders over several months. Agreed actions include:

- A working party of all stakeholders to discuss management issues and find practical solutions.
- A part time caretaker is to be employed to regularly clear gross pollutants from the waterway. The caretaker will also be responsible for visual monitoring of oil and grease slicks.
- Installation of additional litter bins on the western breakwater and boat harbour precinct.
- Preparation of a protocol between the local Fire Brigade, Waterways Authority and the caretaker, for clean up of minor oil spills.
- A program of regular control of vermin on the rock walls.
- A water quality monitoring program to clarify compliance with the water quality parameters for primary contact recreation and protection of aquatic ecosystems.
- Construction of a gross pollutant trap in Victoria Parade and installation of litter baskets on stormwater pits around the harbour.
- Negotiation with the Co-op and commercial fishermen about waste management and refuelling practices.

The water quality monitoring program should ideally continue for one year in the first instance, and should include several rainfall events. Key elements of the program include:

- Collection of an integrated depth sample from two locations in the harbour and one location outside the harbour, at fortnightly intervals. This will provide a baseline of

24 sampling runs. These will be supplemented with event based sampling to ensure a minimum of five rainfall events in the total sample.

Parameters to be recorded should include:

- rainfall;
- tide level;
- salinity, temperature;
- conductivity;
- pH;
- turbidity or suspended sediments;
- faecal coliforms - to be recorded in compliance with ANZECC guidelines.

Part of the costs of the monitoring program will be met out of Port Stephens Council budget for stormwater monitoring. One Council stormwater monitoring site is located in the harbour.

5.6.2 A Boating Management Plan for Port Stephens and Myall Lakes

Issues related to recreational and commercial boating management have been noted for all parts of the estuary. Although both Port Stephens and Great Lakes Councils have conducted several useful studies to enhance boating and foreshore facilities, an integrated plan to strategically manage boating issues is strongly recommended. Aspects of the boating management plan would include:

- A community survey of the needs of waterway users at boat ramps and jetties.

- Assess demand and constraints on recreational access to the waterway and implement management actions to reduce crowding. This would include improved management of holding areas, boarding jetties, multi-lane ramps and parking.

- Preparation of guidance and awareness information for recreational boating users about the potential impacts of their activities on the health of the estuary and how they can reduce the risks of impacts.

- Amendments to the Regulations of the POEO Act to prohibit discharges of raw or treated sewage from all vessels of more than 6 metres in length in Port Stephens and Myall Lakes. The extent to which this is implemented across the whole estuary will depend on community comments on the current Waterways Discussion Paper. Areas where a nil discharge regulation is strongly recommended include the entire nearshore area of the Inner and Outer Port, marinas and mooring areas, all oyster growing areas, Fame Cove, the entire Myall River and Myall Lakes, and the Karuah River.

- Provision of augmented public toilets at boating access points, such as Tea Gardens, Salamander Bay, Nerong, Bulahdelah, and potentially in Myall Lakes National Park.

- Consideration of public facilities at Fame Cove.

- Consideration of options to manage demand for access to Fame Cove, to reduce potential conflict between user groups.

- Preparation of a mooring management plan.

- Amendments to the planning process to require consents or permits for certain waterway activities, or for activities in certain high sensitivity locations.

- Include consideration of dinghy storage areas in the preparation of a foreshore management plan.

- Review of navigation requirements for commercial vessels in relation to the preparation of a dredging program for the Corrie Channel and lower Myall River.

- Ensure navigation issues are considered in the recommendations of the Aquaculture Industry Development Plan.

5.7 ACTION PLAN, COMMUNITY LIFESTYLE

Management Objectives:

- *To protect the aesthetic value of the natural estuarine foreshore and skyline*
- *To promote tourism and recreational activity that is consistent with the protection of natural and cultural values*
- *To protect European heritage sites and significant cultural landscapes around the estuary*
- *To control the location, scale and design of new urban and commercial development so that community lifestyle values are protected.*

Table 5.8a - Community Lifestyle - Naturalness - 2 Years[1]

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
H	**L1** Complete Myall Lakes Plan of Management, to address: Appropriate vessels and waterway access points Waste management from vessels Locations for bushland camping to protect riparian vegetation and better manage waste Noise levels and crowding on the waterway Blue-green algae, etc	Park has conservation and recreational values of State/National significance, attracting high visitor numbers and significant contribution to local economy. Protection of naturalness key to usage and conservation value.	NPWS	GLC, PSC, NSW Fisheries, Waterways, Individual and group users, charter boat operators, Myall Shores and Nerong residents			Funds required for implementation. See NPWS documentation - working papers on this issue are in preparation.

Table 5.8a - Community Lifestyle - Naturalness - 2 Years[1] (cont)

Zone	Action	Why this action is worth doing	Who is responsible (lead agency)	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
E, F	**L2** Complete Conservation and Development Strategy for Hawks Nest / Tea Gardens area	Strong pressure for further urban development in Hawks Nest / Tea Gardens, with potential to degrade high conservation values in relation to water quality, flora and fauna. Test case for implementation of ESD.	GLC	DUAP, residents, visitors, NPWS, PSC	Plan is fully funded in current Council budget	Council budgets	Funds required for implementation. Similar decision process to apply to North Arm Cove area, with no further residential zonings until waste water management resolved.
	L3 Investigate options for managing intensity of use in Fame Cove (see also Actions W1, W8, W9, W23)	Protect water quality and environmental amenity of Fame Cove.	GLC, NPWS	NPWS, DLWC, Waterways, user groups, conservation groups	$10000	Council and NPWS budgets, user groups.	Outcomes from W1, W8, W9, W23 and W10 and L1 Need to be taken into consideration in planning sustainable uses of this important protected embayment.
W	**L4** Use zoning, other planning tools and acquisition as necessary to protect the naturalness of the visual catchment of the estuary (identify sites and strategies in first 2 years)	Visual catchment is an important aspect of naturalness that attracts water users and residence. Also provides habitat value.	PSC/GLC	DUAP, NPWS, DLWC	Ongoing		
W	**L5** Prepare foreshore flood study and plan	Low lying foreshore areas may be subject to inundation during storms. Effective planning controls needed to reduce risks.	PSC/GLC	DLWC, Land owners	$80000	Floodplain Management Program, Council funds.	In current Council and DLWC budget allocations

Note:

1. *The two year time frame identified for high priority actions is intended as a guide as to which actions need to be given consideration first. Where funds are available, the Plan recommends that the implementation of actions be commenced in this time frame. The Plan also acknowledges that where funds are required from external grants, applications should be made within the two year time frame, but the funds may not be immediately available.*

2. *The indicative costs provided in this table are estimates based on currently available information and definition of the scope of each action. They are provided to give an indication of the budgetary implications of the Estuary Management Plan. All cost estimates will be subject to a detailed review in the process of developing a work program to be implemented under the guidance of the Estuary Management Implementation Committee.*

Table 5.8b - Further Actions - 3 to 5 Years[1]
Community Lifestyle - Naturalness

Zone	Action	Why this action is worth doing	Who is responsible	Who would participate	Indicative cost[2]	Options for obtaining new funds	Other comments
F	**L6** Conserve historic features in the centre of Tea Gardens.	Community value of strong historic links in area.	GLC	NSW Heritage Commission	Ongoing		Will be considered in conversation and development strategy (**L2)**
W	**L7** Management plans for Nature Reserves and isolated National Parks around Port Stephens (eg Corrie Island, Bulls Island, Fame Cove).	Provide clear guidance on acceptable and preferred uses and actions to protect natural values.	NPWS	DLWC, PSC, GLC	$15000 per plan	NPWS future budgets.	These reserves provide important habitat protection. Need to manage balance between conservation and recreation uses.
W	**L8** Use zoning, other planning tools and acquisition as necessary to protect naturalness of visual catchment of the estuary. (Implementation 3-5 years)	Visual catchment is an important aspect of naturalness that attracts water users and residence. Also provides habitat value.	GLC, PSC	DUAP with Landcom	Costs for acquisition will be high. Actual costs will depend on land assessment and availability		See **L4** re assessment of land that should be managed / conserved by acquisition.
W	**L9** Prepare Foreshore Management Plan. Confirm zoning and ownership of all foreshore lands, and work towards environmental protection zoning for all high conservation value areas. Restore riparian vegetation in foreshore reserves, whilst maintaining recreational amenity. Ongoing implementation. See also **N2**, **N3**, **N7**, and **N18**.	The naturalness of the foreshore and nearshore is one of the estuary's greatest assets. Protection will meet community and ecological needs.	PSC, GLC	DLWC (Lands), Land Owners	See **N2, N3**, **N7** and **N18**		As with **L8**, costs of acquisition of foreshore land are likely to be high, and would need strong community support. Planning tools to be used wherever possible, plus community action (eg land care.

Note:

1. *The time frame of three to five years indicates that these actions are of medium priority. As with the high priority actions, the time frame is a guide to when these actions should be considered. For externally funded projects, actual implementation will depend on the success of grant applications that must compete with priorities from other regions.*

2. *The indicative costs provided in this table are estimates based on currently available information and definition of the scope of each action. They are provided to give an indication of the budgetary implications of the Estuary Management Plan. All cost estimates will be subject to a detailed review in the process of developing a work program to be implemented under the guidance of the Estuary Management Implementation Committee.*