Coastal Zone Management Plan for Smiths Lake Estuary

- Review and Update

Final Report

Contract No: 05/01 NS-EST-SL-PL

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Coastal Zone Management Plan for Smiths Lake Estuary – Review and Update

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Title :	Coastal Zone Management Plan for Smiths Lake Estuary- Review
Author :	Dr Emma Gale, Megan Ward, Dr Philip Haines
Synopsis :	This document reviews the Smiths Lake Estuary Management Plan, which was finalised in 2001, and presents an updated Coastal Zone (Estuary) Management Plan. The review process involved Council personnel, key stakeholders and the community to develop revised objectives, issues and actions that will allow the new plan to utilise latest information in order to provide relevant management direction for the Lake and surrounds. This document should be read with reference to the original Estuary Management Plan.

REVISION/CHECKING HISTORY

REVISION NUMBER	DATE OF ISSUE	CHECKED BY		ISSUED BY	
0	26 July 2010	PEH		EJG	
1	August 2010	PEH		EJG	
2	November 2011	PEH		EJG	
3*	June 2018	AMM		PT	
4	August 2018	AMM		PT	

*In August 2018 MidCoast Council made minor changes to this document to meet minimum requirements for certification as a Coastal Zone Management Plan against Section 55C of the *Coastal Protection Act, 1979.*

DISTRIBUTION

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EXECUTIVE SUMMARY

We acknowledge the Aboriginal Community, the traditional owners of the land, and we acknowledge their traditional wisdom and enduring culture.

The purpose of this document is twofold:

1. *To provide a review of the existing Estuary Management Plan for Smiths Lake, which was completed in 2001, and*
2. *To provide a revised management plan, to be known as the Coastal Zone Management Plan for Smiths Lake Estuary.*

The review and revision of the Management Plan for Smiths Lake has been supported by collation and consideration of recent relevant scientific and technical information, stakeholder and community consultation, and elicitation of professional and expert opinions.

Study Area

Smiths Lake is a large coastal Lake situated on the mid north coast of New South Wales, approximately 25km south of Forster. The Lake is classified as an Intermittently Closing and Opening Lake or Lagoon (ICOLL) which means that the Lake is not permanently connected to the ocean. The catchment is small (~30km^2) relative to the size of the waterway (~11km^2) when compared to similar estuarine systems along the NSW coast.

Success of the Original Plan

The original Estuary Management Plan was completed in 2001 and since that time a number of the actions (8) have been completed successfully. A large number of the remaining actions (22) are ongoing and require continuing implementation, while the remainder of the original actions in the Plan have either not commenced (12) or have subsequently become redundant (3). The Lake itself is regarded as having high conservation value (GLC, 2009), which has been assisted by the pro-active management of the Lake and surrounds, to this day.

Consultation process

Key stakeholders and the local community were asked to participate in revising the objectives, issues and actions of the Estuary Management Plan. The process involved an interactive workshop with stakeholders, a number of phone calls with local residents, a media release, an information poster and a community brochure. The brochure, containing a questionnaire, was distributed to all landholders and residents surrounding Smiths Lake (totalling 1021 brochures), with some 115 (11%) questionnaires returned. The information gathered was extremely valuable and provided direct input into updating the objectives of the Plan, as well as identifying new and emerging issues that need to be addressed in the future.

Revised Objectives

Overarching ideals and aspirations of the revised Plan are captured within the Plan objectives. Objectives generally do not require much change, subject to paradigm shifts in community values and expectations. One new objective has been added the Plan, however, which aims to formally recognise the traditional owners of the land and recognise the Aboriginal Community as additional key stakeholders. The revised objectives for the new Plan therefore are:

- Protect, conserve and maintain estuarine habitats, ecosystems and natural processes
- Achieve ecologically sustainable use of estuarine resources
- Initiate repair of past damage and prevent future degradation
- Conserve recreational, commercial, cultural and aesthetic values of the estuary
- Balance existing and future use and development with other Lake management objectives
- Facilitate Lake management by increasing community awareness, support and involvement
- Acknowledge the traditional owners of the land and their cultural values and aspirations

New Issues for the Lake

Management of Smiths Lake needs to respond to new and emerging relevant issues. Since the completion of the original Estuary Management Plan in 2001, a number of new issues have manifest at Smiths Lake that requires consideration as part of the revised Coastal Zone Management Plan. These new issues include:

- Sea level rise and the potential impacts upon foreshore vegetation and the existing opening strategy;
- The existing opening strategy requires updating to comply with the *Marine Parks Act 1997*, now that Smiths Lake lies within the Port Stephens-Great Lakes Marine Park;
- Informal Lake entrance openings need to be eliminated and safety needs to be increased during opening events;
- Possible sedimentation in the entrance area and channel into Symes Bay;
- Erosion at a number of new sites, which requires active intervention or management, including the southern foreshore of Smiths Lake and a variety of unsealed dirt roads in the catchment;
- Additional stabilisation and maintenance of existing infrastructure including table drains, as well as a review of the storm water management at Smiths Lake village;
- The identification and monitoring of point source pollutants entering the Lake, including the pumping stations at Eagle Nest Parade and Patsy's Flat Rd;
- The variable condition of fish within the Lake, possibly indicating significant stressors on the ecosystem;

- Need for public toilets near Sandbar Beach;
- Conservation and management of habitat on private land;
- Need for enforcement of restrictions to unauthorised access by 4WD's and boats across foreshore habitats; and
- Clarification of waterway zonings due to overlapping management plans.

Revised Strategic Management Actions

The Strategic Management Actions to be implemented as part of the new Coastal Zone Management Plan have been updated. New and revised actions are aimed at addressing specific issues relevant to Smiths Lake, whilst also meeting the overarching objectives for long-term sustainable management of the waterway.

A total of 50 Strategic Management Actions have been identified. Some of these reflect the original actions, or modified versions of actions that were included in the original EMP (2001). The Strategic Management Actions are **presented overleaf**, including their relative priority, timeframe, and overall implementation ranking.

Implementation Costs

Costs for implementing this Coastal Zone Management Plan have been estimated at $645,000 over the next five years. One of the most significant costs associated with this Plan is the preparation and adoption of a new Floodplain Risk Management Plan, which is already underway by Council and OEH. Major recurrent costs are associated with on-going rehabilitation and revegetation works around the Lake and throughout the catchment.

In addition to the financial demands, a significant in-kind contribution is expected by Council and partner organisations. Costs for additional staff in order to implement this plan have not been included in the financial budget.

Implementation Responsibilities

Implementation of this Coastal Zone Management Plan will largely be the responsibility of MidCoast Council, with considerable assistance and input from partner organisations, such as HCRCMA, OEH (NPWS), MPA and DPI. Community volunteer groups can also provide significant assistance to the implementation of the Plan.

Plan Review

Review of the progress of implementation of this Plan should be conducted annually, while a more comprehensive review of the suitability of actions should be carried out every 7 years (i.e. by 2018).

Ref.	Strategic Management Actions	Timeframe	Priority	Implementation Ranking
OP1	*Update entrance opening strategy to comply with Marine Parks legislation*	*immediately*	Very High	1/11
OP2	*Formalise approvals/license requirements from DoI (CROWN LANDS DIVISION) for artificial entrance opening, including REF or similar*	*immediately*	Very High	1/11
OP4	*Undertake Floodplain Risk Management Study and Plan, incorporating climate change projections*	*immediately*	High	2/11
OP6	*Commence monitoring and recording of entrance conditions and opening impacts*	*immediately*	High	2/11
ES5	*Inspect construction sites for compliance with sediment management development controls*	*immediately*	High	2/11
ES6	*Continue works to manage concentrated flows and to rehabilitate eroded gullies, caused by road works in Smiths Lake Village, along the Lakes Way and throughout the catchment*	*immediately*	High	2/11
ES10	*Survey southern foreshore dune (including wetland edge) near entrance following opening events*	*immediately*	High	2/11
WQ2	*Implement strict control of catchment runoff water quality for all development to WQIP Guidelines.*	*immediately*	High	2/11
WQ4	*Repair and maintain all on-site sewage management systems and enforce appropriate action where required*	*immediately*	High	2/11
WQ6	*Classify all on-site sewage systems within 100m of Lake edge as high risk, requiring annual compliance audits*	*immediately*	High	2/11
HC3	*Maintain restricted access to specific areas containing threatened and endangered species e.g. Coastal Spurge plant*	*immediately*	High	2/11
WA2	*Develop best practice guidelines regarding cultural heritage management*	*immediately*	High	2/11
OP3	*Establish minimum floor level for developments as defined by the flood level in the Floodplain Risk Management Plan (FRMP)*	*short term (following OP4)*	Very High	3/11
ES2	*Implement best practice design guidelines to reduce sediment erosion during road and infrastructure construction and maintenance*	*short term*	Very High	3/11
ES3	*Restrict 4WD vehicle access at Wamwarra Bay and enforce compliance*	*immediately*	Medium	4/11
ES7	*Investigate success of existing dune stabilisation works and implement maintenance / upgrade program*	*immediately*	Medium	4/11
WQ3	*Finalise Draft DCP 34 - Acid Sulfate Soils*	*immediately*	Medium	4/11
HC5	*Undertake priority pest and weed management in degraded areas e.g. dunes, and incorporate traditional methods of management*	*immediately*	Medium	4/11
WA3	*Limit access for domestic animals around foreshore areas and manage associated waste*	*immediately*	Medium	4/11

Ref.	Strategic Management Actions	Timeframe	Priority	Implementation Ranking
OP8	*Investigate and implement options to enhance safety during opening procedure*	*short term*	High	5/11
ES1	*Review sediment management development controls on building/construction works to comply with best practice and ensure all new driveways in catchment are sealed*	*short term*	High	5/11
WQ7	*Investigate pumping stations at Eagle Nest Parade and Patsy's Flat Rd for leakage / overflows during heavy rains*	*short term*	High	5/11
WQ9	*Seal or raise sewer manholes that are currently located below RL 2.5m AHD*	*short term*	High	5/11
WQ10	*Investigate possible pollutant point sources into the Lake and creeks*	*short term*	High	5/11
HC2	*Implement 'best practice' planning controls for natural buffer zones around the Lake and along major drainage pathways.*	*short term*	High	5/11
HC9	*Investigate fish health within the Lake*	*short term*	High	5/11
HC10	*Educate the community on existing waterway zoning*	*short term*	High	5/11
WA5	*Increase enforcement of fishing and zoning regulations through increased presence of relevant Compliance Officers and/or Rangers*	*short term*	High	5/11
WQ1	*Investigate areas that would benefit from a Stormwater Management Plan and develop and implement where necessary*	*short term*	Medium	6/11
HC1	*Review foreshore zoning during the development of the new Standardized LEP to increase protection for habitat and cultural heritage around the Lake.*	*short term*	Medium	6/11
HC4	*Investigate options to restrict boating access in the vicinity of seagrass bed areas during low Lake levels*	*short term*	Medium	6/11
WA1	*Liaise with Aboriginal Community regarding developments on or near known or likely Aboriginal heritage sites*	*short term*	Medium	6/11
WA4	*Identify areas within the Lake entrance area where debris can be removed (for boating safety) and cannot be removed (for habitat protection) and streamline process for removal*	*short term*	Medium	6/11
WA8	*Encourage the community to utilise existing boat ramps, through education*	*short term*	Medium	6/11
OP7	*Develop and implement education program on the dangers and legalities associated with opening events*	*medium term*	High	7/11
ES4	*Sealing of dirt and unsealed roads in Smiths Lake Village e.g. Valley Rd, Phillip Rd, Sandbar Rd*	*medium term*	High	7/11
ES9	*Survey Symes Bay for sedimentation / infill*	*medium term*	High	7/11
WQ8	*Encourage connection of existing caravan park to reticulated sewerage system, with connection to be specified as a condition of consent for any future redevelopment*	*medium term*	High	7/11
HC8	*Investigate potential foreshore habitat response to predicted Sea Level Rise*	*medium term*	High	7/11

Ref.	Strategic Management Actions	Timeframe	Priority	Implementation Ranking
WA7	*Investigate options to improve boat launching facilities at Brambles Reserve, Tarbuck Bay and John de Bert Reserve*	*short term*	Low	8/11
ES8	*Identify eroding watercourses through presence of sedimentation at the outlets of drains and creek around the Lake*	*medium term*	Medium	9/11
WQ11	*Develop and implement education program on pollutant sources to Lake*	*medium term*	Medium	9/11
HC6	*Identify areas of degraded habitat and incorporate into works program for rehabilitation, possibly co-ordinated with ES6/7*	*medium term*	Medium	9/11
HC7	*Update mapping and undertake assessment of sensitive habitat areas such as seagrass beds and wetlands*	*medium term*	Medium	9/11
HC11	*Develop and implement public awareness program on ecological values and important habitat.*	*medium term*	Medium	9/11
HC12	*Encourage protection of natural habitat on private land through education and incentives*	*medium term*	Medium	9/11
WA9	*Monitor conflicts between users in the Lake*	*medium term*	Medium	9/11
OP5	*Undertake a detailed review of the entrance opening strategy and procedure in 2020 and modify strategy as necessary*	*long term*	High	10/11
WQ5	*Maintain and upgrade sewerage system as necessary to accommodate climate change projections e.g. Sea Level Rise*	*long term*	High	10/11
WA6	*Investigate the possibility of constructing a foreshore walking track around sections of the Lake*	*medium term*	Low	11/11

ACKNOWLEDGEMENTS

We would like to acknowledge the stakeholders and community members of who have provided valuable input to the review of the Smiths Lake Estuary Management Plan, without their local knowledge and expertise the new Coastal Zone Management Plan for Smiths Lake Estuary would not be possible

For the purposes of this review the stakeholders consist of a subset of the Wallis Lake and Smiths Lake Estuary Management Committee, and comprise the representatives in Table 1-1.

Table 1-1 Smiths Lake Estuary Management Committee members

Name	Authority
Mr Martin Angle	Department of Primary Industries (Fisheries and Aquaculture)
Mr Bob Birse	Department of Industry – Lands & Water (Crown Lands Division)
Mr Leslie Cheers	Professional Fisherman Smiths Lakes (Rep Newcastle Co-op)
Clr Linda Gill	MidCoast Council (formerly Great Lakes Council)
Mr David Hair	University of New South Wales
Mr David Harasti	Marine Park Authority
Mr Max Haste	Marine Park Authority
Ms Kirsty Hughes	Midcoast Water
Mr Neil Kelleher	Office of Environment and Heritage (formerly DECCW)
Mr Tim Kelly	Aboriginal Community (Forster Local Aboriginal Land Council)
Kellie Syron	Aboriginal Community
Dr George McKay	Great Lakes Environment Association
Ms Fiona Miller	Office of Environment and Heritage (formerly NPWS)
Mr William Robertson	Smiths Lake Foreshore Landcare
Mr Bret Ryan	NSW Maritime
Ms Prue Tucker	MidCoast Council
Mr Gerard Tuckerman	MidCoast Council
Jaimee Vlastuin	Department of Industry – Lands & Water (Crown Lands Division)

DEFINITIONS

ABORIGINAL COMMUNITY	refers to the Forster Aboriginal Land Council, the Elders Group and the Lakkaria native title group
DoI – Crown Lands	Department of Industry - Lands & Water (Crown Lands Division)
DPI	Department of Primary Industries
GLC	Great Lakes Council
MCC	MidCoast Council*
MPA	Marine Parks Authority
NPWS	National Parks and Wildlife Service
OEH	Office of Environment and Heritage (formerly known as the Department of Environment, Climate Change and Water, DECCW)
UNSW	University of New South Wales

COUNCIL AMALGAMATIONS

* On 12 May 2016 MidCoast Council (MCC) was formed by NSW Government proclamation through the merger of the former Great Lakes, Greater Taree and Gloucester Shire Council's. Following this, MidCoast Water was merged into MidCoast Council. Please note naming conventions throughout this plan may refer to former councils. References made to the former councils are now under the jurisdiction of MidCoast Council.

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1 INTRODUCTION

1.1 Document Purpose

The purpose of this document is to review the Smiths Lake Estuary Management Plan, incorporate new information that has become available since its adoption, and prepare a new 'Coastal Zone Management Plan' for Smiths Lake Estuary.

1.2 Report Structure

This document is presented in two parts: a review of the original 'Smiths Lake Estuary Management Plan' (2001); and the production of a revised Smiths Lake Estuary Management Plan, which will be known as the 'Coastal Zone Management Plan for Smiths Lake Estuary'. A breakdown of the document structure is outlined below.

PART A – Review of the original Smiths Lake Estuary Management Plan

Chapter 2 is an introduction to the EMP **plan program** and the **review process** undertaken

Chapter 3 outlines the **consultation strategy**

Chapter 4 identifies the **recent relevant documents** and other material that have been considered as part of the review process

Chapter 5 provides a summary of the **estuarine values and characteristics** relevant to Smiths Lake, and should be read as a supplement to the background information supplied in the original EMP

Chapter 6 identifies the **current issues** facing the management of Smiths Lake, through stakeholder and community feedback

Chapter 7 provides a **review** of the general and specific **objectives** from the original EMP

Chapter 8 provides a **review** of the management **actions** from the original EMP

PART B – the new Coastal Zone Management Plan for Smiths Lake Estuary

Chapter 9 is an introduction to the new Coastal Zone Management Plan

Chapter 10 documents relevant new Plans of Management and Legislation relevant to the management of Smiths Lake

Chapter 11 outlines the revised Objectives

Chapter 12 outlines the **revised strategies and actions,** and provides an **implementation strategy** for the plan.

Chapter 13 describes **opportunities for accessing funding** to implement the plan

Chapter 14 describes the **monitoring, evaluation and review process** to ensure that the Plan remains relevant and achievable

Chapter 15 identifies the **references** utilised in the document

APPENDIX – Additional Information

APPENDIX A: Investigates one of the identified issues in Smiths Lake - the possible sedimentation within the entrance area and Symes Bay through the analysis of water levels and aerial photography.

APPENDIX B: Provides a review of the entrance opening procedure focusing on the requirements for the Marine Parks Act.

APPENDIX B: Provides a copy of the community consultation poster

APPENDIX D: Provides a copy of the community consultation brochure

APPENDIX E: Provides a cross – reference to relate the new and revised actions to the original actions

APPENDIX F: Provides further details on the strategic actions

PART A - REVIEW OF THE ORIGINAL ESTUARY MANAGEMENT PLAN FOR SMITHS LAKE

2 REVIEW INTRODUCTION

The Estuary Management Plan (EMP) for Smiths Lake was adopted by Great Lakes Council in 2001. The EMP outlines actions that should be followed in order to maintain Smiths Lake as a healthy and productive estuarine ecosystem, and was prepared under the NSW Government's Estuary Management Program, in accordance with the Estuary Management Manual (1992).

2.1 Estuary Management Planning Program

The established process for managing estuaries is documented in the NSW Government's Estuary Management Manual (1992), and is outlined in Table 2-1. The NSW Government has undertaken a reform of the way that estuaries and coasts are managed, and the estuary management planning process now falls under the new Guidelines for Preparing Coastal Zone Management Plans (2010). As such, the revised Smiths Lake Estuary Management Plan will be known as the Coastal Zone Management Plan for Smiths Lake Estuary (CZMP) (Part B of this report). It will also need to be prepared giving consideration to the NSW Coastal Zone Management Manual. As part of the planning changes, the new Coastal Zone Management Plan for Smiths Lake Estuary could be submitted to the Minister for the Environment for approval, in accordance with Part 4A of the Coastal Protection Act, 1979.

Table 2-1 NSW Government Estuary Management Process

Steps in the Estuary Management Process (NSW Government, 1992)	
1	Establish an Estuary Management Committee
2	Review all existing data pertaining to the estuary and compile a Data Compilation Study to identify data gaps.
3	Compile an Estuary Processes Study (EPS)
4	Compile an Estuary Management Study (EMS)
5	Prepare a draft Estuary Management Plan (EMP)
6	Review a final EMP through public exhibition and consultation.
7	Adopt and Implement EMP by Council
8	Review the EMP, to determine the level and success of implementation of plan actions, incorporate new information on estuary processes, review values, issues and management options, and revise management strategies and actions to form a revised EMP.

This document includes the completion of Step 8 of the estuary management process (refer Table 2-1), that is, the review of the existing Smiths Lake EMP and the preparation of a revised plan.

2.2 Review Methodology

Review of the Smiths Lake EMP involved revisiting each of the original Plan's values, issues, objectives and actions to determine which are still relevant and which have become redundant since 2001. In appraising the original EMP, consideration was given to any new scientific and technical information now available, new and alternative views regarding the Lake from Council and other stakeholders, and importantly views of the community. The community was involved in defining the scope and content of the original plan, so returning to the community has provided a good opportunity to gauge any paradigm shifts or changes in community perception.

3 COMMUNITY AND STAKEHOLDER CONSULTATION

An important part of the review process involved the participation and feedback from key stakeholders and members of the Smiths Lake community.

The consultation involved written communication, an interactive workshop and phone calls. Aims of the consultation with stakeholders and the community included reconsidering old issues and formulating new issues, as well as providing feedback on the success of existing management measures and suggesting new and alternative options / actions for consideration.

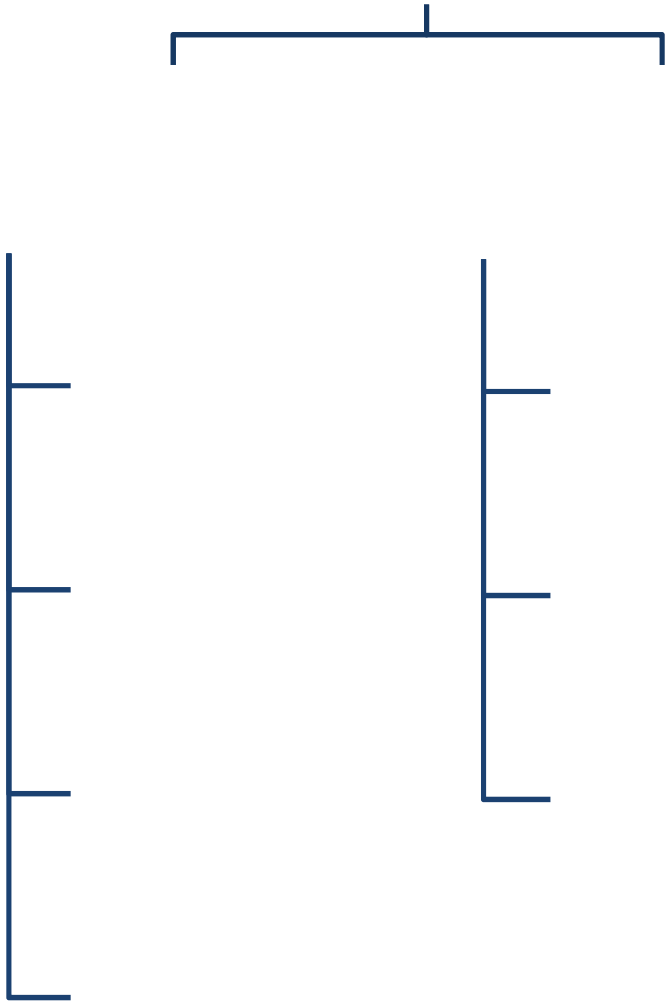


Figure 3-1 Consultation process

3.1 Stakeholder consultation

For the purposes of this review the stakeholders consisted of a subset of the Wallis Lake and Smiths Lake Estuary Management Committee, and comprised the representatives outlined in Table 3-1. Some members of the Committee also oversaw the preparation and adoption of the original EMP.

Table 3-1 Key Stakeholders

Name	Authority
Mr Martin Angle	Department of Primary Industries (Fisheries and Aquaculture) *(includes the department previously known as NSW Fisheries)*
Mr Bob Birse	Department of Industry – Lands & Water (Crown Lands Division) *(previously known as NSW Trade & Investment – Crown Lands)*
Mr Leslie Cheers	Professional Fisherman Smiths Lakes (Rep Newcastle Co-op)
Clr Linda Gill *	MidCoast Council (formerly Great Lakes Council)
Mr David Hair *	University of New South Wales
Mr David Harasti	Marine Park Authority
Mr Max Haste	Marine Park Authority
Ms Kirsty Hughes	Midcoast Water
Mr Neil Kelleher	Office of Environment and Heritage *(includes the department previously known as DECCW)*
Mr Tim Kelly	Aboriginal Community (Forster Local Aboriginal Land Council)
Kellie Syron	Aboriginal Community
Dr George McKay	Great Lakes Environment Association
Ms Fiona Miller	Office of Environment and Heritage *(includes the department previously known as NPWS)*
Mr William Robertson	Smiths Lake Foreshore Landcare
Mr Bret Ryan	NSW Maritime
Ms Prue Tucker	MidCoast Council
Mr Gerard Tuckerman *	MidCoast Council
Jaimee Vlastuin	Department of Primary Industry – Lands & Water (Crown Lands Division) (previously known as NSW Trade & Investment – Crown Lands)

** Involved with development of the original Smiths Lake EMP*

The consultation incorporated:

- ***Letters:*** were sent to each of the above stakeholders and outlined the existing issues and actions. Stakeholders were asked to provide input on the success of the actions for which they had been assigned in the original EMP, including the level of implementation achieved, and to note any problems that hindered the completion of the action. A second letter was then sent out at a later stage of the project and requested Stakeholders to comment upon the relative priority that should be applied to the new and revised actions.

- ***Workshop:*** Following on from the written communication, stakeholders were invited to a workshop to further investigate revision of the issues, actions and objectives of the original EMP. This was achieved through a facilitated discussion and small work groups, to determine changes required to the list of management issues and values. The outcome was a preliminary list of revised management objectives, issues and actions.

3.2 Community consultation

Community feedback on current estuary management issues, as well as the revision and prioritisation of objectives and actions was an important part of updating the EMP. To inform the local community of the project, a media release, poster and feedback brochure were prepared and distributed as appropriate.

- ***Media Release / Poster:*** The media release was published in the local newspaper, and posters were displayed at a number of locations around the community including cafes and general stores.
- ***Community Brochure:*** The brochure outlined the objectives of the project, and requested information from the local community regarding new and ongoing management issues, as well as the implementation and effectiveness of management actions from the original plan. Requests were also made for any historical photographs or evidence regarding Lake entrance breakouts. A copy of the brochure can be found in APPENDIX D:The brochures were distributed by Council to land owners and residents around Smiths Lake and copies of the brochures were also available on the Council's webpage. A total of 1021 community brochures were distributed around the Smiths Lake Community and 11% (115) of these brochures were returned with questionnaires completed.

The results from the stakeholder and community engagement strategy have been incorporated into revision of objectives, issues and actions (refer sections 6, 7 and 8).

4 RECENT TECHNICAL STUDIES REVIEW

The following key management documents were reviewed to identify relevant information for the ongoing management of Smiths Lake. Further information including relevant planning and legislation documents can be found in Section 10, while aerial photography can be found in APPENDIX A:.

4.1.1 Independent Inquiry into Coastal Lakes (2002)

Author: Healthy Rivers Commission

The report outlines a Coastal Lakes Strategy, for the assessment and management of coastal Lakes in NSW. Further information includes a classification for each of the coastal Lakes according to their natural sensitivity, current condition, recognised ecosystem and resource conservation values and other significant socio-economic factors. Smiths Lake has been ranked as requiring significant protection, the second highest level of management orientation and is considered to have moderate conservation value. The catchment is considered to be largely unmodified and the Lake condition slightly affected by stress.

4.1.2 Coastal Lakes Management: strategies for a sustainable future (2006)

Author: Phillip Haines, BMT WBM Broadmeadow NSW

The report contains a summary of a thesis on the management of coastal Lakes. Information within the report includes an overview of coastal lake processes and the pressures and management needs of the Lakes.

Ten strategies are presented to provide a basis for the sustainable management of coastal Lakes, ranging from the discouragement of development around 'healthy' and sensitive coastal Lakes, the implementation of buffers to provide protection, information on the artificial management of entrances including possible implementation approaches and options for formal protection of coastal Lakes.

4.1.3 Additional References

In addition to the information provided above, a number of other technical reports and documents were reviewed to provide current information on Smiths Lake and surrounds. A list of these references is provided in

Table 4-1. Relevant information obtained from these references has been incorporated within section 5.

Table 4-1 List of Relevant References

Reference	Relevance
DCC (2009) Climate Change risks to Australia's Coast: A first pass national assessment, Department of Climate Change, Australian Government	**Climate Change Impacts**
OEH (2009) New South Wales Sea Level Rise Policy Statement, NSW Government, Department of Environment, Climate Change and Water	**Climate Change, Policy**
Digsfish Services (2010) Pathological Assessment of Mullet and Flathead from Smiths Lake, prepared for Kath Cheers, Smiths Lake	**Ecology**
Dissanayake, D.M.P.K., Ranasinghe, R., Roelvink, J.A. (2009) Effect of Sea Level Rise in Tidal Inlet Evolution: A Numerical Modelling Approach, *Journal of Coastal Research*, SI 56, p942 – 946 ICS2009 (Proceedings)	**Climate Change Impacts, Sediment Transport Processes**
Everett, J. (2007) Biogeochemical dynamics of an intermittently open estuary: A field and modelling study, PhD Thesis, University of New South Wales	**Water Quality, Hydrology, Ecology**
Gale, E.J. (2006) The Hydrodynamics of Intermittently Closing and Opening Lakes and Lagoons, PhD Thesis, University of Western Australia	**Hydrology, Water Quality**
GLC (2009) Great Lakes Water Quality Improvement Plan: Wallis, Smiths and Myall Lakes, Great Lakes Council, Forster, NSW	**Water Quality**
Macadam, I, McInnes,K and O'Grady, J. (2007) Climate Change projections for the Wooli Wooli estuary and Bateman's Bay, CSIRO.	**Climate Change Impacts**
McInnes, K., Abbs,D., O'Farrell,S., Macadam, I., O'Grady, J. and Ranasinghe, R. (2007) Projected changes in climatological forcing for coastal erosion in NSW, CSIRO prepared for NSW Department of Environment and Climate Change	**Climate Change Impacts**
NPWS (2002) Myall Lakes National Park and Myall Coast Reserves Plan of Management	**Cultural Values**
NSWMA (2005) Smiths Lake Boating Plan of Management, NSW Maritime Authority	**Cultural Values / Human Uses**

Reference	Relevance
Smith, C. and Heggie, D.T.(2003) Benthic nutrient fluxes in Smiths Lake, NSW, Geoscience Australia Record 2003/16	**Water Quality**
Summerfield, M.A. (1991) Global Geomorphology: an introduction to the study of landforms, Longman Scientific and Technical Publishing	**Sediment Transport processes**
Tung, T.T., Walstra, D-J.R., van de Graff,J. and Stive, M.J.F.(2009) Morphological Modelling of Tidal Inlet Migration and Closure, *Journal of Coastal Research*, SI 56, 1080 - 1084	**Sediment Transport processes**
Weir, F.M., Hughes, M.G. and Baldock, T.E. (2006) Beach face and berm morphodynamics fronting a coastal lagoon, *Geomorphology*, 82, 331-346	**Sediment Transport Processes**
West, E.J., Pitt, K.A., Welsh, D.T., Koop, K. and Rissik, D. (2009) Top-down and bottom-up influences of jellyfish on primary productivity and planktonic assemblages, *Limnol. Oceaongr*. 54(6) 2058-2071	**Ecology**
WMA (2008) Smiths Lake Flood Study, Webb McKeown and Associates	**Flooding, Hydrology**

5 REVIEW OF ESTUARINE VALUES AND CHARACTERISTICS

The environmental characteristics of the Lake have been previously defined in the original EMP (Section 2, WMA 2001). Over time the values and characteristics of the Lake and catchment may change, due to a variety of circumstances. These may include but are not limited to population increases leading to greater recreational pursuits / developments, planning changes e.g. the declaration of the Marine Park, and shifting interest in dominant natural processes.

Presented below is an overview of the general estuarine values and characteristics with new information that has become available since the completion of the original EMP (2001). In some instances, a more detailed description is included than was originally provided, due to the changing focus of issues, e.g. sediment transport processes.

5.1 Review of Physical Features

The study area (Figure 5-1) encompasses the Smiths Lake water body and the surrounding catchment. The relatively steep topography and infertile soils of the Smiths Lake catchment promote limited use with regards to agricultural activity, thus allowing a large expanse of private land to remain forested. The current significant catchment land use consists of the following (GLC 2009):

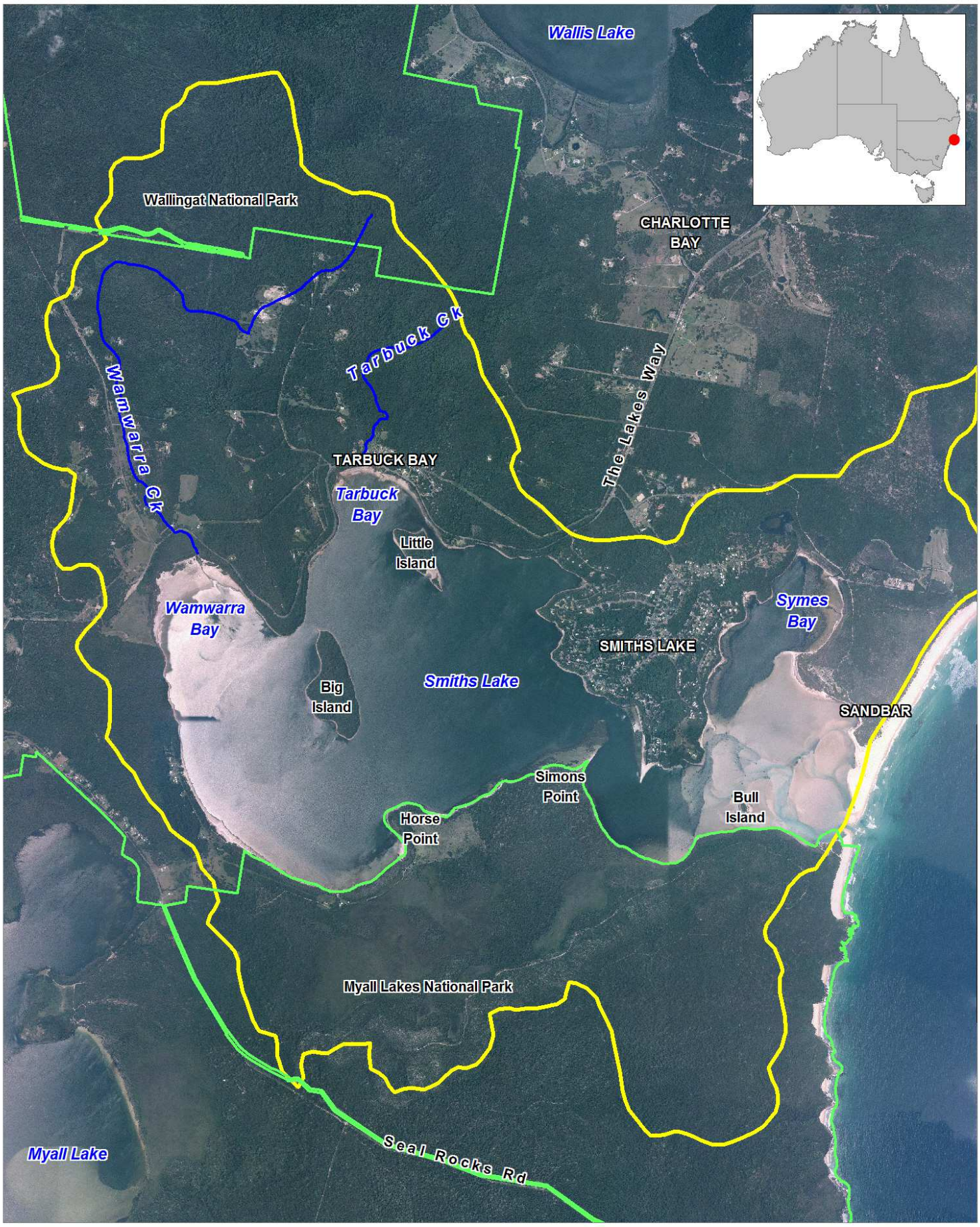
- Urban and rural residential: 2.8 km^2;
- National Park: 10.7 km^2 ; and
- Forested land under private ownership or within State Forest: 11.7 km^2.

5.2 Review of Hydrological Processes

The hydrodynamics of the Lake can be defined by a number of different states (Gale 2006). These include:

- The Lake is typically well mixed when it is closed from the ocean. Weak gradients of temperature and salinity can occur between surface and bottom waters; however these are usually short lived and directly related to either diurnal temperature gradients or rainfall events.
- In the open state tidal waters enter the Lake and initially promote a strong gradient of salinity between surface and bottom waters. During this time dissolved oxygen can become depleted at depth due to the reduced mixing, however values are typically restored within the week due to tidal and wind mixing.
- A strongly stratified state, which typically occurs when the Lake is opened to the ocean. The large density gradient (driven by salinity) between the saltier oceanic waters and the fresher Lake waters promotes stratification of the water column. Persistence of stratification has shown to coincide with periods of low dissolved oxygen at depth, but appears to be short lived, as the stratification is soon broken down due to wind and tidal mixing.

During the entrance opening process, the Lake water levels continually fall during the first couple of hours before oceanic water begins to enter the Lake. The size of the fall is directly related to the size of the entrance opening and the nature of the associated erosion. A number of numerical model simulations of flooding in the Lake (WMA 2009) demonstrated that at different ocean water levels



Title:

Smiths Lake Study Area

Figure: 5-1

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Approx. Scale

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there is no significant change to the peak Lake water level during the flooding, but there was a significant impact on the rate of fall of the Lake water level.

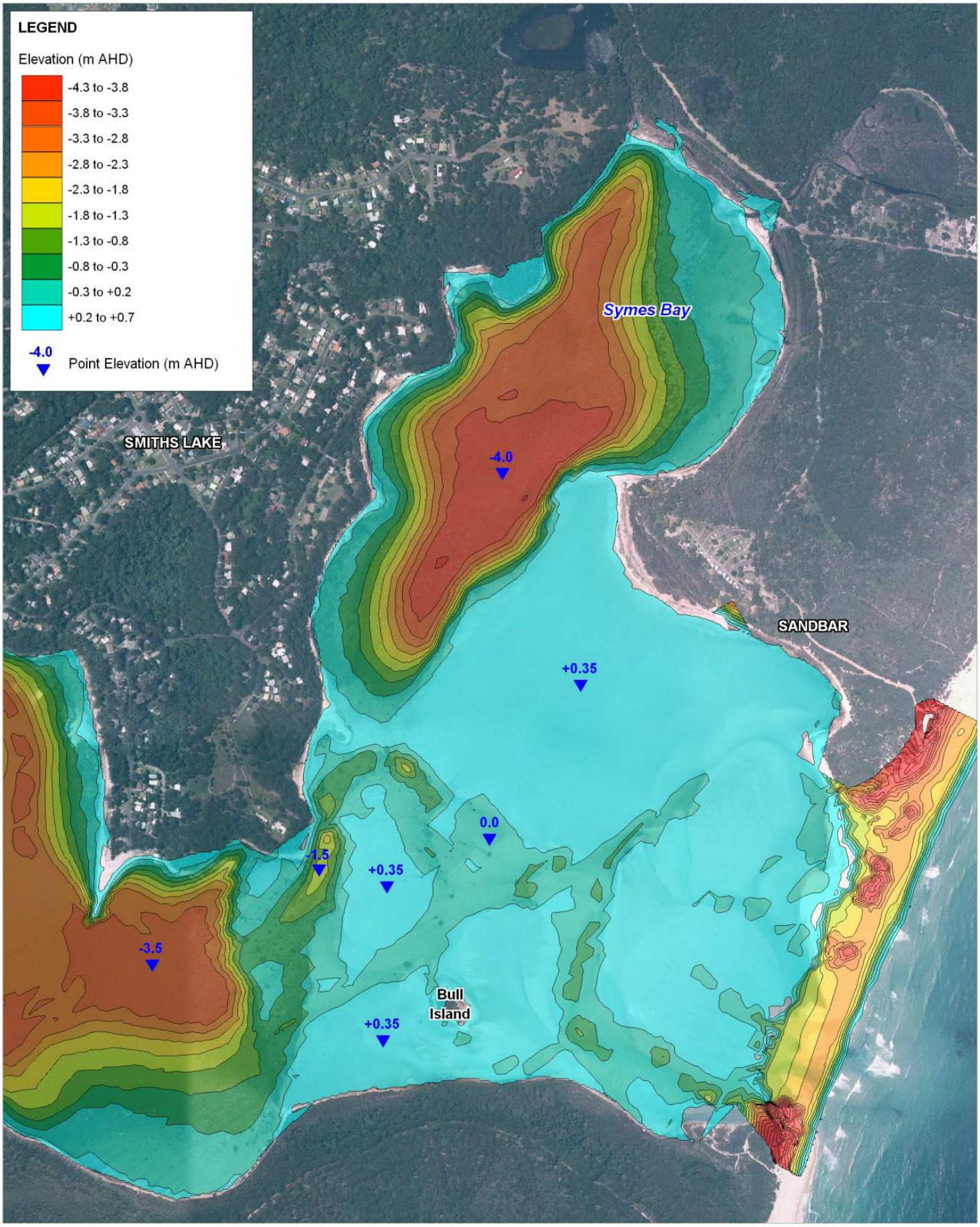
During times when the entrance is open there is a general set-up of water levels within the Lake above mean sea level. This results from the frictional effects within the inlet channel and is common for most estuaries.

5.3 Review of Sediment Transport Processes

ICOLLs are natural deposition environments (Roy et al. 2001). Their physical structure has generally been established over the past 6000 years, in response to catchment and coastal sediment processes. Larger ICOLLs contain three distinct zones: the fluvial delta, the central mud basin, and the flood tide delta (Roy et al. 2001). The fluvial delta is where coarse sediments from the catchment are deposited. The central mud basin is where fine sediments from the catchment are deposited, and the flood tide delta contains marine sands washed in by flood tide processes (Haines 2006).

The flood tide delta is highly dynamic, and can be washed out and then rebuilt following every entrance breakout event; whereas the central mud basins are essentially large silt traps, with generally slow accumulation of fine sediment (Haines 2008). In the case of Smiths Lake, the fluvial deltas are particularly small due to the general lack of river inflows from the catchment. For a more detailed review of the relevant sediment characteristics and transport processes please refer to the Smiths Lake Estuary Processes Study (WMA 1998).

The transport of sediment within the entrance region, and the existence of the sand barrier between the main channel and Symes Bay (Figure 5-2), has arisen as an area of concern since the completion of the EMP (WMA 2001). The following section provides an overview of the sediment transport processes relevant to the entrance region, while APPENDIX A: provides a more detailed analysis of aerial photography and water levels.



Title:

Entrance Region of Smiths Lake

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5.3.1 Aeolian Transport

The beach, berm and dune systems are prominent sources of sand available to be transported by wind into Smiths Lake. The transport of sand by the wind, otherwise known as aeolian transport, starts to occur when wind speeds reach approximately 5 ms^{-1} (Summerfield 1991).

The source of available sand can be enhanced through the development of *blowouts.* Blowouts can occur when sand has been stabilised by vegetation, for example on dunes, and then there is a localised disturbance of the vegetation cover (Summerfield 1991). These features are usually only a few metres across; however, higher wind speeds are attained over these areas due to the lack of vegetation making the sand more susceptible to transport (Summerfield 1991).

The loss of dune vegetation from anthropogenic sources i.e. sand mining, man made tracks and 4WD and other vehicular use, is likely to increase the available sand for transport. In recent times the mining of sand from the south and southeast dune systems has likely produced a readily available source of sand due to the high sand hills which were stripped of vegetation (WMA 1998).

The dune systems also have the ability to recover from such disturbances. Historical aerial photographs (APPENDIX A:) show that the dune at the southern entrance of the Lake was initially part of the active entrance area, with little vegetation cover, but between 1953 and 1998 the northern and southern dunes slowly became vegetated (WMA 1998).

Net flux: The resulting net flux of aeolian transported sand into Smiths Lake is approximately 500m^3/yr (WMA 1998).

5.3.2 Cross-shore and long-shore sediment transport

Cross-shore sediment transport: During storms, increased wave heights and elevated water levels cause sand to be eroded from the upper beach/dune system and transported offshore to form sand bars (Figure 5-3). As the sand bars build up, the wave energy decreases in the shallower depths, and the beach erosion is halted. The severity of the erosion is dependent on wave height, elevated water level and preceding beach condition. During calmer weather, sand slowly moves back onshore re-forming a berm.

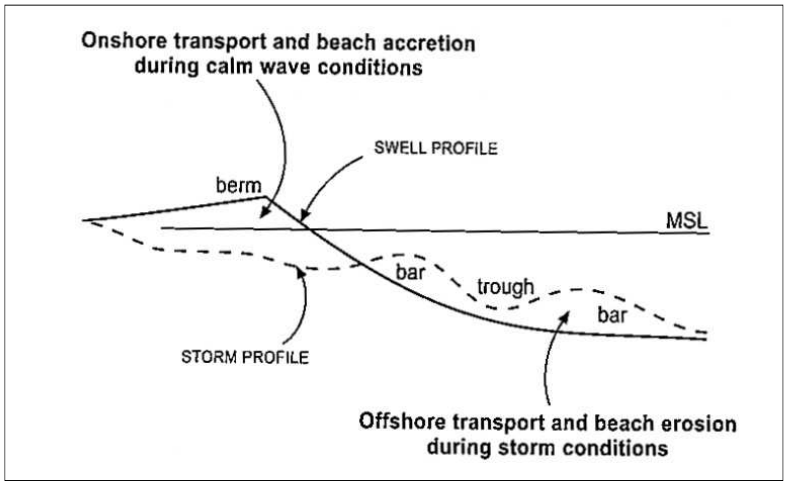


Figure 5-3 Onshore and offshore sediment transport during calm and storm conditions (Masselink and Hughes 2003)

The occurrence of offshore sediment transport is likely to coincide with a breakout event, due to the potential for a storm to coincide with a rainfall event and high Lake water levels. As a result offshore transport may aid in the removal of sand from a small section of the entrance of Smiths Lake.

Alternatively, the onshore transport of sediment is likely to coincide with Lake closures due to prevailing calmer conditions and potential lack of rainfall. The reduction in water flow through the entrance channel due to lack of rainfall and the transport of onshore sediment most likely act towards infilling of the entrance region of Smiths Lake.

This method of sediment transport typically prevails on coastlines with small Lakes or lagoons on embayed beaches, in micro- or meso-tidal environments (Fitzgerald 1988; Hayes 1991; Treloar et al. 1993; Cooper 1994, in Weir 2006), such as the location of Smiths Lake.

Alongshore sediment transport: During periods when the entrance channel is open, wave induced longshore sediment transport can add sand to the up drift side of the inlet. This can result in constriction and lengthening of the inlet channel which increases frictional resistance and reduces the tidal flow in the Lake (Tung et al. 2009). As the tidal currents attempt to scour the channel to remove sand, the down drift side of the inlet channel may become eroded and the inlet may migrate in the down drift direction (Tung et al. 2009). This has been observed at Smiths Lake and incorporates one of the actions; to stop erosion of the southern foreshore dune and wetland.

This process typically dominates on long straight beaches with the persistent supply of sediment and the formation of a spit across the inlet entrance eventually closing the entrance channel (e.g. Largier et al. 1992; Fitzgerald 1996; Komar 1996, in Weir 2006).

Net flux: In the short term there may be some regions of erosion or deposition due to these processes however typically, in the long term these process do not represent a net loss or gain of sand from the overall active beach system.

5.3.3 Tidal Transport

During the initial outflow from the Lake the fast flowing waters promote two modes of sediment transport through the inlet:

- *Bedload transport:* flowing water exerts a shear stress on the bed material, and when a critical velocity is reached, the bed material (sand) will begin to mobilise (roll along the bed) and be transported offshore onto shoals and deltas. The bedload transport is highly dependent on the water velocity, with the rate of transport a function of velocity to the power of 3-4 (depending on which research / reference is utilised).
- *Suspended load:* occurs when high water velocities induce turbulence. The turbulence lifts the sand particles into the water column where they are transported under advection processes (while ever turbulence keeps them suspended within the water column).

When the entrance is open, sand is brought into the Lake with the incoming (flood) tide. The sand originates from the surf zone as well as from offshore shoals and is deposited onto the flood tide delta (Dean and Dalrymple 2002) (Figure 5-4).

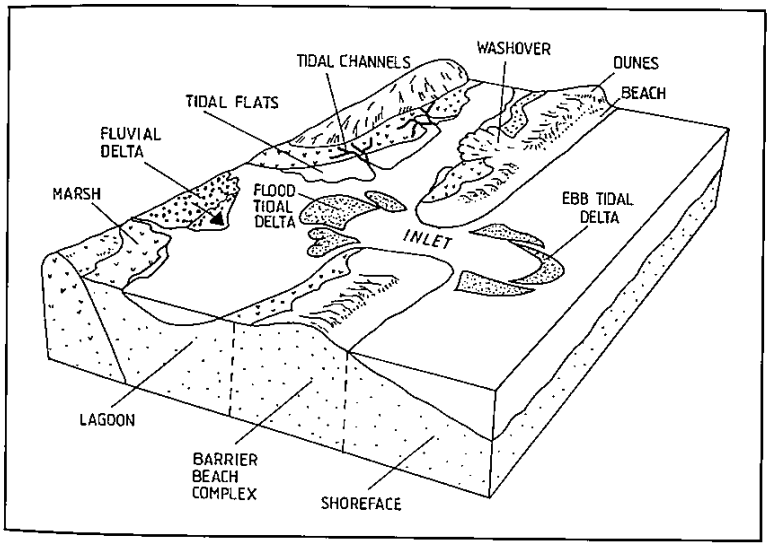


Figure 5-4 Morphological features at a lagoon or Lake entrance (Cooper 1994)

In estuarine environments with restricted entrance channels, such as Smiths Lake, often the flood tide delta is much larger than the ebb tide delta (Figure 5-5). Flood tide inflows to coastal lagoons tend to be strong, but short lived, while ebb tide velocities are weaker, but longer (Figure 5-6). This has a significant impact on sediment transport processes in systems where the flooding tide is larger in velocity magnitude and shorter in duration, than the ebbing tide, the system is classified as flood dominant and the flood dominance produces a **net** landward sediment transport of sand and a positive net flux of sand into the flood tide delta.

Net Flux: As stated in the Estuary Processes Study (WMA 1998) the net transport of sand into the entrance, via tidal flows, is approximately 500m^3/yr.

Figure 5-5 Aerial photograph of Smiths Lake open entrance (OEH 2010)

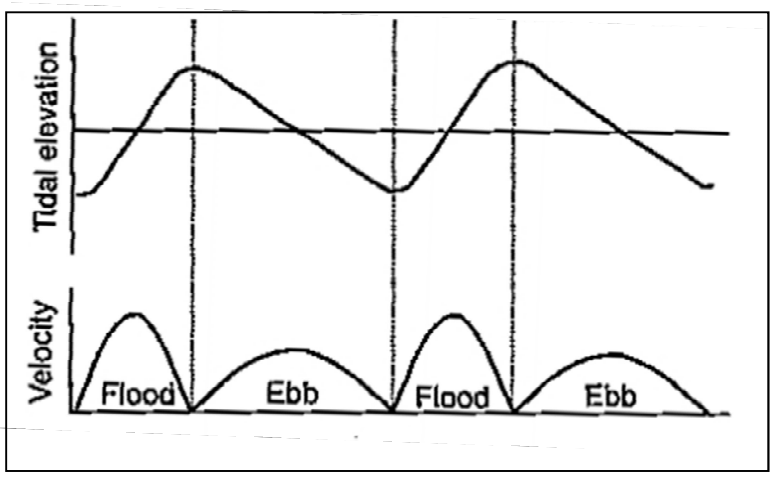


Figure 5-6 Flood dominant tide and velocity characteristics, the axes are in relative magnitudes (Masselink & Hughes 2003)

5.3.4 Overwash Transport

The transport of sand from the ocean, over the closed beach barrier and into the Lake is called *overwash*. This occurs during storms with conditions of elevated water levels and energetic wave conditions (Dean and Dalrymple 2002). The sand deposit is called a *washover fan* (Figure 5-4) and can be identified by the lack of vegetation and a reasonably abrupt and distinct landward edge (Dean and Dalrymple 2002).

In some estuarine systems the thickness of the washover deposits can vary from less than 10 cm to almost 2m and can penetrate up to 1.6 km inland (McGowen and Scott 1975; Leatherman 1979 in Dean and Dalrymple 2002). Vegetation can rapidly colonise the washover fan and aeolian processes can reshape the flat surface into dunes, resulting in the landward migration of the dune system.

5.3.5 Wind Waves

Wind waves in tidal Lakes can often produce surface water velocities that are greater than tidal flow, especially when the dominant wind direction coincides with the main longitudinal axis of the Lake. Higher water velocities have a greater ability to suspend and transport sediment, as discussed previously.

5.4 Review of Water Quality

A numerical modelling study undertaken by Everett (2007) found that the Lake is capable of assimilating its current nutrient loads as well as increases of up to 10 times, regardless of the entrance opening cycle length and the open phase. This is largely due to the highly forested catchment and relatively small catchment to Lake area ratio.

The duration of the entrance opening was found to affect the biogeochemical dynamics in the Lake through altering the nutrients and chlorophyll-a in the water column, however, the ecological responses were not negative i.e. no predicted decline in seagrass or persistent blooms in phytoplankton (Everett 2007). Modelling suggests that phytoplankton is likely to be limited by the amount of phosphorous within the water column, and seagrass is likely to be limited by nitrogen (in the water column and sediments).

5.4.1 Chlorophyll-a

Monitoring indicates that chlorophyll-a values in the Lake are generally low (<2.6 μg L^{-1}) reinforcing the concept that the assimilative capacity of the Lake can accommodate the current nutrient loads, especially when the Lake is closed (Everett 2007). Further water quality monitoring, undertaken by OEH for the WQIP in 2006/7, found the Lake to have mean chlorophyll-a concentrations of 0.65 μgL^{-1}. The Lake is thus well below the ANZECC 'levels of protection' for a high conservation system (of 1.8 μg L^{-1} and 2.6 NTU) (GLC 2009). Higher chlorophyll-*a* values have been recorded in Symes Bay during times when the Lake has been open to the ocean (e.g. 5 μg L^{-1}, in April 2005) and immediately after the Lake is closed. This may be due to a reduction in tidal flushing due to the poor connectivity between Symes Bay and the main body of the Lake at low water levels or it could be a response to higher nutrient availability (from sediments or inflows) in combination with increased light penetration due to the reduced depth of the water column.

5.4.2 Benthic Fluxes

Monitoring of carbon loading and denitrification efficiency (via benthic flux chambers) indicates that phosphorous is being trapped in the sediments, probably by adsorption to Fe-oxyhydroxides while nitrogen is recycled from the degradation of organic matter and being returned to the water column as ammonia (Smith and Heggie 2003). The variance in results across the Lake indicates that Symes Bay has a low risk of eutrophication, while the main basin of the Lake has a moderate to high risk.

5.4.3 Catchment Loading

Nutrient and sediment modelling conducted for the WQIP (GLC 2009) found that 3,245 kg of TN, 317 kg of TP and 529 tonnes of sediment, enter the Lake from the catchment. The modelling adopted a catchment containing 86% forested, 2% unimproved pasture, 7% urban, 3% rural residential and 1% unpaved roads and the following loads were identified:

- Total nitrogen Loads to the Lake
    - urban areas (30%);
    - unpaved roads (30%);
    - forest land (27%);
    - rural residential (4%); and
    - unimproved pasture (8%).
- Total phosphorous loads to the Lake:
    - urban land (42%);
    - unpaved roads (12%);
    - forest land (40%); and
    - unimproved pasture (~6%)
- Total suspended solids load to the Lake:
    - unpaved roads (66%);
    - unimproved pasture (12%);

- urban lands (12%);
- rural residential land (4%); and
- forest land (5%)

The following areas have been identified in the WQIP for actions:

- **Groundcover management** which refers to a sustainable grazing program for landholders, and is focused on improving groundcover management on pasture lands. It involves field days and formal workshops with experts, developing information and training material on stocking rates, formal training courses such as Prograze, a dung beetle release program, and a program of on ground works that will assist landholders to better manage groundcover levels (including off-stream watering, solar pumps and fencing).
- **Unpaved road remediation and the best management of unpaved roads,** which aims to identify and seal unpaved roads in priority areas such as creek crossings in the Smiths Lake Catchment. This would include installing best practice sediment and erosion control features, such as mitre drains to divert road runoff into grassed areas. This program also involves mapping the location and extent of road erosion sites, and undertaking risk analysis in each sub-catchment to prioritise roads for rehabilitation or closure.
- ***Urban mitigation (Water Sensitive Urban Design***): Urban mitigation involves the retrofitting of rainwater tanks supported through a program of rebates. It is recommended that the tanks are plumbed into the home to maximise the water quality benefits. It also involves an extensive program of urban retrofitting where Water Sensitive Urban Design (WSUD) systems such as bio-filtration (including trenches, rain-gardens and biopods) are built into the existing urban landscape to filter the urban stormwater. In Smiths Lake the focus is on the existing urban area, and the program involves education and capacity building on maintenance and construction of WSUD devices, adoption of a developmental Control Plan that specifics best practice WSUD, and associated staff training and capacity-building.
- ***Water Sensitive Design of Greenfield Sites:*** Water-sensitive development of Greenfield sites involves establishing and implementing Local Environmental Plan (LEP) / Development Control Plan (DCP) provisions on Greenfield development sites. This will involve enforcing 'no net increase' in pollutants relative to the existing land use (agricultural and forest land use classifications).
- ***Water Sensitive Redevelopment:*** involves the implementation of a development control plan that specifies best practice water-sensitive urban design (including bio-filtration and rainwater tanks) on all redevelopments. Predicted redevelopment rates in the Smiths Lake area are low, and therefore this is considered more of a protection action.
- ***Foreshore and Riparian Management in urban areas:*** involving improving foreshore areas around Smiths Lake through establishing site specific management plans, education and engagement of residents surrounding foreshore areas to reduce the impact of their behaviours, and increased enforcement of environmental legislation in these areas.
- ***Improved management of Lake Activities:*** reviewing stormwater management plans to clarify the outcomes required to protect the environment, establishing markers to protect seagrass beds, supporting actions in the Smiths Lake Boating Plan.

5.4.4 Water Quality Targets

Water quality targets were developed to protect aquatic ecosystems and by default, other values (such as primary and secondary recreation, visual appreciation, industry/consumption and cultural heritage). As identified by the WQIP (GLC 2009), the Smiths Lake Ecological Condition Target is "no deterioration, improvements to establish buffer", which is said to provide a feasible reduction in chlorophyll-a concentration of 3%.

The feasible catchment load reductions to achieve this target were set at seven-year load reductions of:

- 6.7 % for TN (kg/year) from the current load of 3,425 kg/year;
- 7.3 % for TP (kg/year) from the current load of 317 kg/year; and
- 2.7 % for TSS (tonnes/year) from the current load of 529 kg/year.

5.5 Review of Ecological Values

The intermittent closing and opening nature of the Smiths Lake entrance to the sea has a major influence on a range of processes that ultimately control habitats and assemblages within the Lake and its foreshores.

Characteristics of these ecosystems are strongly driven by the resulting hydrology and water quality of the Lake. Ecological attributes of each habitat type within and directly adjacent to Smiths Lake are described below, together with details of their constituent fauna communities.

5.5.1 Seagrass

In general terms, seagrasses are restricted to shallow areas, where light can easily penetrate to the Lake bed. Specifically, a broad band of seagrass is present around most of the periphery of the Lake, with a more extensive seagrass bed located in Wamwarra Bay. Based on the most recent seagrass mapping (DPI 2006), a total area of ~2.23 km^2 of seagrass is present within Smiths Lake, equating to approximately 20% of the Lakebed area.

The seagrass extents benefit from low nutrient and sediment inputs providing clear waters (GLC 2009). Foreshore vegetation is also mostly intact around the Lake, which, combined with the seagrass and water quality, means Smiths Lake has high ecological value to the region.

These seagrass beds are an important component of the Smiths Lake ecosystem as they assist in the control of nutrient cycling processes and sedimentation, as well as maintaining fish and invertebrate populations (Figure 5-7). The distribution of seagrass beds in Smiths Lake is presented in Figure 5-8.

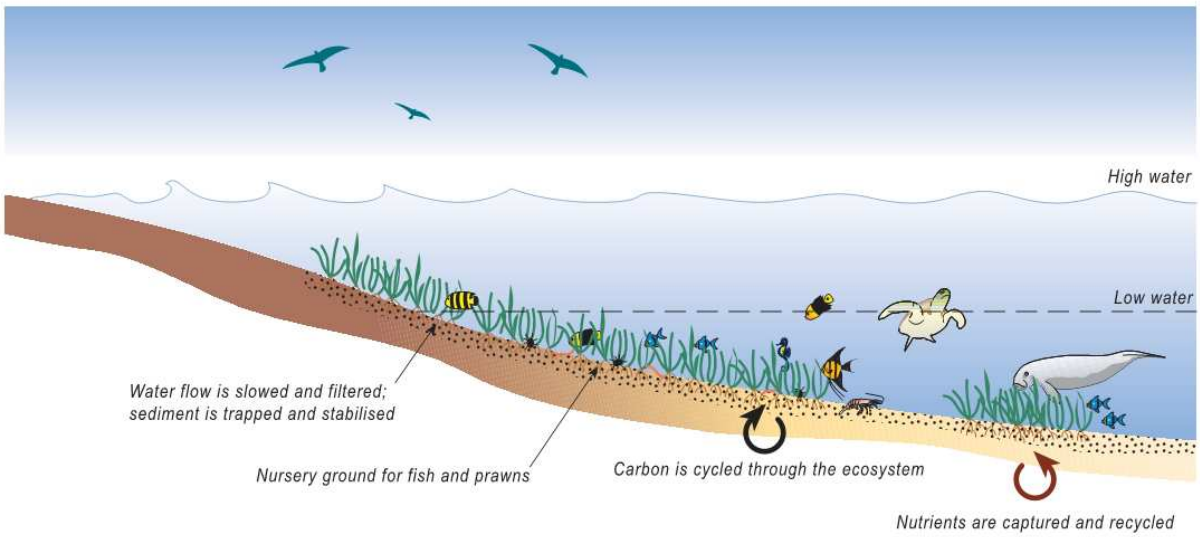


Figure 1.12 A seagrass ecosystem.

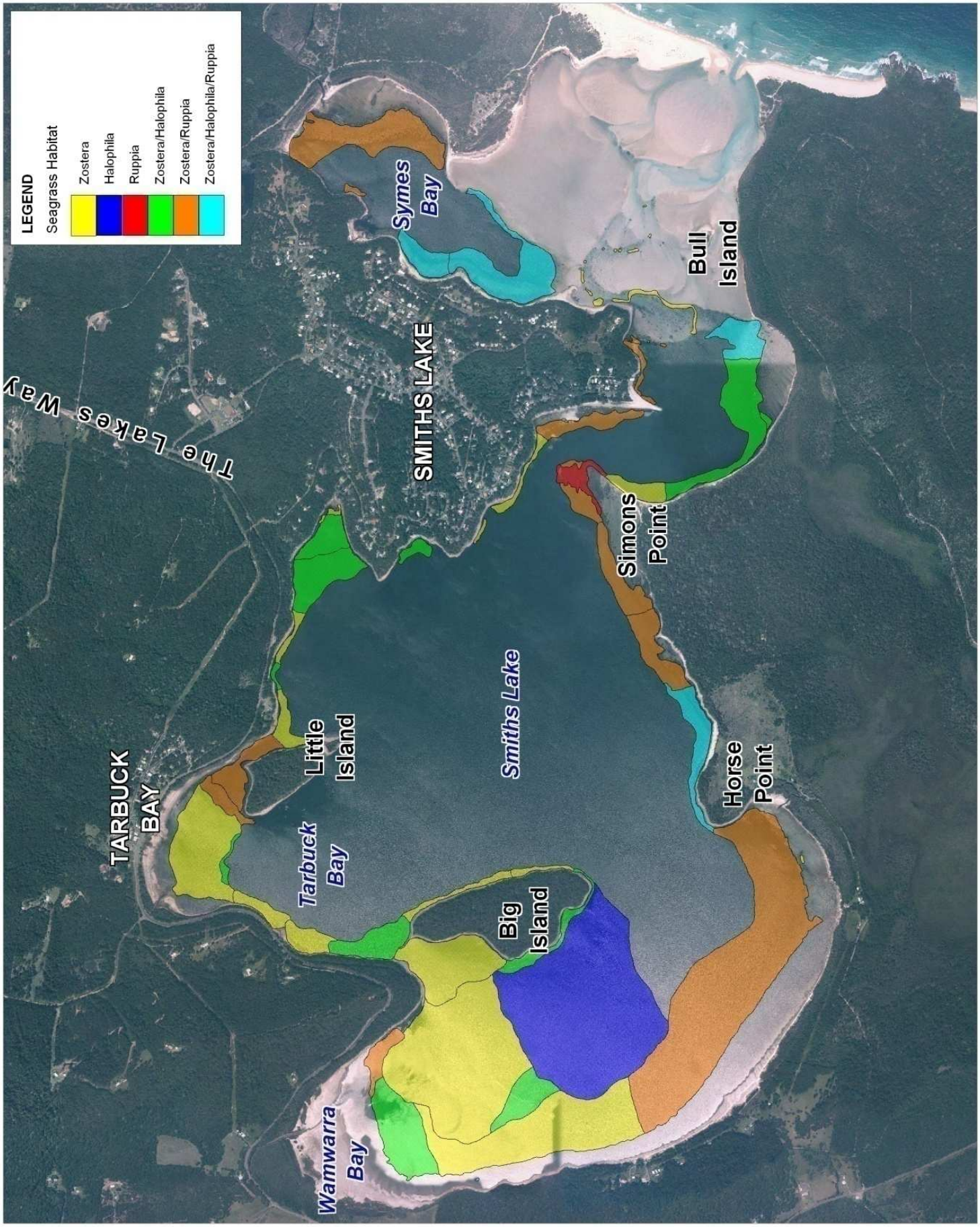
Figure 5-7 Seagrass ecosystem (Source: DCC 2009)

Seagrass communities within the Lake have historically undergone large changes in distribution and species composition, primarily in response to variations in water levels and salinity (i.e. closely associated with entrance conditions). As described by WMA (1998), the following changes have been observed:

- Prior to 1960, *Zostera* dominated the south-western area to a depth of 3.5 m;
- In the mid-1960's, *Zostera* declined and *Ruppia* became dominant due to lower salinity;
- In 1970, *Zostera* was present in the deeper water and in the south-western area as sparse patches amongst the more dominant *Ruppia*;
- In the mid-1970's seagrass was absent, but recolonization by *Zostera* was observed in the late 1970's in response to higher salinities;
- Robinson et al. (1983) found a fringing band of *Zostera*, as well as adjacent patches of *Halophila ovalis*, and *Ruppia* in Symes Bay;
- West *et al.* (1985) observed 2.08 km^2 of seagrass. *Zostera* formed a continuous bank along the southern shore, an extensive bed in Wamwarra Bay, fringing beds in Big Tarbuck Bay and Symes Bay, and patches in the eastern basin. *Ruppia* occurred as extensive beds in shallower areas of Wamwarra Bay and Big Tarbuck Bay, and *Halophila* was also recorded.

5.5.2 Rocky Inter-tidal Habitats

The Lake has several sections of rocky shoreline. Notable rocky shores include those on the northern side of the Lake from Big Point to the eastern side of the township of Smiths Lake, on the southern side between Simons Point and Horse Point, and on the three islands (Big Island, Little Island, and Bull Island) within the Lake. Rocky inter-tidal habitats may be colonised by molluscs such as oysters when the Lake entrance is open, and subsequently experience mortality during the unfavourable conditions when the Lake is closed (WMA 2001).



Title:

Distribution of Seagrass Beds within Smiths Lake

Figure: **5-8**

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5.5.3 Beaches and Dunes

Beaches and dunes are naturally changing environments. Major storms can dramatically erode dunes, and the dunes then rebuild naturally. Vegetation increases the stability of the dunes because they trap sand and build up the dunes rather than letting the sand blow away. A significant beach dune system is present at the entrance to Smiths Lake. According to WMA (2001), the dune to the south of the entrance channel reportedly supports a State-listed endangered plant species, namely Sand Spurge (*Chamaesyce psammogeton*) (Figure 5-9). Database and literature searches conducted as part of the present study did not identify this species within the study area; hence there is no available information on the condition, extent and specific location of this species.

Figure 5-9 Coastal Sand Spurge (DECCW 2010)

5.5.4 Saltmarsh

The perimeter of Smiths Lake is fringed by saltmarsh communities that rely on periodic inundation. Assemblages are typically dominated by Sea Rush (*Juncus* spp.) and may feature Swamp Oak (*Casuarina* spp.). Wetland mapping conducted by Council shows 'tidal marsh' communities in Wamwarra Bay and east of Tarwhine Point (~0.03 km ^{2} in total). Large saltmarsh areas also occur in Symes Bay and west of Horse Point (WMA 2001).

Saltmarsh communities are classified as an Endangered Ecological Community (EEC) under the NSW *Threatened Species Conservation Act 1995* (TSC Act), and are listed as *Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions.*

5.5.5 Unvegetated Muds and Sandflats

Unvegetated mud and sand flats are exposed when the Lake entrance is open and Lake water levels are low (WMA 2001). The exposed sediments can then dry and oxidise, resulting in changes to benthic micro-flora and fauna assemblages. Aerial exposure of sediments can also lead to odour issues.

5.5.6 Fringing Wetlands

Fringing wetlands in the study area include herbaceous marshes as well as tree-dominated swamps. Wetlands that are classified as 'freshwater swamp or marsh in the coastal zone' have been mapped by DPI (2006) with locations including an area in the southern portion of Little Island and two patches on the north-east of Symes Bay.

Patches of 'swamp forest in the coastal zone' are more extensive, and include two of the three areas within the study area that are designated as SEPP 14 Coastal Wetlands (refer section 10.3). These

are primarily located to the north of Wamwarra Bay, to the south-west of Horse Point, around Symes Bay and on Big Island and Little Island. According to vegetation strategy mapping by Council, particular types of swamp forest that surround Smiths Lake include Paperbark communities, Swamp Mahogany communities and Swamp Oak communities.

Fringing wetlands are important to the maintenance of water quality and health condition of the Lake, most notable due to their role in nutrient cycling processes. Fringing wetlands are also valuable due to their provisioning of habitat to various terrestrial and aquatic flora and fauna. In particular, the SEPP 14 wetlands are known to support abundant avifauna and a significant number of mammals, including Threatened species (see below).

Swamp Oak communities are classified as an EEC under the TSC Act, listed as Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions. While the Swamp Oak communities on Big Island and Little Island would likely not be classified as EECs as the islands are not classified as 'floodplain', the two Swamp Oak communities on the south-western shore would be classified as EECs.

5.5.7 Foreshores

Most of the northern and western foreshore supports woodland and open forest. According to vegetation strategy mapping by DPI (2006) these woodlands and forests are dominated by species such as Blackbutt, Grey Ironbark and Grey Gum. Disturbance by human activities is evident in some areas, resulting in a poor scrub and grass layer beneath the trees (WMA 2001). The southern foreshore also supports areas of coastal heath (WMA 2001).

None of these foreshore vegetation communities are listed as an EEC under the TSC Act. The foreshore vegetation communities support an abundance and diversity of fauna, including Threatened species (see below).

5.5.8 Aquatic Fauna

Smiths Lake supports important fish breeding and nursery grounds, and provides habitat for up to 78 fish species (Robinson et al. 1983). Commercial fishing is undertaken within the General Use Zone of the Port Stephens-Great Lakes Marine Park (refer section 10.1.4), with commonly targeted fish species including Sea Mullet, Tarwhine, Sand Mullet and Bream. Marine species rely on the opening of the Lake for spawning migrations and subsequent recruitment of juveniles, and therefore the status of the entrance is important in determining fish distribution and abundance.

5.5.8.1 Fish Health

Investigations into fish health (Digsfish Services 2010) indicated that from the fish sampled (two flathead, *Platycephalus fuscus* and three mullet, *Mugil cephalus*) the fish were in very poor condition and were an average of 41.3% (range 10.5% - 63.3%) underweight compared to what could be expected for normal, healthy specimens. The mullet presented as 'pinhead' fish, where the heads are much larger than the bodies, and this may be due to starvation or from a virus. Furthermore lesions were found in the kidney and the pancreas of some of the fish. No definitive conclusion was derived from the report and further investigation is required to define the cause of the poor fish health.

5.5.8.2 Jellyfish

Recent research on two jellyfish species found within Smiths Lake (zooxanthellate *Phyllorhiza punctata* and non-zooxanthellate *Catostylus mosaicus* (Figure 5-10)), indicated that both jellyfish, when present, exert a top-down predation pressure on meso-zooplankton. This has shown to cause a significant decline in most species of meso-zooplankton and can initiate changes that cascade to multiple trophic levels, although typically not to primary producers. Instead, increased primary production was only observed in the presence of *Catostylus mosaicus* jellyfish, most likely because of the excretion of phosphate (PO^{3-}_4) but this effect was possibly enhanced by a concurrent reduction in grazing by meso-zooplankton. Excretion of nutrients by blooms of *Catostylus mosaicus* jellyfish can also greatly increase phytoplankton production and could favour algal blooms.

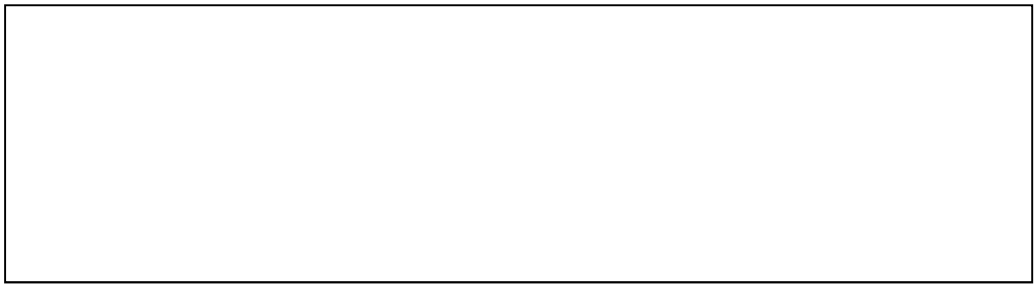


Figure 5-10 Two species of Jellyfish *Phyllorhiza punctata (left)* and *Catostylus mosaicus (right*)

The benthic fauna communities are typical of those that inhabit intermittently open Lakes on the NSW coast, comprised of nemerteans, crustaceans, polychaetes and molluscs (Hutchings et al. 1978).

5.5.9 Terrestrial Fauna

As mentioned above, several habitats surrounding Smiths Lake consistently support a diversity and abundance of terrestrial fauna species. A database search for records of Threatened fauna species that have previously been recorded within or directly adjacent to Smiths Lake found ten mammal species, six bird species, one reptile species and two amphibian species. As shown in Table 5-1, these species have a conservation status of Vulnerable and/or Endangered under State and/or Commonwealth legislation.

An information review was conducted to ascertain the general habitat preferences of these Threatened species. A large proportion of the species (12) are typically forest dwelling, with a further four species that use a variety of habitats. The two frog species are the only species that rely exclusively on swamp habitats, and Pied Oystercatcher requires intertidal flats and sand banks.

Table 5-1 Threatened terrestrial fauna species recorded within or adjacent to Smiths Lake (source: Atlas of NSW Wildlife)

Scientific Name	Common Name	Conservation Status*		Preferred Habitat
		NSW	National	
Hoplocephalus stephensii	Stephen's Banded Snake	V	-	Eucalypt forest
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Tall wet forest

Scientific Name	Common Name	Conservation Status*		Preferred Habitat
		NSW	National	
Miniopterus australis	Little Bentwing Bat	V		Moist Eucalypt, rainforest, coastal scrub
Pteropus poliocephalus	Grey-headed Flying Fox	V	V	Rainforest, sclerophyll, heath, swamps
Phascolarctos cinereus	Koala	V	-	Eucalypt forest/woodland
Petaurus australis	Yellow-bellied Glider	V	-	Eucalypt forest/woodland
Mormopterus norfolkensis	Eastern Freetail-bat	V	-	Dry Sclerophyll
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	Varying
Pseudomys gracilicaudatus	Eastern Chestnut Mouse	V	E	Heath, swamp
Dasyurus maculatus	Spotted-tailed Quoll	V	-	Rainforest, woodland, heath
Ohascogale tapoatafa	Brush-tailed Phascogale	V	-	Dry sclerophyll
Glossopsitta pusilla	Little Lorikeet	V	-	Open Eucalypt forest/woodland
Ninox strenua	Powerful Owl	V	-	Forest, woodland
Haematopus longirostris	Pied Oystercatcher	V	-	Intertidal flats, open beaches, sandbanks
Ephippiorhynchus asiaticus	Black-necked Stork	E	-	Wetlands, swamps, woodlands
Pandion haliaetus	Osprey	V	-	Estuarine forest, forest, woodland
Calyptorhynchus lathami	Glossy Black Cockatoo	V	-	Forest, woodland
Litoria aurea	Green and Golden Bell Frog	E	V	Swamps
Crinia tinnula	Wallum Froglet	V	-	Paperbark and sedge swamps

*Conservation status under NSW *Threatened Species Conservation Act 1995* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, where V is Vulnerable and E is Endangered.

5.6 Review of Cultural Values

Cultural values and places of heritage provide critical links between the past and the present and provide the community with a sense of belonging to the place in which they live.

5.6.1 Heritage

The landscapes surrounding Smiths Lake contain rich and varied evidence of pre-European occupation including scarred trees, open campsites, burial grounds, stone arrangements, middens, rock engravings and a fish trap (NPWS 2002). The landscape also includes important spiritual sites but only a small proportion of the nearby Myall Lakes National Park has been surveyed so far, with 61 sites that have already been located (NPWS 2002).

The Aboriginal Community relevant to the Smiths Lake area includes the Forster Aboriginal Land Council, the Elders Group and the Lakkaria native title group.

5.6.2 Human Uses

Prior to the Lake becoming a marine park, commercial fishing occurred year round with up to 20 fishermen deriving their income catches from the Lake. Methods of commercial fishing included fish

meshing, hauling and prawning. In an audit undertaken in 2003 by the NSW Maritime Authority (NSWMA 2005) 95 non-powered dinghies, 35 sailing craft and 20 canoes/kayaks were located on the Lake shoreline above the high water mark and this number increases during holiday periods.

Boats are common on the Lake; however congestion has not been noted as a significant issue for on-water users. There are however some minor safety issues with regards to swimmers and non-powered vessels.

5.7 Projections for Climate Change

Species and communities have adapted to specific conditions over many thousands of years. Global warming is changing conditions over a relatively short period of time and its effects are apparent in some areas by infrequent rainfall, extreme weather patterns, higher than average atmospheric temperatures, warmer oceans and rising sea levels (HCRCMA 2007). The following aspects of the climate have been predicted to change for the NSW north coast region.

5.7.1 Drought Frequency

The Southeast Coast Drainage Division, incorporating the Smiths Lake catchment, is likely to have an increase in the frequency of drought of up to 20% by 2030, and up to 40% by 2070 (Macadam et al. 2007).

5.7.2 Average Annual Rainfall

The average rainfall may decrease 6% by 2030 and decrease 19% by 2070 (Macadam et al. 2007).

5.7.3 Extreme Rainfall Events

The extreme rainfall events are predicted to be modified by future climate change with potentially greater storm intensity even if overall precipitation decreases (Walsh 2004). The following changes to rainfall intensity (Table 5-2) have been predicted for the Wooli Wooli estuary, which is located north of Smiths Lake, and can be considered relevant in absence of direct projections. The predictions indicate a possible increase in intensity in spring storms, a decrease in intensity for autumn and winter storms, and either a decrease or increase in intensity for summer and annual storms.

High intensity rainfall events are particularly important to coastal Lakes, as it is these events that typically fill the Lakes over short periods of time causing natural breakouts of the entrance. This contrasts to persistent lower intensity rainfall, which typically results in slow increases in water level, which may stay elevated for some time, thus necessitating artificial intervention to minimise public risk.

Table 5-2 Rainfall intensity predictions for Wooli Wooli estuary, NSW (Macadam et al. 2007)

Season	2030	2070
Changes in the intensity of extreme rainfall events for the Wooli Wooli Estuary (%)		
Annual	-10 to 0	-10 to +10
Summer	-10 to +20	-10 to +20
Autumn	-20 to 0	-10 to 0
Winter	-10 to +10	-10 to 0
Spring	-10 to +10	0 to +20

The occurrence of high intensity extreme rainfall events often coincides with East Coast Lows (ECL) which are intense low-pressure systems and occur on average several times each year off the eastern coast of Australia (BOM 2010). ECLs can generate the following:

- Gale or storm force winds along the coast and adjacent waters;
- Heavy widespread rainfall leading to flash and/or major river flooding; and
- Very rough seas and prolonged heavy swells over coastal and ocean waters which can cause damage to the coastline.

Evidence of sediment transport processes likely driven by an ECL in 1974 can be seen in APPENDIX A:

5.7.4 Sea Level Rise

IPCC (2007) projects an increase in mean sea level of between 0.18 and 0.59m by the end of the 21st century, with the possibility of an additional 0.1 to 0.2m due to ice sheet flow, and CSIRO has predicted additional localised sea level rise of up to 0.12m on the east coast of Australia due to thermal effects of the East Australian Current (McInnes et al. 2007). To assist with longer term strategic and land-use planning, the NSW Government has released a *Sea Level Rise Policy Statement* (adopted October 2009), which recommends consideration of a sea level rise of 0.9 m by 2100 which incorporates all of the previously identified numbers.

It must be recognised and emphasised that projected sea level rise will not stop at the end of this century (the limit of most reasonable projections). Sea level rise in Australia is also likely to be affected by the El Nino Southern Oscillation (ENSO), a decadal cycle characterised by periods of drought and drier weather during the El Nino phase of the cycle, and relatively high rainfall and wetter weather during the La Nina phase. The likely effects of a warmer climate on the ENSO are not currently well understood.

5.7.5 Wave Climate

The east coast of Australia experiences high wave energy, during periods when east coast low pressure systems are most frequent (DCC 2009). Climate change is predicted to slightly increase mean wave climates (height, speed and energy) (DCC 2009) and the annual dominant wave direction is predicted to remain from the south east (Macadam et al. 2007).

5.7.6 Shoreline Recession and Berm Movement

As sea level rises, the simplified response of the beach is to remove sand from the dune systems and deposit the sand offshore (Figure 5-11). As sea levels continue to rise, continued coastal erosion is expected, resulting in the landward movement of the coastline. If suitable land is located behind the beach then landward migration is expected.

For NSW open coast situations, the active beach profile slope has generally ranged in the order of 1:50 to 1:100, where a 1m vertical increase in sea level is equivalent to a 50 to 100m horizontal recession in beach / shoreline (OEH 2009). Simplistically, this suggests that a 50 – 100m shoreline recession is likely to occur with the projected sea level rise of 1m. The beach berm, as part of the coastline, is predicted to migrate inland with the shoreline (Figure 5-12).

With the sea level rise the height of the flood tide delta may increase, due to the increase in sediment being transported inside the inlet (Dissanayake et al. 2009). This would manifest from a reduction in bed friction through the inlet resulting from rising water levels thus promoting higher flood tide velocities that will carry more sediment from the ebb tide delta through the inlet and onto the flood tide delta (Dissanayake et al. 2009). The extent of tidal flats within the entrance region will depend on the rate at which sediment is transported in versus the rate at which the sea level rises to maintain water depth.

Figure 5-11 Shoreline recession (Hanslow 2007)

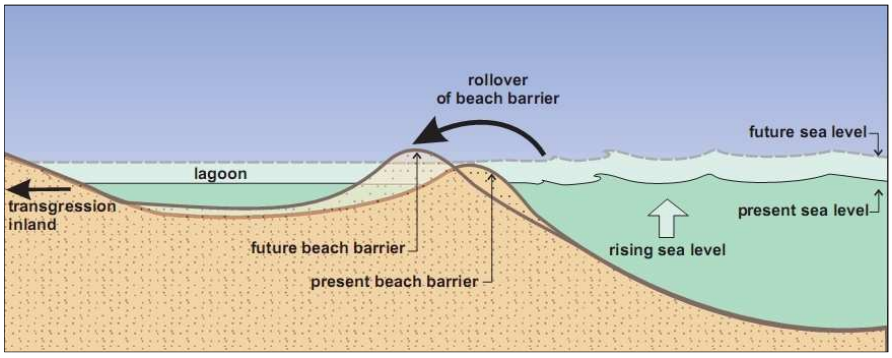


Figure 5-12 Berm movement with sea level rise (PWA 2003)

6 ISSUES ASSESSMENT

The issues related to the management of Smiths Lake are mostly driven by human activities, which fundamentally modify the catchment and/or coastal processes of the estuarine ecosystem. Provided below are descriptions of the main issues, as identified by stakeholders and community members, which require immediate attention in the CZMP.

6.1.1 Compliance of Entrance Opening Procedure with Regulations

The artificial opening of the entrance of Smiths Lake to the ocean, undertaken by Council, occurs on both Crown Land and within a Marine Park, and as such approvals are required from the relevant authorities to ensure that this activity is undertaken in compliance with the relevant acts, as identified below:

Crown Lands Management Act 2016 – The *Crown Land Management Act 2016* provides for the administration and management of Crown land, which includes the bed and entrance of Smiths Lake. The *Crown Land Management Act 2016* requires consideration of the proposed activity to be undertaken prior to the granting of leases or licences in respect of such land. The activity of artificial entrance opening occurs on Crown land and as such requires a licence from DoI – Crown Lands.

Marine Parks Act 1997 - Since the completion of the original EMP, Smiths Lake has been incorporated into the Port Stephens – Great Lakes Marine Park. As a consequence any activities within the park need to comply with the Act (refer to APPENDIX B:).

SEPP (Infrastructure) 2007 – The SEPP provides guidance on the activities that Council is allowed to undertake without permission/consent from relevant authorities (refer to section 10.3.3).

6.1.2 Monitoring and Safety during Entrance Openings

The following issues aim to clarify the procedures for the artificial opening, to improve community safety and provide opportunity for policing of illegal openings.

Increase monitoring and analysis of opening events. The current opening procedure has been formalised with a set of governing procedures, however, there have been limited measurements of the opening characteristics to determine whether this procedure provides an optimal outcome. Detailed investigation, monitoring and analysis of the different aspects of each opening event should be undertaken to gain greater understanding of the sensitivities within the system.

Restrict Illegal openings and increase safety during opening events. A major risk to human life is the unstable nature and high velocities within the inlet channel during an opening event, especially during the initial breakout. Investigation of the ability to enforce policing of illegal openings and increase safety during breakouts is required. Options may include categorising the entrance channel as a coastal bar which would enforce the use of lifejackets in watercraft during the opening events, or the maintenance of a flood notch at the entrance to ensure any informal openings at least occur in the entrance opening policy designated location.

6.1.3 Projected Sea Level Rise

To reduce the impact of global warming we must plan and prepare for changes in climate and sea levels now so that natural resources and infrastructure can be protected into the future (HCRCMA 2007). Sea level rise is anticipated to impact upon a number of physical and ecological characteristics of the Lake including foreshore and dune vegetation, as well as beach berm heights and physical processes associated with entrance openings.

Planning should also consider the impacts of a rising sea level on coastal infrastructure, with the restriction of further development at lower flood levels, and a number of facilities have been identified as likely to become impacted by higher lake water levels; including sewer manholes and other infrastructure (refer Figure 6-1).

Figure 6-1 Sewer manhole near creek entering Smiths Lake

6.1.4 Sedimentation within the Lake

Over recent years there has been a perceived infilling of sediments into the inlet channel and Symes Bay. To quantify this process further investigation is required to define the relationship between the opening of the Lake and sedimentation within the Lake, especially between the main body of water and Symes Bay to the north of the entrance. A desktop investigation has been undertaken as part of the review of this plan. Sedimentation is also a navigational hazard and as such, is another *Waterway Access* issue (as described previously in the Original EMP.

Figure 6-2 Entrance region of Smiths Lake

6.1.5 Bank Erosion

Estuarine foreshores are naturally dynamic places and are at the mercy of natural processes such as floods. They also provide habitat for a range of species and when they become unstable their shape changes due to different patterns of erosion and sedimentation, habitat may become degraded and water may become polluted.

During periods when Smiths Lake is open to the ocean the entrance channel migrates to the southern shoreline of the Lake, occasionally leading to foreshore erosion and bank collapse. The southern foreshore of the Lake constitutes the boundary between the Marine Park and Myall Lakes National Park, and as a consequence there are guidelines for both the management of national park lands and marine park environments. The location and extent of potential Aboriginal cultural sites within this region is also unknown and may be compromised by erosion.

Furthermore, NSW Maritime Authority has a responsibility to ensure safe navigation within the Lake. If a tree falls within the Lake, the removal of the obstruction (tree) can become compromised if the tree is seen as 'habitat' under either the Marine Parks Plan of Management or the National Parks Plan of Management.

6.1.6 Management of Localised Erosion Sites

Sealing of dirt roads. If roads are not managed properly they can erode or promote erosion elsewhere, which can result in sediment (as well as pollutants, such as nutrients and heavy metals) washing into the Lake. The sediments may then reduce habitat quality, by reducing the depth of the waterways and smothering the Lake bed and aquatic vegetation. There are a number of dirt roads within the catchment, especially within the Smiths Lake village (e.g. Ansett Ave, refer Figure 6-3, Sandbar Rd) and the National Park. It is recognised that sealing of roads may not be practical at all locations, however specific focus could be given to a number of roads within Smiths Lake village. Some of these roads were identified and appear in the specific actions section (section 12).

Figure 6-3 Ansett Ave near Smiths Lake

Review of stormwater management at Smiths Lake village. When rain falls on roofs, roads and other hard surfaces in urban areas, large amounts of water travel very quickly into stormwater drains carrying rubbish and other pollution. The water is generally not treated and drains back into the Lake, potentially degrading water quality. Specific areas within the Smiths Lake village have been identified

as requiring a review of the stormwater management in particular the area surrounding 115 Patsy's Flat Rd.

Stabilisation and maintenance of existing table drains. Ongoing maintenance is required for the table drains to ensure efficient transport of water from the catchment.

6.1.7 Identification and Monitoring of Point Source Pollutants

A number of specific sites were identified as potential sources of pollutants into the Lake, including pathogens from overflows in the reticulated sewerage system after heavy rains, possible runoff of nutrients and chemicals from the golf course and benthic sources of nutrients and organics in Symes Bay, as evidenced by occasional foul smell. Investigation is also required into the functionality of sewerage pumping stations at Eagle Nest Parade and Patsy's Flat Rd.

6.1.8 Fish Health

Recent testing of fish, commissioned by the Newcastle Fishermen's Co-Op (Digsfish, 2010), has shown evidence of poor fish health within the Lake. Poor health may be related to water quality or habitat conditions. Further investigation would be required to determine if there is a chronic health issue throughout the Lake.

6.1.9 Options for Public Toilets

Public toilets have been identified as lacking near Sandbar Beach. It is understood that this is a popular area for recreation and the lack of toilets in the vicinity has resulted in open defecation to date.

6.1.10 Conservation or Management of Habitat on Private Land

Native bushland on private freehold land and Smiths Lake is recognised as a valued resource for the protection of local wildlife and water quality within the Lake. An investigation is required into options to conserve and manage the land.

6.1.11 Monitoring of Seagrass

Seagrass beds in the Lake are naturally dynamic, in response to water levels and entrance openings. Effort should be made to conserve and protect seagrass, so up to date mapping is always required.

6.1.12 Informal Storage and Access of Boats

Surrounding the Lake are large expanses of low-lying foreshore vegetation (saltmarsh, paperbark swamps, wetlands etc), which provide a habitat for fauna, a sink for catchment nutrients and a buffer between development and the Lake waters. At a number of locations around the Lake these foreshore habitats, are being degraded due to human access. Types of informal access include:

- boat launching from informal boat launching areas;
- informal boat storage (Figure 6-4);
- dragging boats over foreshore habitats; and

- 4WD access on to the sandy Lake edges e.g. at Wamwarra Bay on the north western edge of the Lake.

Figure 6-4 Western foreshore of Symes Bay with informal boat storage

6.1.13 Clarification of Waterway Zoning

The Smiths Lake Boating Plan of Management was completed and implemented in 2005. The plan contains a series of zones related to waterway use (Figure 6-5). The Lake also is now part of the Port Stephens – Great Lakes Marine Park, and as such, has become incorporated into the Marine Park Plan of Management which largely relates to habitat zonings and aims to retain the ecological values. While there are no changes to the speed restrictions within Smiths Lake, there are some changes to the fishing regulations of which requires community awareness.

Figure 6-5 Signage outlining waterway zoning prior to the marine park, located at Symes Bay

6.1.14 Domestic Animal Management

The presence of dogs and horses around the foreshores of Smiths Lake results in the direction addition of nutrients and other pollutants to the Lake, and the potential degradation of foreshore areas due to erosion and loss of vegetation (Figure 6-6). As the number of visitors to the area increases, these problems may become exacerbated and precautionary management options should be considered prior to this occurring.

Figure 6-6 Visitors at Smiths Lake

6.1.15 Additional Community-based Issues

Feedback from the community brochure indicated there had been a perceived change to a number of specific issues around the Lake. The results from the community feedback indicated the following:

- **No significant change to areas that flood around the Lake.** Flooding around the Lake is largely governed by the management of the Lake entrance (Figure 6-7). The community perception on no significant increase in flooding is reflective of the trigger water level for entrance breakouts, which has remained consistent over the past decade or so.

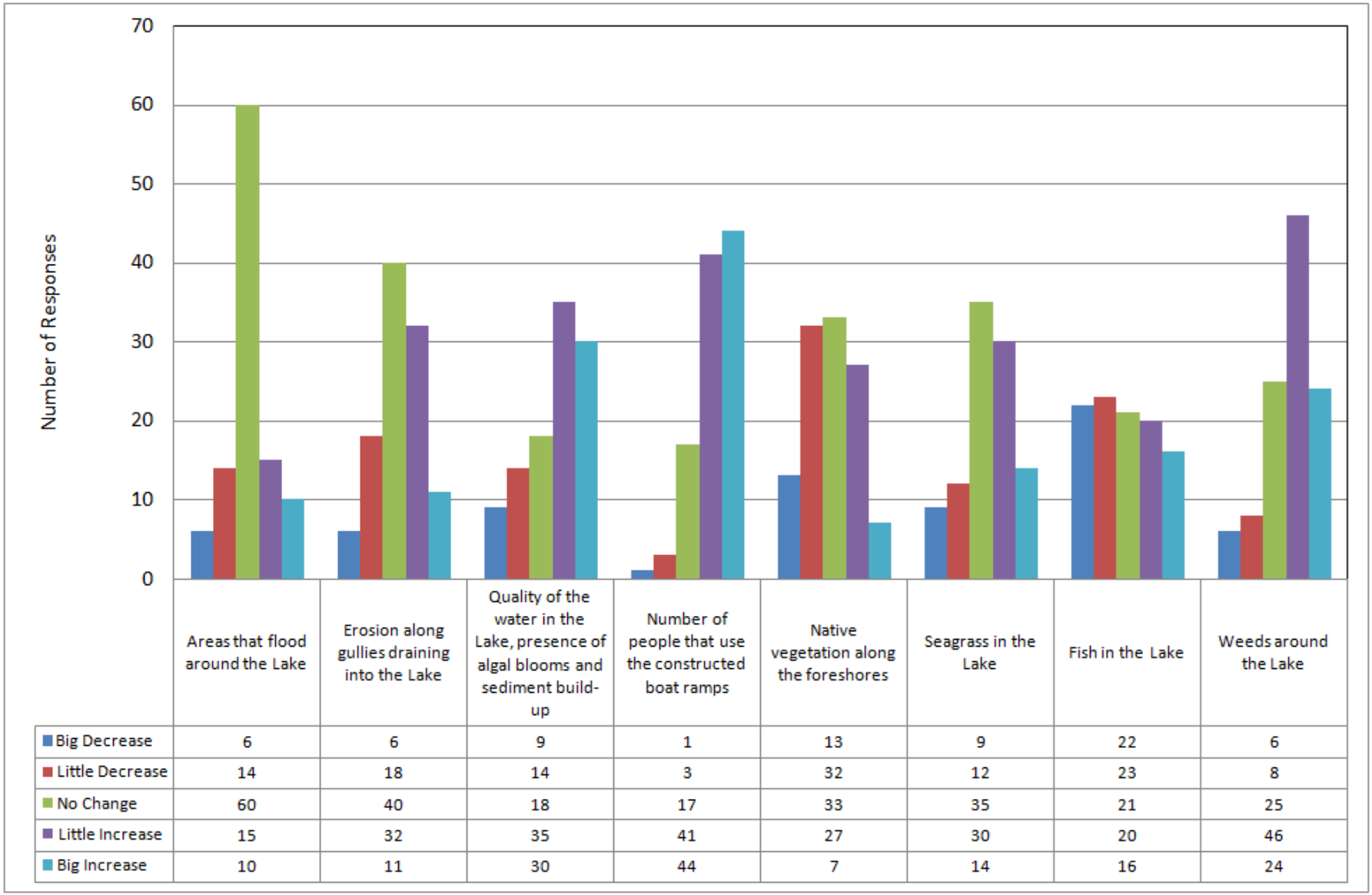
Figure 6-7 Flooding at the southern end of the western basin

- **A slight increase in erosion along gullies draining into the Lake.** This issue was raised within the stakeholder workshop.
- **A change in the water quality of the Lake with an increase in algal blooms and / or sediment build-up.** There have been no noted occurrences of significant algal blooms within the Lake, and therefore we assume that the change here is in relation largely to sediment build up. The issue of sediment build up was raised by the stakeholders, and appears to be a concern particularly around the entrance region of the Lake. The processes involved in the transport of sediment within the entrance region of the Lake and the relationship to Lake opening processes has been investigated (refer to APPENDIX A:).
- **An increase in the number of people that utilise the constructed boat ramps around the Lake.**
- **Changes to native vegetation around the Lake**. This is likely to be site specific. Increases in native vegetation around the Lake are not an issue. The decrease of native vegetation around the Lake may require more specific attention.
- **A slight increase in seagrass in the Lake**. This likely to be site specific. Increases in seagrass beds in the Lake are not an issue. Changes to seagrass within the Lake can be attributable to a number of factors including water quality and entrance status.
- **A slight decrease in the numbers of fish in the Lake**. Fish populations are likely to depend on a dynamic environment of conditions including entrance conditions. Fishing regulations have

changed since the Lake was included in the Marine Park and this may have contributed to a change in fish population dynamics. Also, the Lake was recently open for over a year, which resulted in salinities within the Lake becoming more saline, which in turn may have influenced the ecology within the Lake.

- **An increase in the amount of weeds around the Lake.** The increase in weeds is likely to be site specific. The increase could be attributed to land clearing, introduction of weed species (seeds) from visitors (unknowingly), or changing environmental conditions favouring exotic species. The perceived increase of weeds around the Lake may also be influenced by the increasing knowledge of community members in becoming more aware of weed species. This issue is addressed through a number of revised actions in the following sections including a review of foreshore protection, the addition of vegetation buffers and education.

A summary of the stakeholder and community issues have been outlined on a map of Smiths Lake (Figure 6-8) and (Figure 6-9).



	Areas that flood around the Lake	Erosion along gullies draining into the Lake	Quality of the water in the Lake, presence of algal blooms and sediment build-up	Number of people that use the constructed boat ramps	Native vegetation along the foreshores	Seagrass in the Lake	Fish in the Lake	Weeds around the Lake
Big Decrease	6	6	9	1	13	9	22	6
Little Decrease	14	18	14	3	32	12	23	8
No Change	60	40	18	17	33	35	21	25
Little Increase	15	32	35	41	27	30	20	46
Big Increase	10	11	30	44	7	14	16	24

Figure 6-8 Community views on changes over the last ten years

Title:

Revised Issues Map

Figure: 6-9

Rev: A

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

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Approx. Scale

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7 REVIEW OF MANAGEMENT OBJECTIVES

The management plan can be broken down into three different tiers of information which include the overarching objectives of the plan, followed by the relevant issues and thirdly the actions that will address the issues and achieve the objectives (Figure 7-1).

Figure 7-1 Management Plan interactions

7.1 Review of General Objectives

Outcomes from the Stakeholder workshop confirmed that the original EMP objectives (WMA 2001) were to be retained with some slight modification, and a new objective was to be included. The new objective included the recognition of the traditional owners of the land.

The original overall objectives with revised changes (underlined) are as follows:

- Protect, conserve and maintain estuarine habitats, ecosystems and natural processes
- Achieve ecologically sustainable use of estuarine resources
- Initiate repair of past damage and prevent future degradation
- Conserve recreational, commercial, cultural and aesthetic values of the estuary
- Facilitate improved Lake & catchment management by increasing community awareness, support and involvement
- Balance existing and future use and development with other Lake management objectives
- Acknowledge the traditional owners of the land and their cultural values and aspirations

7.2 Specific Objectives

An issues assessment was undertaken as part of the original EMP (section 5, WMA 2001) and the following five main themes were identified:

- Opening Procedure
- Erosion and Sedimentation
- Habitat Conservation
- Water Quality, and
- Waterway Access and User Conflict

Underlying each of these themes was a set of specific objectives which are outlined in the following section. A review of the specific objectives was undertaken by BMT WBM, utilising information gathered from the stakeholder and community feedback.

7.2.1 Entrance Opening Procedure Objectives

Artificial entrance opening of Smiths Lake is required to alleviate flooding of low lying land surrounding the Lake. When determining if, when, where and how to open the Lake entrance, the adopted management objectives aimed to consider a wider range of relevant matters e.g. environmental, other than just flooding.

Table 7-1 Specific objectives for Entrance Opening

Original Objective	*Change Required*	*Revised Objective*
Implement *an entrance opening policy which considers ecological impacts, recreational users, water quality, and visual and odour problems, as well as flooding problems.*	*Modify*	***Maintain*** *a current and relevant entrance opening policy which considers environmental impacts, flooding and social demands on the Lake.*
Determine *an opening procedure which maximises ecological and social benefits without causing excessive sediment infeed or erosion damage to vegetated areas along the foreshore.*	*Modify*	***Maintain*** *a current and relevant entrance opening procedure which maximises ecological and social benefits without causing excessive sediment deposition or erosion damage to vegetated areas along the foreshore.*

7.2.2 Erosion and Sedimentation Objectives

An increase in population (i.e. waterway usage) and infrastructure (i.e. building works) directly contribute to short and long term erosion and sedimentation in the catchment. As a consequence management of these issues is an ongoing requirement and all existing specific objectives have been retained to be incorporated into the new CZMP (Table 7-2).

Table 7-2 Specific objectives addressing erosion and sedimentation

Original Objectives	*Change Required*	*Revised Objectives*
Reduce the rate of sediments entering the Lake from the catchment, by implementing and strictly monitoring development activities including Council works.	*Retained*	*Reduce the rate of sediments entering the Lake from the catchment, by implementing and strictly monitoring development activities including Council works.*
Restore where possible silted and degraded areas such as areas modified for road drainage or damage by four wheel drive vehicles.	*Retained*	*Restore where possible silted and degraded areas such as areas modified for road drainage or damage by four wheel drive vehicles.*
Reduce habitat damage by controlling access to beach and foreshore areas.	*Retained*	*Reduce habitat damage by controlling access to beach and foreshore areas.*

7.2.3 Water Quality Objectives

Specific objectives aimed to address the issues of pollutants inputs, mainly suspended sediments, nutrients, faecal pathogens, chemicals and acid leachate, due to catchment development, urban runoff, sewage discharges/seepage, and possible chemical spills, entering the Lake. The nature of the pollutant inputs is changing over time due to the installation of reticulated sewerage, habitat restoration and improving works guidelines, and the revised specific objectives (Table 7-3) reflect this.

Table 7-3 Specific objectives addressing Water Quality

Original Objectives	*Change required*	*Revised Objectives*
Maintain water quality at a level which protects ecological, recreational and aesthetic values in line with appropriate Australian Water Quality Guidelines for Fresh and Marine Waters.	*Retained*	*Maintain water quality at a level which protects ecological, recreational and aesthetic values in line with appropriate Australian Water Quality Guidelines for Fresh and Marine Waters.*
Reduce the rate of suspended sediments entering the Lake by implementing and strictly monitoring development activities including Council works.	*Retained*	*Reduce the rate of suspended sediments entering the Lake by implementing and strictly monitoring development activities including Council works.*
Monitor the impacts of sewerage reticulation and determine an accurate picture of subsequent Lake water quality.	*No longer relevant*	*N/A*
Determine the nature and causes of significant pollutant sources such as acid sulfate leachate, or faecal contamination from unsewered areas and ensure any future developments do not increase the pollution load entering the Lake system.	*Modify*	*Determine the nature and causes of significant pollutant sources and ensure any future developments do not increase the pollution load entering the Lake system.*
Develop emergency strategies to deal with potential hazardous material spills.	*No longer relevant*	*N/A*
Develop an appropriate stormwater management plan for the catchment.	*Retained*	*Develop an appropriate stormwater management plan for the catchment.*

7.2.4 Habitat Conservation Objectives

A sustainable society is one that lives off its natural resources but at the same time does not deplete or degrade those natural resources. This ensures the Lake ecosystem has the resilience to cope with negative outside changes, such as drought, pests and climate change. This theme addresses the issues of protection, conservation and rehabilitation of habitat surrounding Smiths Lake.

The inclusion of Smiths Lake into the Port Stephens – Great Lakes Marine Park aims to provide a balance between the protection of the marine biodiversity whilst also providing for sustainable use; and one of the ways this is achieved is through the regulation of fishing. Due to these regulations, one of the specific objectives has become redundant and has been removed (see Table 7-4). The remaining objectives have been retained for inclusion into the CZMP.

Table 7-4 Specific objectives addressing Habitat Conservation

Original Objectives	*Change Required*	*Revised Objective*
Establish and protect valuable and endangered species habitat areas.	*Retained*	*Establish and protect valuable and endangered species habitat areas.*
Preserve the abundance and diversity of estuarine flora and fauna.	*Retained*	*Preserve the abundance and diversity of estuarine flora and fauna.*
Define more clearly factors affecting areas of high ecological value such as seagrass beds, salt marshes, wetlands, foreshore/riparian areas and dunes, and to map endangered species habitat areas.	*Retained*	*Define more clearly factors affecting areas of high ecological value such as seagrass beds, salt marshes, wetlands, foreshore/riparian areas and dunes, and to map endangered species habitat areas.*
Protect fringing riparian vegetation from damage.	*Retained*	*Protect fringing riparian vegetation from damage.*
Maintain the productivity of the system for fishing and tourism.	*No longer relevant*	*N/A*
Maintain and extend the existing foreshore reserve areas.	*Retained*	*Maintain and extend the existing foreshore reserve areas.*

7.2.5 Waterway Access and User Conflict Objectives

Increasing visitor numbers and associated waterway use, as identified from the community feedback (section 6.1.15) indicate a need for ongoing maintenance and improvements to the facilities surrounding the Lake. Furthermore the PSGLMP Zoning Plan, which provides various levels of protection for habitat and species, also allows for multiple uses within the Lake. A variety of these uses/activities now require permits from the Marine Parks Authority. The changing nature of the Lake uses and access is addressed through the revised specific objectives which aim to maintain and improve access and use of the Lake, for the community and visitors alike (Table 7-5).

Table 7-5 Specific objectives addressing waterway access and user conflict

Original Objective	*Change Required*	*Revised Objective*
Improve waterway access for all Lake users without adversely impacting on significant habitat areas, or use and enjoyment of the area by others.	*Modify*	*Improve waterway access for all Lake users without adversely impacting on significant habitat areas, or social demands.*
Manage waterway use to minimise impacts on other users and significant habitat areas.	*Retained*	*Manage waterway use to minimise impacts on other users and significant habitat areas.*
Ensure the fish catch does not exceed the sustainable production capacity of the Lake.	*No longer relevant*	*N/A*
Find a balance between recreational and commercial fishing requirements.	*No longer relevant*	*N/A*
Preserve the very high visual quality of the waterways and surrounding foreshores.	*Retained*	*Preserve the very high visual quality of the waterways and surrounding foreshores.*
Preserve Aboriginal and non-Aboriginal heritage sites.	*Retained*	*Preserve Aboriginal and non-Aboriginal heritage sites.*
	New	*Provide public facilities at appropriate locations around the Lake to allow for the sustainable recreation by tourists and residents.*
	New	*Incorporate traditional methods, knowledge and personnel from the Aboriginal Community to assist in future management of the Lake.*

7.2.6 Climate Change

The climate of the earth has been continually changing over time; but the rate of change that has been recorded in the last century and is projected for the future, is much faster than previously seen. The direct impact of the climate upon the social, economic and environmental aspects of the Lake environment; indicate that immediate incorporation of projected climate change characteristics (section 5.7) into the future management of the Lake is imperative.

Table 7-6 Specific objective addressing climate change

Original Objective	*Change Required*	*Revised Objective*
	New	*Ensure that Climate Change is considered when making long term decisions regarding Smiths Lake and its catchment (e.g. Opening procedure, land development and land use changes, construction of roads, stormwater treatment measures and other infrastructure).*

8 REVIEW OF MANAGEMENT ACTIONS

The review of the existing actions and the production of a new set of actions were undertaken in a manner as described below.

8.1.1 Retain, modify and remove actions

The existing actions, which can be found in the original EMP (Tables 1 to 5, WMA 2001) were reviewed in the stakeholder workshop, and identified as either to be retained, modified or removed. Comments were collated with regards to the success or failure of the actions and possible ways of improving the implementation (if unsuccessful). Typically the actions that required retention were those that were ongoing actions. The actions that required modification were typically those actions that required re-wording with little other amendments, while the actions to be removed were typically those that were either unachievable or 100% completed. The original actions within the EMP and their existing status are outlined in 'Report Card' format Table 8-1 to Table 8-5.

8.1.2 Develop New Actions

The complete lists of new and modified actions are presented in the new Smiths Lake Coastal Zone Management Plan (Part B) of this report.

Table 8-1 Report Card for Opening Procedure Actions

Ref.	Action	Status	Comments	Change Required
OP1	Formalise Entrance Opening Strategy	Completed ☑	The entrance opening strategy now requires further review due to the recent inclusion of Smiths Lake within the Port Stephens – Great Lakes Marine Park. As a consequence any activity undertaken within the park (artificial entrance opening) needs to comply with the *Marine Parks Act 1997*. Further updates may also be required from other relevant reports including predicted impacts from climate change e.g. sea level rise.	Modify
OP2	Establish interim minimum development flood level of 2.5 m AHD	Not started ☒	The delay in establishing the development flood levels has been due to the required completion of the flood study. The study has since been completed.	Modify
OP3	Implement a new entrance opening method with breakout channel opening near centre of entrance area during neap tides	Completed ☑	The entrance opening method has been outlined and followed. The method will require ongoing review.	Modify
OP4	Undertake flood study and floodplain management study of the ecological and human consequences of raising the opening level	Started ☑	The Flood Study has been completed and the Floodplain Risk Management Plan is currently underway. These studies also need to incorporate Sea Level Rise and any other relevant climate change projections.	Modify
OP5	Undertake a complete review of the entrance opening procedure after about five (5) years	Ongoing ☑	The review process is an ongoing action that has been undertaken and will continue to be undertaken after each opening event. The flood study has been completed and floodplain management study needs to be completed.	Retain
OP6	Detailed monitoring and recording of entrance conditions and opening impacts.	Ongoing ☑	This is currently conducted following each opening event.	Modify

Table 8-2 Report Card for Erosion and Sedimentation Actions

Ref.	Actions	Status	Comments	*Change Required*
ES1	Prepare development control plan based on slope stability zones to reduce runoff/erosion risk.	Not started ☒	Unable to implement this action due to new legislation e.g. pole homes don't comply with bushfire regulations.	Remove
ES2	Increase sediment management development controls on building/construction works and urban/rural land clearing, and enforce PoEO Act.	Not started ☒	This action relies on the ability of Council regulatory officers to investigate and where necessary issue fines for non compliant building sites. At this stage Council does not have the resources to allocate staff to this issue. In addition this should be regulated through the BASIX program introduced for new building which includes provisions for rain tanks etc.	Modify
ES3	Implement access controls for 4WD vehicles around foreshores and dunes	Completed ☑	The access controls were effective in stopping cars going north. MCC has suggested that not a lot of people appear to be driving around the Lake. The access to Sandbar has been fixed with a bollard to restrict 4WD access. The north part of the Lake foreshore is not really accessible, and Council is unsure if there are issues of access on the eastern shoreline. Signs have been delivered and are scheduled to be installed soon.	Retain
ES4	Implement design guidelines to reduce sediment erosion during road and infrastructure construction and maintenance.	Ongoing ☑	Have trained staff and prepared standards for maintenance of roads across LGA.	Modify
ES5	Undertake works to avoid flow concentrations and restore gully erosion caused by roads in Smiths Lake Village and the Lakes Way	Ongoing ☑	The Patsy Flat road works were completed. The maintenance program requires review.	Modify

Ref.	Actions	Status	Comments	*Change Required*
ES6	Construct and maintain sediment control structures (sediment traps and ponds) on main drainage paths.	Started ☑	Nicolas ski jumps were installed at a number of locations These devices primarily capture litter; their effectiveness in controlling sediment runoff to the Lake is considered to be low.	Modify
ES7	Undertake dune stabilisation works.	Completed ☑	Continued maintenance is required.	Modify
ES8	Undertake education program for property owners aimed at limiting land use activities which cause soil loss and erosion.	Ongoing ☑	This is an ongoing action that is to be implemented over the long term	Retain
ES9	Inspect construction sites for compliance with sediment management development controls.	Ongoing ☑	This process relies on members to report issues of compliance.	Retain
ES10	Survey catchment and island for erosion.	Not started ☒	This has not been achieved, and clarification is required on reasoning behind surveys.	Modify
ES11	Monitor 4WD vehicles for compliance with controls.	Ongoing ☑	No infringements have been recorded. Community feedback corroborates this and suggests that enforcement is required.	Modify

Table 8-3 Report Card for Water Quality Actions

Ref.	Actions	Status	Comments	*Change Required*
WQ1	Prepare Storm Water Management Plan for catchment.	Not started ☒	No funding has been sourced.	Modify
WQ2	Require strict control of catchment runoff water quality for all development to ANZECC Guidelines and to meet local standards, specifically at Symes Bay.	Ongoing ☑	The wording requires updating to recognise the new Water Quality Improvement Plan (2009)	Modify
WQ3	Prepare DCP which requires ASS testing and implementation of leachate control measures for development in identified ASS areas.	Started ☑	The DCP is at the draft stage and requires testing before completion	Modify
WQ4	Advertise emergency Response Procedures for hazardous materials.	Not started ☒	Trucks are now diverted to the freeway, so this is no longer an issue.	Remove
WQ5	Introduce heavy rate penalties for not connecting to sewerage system.	Completed ☑	No longer required.	Remove
WQ6	Repair and maintain all on-site sewage management systems.	Ongoing ☑	Onsite sewage management systems are now incorporated into management plans	Retain

Ref.	Actions	Status	Comments	*Change Required*
WQ7	Locate and treat existing sources of acid leachate.	Not started ☒	Not believed to be an issue.	Remove
WQ8	Maintain and upgrade sewerage system.	Ongoing ☑	New information needs to be incorporated e.g. sea level rise	Retain
WQ9	Undertake education program to encourage connection to sewerage system.	Not started ☒	No longer needed	Remove
WQ10	Monitor range of water quality indicators from around Lake and creeks on a monthly basis.	Started ☑	Greater detail is required on relevant aims and indicators.	Modify
WQ11	Undertake annual surveys of on-site treatment systems.	Ongoing ☑	Refine the type of surveys to high risk systems only (~100m to Lake edge) and integrate a high inspection frequency of approximately 1-2yrs.	Modify

Table 8-4 Report Card on Habitat Conservation Actions

Code	Actions	Status	Comments	*Change Required*
HC1	Introduce Waterway Zoning to provide enhanced protection to valuable habitat areas.	Completed ☑	Successfully completed and included in the Smiths Lake Boating Plan of Management in 2005	Modify
HC2	Extend foreshore protection zoning to increase habitat protection around Lake.	Not Started ☒	Requires possible changes to the land zoning and needs to be investigated further with regards to suitability and relevance.	Modify
HC3	Establish planning controls to provide 20 m natural buffer zones along major drainage pathways.	Not Started ☒	Not completed, and needs to be updated with recent information on adequate buffers.	Modify
HC4	Enlarge existing foreshore area where possible and appropriate.	Ongoing ☑	Continuing to achieve this action when opportunities arise.	Modify
HC5	Restrict access to specific areas containing the endangered plant Coastal Spurge.	Started ☑	Dune area has been fenced, wind fencing has also installed on sand dunes	Modify
HC6	Restrict power boating access to seagrass bed areas during low Lake levels.	Not Started ☒	Difficult to achieve and will be investigated	Modify

Code	Actions	Status	Comments	*Change Required*
HC7	Undertake rabbit and weed control in degraded entrance areas.	Ongoing ☑	In progress	Retain
HC8	Develop and implement public awareness program on ecological values and important habitat.	Ongoing ☑	In progress	Modify
HC9	Map sensitive habitat areas such as seagrass beds and wetlands.	Not started ☒	The dynamic nature of the seagrass beds means that changes may be due to a range of factors. Assessment needs to occur in conjunction with the mapping.	Retain

Table 8-5 Report Card for Waterway Access and User Conflict Actions

Code	Actions	Status	Comments	*Changes Required*
WA1	Prepare Fishery Management Plan to control fishing activities and ensure sustainable use.	Not Started ☒	No longer relevant due to marine park. Also different plans are currently in place i.e. State-wide Fishery Management Plan.	Modify
WA2	Develop and implement visual management system for the area (Shire).	Not Started ☒	Action not clear and will be integrated into other actions in revised plan.	Remove
WA3	Locate Aboriginal Heritage sites and monitor development and user activities to prevent damage.	Not Started ☒	The knowledge is available and contact is required with the Aboriginal Community. MPA is also currently undertaking cultural mapping of the area, which should include Aboriginal heritage sites. In future, also include liaison with Aboriginal Community pre-development.	Modify
WA4	Erect signs on foreshore areas controlling dog and horse access and faecal material.	Ongoing ☑	No dog sign near Frothy Coffee at walking track, but there is a dog control sign on the ocean foreshore. Some associated issues with human defecation near Bald Head.	Modify
WA5	Improve boat launching and parking facilities at Brambles Reserve (with pontoon and amenities block).	Completed ☑	Investigate further options which may include a floating pontoon. Park facilities and amenities block have been completed.	Modify
WA6	Develop/improve zone from Tarbuck Bay to Frothy Coffee or Symes Bay and provide water access opportunities (parking, picnic facilities) at appropriate locations.	Started ☑	There was a feasibility study on formalising walking areas around Lake and included rubbish bins and lighting. But there is no money for implementing the findings.	Remove

Code	Actions	Status	Comments	*Changes Required*
WA7	Improve parking and picnic facilities at Tarbuck Bay	Completed ☑	Successful	Remove
WA8	Monitor recreational fish catch and compliance to regulations.	Ongoing ☑	Compliance achieved. Hard to monitor recreational catch. The Lake now falls under the Marine Park guidelines.	Remove

PART B - THE COASTAL ZONE MANAGEMENT PLAN FOR SMITHS LAKE ESTUARY

9 PLAN INTRODUCTION

The Coastal Zone Management Plan for Smiths Lake Estuary (CZMP) has been prepared on behalf of MidCoast Council (formerly Great Lakes Council) and the Office of Environment and Heritage (formerly known as the Department of Environment, Climate Change and Water). The preparation has been overseen by MidCoast Council and a subset of the Wallis and Smiths Lake Estuary Management Committee, which contains representatives from various state government authorities and members of the community.

The CZMP represents an update and revision to the former Smiths Lake Estuary Management Plan (EMP) (2001). Under the State Government's Estuary Management Program (refer Section 2.1), Estuary Management Plans should be reviewed and updated on a regular basis to ensure that they remain relevant to the issues facing the estuary, and relevant to the planning framework in which the document resides.

As part of the planning changes, the new Coastal Zone Management Plan for Smiths Lake Estuary can be submitted to the Minister for Environment for approval, in accordance with Part 4A of the Coastal Protection Act, 1979. This is an optional process, at this stage.

Within this CZMP, reference is made to the original Smiths Lake EMP for relevant background information and further details on particular aspects of the Lake and its physical and socio-economic environment. As such this CZMP should be read only as a supplement to the original EMP (WMA 2001).

9.1 Purpose of the Plan

The primary purpose of this plan is to guide future Council actions. Any actions, including project funding, noted in this plan for completion by or contribution from the NSW Government, its Departments or Agencies should be considered as requests for funding or action. The NSW Government will consider these requests when determining its state-wide priorities relating to coastal zone management. If any such actions are not completed in accordance with the plan, this is not to be considered a breach of Section 55L of the *Coastal Protection Act 1979*.

Ministerial approval of this plan for gazettal under Section 55G of the Act is to be considered to be a Ministerial statement that the plan is consistent with the requirements of the Act and suitable for gazettal. Ministerial approval does not necessarily represent endorsement of the contents of the plan.

Actions in this plan may require approval under the *Environmental Planning and Assessment Act 1979* and other legislation and should be considered as intended actions subject to these approvals. In the event of any inconsistency between a statutory instrument or development consent issued under the EP&A Act and this plan, the statutory instrument or development consent applies to the extent of the inconsistency.

The CZMP provides strategic direction and specific focus for the short and long term sustainable management of the Smiths Lake Estuary, its tributaries, it's surrounding foreshore lands, and its catchment insofar as catchment activities impact on the condition of the Lake. The Plan has particular focus on maintaining or improving the environmental qualities and attributes of Smiths Lake Estuary.

The Plan is designed as a 'user manual' for undertaking activities and implementing strategies that will result in improved environmental conditions and balancing both human and ecological demands on the Lake.

Implementation tables are contained in this Plan, to provide a powerful management tool that will assist Council's planners and environmental and infrastructure officers to determine where and how to undertake activities and implement the strategies contained in this plan.

The Plan shall be used to inform other strategic documents that aim to manage and rationalise human activities and development within the catchment, such as Regional Strategies, Urban Structure Plans, Development Control Plans (DCPs) and the proposed review of the Great Lakes Local Environmental Plan (LEP).

The Plan aims to fulfil Council's requirement for applying the principles of Ecologically Sustainable Development (ESD) to Smiths Lake and its catchment. The Plan also provides an opportunity for future climate change to be considered in the strategic management and planning of the Lake and surrounding sensitive coastal lands.

10 INTERACTIONS WITH EXISTING MANAGEMENT PLANS AND LEGISLATION

Smiths Lake and its catchment are subject to numerous environmental planning and management instruments and legislation. The current environmental planning and strategic management frameworks relevant to Smiths Lake that have been introduced since the original EMP are summarised below. For details of relevant plans and legislation, prior to 2001, please refer to section 3 of the original EMP.

There are three main types of statutory environment planning instruments (EPIs): Local Environmental Plans (LEPs), Regional Environmental Plans (REPs) and State Environmental Planning Policies (SEPPs). Non statutory EPIs include Development Control Plans (DCPs) and Estuary Management Plans.

10.1 Local and Regional Management Plans

At the local and regional scale there a number of environmental management plans that incorporate Smiths Lake and the surrounding catchment. A description of relevant documents is listed below.

10.1.1 Great Lakes Local Environmental Plan (LEP) 1996

The LEP was produced prior to the original EMP, but is documented here for background information only. The LEP identifies a range of land zones that control the type of land use that can occur at specific locations around Smiths Lake (refer Figure 10-1). As can be seen from this figure, the southern side of Smiths Lake is protected through various environmental zonings, while the northern side contains rural and village (urban) zonings. A large section of future urban investigation land is located north of Symes Bay, east of the Lakes Way. Council is required to review their LEP to accord with State Government's LEP Standardized Instrumentation. This review is scheduled for the next year.

10.1.2 Myall Lakes National Park Plan of Management 2002

The *National Parks and Wildlife Act 1974* requires that a plan of management (POM) be prepared by the NSW National Parks and Wildlife Service (NPWS) for each national park and nature reserve. A POM is a legal document that outlines how a national park or nature reserve will be managed in the years ahead.

Myall Lakes National Park is over 44,000 ha in size and is located to the immediate south of Smiths Lake. The dominant feature of the park is the Myall Lakes system, which comprises 10,000 ha of waterways including the Bombah Broadwater, Boolambayte Lake and Myall Lake.

The management plan aims to protect and conserve natural and cultural heritage, as well as encouraging visitor use and providing management operations. The National Park PoM management plan contains a variety of actions that are consistent with the objectives of the CZMP, and should be investigated for co-funding opportunities.

Title:

Zoning Map for Smiths Lake

Figure: **10-1**

Rev: **A**

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

N

0 0.75 1.5km

Approx. Scale

BMT WBM

www.wbmpl.com.au

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10.1.3 Smiths Lake Boating Plan of Management 2005

The Smiths Lake Boating Plan of Management (BPoM) was completed in early 2005. The BPoM is implemented through:

- educating the community about practices which can minimise boating impacts; and
- increased compliance powers under the Protection of the Environment Operations Act 1997

The BPoM is a five year plan and is due for review in 2011.

In accordance with the *Ports Corporatisation and Waterways Management Act 1995*, NSW Maritime has jurisdiction over navigable waters. This act defines navigable waters as "all waters that are from time to time capable of navigation and are open to or used by the public for navigation".

10.1.4 Port Stephens – Great Lakes Marine Park Management Plan 2005

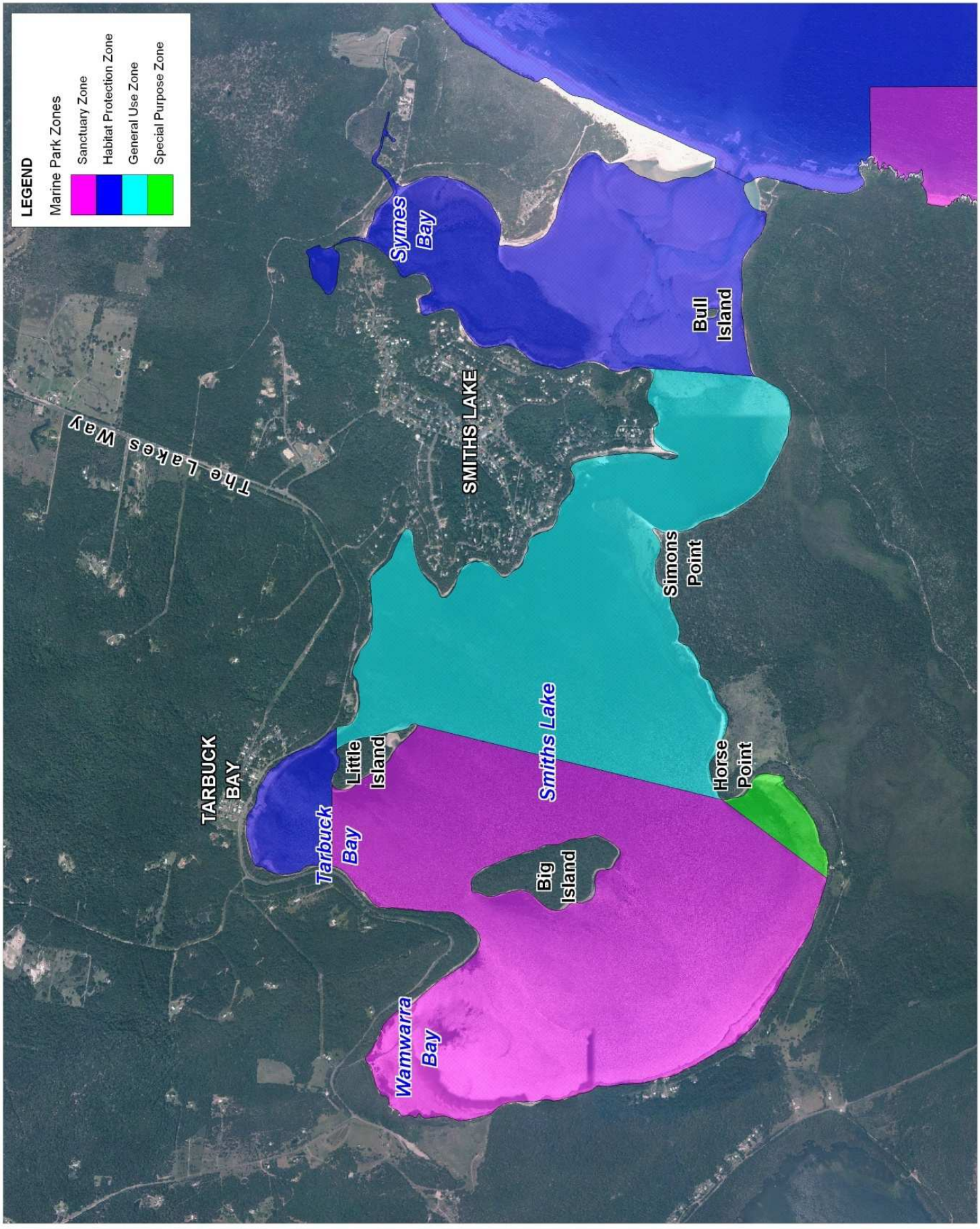
The Port Stephens–Great Lakes Marine Park (PSGLMP) was declared on the 1st December 2005 under the *Marine Parks Act 1997*. The marine park covers an area of approximately 98,000 hectares and includes the estuarine waters of Smiths Lake and all of its tributaries and creeks to the limit of tidal influence (MPA 2007). The plan includes the following zones within Smiths Lake (Figure 10-2):

- ***Sanctuary Zone.*** Provide the highest level of protection for habitats, animals and plants, ecological processes, natural features and areas of cultural significance. Many recreational activities can still be conducted in sanctuary zones however no commercial fishing is permitted and the speed restriction is 4 knots. This zone includes the western basin.

- ***Habitat Protection Zone***: This zone protects the habitat and reduces high impact activities. A range of activities that are of social, commercial or economic importance to the area may continue. This zone includes the entrance of the Lake.

- ***Special Purpose Zone***. This zone provides for the specific management of aquaculture, fish feeding, marinas and other vessel related facilities, commercial and residential facilities, fisheries and aquaculture research. This zone includes a small area within the Lake located near the UNSW Research Station.

- ***General Use Zone***: This zone provides for a wide range of environmentally sustainable activities including both commercial and recreational fishing. This zone includes the middle basin of the Lake.



Title:

Marine Park Zones in Smiths Lake

Figure: **10-2**

Rev: **A**

0 0.75 1.5km

Approx. Scale

BMT WBM
www.wbmpl.com.au

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10.1.5 Hunter-Central Rivers Catchment Action Plan 2007

The Hunter-Central Rivers Catchment Action Plan (CAP) is a guide to protecting and improving our region's natural resources over the next 10 years. The CAP for the HCRCMA region applies to the area from Taree in the north to Gosford and the coastal waterways of the Central Coast in the south, and from the Merriwa Plateau and Great Dividing Range in the west to the Tasman Sea in the east. It builds on the work of the Catchment Blueprints for the Central Coast, Hunter and Lower North Coast, which were endorsed by the NSW Government in February 2003 and have guided natural resource management in these areas since that time (HCRMA, 2007).

Part three of the CAP outlines the guiding principles of the CMA. These guiding principles provide direction for all natural resource managers to achieve ESD and ensure that the whole community (including government) can work towards the same goal. Each set of guiding principles provides an overview of the relevant issues and systematically numbered statements that guide land managers. The CAP also outlines how and how much natural resource management will be funded through the HCRCMA.

10.1.6 Water Quality Improvement Plan 2009

The Great Lakes Water Quality Improvement Plan: Wallis, Smiths and Myall Lakes (the WQIP), was prepared by Great Lakes Council (2009) under the Australian Government's Coastal Catchments Initiative, with the aims of:

- Identifying specific levels of nutrients and sediments required to be conducive to a healthy Lake ecology and environmental values desired by the community;
- Identifying ways to manage activities to reduce key pollutant loads entering the Lakes; and
- Review pollution control (including faecal coliform) management systems as they pertain to the management and protection of the Lakes.

The WQIP was prepared for use by practitioners and catchment / estuary management groups. Of relevance to the Smiths Lake EMP review are the Smiths Lake research results, ecological targets and catchment management actions.

Algae concentration (abundance of chlorophyll-a), water clarity (turbidity, secchi depth) and the extent of seagrass were used as the primary indicators of estuarine condition. Chlorophyll-a and water clarity are considered indicators of catchment disturbance as they may result in algal blooms, potential loss of seagrass, reduced fish abundance and loss of biodiversity. Conservation values were based on chlorophyll-a concentration, and three levels of value were established: high conservation value moderately disturbed and heavily impacted.

Smiths Lake was identified as having high conservation value. The ecological condition target is thus to maintain this high conservation value, and to improve current conditions where possible, to buffer against the potential impact of future pollutant loads of Lake use activities. Implementing proposed management actions from the WQIP is estimated to change chlorophyll-a concentrations in the Lake by 3.6%, achieving a target of no decline in ecological condition.

The actions outlined within the WQIP focus on the following two areas:

- Remediation of existing areas of high pollutant loads, and thus provide reductions in catchment loads and estuary conditions; and
- Protection of areas of high conservation status that are currently providing substantial water quality benefits to the rivers and Lake systems.

Remediation actions may include:

- Sustainable grazing programs focussed on achieving groundcover management actions;
- Sealing of unpaved roads in priority areas such as creek crossings; and
- Retrofitting existing urban areas through implementation of Water Sensitive Urban Design (WSUD) devices, including the potential for adopting a Development Control Plan (DCP) that specifies Best Practice for WSUD.

Protection actions may include:

- Water sensitive development of greenfield sites, including the establishment and implementation of LEP/DCP provisions on greenfield development sites;
- Best management of unpaved roads;
- Improved pollution control systems / management systems;
- Water sensitive redevelopment; and
- Improved management of Lake use activities e.g. boating and seagrass protection, review of stormwater management.

One of the objectives within the WQIP is to encourage and support the uptake of management practices that maximise water quality improvements at the farm scale, as well as supporting the coordination and implementation of these activities. An action within this objective is to scope the possibility of rewarding landholders for Property Vegetation Plans and other conservation covenants.

A range of actions appropriate to Smiths Lake were modelled, from which it was demonstrated that implementing fully the protection actions and expanded remediation actions in the WQIP would reduce catchment loads by the desired level.

The modelling indicated that implementing WSUD devices enabled reductions in TN and TP of around ~7%, while remediating unpaved roads allowed for a ~65% reduction in TSS loads.

10.2 Parliamentary Acts

10.2.1 River and Foreshores Improvement Act, 1948

Part 3A of the Rivers and Foreshores Improvement (RFI) Act 1948 provides for the protection of rivers, lakes and other waterbodies within the State. A permit is required for excavation or removal of material within a waterway / watercourse or within 40 metres of a waterway (measured from the top of bank), unless the works are being carried out by a public or local authority.

Permits are issued by the Department of Environment, Climate Change and Water (OEH). Works assessed under the EP&A Act 1979 that require a permit under the RFI Act are deemed integrated

development. OEH can revoke or modify a permit, or can direct remediation works if it is considered that the conditions of the permit have been breached.

10.2.2 NSW National Parks and Wildlife Act 1974

The National Parks and Wildlife Service (NPWS) is responsible for the administration of national parks and other lands under the *National Parks and Wildlife Act 1974*. The objectives of the Act are outlined as follows:

- Conservation of habitats and ecosystems, biological diversity in the community, landforms of significance, and landscapes and natural features of significance; and
- Conservation of the objects, places or features of cultural values within the landscape, which would include Aboriginal and European heritage and places of historic, architectural or scientific significances.

Of relevance to the Act, lands along the southern shore of Smiths Lake form part of Myall Lakes National Park.

10.2.3 Coastal Protection Act 1979

The *Coastal Protection Act 1979* was amended in 1998 and extended the coastal zone to include estuaries, coastal Lakes and lagoons, islands and rivers in recognition of the strong connection between estuaries and the open coast; as such the Act is relevant to Smiths Lake. The coastal zone is delineated on maps approved by the Minister for the Environment.

The *Coastal Protection Act 1979* provides general supervision of the use, occupation and development of the coastal zone. This includes a requirement for public authorities to gain agreement from the Minister (responsible for the Act) before any development is carried out or consent is given for the use, occupation or development of the coastal zone. It also provides for general supervision of development within the coastal zone that is not otherwise subject to the provisions of an environmental planning instrument (other than a State Environmental Planning Policy).

The Act requires that the Minister promotes ecologically sustainable development. The Minister may reject development or use of occupation of the coastal zone, that is inconsistent with the principles of ecologically sustainable development, or that may adversely affect the behaviour or be adversely affected by the behaviour of the sea or an arm of the sea or any bay, inlet, lagoon, Lake, body of water, river, stream or watercourse.

In 2002, further amendments were made to the *Coastal Protection Act 1979* that requires Coastal Zone Management Plans to be prepared for parts of the NSW coastal zone. Under provisions of the Act, Coastal Zone Management Plans are required to be approved by the Minister prior to being gazetted by Councils. In order to comply with the provisions of the Act, Coastal Zone Management Plans need to address the following matters before they would be approved by the Minister:

a. protecting and preserving beach environments and beach amenity, and

b. emergency actions of the kind that may be carried out under the *State Emergency and Rescue Management Act 1989*, or otherwise, during periods of beach erosion, including the carrying out of related works, such as works for the protection of property affected or likely to be affected by

beach erosion, where beach erosion occurs through storm activity or an extreme or irregular event, and

c. ensuring continuing and undiminished public access to beaches, headlands and waterways, particularly where public access is threatened or affected by accretion.

Once published in the Government Gazette, a Coastal Zone Management Plan becomes a statutory instrument under NSW legislation. In accordance with Section 55L of the *Coastal Protection Act, 1979*, a breach of (eg failure to comply with) the Plan may result in the Minister or a council bringing proceedings in the Land and Environment Court to remedy or restrain the breach.

The *Coastal Protection Act 1979* is currently under further review, and therefore any additional future requirements of the Act are not known. It is recommended that Council endorse the plan as a non-statutory document in the short term, and reconsider the gazettal process, in consultation with the stakeholders responsible for implementation, once the Act has been reviewed and finalised.

10.2.4 Crown Lands Act 1989, Aboriginal Land Rights Act 1983 and Native Title Act 1993

The *Crown Land Management Act 2016* provides for the administration and management of Crown land, which includes most beaches, coastal reserves, nearshore waters and estuaries, including some sections of Smiths Lake, including the entrance. The *Crown Land Management Act 2016* commenced in July 2018, replacing the *Crown Lands Act 1989*, and this will have implications that will need to be considered when the CZMP actions are implemented.

Department of Industry – Lands & Water (Crown Lands Division) is an extensive landholder within the Smiths Lake Catchment and has worked closely with MidCoast Council (formerly Great Lakes Council), who manage a large proportion of these lands on behalf of the organisation. Key areas of Crown Land are currently under the management of a Council Reserve Trust. The bed and banks of water bodies below MHWM, specific foreshore locations and assets at the entrance of Smiths Lake are administered and managed by DoI - Crown Lands.

Land management status should be confirmed prior to works commencing. Where works or actions are proposed or to be implemented on Crown Land, not under Council Trust management, an appropriate authorisation from DoI Lands & Water (Crown Lands Division) will be required under the *Crown Land Management Act 2016*. This may be provided by way of licence or potentially the appointment of Council as the reserve manager.

Formerly, MidCoast Council prepared plans of management under the *Crown Lands Act 1989* for Crown Lands under Council's care and control. Under the new *Crown Land Management Act 2016*, MidCoast Council will be required to prepare plans of management under the *Local Government Act 1993*.

Where actions are proposed on Crown Land, consideration of Aboriginal Land Claims lodged under the Aboriginal Land Rights Act 1983 (NSW) will need to be undertaken. Any works will need to be compliant with the Native Title Act 1993 (Cth).

Note that adequate lead time (at least six months) is required for DoI-Crown Lands to assess and issue authorisation (licence) works on Crown land.

10.2.5 NSW Fisheries Management Act 1994

The aim of the *Fisheries Management Act 1994* is to conserve, develop and share the fisheries resources for State benefit of present and future generations. The Act specifically applies to the protection of freshwater and saltwater fish and invertebrates, and saltwater plants. As such, a permit from the Department of Primary Industries (DPI) is required to damage or destroy marine vegetation such as mangroves, seagrass and saltmarsh.

Section 200 of the Act indicates that dredging can be carried out by a Local Government authority (i.e. Council) without the authority of a permit issued by the Minister of DPI (Fisheries) providing that the works are authorised by the *Crown Lands Act 1989*, or the works have been authorised by another relevant public authority (other than local government authority). It is a condition of the Act, however, that in issuing a licence for the works, other authorities must consult with DPI (Fisheries) regarding the proposal.

10.2.6 Fisheries Management Amendment Act 2009

The purpose of the *Fisheries Management Amendment Act 2009* is to recognise the spiritual, social and customary significance to Aboriginal persons of fisheries resources and to protect and promote Aboriginal cultural fishing. Special provision for Aboriginal cultural fishing have been provided whereby the fishing activities and practices are carried out by Aboriginal persons for the purpose of satisfying their personal, domestic or communal needs or for educational, ceremonial or other traditional purposes, and which do not have a commercial purpose.

The Minister may issue a fishing permit to a person for Aboriginal cultural fishing purposes, as long as the purposes are not inconsistent with native title rights and interests or an indigenous land use agreement within the meaning of the Native Title Act 1993.

10.2.7 NSW Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* is responsible for conservation of biological diversity, prevention of extinction of native flora and fauna, and promotion of sustainable development. The conservation status of particular Threatened species under the Act may be Endangered or Vulnerable, and particular vegetation types are listed as EECs.

As described (in the Ecological Values section) above, a number of Threatened species are known to inhabit Smiths Lake and the immediately adjacent habitats, including 19 fauna species and possibly one flora species. Furthermore, patches of two types of Endangered Ecological Community fringe the lake.

Unless a licence has been obtained under the *National Parks and Wildlife Act 1974* or the *Threatened Species Conservation Act 1995*, or approval under the EPA Act, it is an offence to harm any animal or plant that is a threatened species, population or ecological community.

10.2.8 NSW Marine Parks Act 1997

At the time of development of the original estuary management plan, Smiths Lake was not part of a designated marine park and as such the *Marine Parks Act 1997* was not relevant for the original plan.

The *Marine Parks Act 1997* provides for the creation of marine parks. Once a marine park or reserve is declared under the Act, the area can only be used for activities that are consistent with the Act. Specifically, the objectives of the Act are described as follows:

- To conserve marine biological diversity and marine habitats by declaring and providing for the management of a comprehensive system of marine parks;
- To maintain ecological processes in marine parks;
- To provide for ecologically sustainable use of fish and marine vegetation in marine parks; and
- To provide opportunities for public appreciation, understanding and enjoyment of marine parks.

Smiths Lake lies within the recently (2005) declared Port Stephens - Great Lakes Marine Park. All three main categories of marine park zones are present within the Lake: the western third of the Lake is afforded the highest level of protection as Sanctuary Zone; the central third of the Lake is General Use Zone; and the eastern third of the Lake, together with Tarbuck Bay, is Habitat Protection Zone. Additionally, a Special Purpose Zone is located south-west of Horse Point.

Under the *Marine Parks (Zoning Plans) Regulation 1999*, the objectives of the particular zones are as follows:

Sanctuary Zone

- To provide the highest level of protection for biodiversity, habitat, ecological processes, natural features and cultural features; and
- Where consistent with above, to provide opportunities for recreational, education, research and other activities that does not harm any species, habitats or features.

Habitat Protection Zone

- To provide a high level of protection for biodiversity, habitat, ecological processes, natural features and cultural features; and
- Where consistent with above, to provide opportunities for recreational, commercial, research, education and other activities that are ecologically sustainable and do no have a significant impact on species or habitats.

General Use Zone

- To provide protection for biodiversity, habitat, ecological processes, natural features and cultural features; and
- Where consistent with above, to provide opportunities for recreational, commercial, research, education and other activities that are ecologically sustainable.

Special Purpose Zone

- To provide for the management of biodiversity, habitat, ecological processes, natural features and cultural features; and
- Where consistent with above, to provide opportunities for recreational, commercial, research, education and other activities that are ecologically sustainable.

Under the provisions outlined in the *Marine Parks Regulations 2009*, consent from the relevant Ministers must be obtained prior to carrying out an activity within a marine park. The following assessment criteria are applied in a decision as to whether or not consent for a particular activity should be granted:

- The objectives of the Act;
- The objectives and permissible activities of the zone in which the activity is proposed;
- Any operational plan for the marine park;
- Any threatened species or other protected flora or fauna;
- The form of transport and equipment to be used;
- Arrangements for rectifying any damage to the marine park that arises from the proposed activity; and
- Other requirements as the relevant Ministers consider appropriate.

10.2.9 Native Vegetation Act 2003

The *Native Vegetation Act 2003* aims to promote the management of native vegetation as well as prevent broad scale clearing unless it improves or maintains environmental outcomes. It states that native vegetation must not be cleared except in accordance with:

- A development consent granted in accordance with this Act, or
- A Property Vegetation Plan.

Land to which this Act does not apply includes:

- SEPP 14 – coastal wetlands
- SEPP 26 – littoral rainforests
- Land reserved under National Parks and Wildlife Act.

10.2.10 Natural Resource Management Act 2003

The *Natural Resource Management Act 2003* is responsible for the creation of the Natural Resources Commission. The objectives of the Act are:

- To establish a sound scientific basis for the informed management of natural resources in regards to the social, economic and environment interests of the State;
- To enable the adoption of State-wide standards and targets for natural resource management issues; and
- To advise in the circumstance where broad-scale clearing is regarded to be an improvement or maintenance of environmental outcomes for the purpose of the *Native Vegetation Act 2003*.

The Natural Resource Commission consists of a full time Commissioner and Assistant Commissioner. The role of the Commission is to provide the government with independent advice on natural resource management, in addition to recommending state-wide targets for natural resource management, approval of catchment action plans, and commenting on the effectiveness of these plans. The commission would also undertake natural resource management assessments, and

would control investigations and inquires into natural resource management issues and research of the issues.

10.2.11 Catchment Management Act 2003

The purpose of the *Catchment Management Act 2003* is to establish catchment management authorities that would carry out certain natural resource management functions in their regions. There are thirteen catchment management authorities in New South Wales. Smiths Lake falls in the Hunter Central Rivers catchment area. The Act repeals the *Catchment Management Act 1989* and amends various other Acts.

The objectives of the Act are:

- To provide natural resource planning on a catchment level;
- To ensure that the decisions about natural resources take into account appropriate catchment issues;
- To ensure that catchment level decisions take into account state standards and involve the Natural Resource Commission in catchment planning;
- To make use of the communities' knowledge and expertise and to involved them in decision making;
- To ensure proper management of natural resources from the social, economic and environmental issues; and
- To provide financial assistance and incentives to landholders in connection with natural resource management.

Under the Act each catchment authority is required to prepare a Catchment Action Plan (CAP) as soon as possible after the commencement of this Act and submit it for approval by the Minister.

10.2.12 Commonwealth Environmental Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides for the protection of matters of national environmental significance, including:

- World Heritage Properties;
- National Heritage Places;
- Wetlands of International Importance;
- Listed Threatened Species and Ecological Communities;
- Listed Migratory Species; and
- Commonwealth Marine Areas.

Of relevance here, the Myall Lakes Ramsar site borders Smiths Lake, and two nationally Threatened fauna species are known to inhabit the lake and its immediate surrounds.

If an activity has the potential to impact on one or more matters of national environmental significance, an assessment process in accordance with the EPBC Act and Guidelines (DEWHA 2009) is required. If the assessment concludes that a significant impact is likely, then the activity will be deemed a controlled action and approval for the activity is required from the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) via a detailed referral process, including public exhibition.

10.3 State Policies

The state policies of direct relevance to the management of Smiths Lake have been included here, building on the information provided previously in the original EMP.

10.3.1 NSW Estuary Management Policy 1992

The NSW Estuary Management Policy is one of a suite of policies under the umbrella NSW State Rivers and Estuaries Policy. The Estuary Management Policy was developed in response to the State Government's recognition of the social and economic importance of estuaries. The specified general goal of the policy is "to achieve an integrated balance responsible and ecologically sustainable use of the State estuaries which form a key component of coastal catchments".

Specific objectives can be summarised as:

- Protection of estuarine habitats and eco-systems in the long term;
- Preparation and implementation of a balanced long term management plan for the sustainable use of each estuary and its catchment;
- Conservation of habitats;
- Conservation of aesthetic values;
- Prevention of further estuary degradation;
- Repair of damage to the estuarine environment; and
- Sustainable use of estuarine resources.

The Estuary Management Policy is implemented through the State's Estuary Management Program. This Coastal Zone Management Plan for Smiths Lake Estuary has been prepared in accordance with the program to help meet the objectives of the Estuary Management Policy, and the Coastal Policy, which is described below.

10.3.2 NSW Coastal Policy 1997

The aim of the New South Wales Coastal Policy 1997 is to promote the ecologically sustainable development of the New South Wales coastline. To achieve this, the policy sets out various goals, objective and actions.

This policy applies to areas the fall into the coastal zone. The coastal zone is defined by the area that extends to:

- Three nautical miles seaward of the mainland and offshore islands;
- One kilometre inland of the 'open coast' High Water Mark;

- One kilometre around all the bays, estuaries, coastal Lakes, lagoons and island; and
- In relation to tidal rivers, one kilometre around the tidal waters of the river to the limit of mangroves or the tidal limits (whichever is closer to the sea).

Based on the above definitions, Smiths Lake and its foreshores will fall within the defined coastal zone; and therefore the Coastal Policy has been considered in the preparation of the Coastal Zone Management Plan for Smiths Lake Estuary.

The relevance of the Policy to future development is that the council is required to implement the policy when making local environment plans applying to land within the coastal zone and to take the provisions of the policy into consideration when determining development applications in the coastal zone.

As the NSW Coastal Policy 1997 applies to Smiths Lake, Council is required to reflect the principles of ecologically sustainable development in planning and management decisions. Also, Council is committed to the principles of ecologically sustainable development through the *Local Government Act 1993* (amended 1997), which are embodied within Council's Environmental Policy 2002.

The Coastal Zone Management Plan for Smiths Lake Estuary outlines a series of actions that are fundamentally aligned with the ESD principles. Therefore, the Plan provides a framework for implementing these principles as they apply to the estuaries, and their associated catchments.

The Coastal Policy has nine goals, each underpinned by objectives that are to be achieved by strategic actions. Responsibilities for these actions have been assigned to appropriate agencies, councils and other bodies. OEH is wholly or partly responsible for nearly half of the strategic actions in the Coastal Policy, with many of these involving a partnership with local councils.

The nine goals of the NSW Coastal Policy 1997 are:

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

10.3.3 SEPP (Infrastructure) 2007

The State Environmental Planning Policy (SEPP) (Infrastructure) 2007 combines a large number of planning policies. Some of the features of the SEPP, relevant to the management of Smiths Lake, include:

- Identification of classes of public infrastructure development which can be approved in certain zones, by the proponents of the development, without going through assessment by Council; and
- Exemption of minor development by local or State government authorities from needing approval, if it falls within set guidelines and the assignment of new land uses to nominated lands (predominantly land zoned 'special uses' or government owned land) without having to amend Council's LEP. In particular, nominated land can adopt the zoning of neighbouring land, where the Department of Planning has assessed the compatibility of the use for the area and issued a 'Compatibility Statement' allowing the new use.

Furthermore these developments can be broken down into the following categories:

- Development for any of the following purposes may be carried out by, or on behalf of, a council without consent on a public reserve under the control of, or vested, in the council:
    - roads, cycle ways, ticketing facilities and viewing platforms;
    - outdoor recreational facilities, including playing fields;
    - information facilities such as visitors' centers and information boards;
    - landscaping, including irrigation schemes (whether they use recycled or other water);
    - amenity facilities;
    - maintenance depots; and
    - environmental management works.
- Development may also be carried out on lands reserved under the *National Parks and Wildlife Act 1974* or lands declared under the *Marine Parks Act 1997*, as long as the development conforms to the relevant Acts;
- Construction works, routine maintenance works, environmental management works and emergency works (including works required as a result of flooding, storms or coastal erosion) for the purpose of flood mitigation, waterway or foreshore management activities may be carried out by or on behalf of a public authority without consent, on any land;

Note: Within the context of the SEPP, "waterway or foreshore management activities" means:

(a) riparian corridor and bank management, including erosion control, bank stabilisation, re-snagging, weed management, re-vegetation and the creation of foreshore access ways, and

(b) in-stream management or dredging to rehabilitate aquatic habitat or to maintain or restore environmental flows or tidal flows for ecological purposes, and

(c) coastal management and beach nourishment, including erosion control, dune or foreshore stabilisation works, headland management, weed management, revegetation activities and foreshore access ways.

10.3.4 SEPP 14 Coastal Wetlands

SEPP-14 has been designed to protect and preserve coastal wetlands for the environmental and economic interests of the State. The policy provides protection to specific wetland areas that have

been mapped and gazetted by Department of Planning (DoP). Development that involves the following activities is not allowed to be carried out unless consent (designated development) is provided by local council or the Director General of Planning. These activities include clearing of land, construction of levees, draining of land, and filling of land. If this development is to be carried out, an Environmental Impact Statement (EIS) first needs to be prepared.

The Director General of Planning must consider a number of matters prior to agreeing to the proposed development including:

- The environmental effect of the proposed development;
- Whether adequate safeguard and rehabilitation methods are proposed;
- Whether the development is consistent with the aims of the policy; and
- Whether any feasible alternatives have been considered and if so, the reason for choosing the proposed development.

There are three SEPP 14 coastal wetlands on the southern and western edges of Smiths Lake (Figure 10-3). Specifically, these are located to the north of Wamwarra Bay (No. 648), an estuarine area south and west of Horse Point (No. 648) and south-east of Simons Point (No. 650).

10.3.5 SEPP 26 Littoral Rainforests

This policy was devised to provide a mechanism for the consideration of applications for development that were likely to damage or destroy littoral rainforest areas with a priority to preserve those areas in their natural state. The policy applies to land identified by DoP as containing littoral rainforests.

Once again the consent of the local council and the concurrence of the Director of DoP must be obtained for the purposes of erecting a building, carrying out work, use of the land, subdivision or any work that could disturb, change or alter the landform and/or remove, damage or destroy any native flora or other element of the landscape.

There is a small pocket of gazetted SEPP 26 littoral rainforest located in the north eastern corner of the Smiths Lake catchment (Figure 10-3).

10.3.6 SEPP 71 Coastal Protection

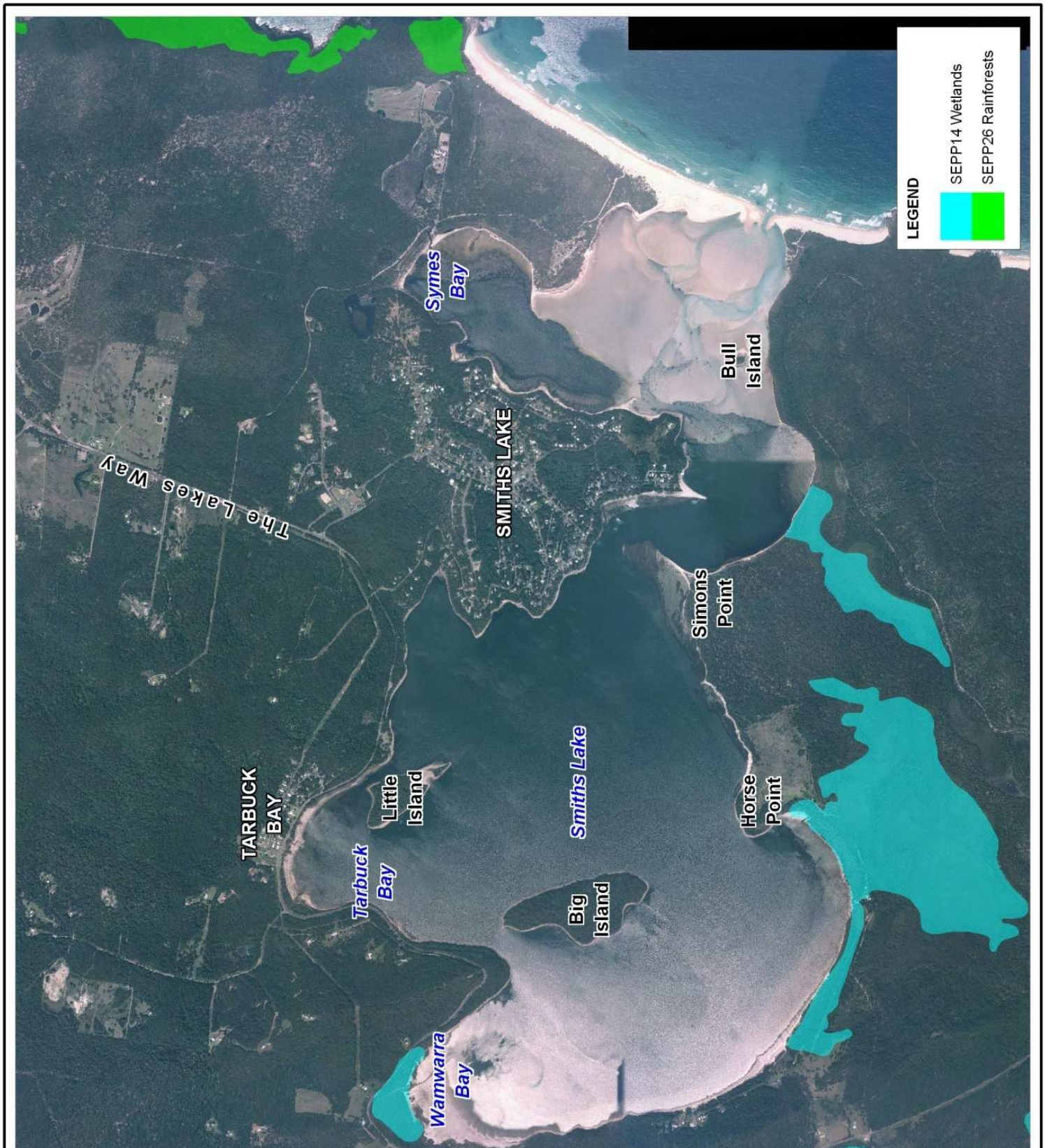
State Environmental Planning Policy (SEPP) No. 71 was made under the Environmental Planning and Assessment Act 1979, and gazetted in November 2002. The policy aims to ensure that development in the NSW coastal zone is appropriate and suitably located. The policy provides protection of and improvement to public access for coastal foreshores, compatible with the natural attributes of the foreshore, and protects and preserves Aboriginal cultural heritage, visual amenities of the coast, the beach environment and amenity, native coastal vegetation, marine environment of New South Wales, and rocky platforms. In addition, the policy aims to carry out management of coastal zones in accordance with the principles of the Ecologically Sustainable Development (ESD).

Under this policy, the Minister for Infrastructure and Planning becomes the consent authority for state significant development, and significant coastal development. State significant coastal development includes mining, extractive industry, industry, landfill, recreational establishments, marinas, tourist facilities (except bed and breakfast establishments, and farm stays) and buildings greater than 13

metres in height above the natural ground level. It also includes development, comprising subdivision of land:

- Within a residential zone into more than 25 lots;
- Within a rural residential zone into more than five lots; or
- Within any zone into any number of lots if the future development of any lot created by the subdivision will require effluent to be disposed of by means of a non-reticulated system.

The policy applies also to 'significant coastal development', which are development in 'sensitive coastal locations'. These locations include:



- Coastal Lakes, Ramsar wetlands and World Heritage areas;
- Marine parks and aquatic reserves under the *Fisheries Management Act*;
- Land within 100 metres of any of the above;
- Land reserved under the *National Parks and Wildlife Act*;
- SEPP 14 coastal wetlands; and
- Residential land within 100 metres of SEPP 26 littoral rainforests.

Master plans are required to be approved by the Minister before some consent can be granted. Generally a master plan is a document consisting of written information, maps and diagrams that outline proposals for development of land.

10.4 Ecologically Sustainable Development

In lieu of planning documents or legislation covering specific areas within and around Smiths Lake, the four principles of Ecologically Sustainable Development (ESD) should be followed, including:

1. The precautionary principle: The lack of full scientific evidence should not be used as a justification for the postponement of the introduction of measures to prevent or mitigate environmental degradation. This principle is fundamental to adaptive management. Monitoring and prevention are central to the precautionary principle – monitoring to measure progress, and prevention to minimise costs and risks. Decisions can and should be refined as ongoing monitoring and research provides better understanding.

2. Intergenerational equity: Each generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for future generations. This principle points to institutional and community responsibilities for integrated management, to ensure quality of life are maintained and enhanced.

3. Conservation of biological diversity and ecological integrity: Measures should be taken to prevent and protect against the extinction or loss of viability of plant and animal species due to human activities.

4. Improved valuation and pricing of environmental resources: The quality and value of environmental resources should be maintained and enhanced through appropriate management and pricing, preventing degradation and damage.

11 MANAGEMENT OBJECTIVES

11.1 Principles for Future Management

The future management of Smiths Lake should accord to the following overarching principles. These principles have been chosen to guide the Coastal Zone Management Plan for Smiths Lake Estuary and represent the desires of the key stakeholders to preserve existing environmental and social values through sustainable management. Four of these have come from the NSW Coastal Policy while the others are specific to Smiths Lake and have been formulated by the Committee and Stakeholders.

11.2 Specific Management Objectives

The objectives define the specific aims of the CZMP and essentially represent the “goal posts” for which future management of the estuary should be targeted towards. Furthermore the objectives aim to preserve and enhance existing estuary values whilst also remediating existing issues or problems. The specific objectives can be found in Table 11-1 and have not been prioritised.

Table 11-1 Specific objectives of the CZMP

		Specific Objectives
Opening Procedure	*1*	*Maintain a current and relevant entrance opening policy which considers environmental impacts, flooding and social demands on the Lake*
	2	*Maintain a current and relevant entrance opening procedure which maximises ecological and social benefits without causing excessive sediment deposition or erosion damage to vegetated areas along the foreshore*
Erosion & Sedimentation	*3*	*Reduce the rate of sediments entering the Lake from the catchment, by implementing and strictly monitoring development activities including Council works*
	4	*Restore where possible silted and degraded areas as a result from road drainage and damage by four wheel drive vehicles*
	5	*Reduce habitat damage by controlling access to beach and foreshore areas*
Water Quality	*6*	*Maintain water quality at a level which protects ecological, recreational and aesthetic values in line with appropriate Australian Water Quality Guidelines for Fresh and Marine Waters.*
	7	*Reduce the rate of suspended sediments entering the Lake by implementing and strictly monitoring development activities including Council works*
	8	*Determine the nature and causes of significant pollutant sources and ensure any future developments do not increase the pollution load entering the Lake system*
	9	*Develop an appropriate stormwater management plan for the catchment*
Habitat Conservation	*10*	*Establish and protect valuable and endangered species habitat areas*
	11	*Preserve the abundance and diversity of estuarine flora and fauna*
	12	*Define more clearly factors affecting areas of high ecological value such as seagrass beds, salt marshes, wetlands, foreshore/riparian areas and dunes, and to map endangered species habitat areas*
	13	*Protect fringing riparian vegetation from damage*
	14	*Maintain and extend the existing foreshore reserve areas*
Waterway Access & User Conflict	*15*	*Improve waterway access for all Lake users without adversely impacting on significant habitat areas, or social demands*
	16	*Manage waterway use to minimise impacts on other users and significant habitat areas*
	17	*Preserve the very high visual quality of the waterways and surrounding foreshores*
	18	*Preserve Aboriginal and non-Aboriginal heritage sites*
	19	*Provide public facilities at appropriate locations around the Lake to allow for the sustainable recreation by tourists and residents*
	20	*Incorporate traditional methods, knowledge and personnel from the Aboriginal Community to assist in future management of the Lake*
Climate Change	21	*Ensure that Climate Change is considered when making long term decisions regarding Smiths Lake and its catchment (e.g. Opening procedure, land development and land use changes, construction of roads, stormwater treatment measures and other infrastructure)*

11.2.1 Specific objectives addressing Entrance Opening Procedure

Artificial entrance opening of the Lake is a necessity to alleviate flooding of low lying infrastructure around the Lake, however the procedure should address a balance between which incorporates all areas impacted by this human intervention. These specific objectives aim to address these issues:

1. *Maintain a current and relevant entrance opening policy which considers environmental impacts, flooding and social demands on the Lake; and*
2. *Maintain a current and relevant entrance opening procedure which maximises ecological and social benefits without causing excessive sediment deposition or erosion damage to vegetated areas along the foreshore.*

11.2.2 Specific objectives addressing Erosion and Sedimentation

Some soils are more prone to erosion than others and the most important factor for preventing soil erosion is vegetation cover. Plants hold the soil together and shelter the surface of the land from wind and rain. When soil becomes compacted, water cannot filter through it and instead runs over the surface and causes erosion. The soil may then be transported into the Lake, where it can smother aquatic ecosystems and increase turbidity. This issue addresses the input of sediments to the Lake from catchment erosion, as well as from beach and foreshore erosion, and is met by the following specific objectives:

3. *Reduce the rate of sediments entering the Lake from the catchment, by implementing and strictly monitoring development activities including Council works;*
4. *Restore where possible silted and degraded areas such as areas modified for road drainage or damage by four wheel drive vehicles; and*
5. *Reduce habitat damage by controlling access to beach and foreshore areas.*

11.2.3 Specific objectives addressing Water Quality

Good water quality not only benefits the Lake ecosystem but also improves recreational opportunities including boating, swimming and fishing. Water quality in the Lake should be protected and improved where possible, and this can be achieved through addressing the following specific objectives:

6. *Maintain water quality at a level which protects ecological, recreational and aesthetic values in line with appropriate Australian Water Quality Guidelines for Fresh and Marine Waters;*
7. *Reduce the rate of suspended sediments entering the Lake by implementing and strictly monitoring development activities including Council works;*
8. *Determine the nature and causes of significant pollutant sources and ensure any future developments do not increase the pollution load entering the Lake system; and*
9. *Develop an appropriate stormwater management plan for the catchment.*

11.2.4 Specific objectives addressing Habitat Conservation

In order to live, all forms of life require certain conditions including adequate food, water, shelter and space. The type of habitat required varies between species and locations with species evolving over periods of time in a particular habitat. As a result species cannot always adapt to sudden changes in conditions. So that all species are able to continue to exist in the landscape, habitat should not be destroyed or degraded. Furthermore the conservation of threatened species and their habitat is critical to maintain species diversity with many species facing threats that will lead to their extinction if no recovery action is taken. The specific objectives aiming to address these issues of protection; conservation and rehabilitation of habitat surrounding Smiths Lake are covered below:

10. *Establish and protect valuable and endangered species habitat areas;*
11. *Preserve the abundance and diversity of estuarine flora and fauna;*
12. *Define more clearly factors affecting areas of high ecological value such as seagrass beds, salt marshes, wetlands, foreshore/riparian areas and dunes, and to map endangered species habitat areas;*
13. *Protect fringing riparian vegetation from damage; and*
14. *Maintain and extend the existing foreshore reserve areas.*

11.2.5 Specific objectives addressing Waterway Access and User Conflict

The impacts of recreation upon the Lake ecosystem should be managed to reduce damage to the estuarine flora and fauna, and to allow rehabilitation of degraded areas. The Lake area should also be accessible to the community and visitors to enjoy. The following specific objectives aim to promote these concepts:

15. *Improve waterway access for all Lake users without adversely impacting on significant habitat areas, or social demands;*
16. *Manage waterway use to minimise impacts on other users and significant habitat areas;*
17. *Preserve the very high visual quality of the waterways and surrounding foreshores; and*
18. *Provide public facilities at appropriate locations around the Lake to allow for the sustainable recreation by tourists and residents.*

The understanding and appreciation of Aboriginal culture and heritage has changed in recent times from the limited scientific definition of archaeological sites to a much broader understanding that Aboriginal people have a commitment to care for Country and therefore should be responsible for the co-management of natural resources (HCRCMA 2007). The following objectives promote the integration of Aboriginal culture and heritage into the management of the Lake and surrounds:

19. *Preserve Aboriginal and non-Aboriginal heritage sites; and*
20. *Incorporate traditional methods, knowledge and personnel from the Aboriginal Community to assist in future management of the Lake.*

11.2.6 Specific objective addressing Climate Change

The climate of the earth has been continually changing over time; but the rate of change that has been recorded in the last century; and is projected for the future; is much greater than previously identified. Rising sea levels will likely bring the most significant change to Australia's coastal zone in coming decades (DCC 2009) and will play an important role in the social, economic and environmental aspects of Smiths Lake. The following specific objective aims to ensure that the potential characteristics of climate change are incorporated into future management of the Lake:

21. *Ensure that Climate Change is considered when making long term decisions regarding Smiths Lake and its catchment (e.g. opening procedure, land development and land use changes, construction of roads, stormwater treatment measures and other infrastructure, foreshore zoning etc).*

12 MANAGEMENT STRATEGIES AND ACTIONS

12.1 Overview

The Smiths Lake EMP review considered all the strategies and actions developed previously and assessed their effectiveness to date. As provided in Section 8, various actions were recommended for retention, modification, or removal. In addition, new actions were considered, particularly in relation to new issues that have emerged since the preparation of the EMP.

As was adopted for the previous EMP, strategies have been broadly grouped under the general headings of:

- Planning;
- Management (and compliance);
- Remediation works;
- Monitoring and research; and
- Education.

Strategic management actions are provided for each of these strategies that address the key management themes of:

- Opening procedure (8 actions: OP1 – OP8);
- Erosion and sedimentation (10 actions: ES1 – ES10);
- Water quality (11 actions: WQ1 – WQ11);
- Habitat conservation (12 actions: HC1 – HC12); and
- Waterway access and user conflicts (9 actions: WA1 – WA9).

These actions are aimed to address the issues and objectives that have been grouped under the same general headings (noting that the Climate Change objective is addressed through various actions under other headings).

In total, 50 strategic management actions have been developed for this revised Coastal Zone Management Plan.

12.2 Order of Works

The order that the strategic management actions get implemented should give consideration to two factors:

- How important the action is for addressing the issues and objectives (i.e. the prioritisation); and
- The realistic timeframes for implementation (given necessary lead times, funding constraints etc).

These points are discussed in detail following.

12.2.1 Prioritisation of Strategic Management Actions

Given the large number of actions, prioritisation of actions is particularly important so that users of the document are able to appreciate which actions should be carried out as a matter or urgency. Typically, actions that are high priority are those actions that give the best 'bang for your buck' – that is, they provide greatest value to the Smiths Lake environment (biophysical, social, economic) within realistic budgetary constraints.

Given that implementation of the Smiths Lake EMP has been underway for a number of years, stakeholders and agencies responsible for implementation of actions now have a good appreciation for the processes and difficulties associated with such a plan. To capture this knowledge, stakeholders and agencies, as well as the broader community, have been involved in prioritisation of the strategic management actions for this revised Coastal Zone Management Plan. Through a workshop process, participants (stakeholders, authorities, community) were able to give a relative priority to each management action. The median of inputs provided from all workshop participants was then adopted as the relative priority for each of the 50 actions.

Prioritisation of Management Actions has been assigned the following levels:

- Very High: indicating that implementation of these particular strategies must generally take precedence over other strategies within existing funding and resource limitations;

- High: indicating that these strategies are also important and should take precedence over lower order strategies;

- Medium: indicating that these strategies are not as crucial as the higher order strategies. These strategies should still be implemented when funding and resources become available; and

- Low: indicating that these strategies have the least potential to make significant difference to the Smiths Lake environment. These strategies will, however, still benefit many aspects of the estuary, and as such, should still be implemented when funding and resources becomes available.

12.2.2 Timeframes for Implementation

The prioritisation described above has been established independent of the anticipated and necessary timeframes to implement the actions. Relative timeframes have therefore been prescribed for each action based on the 'achievability' of implementation, giving consideration to funding and resource demands, as well as legislative and procedural barriers. Also, consideration has been given to sequences for connected actions – that is, some actions are dependent on the successful completion of another action before it can be implemented.

Indicative timeframes for the strategic actions are:

- Immediately – within 12 – 18 months
- Short term – within 1 – 3 years

- Medium term – within 3 – 5 years
- Long term – more than 5 years

It is anticipated that a major review of this Coastal Zone Management Plan would occur after about 5 years. Therefore, it is envisaged that not all of the actions prescribed within this Plan would be completed, or even initiated, prior to the next review.

12.2.3 Final Order of Implementation

A final order of implementation for the strategic management actions has been developed based on prioritisation and timeframe. The order is based on a principle that gives joint consideration to timeframes and priorities, as presented in Figure 12-1. Each action is positioned within a 4 x 4 matrix (4 levels of priority vs. 4 levels of timeframe). For example, Action OP1 has been assigned a Very High Priority and an Immediate Timeframe – therefore it is positioned in the matrix that corresponds to these two variables (top left corner).

All 50 strategic management actions were positioned; yielding actions within 11 of the 16 possible matrix positions (refer Figure 12-2). Within each matrix position (cell), there is no further order of actions – that is, all actions within the same matrix position can be carried out in any order, subject to available funding, resources etc. Implementation order of the strategic management actions have thus been given a ranking between 1 and 11, representing the position within the matrix they are located (refer Figure 12-2).

Figure 12-1 Order of implementation for strategic management actions

	Timeframe			
	Immediate	***Short Term***	***Medium Term***	***Long Term***
Very High	***1***	***3***	***6***	***10***
High	***2***	***5***	***9***	***13***
Medium	***4***	***8***	***12***	***15***
Low	***7***	***11***	***14***	***16***

Figure 12-2 Implementation ranking for strategic management actions

		Timeframe			
		Immediate	**Short Term**	**Medium Term**	**Long Term**
Relative Priority	**Very High**	1/*11* OP1, OP2	3/*11* OP3, ES2	nil	nil
	High	2/*11* OP4, OP6, ES5, ES6, ES10, WQ2, WQ4, WQ6, HC3, WA2	5/*11* OP8, ES1, WQ7, WQ9, WQ10, HC2, HC9, HC10, WA5	7/*11* OP7, ES4, ES9, WQ8, HC8	10/*11* OP5, WQ5
	Medium	4/*11* ES3, ES7, WQ3, HC5, WA3	6/*11* WQ1, HC1, HC4, WA1, WA4, WA8	9/*11* ES8, WQ11, HC6, HC7, HC11, HC12, WA9	nil
	Low	nil	8/*11* WA7	11/*11* WA6	nil

Ultimately, implementation of the strategic actions described within this Plan will be dependent on the availability of funds and resources available to the responsible authorities. Whilst grants and external funding may be sought for some actions, the indicative priorities, timeframes and order outlined within this Plan may not always be achievable.

12.3 Cross Reference to Actions in the Original EMP

The strategic management actions provided herein has a different reference system to the actions presented in the original Smiths Lake EMP (2001). APPENDIX E: provides a mechanism for cross referencing the new actions within this Coastal Zone Management Plan with the original list of actions in the EMP.

12.4 Descriptions of Strategic Management Actions

12.4.1 Implementation Schedule

Implementation schedules for the strategic management actions are presented in Table 12-1 to Table 12-5, under the groupings of Opening Procedure actions (Table 12-1), Sediment and Erosion actions (Table 12-2), Water quality actions (Table 12-3), Habitat Conservation actions (Table 12-4) and Waterway Access and User Conflicts actions (Table 12-5).

12.4.2 Further Details / Implementation Steps

More specific details on each of the strategic management actions are provided in Appendix F. These details include some background additional information relevant to each action, as well as suggested steps involved in implementing the action.

Table 12-1 Implementation Table: Opening Procedure Strategies and Actions

Strategy	*Reference*	*Strategic Management Actions*	*Responsibility*	*Performance Measures & Targets*	*Timeframe*	*Indicative costs*	*Priority*	*Implementation Ranking*
Planning procedure to formalise the entrance opening strategy	OP1	*Update entrance opening strategy to comply with Marine Parks legislation (Details provided in Appendix F: Page F-3)*	*MCC, MPA*	*Amended strategy completed*	*immediately*	*~$10,000 (external resource)*	Very High	1/11
	OP2	*Formalise approvals/license requirements from DoI – Crown Lands for artificial entrance opening, including REF or similar (Details provided in Appendix F: Page F-4)*	*MCC, DPI (DoI - Crown Lands)*	*Licence to open entrance is obtained*	*immediately*	*~$30,000 (external resource)*	Very High	1/11
	OP3	*Establish minimum floor level for developments as defined by the flood level in the Floodplain Risk Management Plan (FRMP) (Details provided in Appendix F: Page F-5)*	*MCC*	*Revised Planning Instrument in force*	*short term (following OP4)*	*Staff time*	Very High	3/11
Management measures to achieve ecologically sustainable management and to minimise habitat loss and sediment infilling	OP4	*Undertake Floodplain Risk Management Study and Plan, incorporating climate change projections (Details provided in Appendix F: Page F-6)*	*MCC, OEH*	*FRMP completed and adopted by Council*	*immediately*	*~$100,000 (external resource)*	High	2/11
	OP5	*Undertake a detailed review of the entrance opening strategy and procedure in 2020 and modify strategy as necessary (Details provided in Appendix F: Page F-7)*	*MCC, OEH, DPI, MPA*	*Updated strategy is completed*	*long term*	*Staff time or external (~$30,000, 2010 value)*	High	10/11
Monitoring & Research	OP6	*Commence monitoring and recording of entrance conditions and opening impacts (Details provided in Appendix F: Page F-8)*	*MCC*	*MERI process for entrance conditions is on-going and reported periodically*	*immediately*	*Staff time*	High	2/11
Community **Education**	OP7	*Develop and implement education program on the dangers and legalities associated with opening events (Details provided in Appendix F: Page F-10)*	*MCC, NSW Maritime Authority, MPA*	*> 90% of local community receive education*	*medium term*	*staff time plus materials (~$5,000/yr)*	High	7/11
	OP8	*Investigate and implement options to enhance safety during opening procedure (Details provided in Appendix F: Page F-11)*	*MCC, NSW Maritime Authority*	*Risks to community reduced to ALARP*	*short term*	*staff time plus materials (~$5,000/yr)*	High	5/11

Table 12-2 Implementation Table: Erosion and Sedimentation Strategies and Actions

Strategy	*Reference*	*Strategic Management Actions*	*Responsibility*	*Performance Measures & Targets*	*Timeframe*	*Indicative costs*	*Priority*	*Implementation Ranking*
Planning Controls to minimise catchment erosion and sediment runoff	ES1	*Review sediment management development controls on building/construction works to comply with best practice and ensure all new driveways in catchment are sealed (Details provided in Appendix F: Page F-13)*	*MCC, Developers and Land Holders*	*Revised Planning Instruments in force*	*short term*	*Staff time*	High	5/11
	ES2	*Implement best practice design guidelines to reduce sediment erosion during road and infrastructure construction and maintenance (Details provided in Appendix F: Page F-14)*	*MCC, RTA*	*Best practice guides adopted during construction*	*short term*	*Staff time*	Very High	3/11
Management measures for vehicle access, infrastructure construction and urban	ES3	*Restrict 4WD vehicle access at Wamwarra Bay and enforce compliance (Details provided in Appendix F: Page F-15)*	*MCC, Vehicle Owners, DoI - Crown Lands*	*No vehicle access*	*immediately*	*staff time plus materials (~$15,000)*	Medium	4/11

Strategy	Reference	Strategic Management Actions	Responsibility	Performance Measures & Targets	Timeframe	Indicative costs	Priority	Implementation Ranking
developments	ES4	*Sealing of dirt and unsealed roads in Smiths Lake Village e.g. Valley Rd, Phillip Rd, Sandbar Rd (Details provided in Appendix F: Page F-16)*	*MCC, RTA*	*No unsealed roads remaining around Lake*	*medium term*	*staff time plus materials (~$200 - 400 per metre)*	High	7/11
	ES5	*Inspect construction sites for compliance with sediment management development controls (Details provided in Appendix F: Page F-17)*	*MCC, Developers and Land Holders*	*All building sites compliant with regulations*	*immediately*	*Staff time*	High	2/11
Remediation works for eroding environments e.g. Gullies, dunes	ES6	*Continue works to manage concentrated flows and to rehabilitate eroded gullies, caused by roadworks in Smiths Lake Village, along the Lakes Way and throughout the catchment (Details provided in Appendix F: Page F-18)*	*MCC, Bushcare groups*	*Reduced sediment runoff entering Smiths Lake*	*immediately*	*staff and volunteer time plus materials (~$10,000/yr)*	High	2/11
	ES7	*Investigate success of existing dune stabilisation works and implement maintenance / upgrade program (Details provided in Appendix F: Page F-19)*	*MCC, OEH, Aboriginal Community*	*Successful dune stabilisation in entrance area*	*immediately*	*staff and volunteer time plus materials (~$5,000/yr)*	Medium	4/11
Monitoring & Research	ES8	*Identify eroding watercourses through presence of sedimentation at the outlets of drains and creek around the Lake (Details provided in Appendix F: Page F-20)*	*MCC*	*All eroding watercourses identified and included in rehab plans (ES6)*	*medium term*	*Staff time*	Medium	9/11
	ES9	*Survey Symes Bay for sedimentation / infill (Details provided in Appendix F: Page F-21)*	*MCC*	*Completed survey and determination of sediment infill rate*	*medium term*	*~$20,000 (external resource)*	High	7/11
	ES10	*Survey southern foreshore dune (including wetland edge) near entrance following opening events (Details provided in Appendix F: Page F-22)*	*MCC, OEH (NPWS)*	*Completed surveys and measure of foreshore erosion*	*immediately*	*Staff time*	High	2/11

Table 12-3 Implementation Table: Water Quality Strategies and Actions

Strategy	Reference	Strategic Management Actions	Responsibility	Performance Measures & Targets	Timeframe	Indicative costs	Priority	Implementation Ranking
Planning controls to improve water quality	WQ1	*Investigate areas that would benefit from a Stormwater Management Plan and develop and implement where necessary (Details provided in Appendix F: Page F-24)*	*MCC*	*Preparation and adoption of Plans*	*short term*	*Staff time (or external) plus implementation costs ($ unknown)*	Medium	6/11
	WQ2	*Implement strict control of catchment runoff water quality for all development to WQIP Guidelines (Details provided in Appendix F: Page F-25)*	*MCC*	*No further degradation of water quality due to new developments*	*immediately*	*Staff time*	High	2/11
	WQ3	*Finalise Draft DCP 34 - Acid Sulfate Soils (Details provided in Appendix F: Page F-26)*	*MCC*	*DCP finalised and adopted by Council*	*immediately*	*Staff time plus lab analysis (~$5,000)*	Medium	4/11
Remediation works and **management measures** for pollutants	WQ4	*Repair and maintain all on-site sewage management systems and enforce appropriate action where required (Details provided in Appendix F: Page F-27)*	*MCC, Land Holders*	*> 90% compliance with regulations*	*immediately*	*Staff time*	High	2/11

Strategy	Reference	Strategic Management Actions	Responsibility	Performance Measures & Targets	Timeframe	Indicative costs	Priority	Implementation Ranking
	WQ5	*Maintain and upgrade sewerage system as necessary to accommodate climate change projections e.g. Sea Level Rise (Details provided in Appendix F: Page F-28)*	*MCW*	*No future increase in overflows*	*long term*	*Depends on works required ($ unknown)*	High	10/11
	WQ6	*Classify all on-site sewage systems within 100m of Lake edge as high risk, requiring annual compliance audits (Details provided in Appendix F: Page F-29)*	*MCC*	*Annual audits of on-site systems close to Lake*	*immediately*	*staff time*	High	2/11
	WQ7	*Investigate pumping stations at Eagle Nest Parade and Patsy's Flat Rd for leakage / overflows during heavy rains (Details provided in Appendix F: Page F-30)*	*MCW*	*Determination of risk of pollution to Lake during rain events*	*short term*	*Staff time*	High	5/11
	WQ8	*Encourage connection of existing caravan park to reticulated sewerage system, with connection to be specified as a condition of consent for any future redevelopment (Details provided in Appendix F: Page F-31)*	*MCW, Land Holder*	*Connection of caravan park to reticulated sewerage system*	*medium term*	*Staff time plus possible incentive ($ unknown)*	High	7/11
	WQ9	*Seal or raise sewer manholes that are currently located below RL 2.5m AHD (Details provided in Appendix F: Page F-32)*	*MCW*	*No inundation of manholes when Lake is closed or during flooding*	*short term*	*Depends on # manholes ($ unknown)*	High	5/11
Monitoring & Research	WQ10	*Investigate possible pollutant point sources into the Lake and creeks (Details provided in Appendix F: Page F-33)*	*MCC, Community*	*Pollution point sources identified*	*short term*	*Staff time plus lab analysis (~$5,000)*	High	5/11
Community Education	WQ11	*Develop and implement education program on pollutant sources to Lake (Details provided in Appendix F: Page F-34)*	*MCC, Community*	*> 90% of local community receive education*	*medium term*	*staff time plus materials (~$5,000/yr)*	Medium	9/11

Table 12-4 Implementation Table: Habitat Conservation Strategies and Actions

Strategy	Reference	Strategic Management Actions	Responsibility	Performance Measures & Targets	Timeframe	Indicative costs	Priority	Implementation Ranking
Planning controls to preserve and enhance Lake and foreshore habitat	HC1	*Review foreshore zoning during the development of the new Standardized LEP to increase protection for habitat and cultural heritage around the Lake. (Details provided in Appendix F: Page F-36)*	*MCC, Aboriginal Community, OEH(NPWS)*	*Revised LEP incorporating mechanisms for conservation / protection*	*short term*	*Staff time*	Medium	6/11
	HC2	*Implement 'best practice' planning controls for natural buffer zones around the Lake and along major drainage pathways. (Details provided in Appendix F: Page F-37)*	*MCC*	*Revised LEP incorporating mechanisms for conservation / protection*	*short term*	*Staff time*	High	5/11
Management measures	HC3	*Maintain restricted access to specific areas containing threatened and endangered species e.g. Coastal Spurge plant (Details provided in Appendix F: Page F-39)*	*MCC, OEH(NPWS)*	*Minimal disturbance of threatened or endangered species*	*immediately*	*staff time plus materials (~$5,000)*	High	2/11
	HC4	*Investigate options to restrict boating access in the vicinity of seagrass bed areas during low Lake levels (Details provided in Appendix F: Page F-40)*	*NSW Maritime Authority , DPI*	*Minimal disturbance of seagrass beds*	*short term*	*staff time plus materials (~$10,000)*	Medium	6/11

Strategy	Reference	Strategic Management Actions	Responsibility	Performance Measures & Targets	Timeframe	Indicative costs	Priority	Implementation Ranking
Remediation Works for degraded habitat areas	HC5	*Undertake priority pest and weed management in degraded areas e.g. dunes, and incorporate traditional methods of management (Details provided in Appendix F: Page F-41)*	*MCC, Aboriginal Community, OEH(NPWS)*	*Reduce prevalence of weeds and pests*	*immediately*	*staff and volunteer time plus materials (~$20,000/yr)*	Medium	4/11
	HC6	*Identify areas of degraded habitat and incorporate into works program for rehabilitation, possibly co-ordinated with ES6/7 (Details provided in Appendix F: Page F-42)*	*MCC, Aboriginal Community, Bushcare groups*	*Reduced extents of degraded habitat around Lake and within catchment*	*medium term*	*staff and volunteer time plus materials (~$20,000/yr)*	Medium	9/11
Monitoring and Research	HC7	*Update mapping and undertake assessment of sensitive habitat areas such as seagrass beds and wetlands (Details provided in Appendix F: Page F-43)*	*OEH, MPA, DPI*	*Revised maps of important habitat*	*medium term*	*~$30,000 (external resource)*	Medium	9/11
	HC8	*Investigate potential foreshore habitat response to predicted Sea Level Rise (Details provided in Appendix F: Page F-44)*	*MCC, MPA, OEH(NPWS)*	*Mapping of potential future foreshore habitat*	*medium term*	*~$20,000 (external resource)*	High	7/11
	HC9	*Investigate fish health within the Lake (Details provided in Appendix F: Page F-45)*	*MCC, MPA, DPI*	*Knowledge of extent and gravity of any issues relating to fish health in Lake*	*short term*	*~$40,000 (external resource)*	High	5/11
Community **Education**	HC10	*Educate the community on existing waterway zoning (Details provided in Appendix F: Page F-46)*	*NSW Maritime Authority, MPA*	*> 90% of local community receive education*	*short term*	*staff time plus materials (~$5,000/yr)*	High	5/11
	HC11	*Develop and implement public awareness program on ecological values and important habitat. (Details provided in Appendix F: Page F-47)*	*MCC, Community*	*> 90% of local community receive education*	*medium term*	*staff time plus materials (~$5,000/yr)*	Medium	9/11
	HC12	*Encourage protection of natural habitat on private land through education and incentives (Details provided in Appendix F: Page F-48)*	*MCC, HCRCMA, Community*	*Increasing proportion of private land under voluntary protection*	*medium term*	*Staff time plus incentives ($ unknown)*	Medium	9/11

Table 12-5 Implementation Table: Waterway Access and User Conflicts Strategies and Actions

Strategy	Reference	Strategic Management Actions	Responsibility	Performance Measures & Targets	Timeframe	Indicative costs	Priority	Implementation Ranking
Planning controls to manage waterway access and minimise user conflicts	WA1	*Liaise with Aboriginal Community regarding developments on or near known or likely Aboriginal heritage sites (Details provided in Appendix F: Page F-50)*	*MCC, Aboriginal Community*	*No future developments that compromise Aboriginal heritage values*	*short term*	*Staff time*	Medium	6/11
	WA2	*Develop best practice guidelines regarding cultural heritage management (Details provided in Appendix F: Page F-51)*	*MCC, Aboriginal Community*	*Guidelines prepared, adopted and in use*	*immediately*	*Staff time*	High	2/11
Management measures to avoid user conflicts	WA3	*Limit access for domestic animals around foreshore areas and manage associated waste (Details provided in Appendix F: Page F-52)*	*MCC, OEH (NPWS)*	*Reduction in number of domestic pets on foreshore*	*immediately*	*staff time plus materials (~$5,000)*	Medium	4/11
	WA4	*Identify areas within the Lake entrance area where debris can be removed (for boating safety) and cannot be removed (for habitat protection) and streamline process for removal (Details provided in Appendix F: Page F-53)*	*NSW Maritime Authority, DPI, OEH (NPWS) & MPA*	*Reduction in navigation hazards due to debris*	*short term*	*Staff time*	Medium	6/11

Strategy	*Reference*	*Strategic Management Actions*	*Responsibility*	*Performance Measures & Targets*	*Timeframe*	*Indicative costs*	*Priority*	*Implementation Ranking*
	WA5	*Increase enforcement of fishing and zoning regulations through increased presence of relevant Compliance Officers and/or Rangers (Details provided in Appendix F: Page F-54)*	*NSW Maritime Authority, MPA, DPI*	*Reduction in non-compliance to regulations*	*short term*	*Staff time (additional staff may need to be employed)*	High	5/11
Remediation works to improve waterway access	WA6	*Investigate the possibility of constructing a foreshore walking track around sections of the Lake (Details provided in Appendix F: Page F-55)*	*MCC, OEH (NPWS)*	*Report on feasibility, including costs and benefits*	*medium term*	*Staff time (or external ~$20,000, not including design, approvals or construction)*	Low	11/11
	WA7	*Investigate options to improve boat launching facilities at Brambles Reserve, Tarbuck Bay and John de Bert Reserve (Details provided in Appendix F: Page F-56)*	*MCC, NSW Maritime Authority, DPI, MPA*	*Report on feasibility, including costs and benefits*	*short term*	*Staff time (or external ~$20,000, not including design, approvals or construction)*	Low	8/11
Community **education**	WA8	*Encourage the community to utilise existing boat ramps, through education (Details provided in Appendix F: Page F-57)*	*MCC, NSW Maritime Authority, MPA*	*> 90% of local community receive education*	*short term*	*staff time plus materials (~$5,000/yr)*	Medium	6/11
Monitoring	WA9	*Monitor conflicts between users in the Lake (Details provided in Appendix F: Page F-58)*	*MCC, NSW Maritime Authority, MPA*	*Improved appreciation of user conflicts in Lake*	*medium term*	*Staff time*	Medium	9/11

13 OPPORTUNITIES FOR FUNDING

The implementation of the actions within the plan depends on available resources, materials and funding. Within the original EMP a number of funding opportunities were identified (section 8, WMA 2001); however as governments and their departments change, strategic directions and sources of funding may also change. The following is a list of current funding requirements to implement the new coastal zone management plan for Smiths Lake and a list of current opportunities to obtain funding to undertake the works.

13.1 Funding requirements

The total cost of the Plan over the first 5 years is approximately $645,000, comprising $365,000 for capital works and up to $80,000 per year for on-going funding commitments (2010 value). This cost does not include the following, as the financial commitments required are unknown at this stage due to undetermined scopes or works:

- Sealing of dirt roads (ES4);
- Preparation and implementation of Stormwater Management Plans (WQ1);
- Upgrade of sewerage system to accommodate climate change (WQ5);
- Incentives for caravan park to connect to the reticulated sewer (WQ8);
- Sealing of manholes below RL 2.5m AHD (WQ9);
- Incentives for protection of private lands (HC12); and
- Construction of foreshore walking track (WA6) or improved boat launching facilities (WA7).

Also not included in these figure is any costs associated with additional staff required to implement this Coastal Zone Management Plan. It is noted that **in-kind** staff time (Council and others) is required for implementation of all actions, with significant reliance on staff time and/or volunteer time, for some 38 of the 50 strategic management actions. While it may seem attractive to undertake actions that do not require external funding, it may be just as difficult to secure the labour and commitment of staff to undertake these works.

Ensure funding applications for works proposed on Crown Lands are discussed with DoI – Crown Lands prior to submitting a proposal, allowing at least three weeks for review.

A detailed breakdown of the finances required to implement the Plan over the first 5 years is given in Table 13-1.

Table 13-1 Funding requirements for Plan implementation

Year	*Capital costs*	*Annual recurrent costs*	*TOTAL*
0	$40,000 *(OP1, OP2)*	nil	$40,000
1	$105,000 *(OP4, HC3)*	$10,000 *(ES6)*	$115,000
2	$70,000 *(ES3, WQ3, WA3, WQ10, HC9)*	$45,000 *(ES6, ES7, HC5, OP8, HC10)*	$115,000
3	$50,000 *(HC4, WA7, ES9)*	$55,000 *(ES6, ES7, HC5, OP8, HC10, WA8, OP7)*	$105,000
4	$50,000 *(HC7, HC8)*	$85,000 *(ES6, ES7, HC5, OP8, HC10, WA8, OP7, WQ11, HC6, HC11)*	$135,000
5	$50,000 *(WA6, OP5)*	$85,000 *(ES6, ES7, HC5, OP8, HC10, WA8, OP7, WQ11, HC6, HC11)*	$135,000
		TOTAL	$645,000

Note: Costs included in this plan were developed based on available information in 2011 and are considered indicative for that time. When implementing actions from this plan, costing will need to be carefully considered during project planning taking inflation into account.

13.2 Possible funding sources

Council is expected to fund parts of this Coastal Zone Management Plan using environmental budget allocations of general revenue. There is opportunity, however, for elements of the Plan to be funded through external grants and other funding programs, some of which will require matching funding from Council.

Primary funding sources include the NSW Government's Estuary Management Program (refer Section 13.2.1), the Hunter Central Rivers Catchment Action Plan initiatives (refer Section 13.2.2), and a suite of grant programs offered by local, state and federal government, as well as some private organisations (refer Table 13-2).

In-kind contributions for completion of some of the elements of this Coastal Zone Management Plan could also come from various educational institutions (such as universities), who could use the estuary for specific data collection or research projects. In-kind contributions could also come from volunteer community groups, such as Landcare, Creekcare, Coastcare and schools.

Opportunities should also be explored to utilise environmentally-oriented volunteer teams, such as Greening Australia, Green Corps and Work for the Dole, to assist with physically demanding elements of the Plan, such as revegetation works.

13.2.1 Estuary Management Program

Given that this Coastal Zone Management Plan review has been prepared in accordance with the NSW Government's Estuary Management Process; all works recommended by this Plan are eligible for part (50:50) funding under the NSW Estuary Management Program. It should be noted that Estuary Management Program subsidy funding may not be matched with other State grant funds.

13.2.2 Hunter – Central Rivers Catchment Management Authority

The Hunter Central Rivers CMA has prepared a Catchment Action Plan (CAP) (HCRCMA, 2007) that outlines the aims, objectives and strategies for catchment management across the Central Rivers region of NSW. The CAP contains biodiversity and water themes, which would be relevant to this Coastal Zone Management Plan. In essence, the CMA could partly or wholly fund actions related to natural resource management, and as such, could contribute to the implementation of the following strategies that require external funding (upward of $55/000/yr):

- ES7: Dune stabilisation ($5,000/yr)
- HC5: Undertake priority pest and weed management ($20,000/yr)
- ES6: Manage concentrated flows and rehabilitate eroded gullies ($10,000/yr)
- HC6: Rehabilitation for degraded habitat areas ($20,000/yr)
- HC12: Protection of native habitat on private land (not costed in Plan)
- WA6: Foreshore walking track educational signage (not costed in Plan)

13.2.3 Grants Programs

There are a number of state and federal government grant programs and private foundations that should be explored for potential funding of various strategies outlined within this Coastal Zone Management Plan. A number of these grant programs are outlined in Table 13-2.

Table 13-2 Potential sources of funding for CZMP strategies

Program title	Funding authority
Rehabilitation and Conservation Programs	
Caring for our Country Program Caring for our Country aims to protect and restore our unique and valuable	DEHWA, Australian

Program title	Funding authority
environment by focusing on six national priority areas of which some are relevant to Smiths Lake: biodiversity and natural icons, coastal environments and critical aquatic habitats and community skills, knowledge and engagement.	Government
Environmental Research Grants Program The aim of the Research program is to support research projects that help address environmental problems in NSW	OEH
Urban Sustainability Grants Program The Urban Sustainability Program aims to facilitate projects of significant environmental benefit to NSW, delivered by local government organisations in partnership with other government agencies, local businesses, community organisations and householders	OEH
Restoration and Rehabilitation Program The aim of the Restoration and Rehabilitation (R&R) program is to facilitate projects to prevent or reduce pollution, the waste stream or environmental degradation of any kind, run by community organisations and State and Local government organisations.	OEH
Protecting our Places Grants Program The aim of the program is to protect land that is culturally significant to Aboriginal people and to support education projects about the environment and its importance in Aboriginal life.	OEH
Eco-Schools Program This program provides grants to schools to give them the opportunity to involve their students and community in developing and implementing environmental management projects.	OEH
Environmental Education Program The aim of the Environmental Education program is to support educational projects or programs that develop or widen the community's knowledge of, skills in, and commitment to protecting the environment and promoting sustainable behaviour.	OEH
Estuary Management Program Refer above.	OEH
Better Boating Program (BBP) The program is a State Government grants program aimed at providing recreational boating infrastructure for the benefit of the boating community on New South Wales waterways. The BBP, commencing in July 2009, consolidates the three grants programs previously run by NSW Maritime.	NSW Maritime Authority

Program title	Funding authority
Coastcare Community Grants	Australian Government
Infrastructure	
NSW Local Infrastructure Fund The NSW Local Infrastructure Fund has been established as an interest-free loan scheme to bring forward infrastructure projects which have been delayed due to a lack of funding and are essential to urban development.	Department of Planning, NSW Government
NSW Coastline Cycleway Grants Program The NSW Coastline Cycleway program provides grants to non-metropolitan coastal councils (including MidCoast Council) to improve cycling facilities as part of the development of a cycleway along the entire NSW coast.	Department of Planning, NSW Government
Research Programs	
Tactical Research Fund The aim of the this fund is to allow the FRDC to provide investment funds to its stakeholders in a timely manner to take advantage of opportunities, avert threats, or manage unforeseen events, as they arise. A TRF project may be of an urgent 'break-the-glass' type; or, it could also be a project that is used to overcome significant hurdles in, or to significantly fast track, important stakeholder processes, including production. In these cases it is likely that the adoption and benefits will be significantly brought forward if the project had not been funded at all.	Fisheries Research and Development Corporation (FRDC)
Water Smart Australia Program The Australian Government's Water Smart Australia Program aims to accelerate the development and uptake of smart technologies and practices in water use across Australia.	Australian Government Water Fund
Community Action grants Community Action Grants are the small grants component of the Australian Government's Caring for our Country initiative that aims to help community groups take action to conserve and protect their natural environment. The grants are targeted towards established community-based organisations which have sustainable farming and/or protecting and enhancing the natural environment as their principal objective	National Landcare Program
Planning Reform Fund Program The aim of the Planning Reform Fund is to support initiatives to streamline the planning process, making it more strategic, efficient and transparent while enhancing community involvement. The Planning Reform Fund helps fund the reforms and can assist councils in particular by supporting the	Department of Planning, NSW Government

Program title	Funding authority
delivery of new local plans and key strategic planning projects.	
Public Reserves Management Fund	DoI – Crown Lands
Indigenous Heritage Program This is an Australian Government initiative that supports the identification, conservation, and promotion (where appropriate) of Indigenous heritage	DEWHA, Australian Government
Climate Change Programs	
Climate Change Fund The aim of the fund is to help business, households, schools, communities and government save water, energy and greenhouse gas emissions.	OEH

14 MONITORING, EVALUATION AND REVIEW

14.1 Monitoring of Plan Success

The success of the Coastal Zone Management Plan should be gauged through its ability to achieve the designated targets. The overarching targets are the Management Objectives, as described in Section 7.1. However, the timeframe for achieving some of these objectives is long (given the slow rate of vegetation establishment and growth, for example). To gain a better appreciation for the relative success of the Plan, a series of evaluation measures can be assessed on a periodic basis. Different types of evaluation measures are discussed in more detail below.

14.1.1 Primary Evaluation Measures

The first set of evaluation measures should ascertain whether the strategies are being implemented within the timeframe designated in the Plan. As such, the primary performance measures are simply a *measure of implementation*.

The Estuary Management Plan recommends some 50 different actions over a period of 5 years. Many of these actions will need to be carried out concurrently. Organisations responsible for implementation will need to review the Plan carefully and ensure that adequate resources are allocated to the various strategies to ensure that the timeframe for implementation is achieved.

Clearly, a high degree of co-ordination will be required to manage the successful implementation of all the strategies within the designated timeframe. This co-ordination should be facilitated by Council's Coast and Estuary Management Committee, who would be required to meet regularly to discuss and manage the implementation of the estuary management strategies.

If it is determined that the strategies are not being implemented to the nominated timeframe then one or both of the following *contingencies* should be adopted:

- Determine the cause for the delay in implementation. If delays are funding based, then seek alternative sources of funding, including a formal request to Council to increase contributions to the Plan. If delays are resource-based, seek additional assistance from stakeholder agencies and/or consider using an external consultancy to coordinate implementation of the Plan;
- Modify and update the Coastal Zone Management Plan for Smiths Lake Estuary to reflect a timeframe for implementation that is more achievable. The revised Plan would need to be endorsed by all relevant stakeholders and agencies responsible for implementation.

14.1.2 Secondary Evaluation Measures

The second set of evaluation measures relate to *measuring specific performance outputs* from the individual strategies, as appropriate. The specific outputs, or 'Performance Measures' from each strategy, are provided within the Implementation Schedules (refer Section 12.4.2). These measures define what the specific outcome from each strategy should be. If these outputs are delivered as defined, then the strategy is considered to have been successful.

If the defined performance measures are not generated as a result of implementation of the strategy then the following *contingencies* need to be adopted:

- Determine the reason for not producing the specified output. If the reason involves a lack of funding or resources, then similar contingency measures to those described for the primary performance measures (refer Section 14.1.1) should be adopted. If the reason is of a technical nature, then expertise in the area should be consulted to overcome the technical problem. OEH and other government agencies should have the necessary in-house expertise to assist in most cases.
- Review the appropriateness of the specific output of the management strategy, and if necessary, modify the output described in the Plan to define a more achievable product.

14.1.3 Tertiary Evaluation Measures

The third set of evaluation measures are aimed at *measuring the outcomes of the Plan*, and as such relate to the specific *management objectives* of the Plan (as described in Section 11.1), and how implementation of the Plan has made a difference to the biophysical and social environments of Smiths Lake. The main mechanism for gauging whether these objectives have been achieved, or not, is monitoring. Therefore, monitoring of various elements of the physical, biological and social environment is an essential component of assessing the overall success of the Estuary Management Plan.

If, after a reasonable period of time, the specific objectives of the Plan are not being achieved by the actions being implemented, then the following contingencies should be adopted:

- Carry out a formal review of the implemented management actions, identifying possible avenues for increasing the effectiveness of the action in meeting the Plan objectives;
- Commence implementation of additional management actions that may assist in meeting Plan objectives (possibly 'fast-track' some longer term strategies as necessary);
- Reconsider the objectives of the Plan to determine if they set impossible targets for future estuary conditions, and adjust the Plan, as necessary. Any such changes to the Plan would need to be endorsed by the stakeholders and relevant government agencies, as well as the public.

14.2 Reviews and Amendments

Irrespective of the number of strategies implemented, it is strongly recommended that a detailed review be carried out approximately five years after adoption of the Plan. This will provide opportunity for new issues to be addressed, new management strategies / practices to be incorporated, and an update of responsibilities within government agencies (which change on a relatively regular basis). The five year review also allows more updated scientific information to be incorporated into the Plan (e.g. climate change management and adaptation methods, threatened species listings etc).

It is proposed that the Coastal Zone Management Plan for Smiths Lake Estuary is revisited on a regular basis, and completely reviewed / updated after 7 years (i.e. before 2018). A regular revisit of the Plan (which may occur annually, for example) is necessary to allow modifications / alterations to the management of the estuary, on an as-needed basis, within the context of an adaptive management framework.

The periodic Coastal Zone Management Plan reviews should cover the topics described in Table 14-1. This table also outlines who is responsible for conducting the periodic reviews.

The new Guidelines for Preparing Coastal Zone Management Plans combine with the existing Estuary Management Manual (1992) and the Coastline Management Manual (1990). Therefore, on-going liaison between Council, OEH and the HRCMA is necessary to ensure that the aims and objectives of the Coastal Zone Management Plan for Smiths Lake Estuary continue to be achieved in the future.

Table 14-1 Framework for Future Estuary Management Plan Review

Review Period	Review tasks	Responsibility
Annually	• Assess primary, secondary and tertiary evaluation measures, and determine appropriate contingencies if performance measures do not meet targets • Review funding arrangements and allocations for current and future management strategies • Review resourcing and staffing allocations for current and future management strategies • Provide report on progress of Coastal Zone Management Plan for Smiths Lake Estuary implementation, results of annual review, and any modifications required to the Plan coming out of the review	Estuary Management Committee or appointed external consultant* To be coordinated through Council and reported to Council, relevant stakeholders and government agencies
After 7 Years *(Second review to be completed before 2018)*	• Assess the overall effectiveness of each management strategy implemented to date • For strategies requiring on-going commitment, assess the value in maintaining implementation of those strategies • Reconsider the management options that were not short-listed and included in the original Plan • Provide implementation details of additional strategies that are to be included in the subsequent 5 year Plan • Update the CZMP to reflect proposed strategies for implementation over the next 10 year period, and seek endorsement by stakeholders, government agencies and the community.	Estuary Management Committee or appointed external consultant* To be coordinated through Council and reported to Council, relevant stakeholders government agencies and the general community

** It would be advantageous for the same consultant responsible for initially preparing the Estuary Management Plan to be involved in the annual review and 7-yearly update, given their appreciation of the study area and the details of the Plan and associated strategies.*

14.3 Amendment Record

This Plan was last reviewed and amended on ……..

The next scheduled review is due …….

15 REFERENCES

BOM (2010) 'About East Coast Lows', http://www.bom.gov.au/nsw/sevwx/facts/ecl.shtml, Bureau of Meteorology, Australian Government, Accessed in May 2010

DEC (2010) 'Sand Spurge – profile' http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10160; Image by Di Brown, Department of Environment and Conservation: Threatened Species website, NSW Government, Accessed in August 2010

DCC (2009) Climate Change risks to Australia's Coast: A first pass national assessment, Department of Climate Change, Australian Government

Dean, R.G. and Dalrymple, R.A. (2002) Coastal Processes with Engineering Applications, Cambridge University Press

OEH (2009) New South Wales Sea Level Rise Policy Statement, NSW Government, Department of Environment, Climate Change and Water

DEHWA (2009) Matter of National Environmental Significance: Significant Impact Guidelines 1.1 *Environment Protection and Biodiversity Conservation Act 1999*. Department of Environment, Water, Heritage and the Arts (DEWHA), Commonwealth of Australia

Digsfish Services (2010) Pathological Assessment of Mullet and Flathead from Smiths Lake, prepared for Kath Cheers, Smiths Lake

Dissanayake, D.M.P.K., Ranasinghe, R., Roelvink, J.A. (2009) Effect of Sea Level Rise in Tidal Inlet Evolution: A Numerical Modelling Approach, *Journal of Coastal Research*, SI 56, p942 – 946 ICS2009 (Proceedings)

DPI (2006) Estuarine Resources of NSW, as part of the Comprehensive Coastal Assessment: Better Planning for NSW, Department of Primary Industry now known as Department of Industry and Investment (DPI) NSW Government

Everett, J. (2007) Biogeochemical dynamics of an intermittently open estuary: A field and modelling study, University of NSW, Australia

Gale, E.J. (2006) The Hydrodynamics of Intermittently Closing and Opening Lakes and Lagoons, PhD Thesis, University of W.A., Australia

GLC (2009) Great Lakes Water Quality Improvement Plan: Wallis, Smiths and Myall Lakes, Great Lakes Council, Forster, NSW

Haines, P.E. (2006) Coastal Lakes Management: strategies for a sustainable future, BMT WBM Broadmeadow NSW

Hanslow, D. (2007) Identifying and Adapting to the impacts of Climate Change in the Coastal Zone, presentation to the Department of Environment and Climate Change, Coastal Unit, NSW Government

HCRMA (2007) Hunter – Central Rivers Catchment Action Plan, Hunter Central Rivers Catchment Management Authority

Hutchings, P.A., Nicol, P.I and O'Gower, A.K. (1978) The marine macrobenthic communities of Wallis and Smiths Lakes, New South Wales, *Australian Journal of Ecology* 3: 79-90.

IPCC (2007) Fourth Assessment Report: Climate Change (AR4), Intergovernmental Panel on Climate Change

Macadam, I, McInnes,K and O'Grady, J. (2007) Climate Change projections for the Wooli Wooli estuary and Bateman's Bay, CSIRO.

Masselink,G. and Hughes, M.G. (2003) Introduction to Coastal Processes and Geomorphology, Arnold Publishing

McInnes, K., Abbs,D., O'Farrell,S., Macadam, I., O'Grady, J. and Ranasinghe, R. (2007) Projected changes in climatological forcing for coastal erosion in NSW, CSIRO prepared for NSW Department of Environment and Climate Change

NPWS (2002) Myall Lakes National Park and Myall Coast Reserves Plan of Management

NSW Government (1992) Estuary Management Manual, Public Works Department, Sydney

NSWMA (2005) Smiths Lake Boating Plan of Management, NSW Maritime Authority

PWA (2003) Bolinas Lagoon Conceptual Model, Phillip Williams and Associates

Robinson, K.I., Gibbs, P.J., Barclay, F.B. and May, J.L. (1983) Estuarine flora and fauna of Smiths Lake, New South Wales, Proceedings of the Linnaean Society of New South Wales 107: 19-33.

Roy, P.S. Williams, R. J., Jones, A. R., Yassini, I., Gibbs, P. J., Coates, B., West, R. J., Scanes, P. R., Hudson, J. P. and Nichol, S., (2001) Structure and function of Southeast Australian Estuaries, *Estuarine, Coastal and Shelf Science* 53, 351-384

Smith, C. and Heggie,D.T.(2003) Benthic nutrient fluxes in Smiths Lake, NSW, Geoscience Australia Record 2003/16

Summerfield, M.A. (1991) Global Geomorphology: an introduction to the study of landforms, Longman Scientific and Technical Publishing

Tung, T.T., Walstra, D-J.R., van de Graff,J. and Stive, M.J.F.(2009) Morphological Modelling of Tidal Inlet Migration and Closure, *Journal of Coastal Research*, SI 56, 1080 - 1084

Walsh, K. (2004) Climate change and coastal response: a theme report for the Coast to Coast 2002 National Conference, Gold Coast, November 2002, CRC for Coastal Zone Management, Indooroopilly

Weir, F.M., Hughes, M.G. and Baldock, T.E. (2006) Beach face and berm morphodynamics fronting a coastal lagoon, *Geomorphology*, 82, 331-346

West, E.J., Pitt, K.A., Welsh, D.T., Koop, K. and Rissik, D. (2009) Top-down and bottom-up influences of jellyfish on primary productivity and planktonic assemblages, *Limnol. Oceaongr*. 54(6) 2058-2071

West, R.J., Thorogood, C., Walford, T. and Williams, R.J. (1985) An estuarine inventory for New South Wales, Australia. Fisheries Bulletin 2, Department of Agriculture, NSW

WMA (1998) Smiths Lake Estuary Processes Study, Webb McKeown and Associates

WMA (2001) Smiths Lake Estuary Management Plan, Webb McKeown and Associates

WMA (2008) Smiths Lake Flood Study, Webb McKeown and Associates

APPENDIX A: INVESTIGATION INTO SEDIMENT TRANSPORT WITHIN THE ENTRANCE AREA OF SMITHS LAKE

APPENDIX B: REVIEW OF THE SMITHS LAKE OPENING PROCEDURE WITH RESPECT TO THE MARINE PARKS ACT

APPENDIX C: COMMUNITY CONSULTATION POSTER

APPENDIX D: COMMUNITY BROCHURE

APPENDIX E: CROSS REFERENCE OF NEW ACTIONS AGAINST ORIGINAL ACTIONS

Table E-1 Cross Reference New Actions against Original Actions

New Reference	Cross Reference to Original Actions
OP1	Modified from OP1
OP2	New
OP4	Modified from OP4
OP3	Modified from OP2
OP5	Modified from OP5
OP6	Retained from OP6
OP7	New
OP8	New
ES1	Modified from ES1
ES2	Modified from ES4
ES3	Modified from ES3
ES4	New
ES5	Modified from ES2
ES6	Modified from ES5
ES7	Modified from ES7
ES8	Modified from ES10
ES9	New
ES10	New
WQ1	Modified from WQ1
WQ2	Modified from WQ2
WQ3	Modified from WQ3
WQ4	Modified from WQ6
WQ5	New
WQ6	Modified from WQ11
WQ7	New
WQ8	New
WQ9	New
WQ10	New
WQ11	New
HC1	Modified from HC2
HC2	Modified from HC3
HC3	Modified from HC5
HC4	Modified from HC6
HC5	Modified from HC7
HC6	New
HC7	Modified from HC9
HC8	New
HC9	New
HC10	Modified from HC1
HC11	Retained from HC8
HC12	New
WA1	Modified from WA3
WA2	New
WA3	Modified from WA4
WA4	New
WA5	Modified from WA8
WA6	New
WA7	Modified from WA5
WA8	New
WA9	New

APPENDIX F: FURTHER DETAILS OF STRATEGIC ACTIONS

STRATEGIC ACTIONS TO ADDRESS

ENTRANCE OPENING PROCEDURE

OP1 – Update entrance opening strategy to comply with Marine Parks legislation

Priority: Very High

Timeframe: Immediately (within 12 – 18 months)

Implementation ranking: **1** (scale 1 to 11)

Responsibility: MCC, MPA

Indicative cost: Externally sourced report ~$10,000

Additional information: Since the completion of the original estuary management plan, Smiths Lake has become part of the Port Stephens – Great Lakes Marine Park, and as a consequence the artificial opening of the entrance must now comply with the legislation governing marine parks, primarily the Marine Parks Act 1997 and associated regulations. The main purpose of the Marine Parks Act 1997 is to ensure that natural processes are maintained insofar as is possible, given other constraints of existing infrastructure and development.

Relevant legislation: Marine Parks Act 1997

Indicative steps involved:

Step No.	Tasks	Achieved
OP1-1	Review legislation and determine aspects that need to be addressed within the opening strategy	☐
OP1-2	Modify the strategy to address the legislation	☐

OP2 – Formalise approval/licence requirements from DoI – Crown Lands for artificial entrance opening, including REF or similar

Priority: Very High

Timeframe: Immediately

Implementation ranking: **1** (scale 1 to 11)

Responsibility: MCC, DoI – Crown Lands

Indicative cost: externally sourced report ~$30,000

Additional information: A Review of Environmental Factors (REF) is required when works are to be undertaken on Crown lands. In the case of Smiths Lake the entrance berm is located on Crown Land and as a consequence, an REF or other form of environmental assessment may be required to continue the process of artificially opening the Lake for flood mitigation purposes.

Relevant legislation: Crown Lands Act 1989, Environmental Planning and Assessment Act 1979

Indicative steps involved:

No.	Tasks	Achieved
OP2-1	Liaise with the DoI – Crown Lands to define approvals and licence requirements for artificial entrance opening of the Lake	☐
OP2-2	Undertake reports (environmental assessments) required to accompany licence applications, suitable for approval	☐

OP3 – Establish minimum floor level for developments as defined by the flood level in the Floodplain Risk Management Plan (FRMP)

Priority: Very High

Timeframe: Short Term (within 1 – 3 years), but only following completion of OP4.

Implementation Ranking: **3** (scale 1 to 11)

Responsibility: MCC

Indicative cost: Minimal - Staff time only

Additional information: The timeframe is dependent on the completion of the FRMP, which is currently in preparation. Flood levels used for determination of minimum floor levels should incorporate provisions for future sea level rise and other climate change variables, as well as appropriate freeboard. Assumptions will also have to be made regarding the future artificial management of the Lake entrance. By assuming a particular level of artificial intervention, and then allowing future development based on that level, commits Council to the liability of maintaining such minimum entrance conditions.

The lowest lying residential floor level is at 3m AHD. Other non-residential land users that will be significantly affected by flood waters associated with Smiths Lake include Frothy Coffee Cafe (2.2m AHD), the Sandbar and Bushland Caravan Parks, the UNSW research station and the golf course near Cellito Beach (WMA 2009).

Indicative steps involved:

No.		Achieved
OP3-1	Identify relevant planning controls requiring that stipulate minimum floor levels.	☐
OP3-2	Incorporate revised minimum floor level, as determined through the FRMP, into relevant planning controls	☐

OP4 – Undertake Floodplain Risk Management Study (FRMS) and Plan (FRMP), incorporating climate change projections

Priority: High

Timeframe: Immediately (within 12 – 18 months)

Implementation Ranking: **2** (scale 1 to 11)

Responsibility: MCC, OEH

Indicative cost: Externally sourced report ~$100,000

Additional Information: The Floodplain Risk Management Plan is currently underway. Guidelines for the preparation of the Floodplain Risk Management Plan are given in the NSW Government's Floodplain Development Manual (2005).

Indicative steps involved:

No.	Task	Achieved
OP4-1	Ensure that appropriate climate change projections, entrance management provisions and ecological values are included within management study and plan.	☐
OP4-2	Implement the recommendations of the Floodplain Risk Management Plan	☐

OP5 – Undertake a detailed review of the entrance opening strategy and procedure in 2020

Priority: High

Timeframe: Long Term (5+ years)

Implementation Ranking: **10** (scale 1 to 11)

Responsibility: MCC, OEH, DPI, MPA

Indicative cost: Staff time, or externally sourced report ~$30,000 (2010 value)

Additional information: Artificial entrance opening of Smiths Lake has been occurring since 1932, with Council taking responsibility for initiating the opening since the 1960's (WMA, 2008) The main purpose for opening the Lake has been flood mitigation, with some additional openings for water quality or construction purposes. Up until 1999 the trigger water level was set at approximately 1.7m AHD. After 1999 the trigger water level was raised to 2.1m AHD to reduce the number of openings and to replicate more closely a natural opening and closing regime.

One of the new objectives of the CZMP is to ensure that *Climate Change is considered when making long term decisions regarding Smiths Lake and its catchment* (Table 7-6). Sea levels are predicted to rise under climate change, and the magnitude predicted for the NSW coastline includes a rise relative to 1990 mean sea levels of 40 cm by 2050 and 90 cm by 2100 (DECCW 2009). A review of the entrance opening strategy should investigate in detail the impacts of a rise in sea level upon the opening procedure, as some likely impacts may include increased berm heights and restrictions to outflow resulting in increased potential for local flooding. It may therefore be necessary to plan for future raising of the opening water level in line with the increase in mean sea level.

Indicative steps involved:

No.		Achieved
OP5-1	Collate relevant new information including all monitoring data and recent research.	☐
OP5-2	Review and update the procedure in accordance with relevant information.	☐
OP5-3	Incorporate projected Sea Level Rise into management regime	☐

Reference: DECCW (2009) NSW Sea Level Rise Policy Statement, Department of Environment, Climate Change and Water, NSW Government

OP6 – Commence monitoring and recording of entrance conditions and opening impacts

Priority: High

Timeframe: Immediately (within 12 – 18 months)

Implementation Ranking: **2** (scale 1 to 11)

Responsibility: MCC

Indicative cost: staff time only

Additional Information: Every opening event is different, given different meteorological conditions and different berm conditions. Routine monitoring of environmental conditions over time will enable relationships between environmental forcing (storms, tides) and entrance configuration to be developed, enhancing the refinement of management strategies.

Recent focus of monitoring includes the impacts from entrance openings on erosion of the southern dune as well as the loss of dune complex and wetland habitat, which are included within the Myall Lakes National Park.

Characteristics to be recorded or monitored should attempt to include those listed in Table F-1, with higher importance on those identified with an asterix (*).

Adaptive entrance opening management allows for amendments to the Entrance Opening Strategy. The most recent amendment, as agreed at the Estuary Management Committee Meeting (August 2011), includes:

- The next opening should be closer to the southern dune (no closer than 75 m but within 100m) as the last opening in May 2011 was followed by a large easterly swell which pushed a substantial quantity of sand into the entrance channel. It will be necessary to move the opening from the current position in order to influence a suitable opening.

Indicative steps involved:

No.	Task	Achieved
OP6-1	Undertake monitoring. Engage professionals if required.	☐
OP6-2	Analyse data and identify relationships to determine impacts of opening	☐
OP6-3	Amend entrance opening plan as required.	☐

Table F-1 Parameters for recording and monitoring during entrance openings

Location	Measurement	Additional Notes
Entrance	Width and contours of beach berm before breakout, including area over berm into Lake.	Changes to the beach berm are likely to indicate changes to sediment supply and will impact upon time required to initiate opening and maintain an effective channel.
	Time and date of opening*	Individual records, in conjunction with antecedent rainfall and tidal stage, allow identification of opening duration and effectiveness. Longer term records allow for investigation into relationships between openings and local climate.
	Approximate date of closure*	Identification of closure date allows identification of key environmental and oceanic conditions that may affect closure success.
	GPS or approximate opening location*	Knowledge of the entrance opening location, in conjunction with descriptions on erosion / deposition and channel dynamics, allows future management activities to be amended to reduce impacts.
	Nature of opening (natural / artificial / illegal)	Allows assessment of the effectiveness of artificial management (vs. natural and illegal openings) as well as providing documentation of illegal openings, if ever required.
	Water velocities recorded through channel over time	Provide identification of higher and lower flow velocities, which impact upon flushing and exchange of the Lake. In conjunction with the channel dimensions, will provide indication of flow volumes and mass fluxes exchanged between the Lake and the ocean. The collection of data within the entrance channel is problematic therefore the timing of drogues (e.g. oranges) past key locations (e.g. stakes) may provide sufficient information whilst maintaining safety of personnel.
	Edges of channel as it evolves	Provide quantitative evidence of channel dynamics to identification of key morphological processes and patterns, as well as providing information for calculation of mass volumes and fluxes. E.g. bottom of side bank measurements, utilising a hand held or RTK GPS, provide sufficient information to allow channel width o be estimated.
	Digital photos / Aerial photos	Provide qualitative evidence of channel location and extents, flood limits, environmental and oceanic conditions.
Lake	Breakout Lake water level*	In conjunction with opening duration, water levels over time and climate, an assessment of breakout water level on effectiveness of opening can be assessed.
	Chlorophyll *a* (Symes Bay and main water body)	May be used as an indicator of high nutrients whilst also providing an indication of inflows and flushing within Symes Bay, when compared against the main body of the Lake.
	Lake Water Levels over time*	Provide an indication of the degree of tidal exchange experienced within the Lake, and provides an indicator of when the Lake is likely to close (tidal signal is dampened).
Ocean	Significant wave height and direction*	Offshore waves are a good indicator of the direction of offshore and alongshore sand transport, both of which act towards closing the entrance e.g. big seas can block the entrance with sand very quickly.
	Tidal stage during initial breakout*	In conjunction with water velocities and channel dimensions the tidal stage can be assessed for effectiveness in maintaining an open channel, under different combinations of environmental forcing.

Climate	Ocean water levels over time*	Provide evidence of tidal dynamics, setup and storm surges. Data can be utilised to identify relationships between downstream water levels, entrance channel dynamics and water exchange.
	Wind speed & direction	Allows assessment of wind impacts on effectiveness in maintaining an open channel, and in conjunction with tidal velocities, allows mixing between oceanic and Lake waters to be estimated. Local wind may also promote seiching of water bodies promoting a setup of waters and return flows, which can impact upon channel flows.
	Rainfall over time*	In conjunction with water levels, rainfall provides an indication of cumulative rainfall required to initiate and maintain an opening.
Amendments to Entrance Opening	May include change to entrance opening location. Care should be taken that these changes are minor and do not require greater impact assessment before implementation.	

OP7 – Develop and implement education program on the dangers and legalities associated with opening events

Priority: High

Timeframe: Medium term (within 3 – 5 years)

Implementation Ranking: **7** (scale 1 to 11)

Responsibility: MCC, NSW Maritime Authority, MPA

Indicative cost: Staff time, plus resources and materials ~$5,000/yr

Additional Information: Entrance breaches initiated by the community can be very dangerous, as once an outflow is established, the channel can grow rapidly and unpredictably. The water is of high velocity, which can be very dangerous for wading. Sudden bank collapse is a feature of channel growth – therefore observers standing too close may end up in the channel requiring rescue.

Indicative steps involved:

No.	Tasks	Achieved
OP7-1	Identify risk and dangers associated with entrance openings	☐
OP7-2	Identify legalities and / or fines associated with community initiation or intervention of opening events	☐
OP7-3	Educate community on dangers, legalities, fines and safety through options including signage, brochures, posters, etc	☐

Example safety brochure by NSW Maritime

OP8 – Investigate and implement options to enhance safety during opening procedure

Priority: High

Timeframe: Short term (within 1-3 years)

Implementation Ranking: **5** (scale 1 to 11)

Responsibility: MCC, NSW Maritime Authority

Indicative cost: Staff time, plus resources and materials ~$5,000/yr

Additional Information: This is typically a more significant issue when community members undertake illegal opening the Lake, rather than during Council-organised operation. Options including greater signage may increase awareness of safety when Council and other authorities are not present.

Indicative steps involved:

No.	Tasks	Achieved
OP8-1	Investigate specific areas or times requiring extra safety during an opening event and investigate safety options.	☐
OP8-2	Implement options to enhance safety during these times e.g. education, developing local Council legislation to allow greater enforcement of compliance to safety controls e.g. signage outlining exclusion zone during certain times of the opening event.	☐

STRATEGIC ACTIONS TO ADDRESS

EROSION AND SEDIMENTATION

ES1 – Review sediment management development controls on building/construction works with best practice and ensure all new driveways in catchment are sealed

Priority: High

Timeframe: Short term (within 1 - 3 years)

Implementation Ranking: **5** (scale 1 to 11)

Responsibility: MCC, Developers, Land Holders

Indicative cost: staff time

Additional Information: There are various industry standards that can be referred to for identifying current best practice for sediment and erosion control (eg the construction Blue Book). Council should ensure that their development controls and standard conditions of consent reflect current best practice in this regard.

Indicative steps involved:

No.	Tasks	Achieved
ES1-1	Identify 'Best Practice' sediment management development controls. This may be undertaken through a review of State or other Council documentation and may include a review of the existing Erosion and Sediment control policy (GLC, 1995) with regards to identified 'Best Practice' guidelines.	☐
ES1-2	Incorporate driveway sealing into guidelines and development controls	☐

ES2 - Implement 'best practice' design guidelines to reduce sediment erosion during road and infrastructure construction and maintenance

Priority: Very High

Timeframe: Short term (within 1 – 3 years)

Implementation Ranking: **3** (scale 1 to 11)

Responsibility: MCC, RTA

Cost: staff time

Additional Information: Council is currently undertaking a project to improve sediment erosion control performance in 2010. Council has trained staff on standards for maintenance of roads across LGA and in best practice gravel road maintenance.

Indicative steps involved:

No.		Achieved
ES2-1	Ensure Council guidelines are the most recent 'Best Practice' design guidelines for road and infrastructure construction and maintenance. This may be undertaken through a review of State, other Council documentation or relevant organisations e.g. Austroads, the association of Australian and New Zealand road transport and traffic authorities	☐
ES2-2	Ensure best practice guidelines are implemented during road and infrastructure construction and maintenance	☐

ES3 – Restrict 4WD vehicle access at Wamwarra Bay and enforce compliance

Priority: Medium

Timeframe: Immediately (within 12 – 18 months)

Implementation Ranking: **4** (scale 1 to 11)

Responsibility: MCC, Vehicle owners, DoI – Crown Lands

Cost: Staff time, plus materials including bollards, signage, fencing etc ~$15,000

Additional Information: Strategies employed by NPWS include: permit systems (including a maximum limit on permit numbers), improved information provided to drivers, improved signage, clearly marked entry and exit points, hardening of entry and exit points, and seasonal beach closures to protect threatened species.

Indicative steps involved:

No.		Achieved
ES3-1	Investigate access control options e.g. bollards, signage.	☐
ES3-2	Develop program to implement access controls.	☐
ES3-3	Monitor for effectiveness and investigate penalties for non-compliance if required.	☐

Existing signage restricting vehicle access on the eastern edge of Symes Bay

ES4 – Undertake sealing of dirt and unsealed roads in Smiths Lake Village e.g. Valley Rd, Phillip Rd and Sandbar Rd

Priority: High

Timeframe: Medium term (within 3 - 5 years)

Implementation Ranking: **7** (scale 1 to 11)

Responsibility: MCC, RTA

Indicative cost: Staff time, with costs to be incorporated into Council's existing works program. Typical costs for road sealing are $200 - $400 per lineal metre for a 2 lane country road.

Additional information: The following areas have also been identified by the community as requiring some degree of works: steep gravel road (Ansett Ave).

Indicative steps involved:

No.		Achieved
ES4-1	Identify all dirt and unsealed roads requiring sealing e.g. Valley Rd, Phillip Rd, Sandbar Rd, Road to Golf course, Ansett Ave	☐
ES4-2	Identify priority for sealing of those roads.	☐
ES4-3	Develop program to undertake works.	☐
ES4-4	Ensure best practice in the stabilisation of roads is undertaken prior to sealing	☐

ES5 – Inspect construction sites for compliance with sediment management development controls

Priority: High

Timeframe: Immediately (within 12 – 18 months)

Implementation Ranking: **2** (scale 1 to 11)

Responsibility: MCC, Developers, Land Holders

Indicative cost: staff time

Additional Information: Council is already responsible for inspections of building sites to ensure compliance with conditions of development consent that relate to sediment and erosion control. Additional inspectors / compliance officers may be required to ensure that building sites are audited on a regular basis.

Indicative steps involved:

No.		Achieved
ES5-1	Promote integration of inspections into the works programs	☐
ES5-2	Evaluate internal resourcing of inspectors, to ensure that inspections are undertaken in a timely and regular basis for all construction sites	☐

ES6 – Continue works to manage concentrated flows and to rehabilitate eroded gullies, caused by roadwork's in Smiths Lake Village, along the Lakes Way and throughout the catchment

Priority: High

Timeframe: Immediately (within 12 to 18 months)

Implementation Ranking: **2** (scale 1 to 11)

Responsibility: MCC, Bushcare Groups

Cost: Council staff and volunteer time, plus resources and materials for on-going rehabilitation works ~ $10,000/yr

Additional Information: New areas for rehabilitation will be identified through works undertaken as part of Action ES8

Indicative steps involved:

No.	Tasks.	Achieved
ES6-1	Review existing outlined area for required works. Investigate new potential areas in catchment for required works including the identification of eroding drainage paths and existing sediment control structures around the Lake edge.	☐
ES6-2	Identify most suitable sediment control structures for area where required. Identify rehabilitation options where required.	☐
ES6-3	Develop program to undertake works. Develop program to routinely clear blocked drains, investigate options for street sweeping.	☐
ES6-4	Maintain all sediment control structures.	☐

Table drain located along Patsys Flat Rd

ES7 – Investigate success of existing dune stabilisation works and implement maintenance / upgrade program

Priority: Medium

Timeframe: Immediately (within 12 to 18 months)

Implementation Ranking: **4** (scale 1 to 11)

Responsibility: MCC, OEH, Aboriginal Community, Volunteer groups

Cost: Council staff and volunteer time, plus resources and materials for on-going maintenance and upgrade works ~ $5,000/yr

Additional information: In the vicinity of the Lakes entrance the aerial photographs show vegetation along the dune system that has extended eastward, indicating the possibility of beach accretion in this area (WMA 1998). The dunes may be a possible source of sand moving into the Lake and reducing water depths (i.e. wind blown sands). Dunes stabilisation is likely to become an important management measure to minimising the impacts of future climate change.

Indicative steps involved:

No.	Tasks	Achieved
ES7-1	Identify dune areas where stabilisation works have not been successful.	☐
ES7-2	Liaise with Aboriginal Community on dune stabilisation options and opportunities for on the ground help.	☐
ES7-3	Develop and implement program for maintenance and upgrade where required, including cost (identify funding options), identify work force options (bushcare or dunecare groups). Where actions are proposed on Crown Land, not under Council management, authorisations from DoI – Crown Lands are likely to be required.	☐
ES7-4	Identify any new areas requiring stabilisation works.	☐

ES8 – Identify eroding watercourses through presence of sedimentation at the outlets of drains and creeks around the Lake

Priority: Medium

Timeframe: Medium (within 3 - 5 years)

Implementation Ranking: **9** (scale 1 to 11)

Responsibility: MCC

Indicative cost: staff time

Indicative steps involved:

No.		Achieved
ES8-1	Assess air photographs and hydrosurveys to determine presence and size of alluvial deltas around the Lake	☐
ES8-2	Identify potential areas of erosion in the catchment (steep gradient, land clearing etc) contributing to alluvial sedimentation.	☐
ES8-3	Identify relevant timescales for continuing erosion to advance and develop program to survey and monitor the specific sites of erosion at the relevant timescales	☐
ES8-4	Investigate requirements for any associated remediation works relating to erosion sites. Develop and implement program as required.	☐

Creek outlet location next to UNSW field Research Station, SW corner of Smiths Lake

ES9 – Survey Symes Bay for sedimentation / infill

Priority: High

Timeframe: Medium term (within 3 - 5 years)

Implementation Ranking: **7** (scale 1 to 11)

Responsibility: MCC

Indicative cost: Hydrosurvey likely to cost in the order of $20,000

Additional information: The aerial photography analysis (APPENDIX A:) indicates minimal sedimentation within the entrance region since 1953, with the exception of washover fans that likely occurred during large storms in 1974. The two main entrance channels have shown relative stability over the last 50 years. Community feedback is divided over the perception of infilling.

Indicative steps involved:

No.	Tasks	Achieved
ES9-1	Identify requirements for a field investigation to confirm sedimentation in Symes Bay e.g. bathymetry mapping, sediment sampling or coring, modelling etc, and undertake works as required.	☐
ES9-2	Using gathered information, calculate sedimentation rates in Symes Bay and decide whether these rates are acceptable or not.	☐
ES9-3	If rates are unacceptable then decide on management options e.g. removal of sediments, 'do nothing' etc.	☐
ES9-4	If sediment removal is the desired outcome then investigate options for removal	☐

ES10 – Survey southern foreshore dune (including wetland edge) near entrance following opening events

Priority: High

Timeframe: Immediately (within 12 to 18 months)

Implementation Ranking: **2** (scale 1 to 11)

Responsibility: MCC, OEH (NPWS)

Indicative cost: staff time, incorporate into monitoring during opening events,

Additional information: In the vicinity of the Lakes entrance, the aerial photographs show vegetation along the dune system that has extended eastward, indicating the possibility of beach accretion along the southern foreshore dune (WMA 1998). The specific location of the entrance channel opening has been set to minimise erosion of the southern foreshore dune.

Indicative steps involved:

No.		Achieved
ES10-1	Undertake survey of foreshore edge before and after each entrance opening event.	☐
ES10-2	Identify rates of erosion and the connection to opening events. Consider other factors that may be influencing erosion, eg natural geomorphic channel meandering, prevalent storm conditions, human intervention etc.	☐
ES10-3	Investigate options to minimise erosion events if considered detrimental to habitats or infrastructure.	☐

STRATEGIC ACTIONS TO ADDRESS

WATER QUALITY

WQ1 – Investigate areas that would benefit from a Stormwater Management Plan and develop and implement where necessary

Priority: Medium

Timeframe: Short term (within 1 - 3 years)

Implementation Ranking*:* **6** (scale 1 to 11)

Responsibility: MCC

Indicative cost: staff time, or an externally commissioned consultant to prepare Plan(s), and then unknown costs for implementation (depends on the cost of the Plan(s))

Additional Information: For communities with less than 1000 residents, Council is not required under the *Protection of the Environment Administration Act 1991* to provide a Stormwater Management Plan. In some areas this may however be beneficial and Council may decide to embark on the process anyway. The final responsibility lies with Council's Engineering branch.

Indicative steps involved:

No.		Achieved
WQ1-1	Identify areas which may benefit from a Stormwater Management Plan.	☐
WQ1-2	Prepare and implement stormwater management plan(s) including potential options for integration of Water Sensitive Urban Design (WSUD).	☐
WQ1-3	Investigate incentives to promote WSUD	☐

WQ2 – Implement strict control of catchment runoff water quality for all development to WQIP Guidelines

Priority: High

Timeframe: Immediately (within 12 to 18 months)

Implementation Ranking: **2** (scale 1 to 11)

Responsibility: MCC

Indicative cost: Staff time

Additional information: New developments are to meet 'no net increase' requirements, as specified in the WQIP (GLC, 2009).

Indicative steps involved:

No.		Achieved
WQ2-1	Investigate options to allow enforcement of compliance for developments.	☐
WQ2-2	Educate new private landholders e.g. with information packs, when a Development Application is received, and undertake annual open days / workshops etc.	☐
WQ2-3	Link with Water Quality Monitoring Program. Key area to be included is Symes Bay	☐

WQ3 – Finalise Draft DCP 34 - Acid Sulfate Soils

Priority: Medium

Timeframe: Immediately (within 12 – 18 months)

Implementation Ranking: **4** (scale 1 to 11)

Responsibility: MCC

Indicative cost: staff time plus commercial lab analysis ~$5,000 say

Additional information: The DCP is currently in draft stage and requires final testing before completion.

Indicative steps involved:

No.	Tasks	Achieved
WQ3-1	Outline specific requirements and tasks to finalise DCP.	☐
WQ3-2	Develop and implement program of works to undertake tasks.	☐
WQ3-3	Finalise and adopt DCP	☐

WQ4 – Repair and maintain all on-site sewage management systems, and enforce appropriate action where required

Priority: High

Timeframe: Immediately (within 12 to 18 months)

Implementation Ranking: **2** (scale 1 to 11)

Responsibility: MCC, Land Holders

Indicative cost: staff time for inspections / audits, maintenance costs to be met by owners

Additional information: All onsite sewage management systems require ongoing maintenance to ensure they function properly, and any works should be undertaken in accordance with the on-site sewage management strategy.

Indicative steps involved:

No.	Tasks	Achieved
WQ4-1	Community education on the need for auditing and maintenance of onsite sewage management systems	☐
WQ4-2	Undertake periodic audits of all on-site sewage management systems. For high risk systems (eg around Lake edge), audits should be annually.	
WQ4-3	Follow enforcement procedures where required	☐
WQ4-4	Ensure repair and maintenance occurs in a timely fashion	☐

WQ5 – Maintain and upgrade sewerage system as necessary to accommodate climate change projections e.g. Sea Level Rise

Priority: High

Timeframe: Long term (more than 5 years)

Implementation Ranking: **10** (scale 1 to 11)

Responsibility: Mid Coast Water

Indicative cost: Costs not known until an audit of the vulnerability of the system is carried out

Additional information: Climate change projections indicate a rise in sea level of 0.9m by 2100. This is likely to have potential consequences for low lying infrastructure, and should be investigated further.

Indicative steps involved:

No.	Tasks	Achieved
WQ5-1	Undertake an audit of the existing sewerage system to determine vulnerability to future sea level rise and other climate change projections	☐
WQ5-2	Investigate options to upgrade sewage system to accommodate climate change.	☐
WQ5-3	Develop and implement program to make appropriate changes	☐

WQ6 – Classify all on-site sewerage systems within 100m of Lake edge as high risk, requiring annual compliance audits

Priority: High

Timeframe: Immediately (within 12 – 18 months)

Implementation Ranking: **2** (scale 1 to 11)

Responsibility: MCC

Indicative cost: staff time

Additional information: Refer to Council's On Site Sewage Management Strategy

Indicative steps involved:

No.		Achieved
WQ6-1	Map all on-site sewage systems within Smiths Lake catchment, identifying systems that are low-lying and/or are located within 100 metres of the water's edge	☐
WQ6-2	Undertake surveys in accordance with the on-site sewage management strategy, with a minimum of annual surveys for high risk systems.	☐

WQ7 – Investigate pumping stations at Eagle Nest Parade and Patsy's Flat Rd for leakage / overflows during heavy rains

Priority: High

Timeframe: Short term (within 1 – 3 years)

Implementation Ranking: **5** (scale 1 to 11)

Responsibility: Mid Coast Water

Indicative cost: staff time

Additional information: Identified as a possible issue by the community and has been investigated during dry weather with no conclusive evidence of overflows. Further investigation required during wet weather.

MCW has a policy to respond to any sewer spill immediately, and everything gets reported to council. There hasn't been a recorded spill into the Lake since December 2008, and the last pump station break was in 2002. All past spills have been fixed and followed up to avoid recurrence. Some works have also been undertaken to fix odour complaints including better sealing of manhole covers, wet well washing in the pump stations and adding chemicals to stop the sewer becoming anaerobic.

All the pumping stations have alarmed monitoring systems, to inform MCW straight away if there's a problem. MCW are happy to provide a demonstration to the community on the alarmed systems if required.

Indicative steps involved:

No.	Tasks	Achieved
WQ7-1	Community education on procedure for notifying MCW if an overflow from a pumping station is noticed	☐
WQ7-2	Investigate specific pumping stations during heavy rains	☐

WQ8 – Encourage connection of caravan park to reticulated sewerage system, with connection to be specified as a condition of consent for any future development

Priority: High

Timeframe: Medium term (within 3 - 5 years)

Implementation Ranking: **7** (scale 1 to 11)

Responsibility: MCC, MCW, private landowners

Cost: Staff time, with cost for connection to be met by owners, less any incentives offered (costs of incentives unknown)

Additional information: MCW has been in negotiation with Paspaley (land owner) over connection of Bushland and Sandbar Caravan Parks to reticulated sewerage, with designs for work and environmental assessment currently underway.

Indicative steps involved:

No.	Tasks	Achieved
WQ8-1	Incentives may include a range of provisions or mechanisms associated with existing or future management of the site. An example incentive may be to restrict connection of reticulated water supply until they connected to sewerage	☐
WQ8-2	Ensure any new developments or redevelopments propose connection to the sewer.	☐

WQ9 – Seal or raise sewer manholes located below 2.5m AHD

Priority: High

Timeframe: Short term (within 1 – 3 years)

Implementation Ranking: **5** (scale 1 to 11)

Responsibility: Mid Coast Water

Indicative cost: Unknown until audit is carried out to determine the infrastructure and number of manholes that is below 2.5m AHD.

Additional information: some of the manhole covers are situated quite low and are likely to become inundated for extended periods when the entrance is closed. If the manhole covers are frequently inundated they will need to be sealed or raised. A level of 2.5m AHD has been chosen to accommodate the existing entrance breakout level (2.1m AHD) plus scope for future increase in this level and/or freeboard (incorporating waves, wind set-up etc).

Indicative steps involved:

No.		Achieved
WQ9-1	Identify relevant sewer manholes that require sealing or raising. Develop priority program.	☐
WQ9-2	Undertake works to seal and raise manholes	☐

Low-lying manhole located next to creek entering Smiths Lake

WQ10 – Investigate possible pollutant point sources into the Lake and creeks

Priority: High

Timeframe: Short term (within 1 - 3 years)

Implementation Ranking: **5** (scale 1 to 11)

Responsibility: MCC, Community

Indicative cost: staff time plus commercial lab analysis ~$5,000 to help with assessment

Additional information: Community feedback has identified a number of possible point sources of pollution that require further investigation: runoff from Sandbar Golf Course, foul smell along foreshores of Symes Bay, pollution entering Lake from urban areas after heavy rain

Indicative steps involved:

No.	Tasks	Achieved
WQ10-1	Identify possible point sources to be monitored, through community feedback and catchment landuse analysis. Outline aspects of required monitoring including timing of monitoring (related to rainfall, tides, opening events, seasons etc), parameters to be monitored (e.g. pathogens, nutrients, pesticides) and locations to be monitored and cross reference with WQIP program	☐
WQ10-2	Investigate possible sources of funding e.g. collaboration with UNSW or Waterwatch programs	☐
WQ10-3	Analyse monitoring data to provide assessment of possible pollutant point sources. Investigate enforcement options (e.g. EPA licence requirements for golf course, fines for pollution etc).	☐

WQ11 – Develop and implement education program on pollutant sources to Lake

Priority: Medium

Timeframe: Medium term (within 3 - 5 years)

Implementation Ranking: **9** (scale 1 to 11)

Responsibility: MCC, Community

Indicative cost: staff time plus resources and materials ~$5,000/yr

Additional Information: This strategy involves community education targeting the current natural values and the uniqueness Smiths Lake and the environmental sensitivity and fragility of the area, and the impact of catchment-based pollution on the natural values. The program would highlight the framework for management of Smiths Lake, specifically the role of the Marine Park (i.e. "its equivalent of a National Park, but for a waterway, and it has to be treated and respected the same as a National Park."). Community based education could involve educational brochures, signage, media coverage and participatory on-site workshops. In addition direct consultation could be carried out with residents within Smiths Lake Village.

Education programs could be set up during school holidays for children and adults at the Caravan Parks and the foreshore adjacent to Frothy Coffee, providing activities in which the community can learn about the diverse range of species and habitats in the estuary and the wider catchment.

Indicative steps involved:

No.	Tasks	Achieved
WQ11-1	Identify activities within the catchment that may pollute the Lake.	☐
WQ11-2	Develop education program promoting awareness of the linkage between the activities and pollution e.g. information day, workshops, information packs, posters, signage, drain stencilling etc. Provide education about fines for pollution.	☐
WQ11-3	Implement program and periodically review and amend as appropriate	☐

STRATEGIC ACTIONS TO ADDRESS

HABITAT CONSERVATION

HC1 – Review foreshore zoning during the development of the new Standardized LEP to increase protection for habitat and cultural heritage around the Lake

Priority: Medium

Timeframe: Short term (within 1 - 3 years)

Implementation Ranking: **6** (scale 1 to 11)

Responsibility: MCC, Aboriginal community, OEH (NPWS)

Indicative cost: staff time only

Additional information: The southern edge of the Lake is part of the Myall Lakes National Park and as such is protected under the national parks management plan, and Council zoning 8a (National Parks and Recreation Areas Zone). A large majority of the foreshore is zoned 'open space' and certain developments are not allowed within this region already. See Figure 10-1 for land zoning around the Lake.

Indicative steps involved:

No.		Achieved
HC1-1	Identify foreshore areas that require additional active protection from impacts including specific habitat types and sites of cultural heritage e.g. western edge of the Lake	☐
HC1-2	Identify possible changes to zoning for inclusion into new standardised LEP	☐
HC1-3	If zoning is not to change then identify program of actions that promote protection e.g. fencing, revegetation etc.	☐
HC1-4	Implement program	☐

HC2 – Implement 'best practice' planning controls for natural buffer zones around the Lake and along major drainage pathways

Priority: High

Timeframe: Short term (within 1-3 years)

Implementation Ranking: **5** (scale 1 to 11)

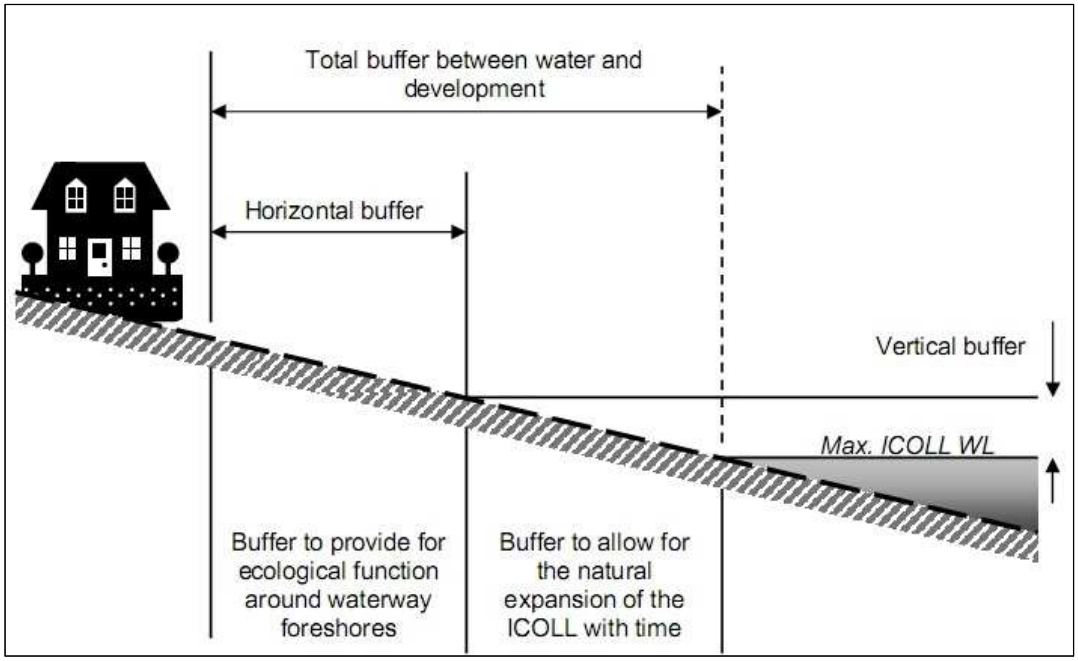
Responsibility: MCC

Indicative cost: staff time

Additional information: A **vertical buffer** should be defined as a specific level above Australian Height Datum (AHD), and should represent a maximum water level at the end of the set management planning period. Based on the current opening water level within Smiths Lake, of 2.1m AHD (at initiation of breakout) and the projected sea level rise of 0.9m by 2100, the maximum water level should be the sum of these two and is approximately 3.0m AHD.

A **horizontal buffer** should then lie landward of the vertical buffer (3.0m AHD) and incorporate a horizontal extent sufficient for a riparian corridor. Buffers of 50m are recommended in Western Australia and are generally accepted also by key NSW state agencies such as OEH and Department of Lands. To maximise their ecological function these buffers should not be used for stormwater treatment or as a bushfire buffer, likewise roads should be located between the buffers and development to mitigate bushfire risk and to minimise illegal encroachment of private development into the buffer area (Haines 2006, 2008).

Zonings should be consistent with Crown Reserve purpose, where relevant.



Vertical and Horizontal vegetation buffer extents (Haines 2008)

Indicative steps involved:

No.	Tasks	Achieved
HC2-1	Identify major drainage pathways into Smiths Lake and investigate requirement for a 'planning control' for buffer zones e.g. are the buffer regions covered by other legislation etc.	☐
HC2-2	Develop a 'Best Practice' planning control (eg in form of DCP) for buffer zones along drainage pathways incorporating current information from *Haines 2008*. Public land managers should be consulted ahead of proposed LEP zone changes **Vertical buffer** of 3.0m AHD to allow for the natural expansion and contraction of the waterway as well as allowance for higher Lake levels or future sea level rise. H**orizontal buffer** landward of the vertical buffer and at least 50m from the water's edge, to maintain riparian ecosystems and to protect the waterway environment from the potential impacts of development	☐

HC3 – Maintain restricted access to specific areas containing threatened and endangered species e.g. Coastal Spurge

Priority: High

Timeframe: Immediately (within 12 to 18 months)

Implementation Ranking: **3** (scale 1 to 11)

Responsibility: MCC, OEH (NPWS)

Indicative cost: Staff time, plus resources and materials ~ $10,000 for mapping and protection works

Additional information: Dune area fenced and wind fencing installed on sand dune

Indicative steps involved:

No.		Achieved
HC3-1	Review relevant legislation periodically to ensure list of species are current.	☐
HC3-2	Periodically update mapping to ensure boundaries for protected areas are current.	☐
HC3-3	Develop program, if required, for maintenance and to restrict access to these areas.If actions are proposed on Crown Land, authorisations from DoI - Crown Lands are likely to be required.	☐

HC4 – Investigate options to restrict boat access in the vicinity of seagrass bed areas during low Lake levels

Priority: Medium

Timeframe: Short term (within 1 - 3 years)

Implementation Ranking: **6** (scale 1 to 11)

Responsibility: MCC, NSW Maritime Authority, DPI

Indicative cost: staff time plus materials ~$10,000

Additional information: Marker buoys can be installed, but would need to be moved periodically to ensure that they reflect up-to-date seagrass extents. Education is one of the key factors in protecting the seagrass.

Indicative steps involved:

No.	Tasks	Achieved
HC4-1	Identify all seagrass areas within Smiths Lake (see action HC7) and identify times when access needs to be restricted e.g. just after an opening event etc.	☐
HC4-2	Investigate options to restrict boat access to these areas including education and signage (e.g. seagrass are habitats for fish), brochures at bait shops, marker buoys (liaise with NSW Maritime and MPA),	☐
HC4-3	Consider introducing and enforcing regulations against damaging seagrass (e.g. propeller damage)	☐

HC5 - Undertake priority pest and weed management in degraded areas e.g. dunes, and incorporate traditional methods of management

Priority: Medium

Timeframe: Immediately (within 12 to 18 months)

Implementation Ranking: **4** (scale 1 to 11)

Responsibility: MCC, OEH (NPWS), Aboriginal community

Indicative cost: staff time and volunteer time plus resources and materials ~$20,000/yr

Additional information: The management of rabbits within the catchment has been found to be difficult, whilst bitou bush is routinely sprayed by National Parks.

Indicative steps involved:

No.	Tasks	Achieved
HC5-1	Identify pests and weeds of concern within Smiths Lake catchment, including liaison with the Aboriginal Community	☐
HC5-2	Identify specific areas requiring active pest management, identify relevant authority(e.g. MPA, NPWS, MCC, Aboriginal Community) and investigate pest management options	☐
HC5-3	Investigate sensitive practice options for weed control in culturally sensitive areas subject to potential erosion e.g. hand pulling weeds on dune systems to avoid aerial spraying which kills indigenous plants as well as weeds and reduces dune stabilisation. Liaise with Aboriginal Community.	☐
HC5-4	Develop and implement programs to manage specific pests, including delegation to relevant authorities.	☐

HC6 – Identify areas of degraded habitat and incorporate into works program for rehabilitation, possibly co-ordinated with ES6 and/or ES7

Priority: Medium

Timeframe: Medium term (within 3 – 5 years)

Implementation Ranking: **9** (scale 1 to 11)

Responsibility: MCC, Volunteer groups (e.g. Bushcare, Aboriginal community)

Indicative cost: Staff and volunteer time plus resources and materials ~$20,000/yr

Additional information: Exotic lilies have been identified by the community in the rainforest at the end of Harcourt Cr, while various weeds are prevalent along the Smiths Lake Village foreshores.

Indicative steps involved:

No.		Achieved
HC6-1	Identify areas of degraded habitat requiring rehabilitation works, and develop priority program	☐
HC6-2	Investigate options to undertake works e.g. Council staff, volunteer groups etc. Advertise to residents for help in volunteer groups.	☐
HC6-3	Where actions are proposed on Crown Land not under Council management, authorisations from DoI – Crown Lands are likely to be required.	☐
HC6-4	Initiate works	☐

HC7 – Update mapping and undertake assessment of sensitive habitat areas such as seagrass beds and wetlands

Priority: Medium

Timeframe: Medium term (within 3 - 5 years)

Implementation Ranking: **9** (scale 1 to 11)

Responsibility: OEH, MPA, DPI

Indicative cost: surveys and assessment ~$30,000

Additional Information: Previous mapping of seagrass beds has occurred in 1970, 1979/1980, 1984 and 1997 (EPS, 1998). Due to the dynamic nature of the seagrass beds within Smiths Lake, assessments should be made over the long-term before concluding about any significant changes to the seagrass patterns in the Lake. Wetlands of concern include the Paperbark swamps in the Myall Lakes National Park, which appear to have undergone some changes, possibly due to the changing salinities and water levels within the Lake (pers. comm. F. Miller 2010).

Indicative steps involved:

No.		Achieved
HC7-1	Identify if there is a requirement for assessment of wetlands and seagrass beds	☐
HC7-2	Identify relevant timescales for remapping of wetlands and seagrass beds e.g. maybe every ten years, and during summer or winter. Identify characteristics required for assessment e.g. extent, height, species diversity etc	☐
HC7-3	Develop and implement program for assessment and remapping	☐

HC8 – Investigate potential foreshore habitat response to predicted sea level rise

Priority: High

Timeframe: Medium (within 3 - 5 years)

Implementation Ranking: **7** (scale 1 to 11)

Responsibility: MCC, OEH (NPWS), MPA

Indicative cost: staff time, or externally commissioned consultant ~$20,000

Additional information: Climate change predictions indicate that there is likely to be a rise in sea level of ~0.9m along the NSW coast, by 2100. Due to the intermittent nature of the connection between Smiths Lake and the ocean, these changes to sea level are expected to impact upon foreshore habitats. The response of these habitats will also be a function of the opening regime (magnitude and duration).

Indicative steps involved:

No.		Achieved
HC8-1	Review research reports and relevant literature on predicted response of foreshore environments to sea level rise, especially within ICOLLs	☐
HC8-2	Predict impacts on Smiths Lake given the unique entrance management regime, foreshore morphology and existing foreshore habitat and landuse	☐
HC8-3	Investigate potential actions to mitigate undesired impacts.	☐

HC9 – Investigate fish health within the Lake

Priority: High

Timeframe: Short term (within 1 - 3 years)

Implementation Ranking: **5** (scale 1 to 11)

Responsibility: MCC, DPI, MPA, Fishermen's Co-Op

Indicative cost: External consultant investigation comprising netting and ecotoxicological analysis ~ $40,000

Additional information: Recent investigations, undertaken by the Fishermen's Co-Op, into the fish health in Smiths Lake have uncovered some problems. A number of sampled fish appear to have starved to death. There are a number of hypotheses raised by the community that explain the poor fish health, including:

- longer than usual opening period prior to the fish deaths,
- reduction in commercial fishing due to the zoning of the marine park,

Indicative steps involved:

No.		Achieved
HC9-1	Collate existing information on fish health e.g. Digifish report (2010) and community knowledge, and identify gaps in knowledge	☐
HC9-2	Initiate program to investigate cause of fish distress. This may include monitoring or research, expert opinion / knowledge	☐

HC10 – Educate the community on existing waterway zoning

Priority: High

Timeframe: Short term (within 1 - 3 years)

Implementation Ranking*:* **5** (scale 1 to 11)

Responsibility: NSW Maritime, MPA

Indicative cost: Staff time plus resources and materials ~$5,000/yr

Additional Information: In December 2002 the zoning plan for the Lake underwent review and as a result a number of signs were repositioned, applying the speed restriction (4 knots) across the Lake to the opposite shore, extending from Simons Point to Bull Island. A Boating Plan of Management was implemented in 2005 and adopted by Council.

Education options may include information packs to residents, posters at bait shops, local cafes, and signage along foreshore.

Indicative steps involved:

No.		Achieved
HC10-1	Identify relevant waterway zoning, incorporating the range of different plans covering the Lake.	☐
HC10-2	Identify relevant education options and implement program	☐

HC11 – Develop and implement public awareness program on ecological values and important habitat

Priority: Medium

Timeframe: Medium term (within 3 - 5 years)

Implementation Ranking: **9** (scale 1 to 11)

Responsibility: MCC, Community

Indicative cost: Staff time plus resources and materials ~$5,000/yr

Additional information: The program is currently in progress. Funding is available (Envirofund) and personnel have been employed to coordinate the project

Indicative steps involved:

No.		Achieved
HC11-1	Identify ecological values (from within this plan, Marine Parks Plan, National Parks) and specific habitat areas for promotion. Options may include focusing on 1 or 2 key values and habitats / species at a time, or season.	☐
HC11-2	Identify education awareness options e.g. information packs to households, community workshops / open days / invited talks, Coastcare programs, brochures, posters, magnets etc.	☐
HC11-3	Develop program to implement education within Community.	☐

HC12 – Encourage protection of natural habitat on private land through education and incentives

Priority: Medium

Timeframe: Medium term (within 3 - 5 years)

Implementation Ranking: **9** (scale 1 to 11)

Responsibility: MCC, HCRCMA, OEH

Indicative cost: staff time plus incentive (costs unknown, but could be in the form of resources, materials, offsets or other provisions)

Additional Information: An option through the CMA includes a Property Vegetation Plan (PVP), which is a voluntary, legally binding agreement between a landholder and the CMA, which can provide a number of benefits, including: long-term security for landholders wanting to protect native vegetation for future generations; financial assistance for managing native vegetation on a particular property; the certainty of knowing what vegetation on a property is re-growth and will not require future clearing approvals; clarification on requirements under the Native Vegetation Act of activities like rotational farming, grazing or cultivation practices and the determination on clearing approval and offsets associated with the clearing.

An alternative is through the Conservation Partners program (OEH), and includes:

- Conservation agreements which are permanent legal protection for your property, registered on the property title. This is the highest level of protection, and remains on the land with a change of ownership.
- Wildlife refuge. Private land is legally declared a wildlife refuge, the status can be changed when required and the status is noted on the land title and remains with a change of ownership.
- Property registration. The private property is registered through the conservation partners program (OEH) to be managed for conservation. This is not legally binding, and it does not change your property's legal status. Registration ceases when you sell the property.

Indicative steps involved:

No.	Tasks	Achieved
HC12-1	Identify suitable options to protect natural habitat on private land e.g. Property Vegetation Plans, Conservation Partners Program etc	☐
HC12-2	Implement community education program to educate e.g. information sessions at Council, Workshops, Information Packs, incentive options including discount vouchers to local nurseries etc.	☐

STRATEGIC ACTIONS TO ADDRESS

WATERWAY ACCESS AND USER CONFLICTS

WA1 – Liaise with Aboriginal Community regarding developments on or near known or likely Aboriginal heritage sites

Priority: Medium

Timeframe: Short term (within 1 – 3 years)

Implementation Ranking: **6** (scale 1 to 11)

Responsibility: MCC, Aboriginal Community

Indicative cost: Staff time

Additional Information: The Smiths Lake catchment is a highly sensitive area, which requires controls to ensure protection of cultural heritage. The NPWS manages a database of culturally significant sites and areas, and as part of the development application (DA) process, they should be consulted before any development occurs. At the time of publishing the Marine Parks Authority were also undertaking a cultural mapping program that includes the area surrounding Smiths Lake.

Recent liaisons with the Aboriginal community identified the requirement to update the existing databases of cultural heritage sites, as the databases were typically not comprehensive enough to base assessments on. Prior to the updating of the Cultural heritage databases, a precautionary principle should apply, and the whole foreshore area of Smiths Lake should be considered sensitive with regards to cultural heritage.

Indicative steps involved:

No.	Tasks	Achieved
WA1-1	Contact Aboriginal community to update database of approximate areas of cultural heritage significance	☐
WA1-2	Identify within development controls 'sensitive' areas of the catchment to be flagged when development applications are submitted to Council	☐
WA1-3	Liaise regularly with Aboriginal Community with regards to development applications	☐

WA2 Develop best practice guidelines regarding cultural heritage management

Priority: High

Timeframe: Immediately (within 12 to 18 months)

Implementation Ranking: **2** (scale 1 to 11)

Responsibility: MCC, Aboriginal Community

Cost: staff time

Additional information: The foreshores of the Lake are likely to be impacted by future climate change, particularly sea level rise. Many Aboriginal cultural artefacts and sites of significance may be located around the foreshores of the Lake.

The following may be considered for incorporation into best practice management guidelines:

- ongoing cultural heritage training for volunteers involved in bush regeneration,
- cultural heritage inspections by suitable representatives of the Aboriginal community during any works that disturb the land surface,
- utilise sensitive practices for weed control in culturally sensitive areas subject to potential erosion (e.g. hand pulling weeds on dune systems to avoid aerial spraying which kills indigenous plants as well as weeds and reduces dune stabilisation)

Relevant references: Aboriginal Culturally Significant Landscapes, CMA (2009)

Indicative steps involved:

No.		Achieved
WA2-1	Review existing information on best practice guidelines from sources including CMA reports. Prepare draft guidelines incorporating climate change projections as appropriate.	☐
WA2-2	Liaise with the Aboriginal Community to finalise guidelines	☐
WA2-3	Educate community on the guidelines	☐

WA3 – Limit access for domestic animals around foreshore areas and manage associated waste

Priority: Medium

Timeframe: Immediately (within 12 – 18 months)

Implementation Ranking*:* **4** (scale 1 to 11)

Responsibility: MCC, OEH (NPWS)

Indicative cost: Staff time plus resources and materials ~$5,000/yr

Additional information: Domestic animals include dogs, horses, cats etc. The restriction of access will also address the issue of faecal material within these areas. Within areas where access is not restricted there may be a requirement for signage e.g. for horse activities. Options to limit / restrict access may include:

- signage outlining water quality problems associated with domestic animal waste into waterways,
- signage outlining fines,
- visual presence of compliance officers,

Indicative steps involved:

No.		Achieved
WA3-1	Identify areas where domestic animals, or their waste, is a problem.	☐
WA3-2	Increase presence of compliance officers and signage in these regions	☐

WA4 – Identify areas within the Lake entrance area where debris can be removed (for boating safety) and cannot be removed (for habitat protection) and streamline process for removal

Priority: Medium

Timeframe: Short term (within 1 – 3 years)

Implementation Ranking: **6** (scale 1 to 11)

Responsibility: NSW Maritime Authority, DPI, OEH (NPWS), MPA

Indicative cost: staff time

Additional Information: In the shallow entrance area of the Lake fallen trees can often restrict waterway access. Fallen trees may also represent a fish habitat if retained in the water for a certain period of time, and therefore permission is required to transport the fallen tree from the waterway to the Lake edge. The identification of debris removal zones, and the specifications governing the transport of the debris, would streamline the process and ensure that no relevant legislation is contradicted. At present, when the Lake is opened there are yellow markers restricting boat access to the east entrance channel area, and therefore requirements of this region for navigable waterways may also need to be resolved further.

Relevant legislation: Fisheries Management Act 1994, National Parks and Wildlife Act 1974. Authorisation for implementing works of this nature may be required under the relevant Crown Land legislation.

Indicative steps involved:

No.		Achieved
WA4-1	Liaison between NSW Maritime and OEH to define areas where debris (e.g. fallen trees, branches etc) can and cannot be removed within the Lake, for navigation purposes.	☐
WA4-2	Document the areas for NSW Maritime Authority and Council reference	☐

WA5 Increase enforcement of fishing and zoning regulations through increased presence of relevant Compliance Officers / Rangers

Priority: High

Timeframe: Short term (within 1 – 3 years)

Implementation Ranking: **5** (scale 1 to 11)

Responsibility: NSW Maritime Authority, MPA, DPI

Indicative cost: Staff time (additional staff may need to be employed)

Additional information: Community perception is that there may be over fishing in the Lake, with fishermen entering restricted fishing areas during the darkness of night. There is also a lack of signage with regards to the new zoning laws associated with the Marine Park.

The compliance of the boating community is currently monitored by two Boating Service Officers (BSO's) stationed at Forster covering an area from Seal Rocks to Crowdy Head, with extra personnel are transferred into the area during peak boating times (NSWMA 2005).

Increased presence and compliance may be achieved through some or all of the following options:

- Information signs surrounding the Lake notifying Lake users of the Marine Park zoning especially for seasonal visitors
- Investigate the ability of members from the Aboriginal community to act as rangers to educate and enforce compliance

Indicative steps involved:

No.		Achieved
WA5-1	Identify likely periods when increased presence is required e.g. summer holidays	☐
WA5-2	Investigate opportunities for members from the Aboriginal Community to assist through a Rangers program	☐
WA5-3	Employ or roster more frequent patrolling during these periods	☐
WA5-4	Increase signage and other education opportunities to help promote compliance of regulations	☐

WA6 - Investigate the possibility of constructing a foreshore walking track around sections of the Lake

Priority: Low

Timeframe: Medium term (within 3 – 5 years)

Implementation Ranking: **11** (scale 1 to 11)

Responsibility: MCC, OEH (NPWS)

Indicative cost: staff time (or externally resourced consultant ~$20,000) for feasibility assessment. Design, approval and construction costs would vary (typically around $500/m^2, or $1000 per lineal metre)

Additional information: A walking track can provide educational benefits as well as recreational benefits. The placement of educational signage along the walking track could include information on Aboriginal and European cultural history, Marine Park information, local ecology, and could be linked via a story book fashion, interconnecting the track.

Relevant Legislation: Authorisation for implementing works of this nature may be required under the relevant Crown Land legislation.

Indicative steps involved:

No.	Tasks	Achieved
WA6-1	Investigate feasibility and optimal location of track. Define purpose of track e.g. walking and/or cycling. Identify funding options.	☐
WA6-2	Liaise with the Aboriginal community on appropriateness of signage for specific cultural heritage sites. Consultation with relevant stakeholders on appropriate information for signage.	☐
WA6-3	Develop implementation plan that may involve local volunteer groups or Green Corps.	☐

WA7 Investigate options to improve boat launching facilities at Brambles Reserve, Tarbuck Bay and John de Bert Reserve

Priority: Medium

Timeframe: Short term (within 1 – 3 years)

Implementation Ranking: **6** (scale 1 to 11)

Responsibility: MCC, NSW Maritime Authority, DPI, MPA

Indicative cost: staff time only

Additional information: Community feedback has identified the following:

- The existing ramp at Tarbuck Bay is hard to use with the dog leg, and hard to hold a boat still in the shallow, rocky area,
- the steps at John de Bert's Reserve suffer erosion during high water levels

Relevant legislation: Authorisations may be required for implementing works of this nature under the relevant Crown Land legislation.

Indicative steps involved:

No.		Achieved
WA7-1	Investigate boat launching improvements to infrastructure including the addition of rocks or resealing of boat ramps.	☐
WA7-2	Investigate possible erosion below steps at John de Bert Reserve, and identify remediation options	☐
WA7-3	Investigate possible options for efficient boat trailer parking near Frothy Coffee to reduce road blockage.	☐

WA8 – Encourage the community to utilise existing boat ramps, through education

Priority: Medium

Timeframe: Short term (within 1 – 3 years)

Implementation Ranking*:* **6** (scale 1 to 11)

Responsibility: MCC, NSW Maritime Authority, MPA

Indicative cost: Staff time plus resources and materials ~$5,000/yr

Additional Information: A related problem is the storage of small boats along the foreshores, however problems exist in identifying alternative storage options.

Indicative steps involved:

No.		Achieved
WA8-1	Identify specific areas where boats have been launched into the Lake without the use of existing boat ramps e.g. Wamwarra Bay, Patsy's Flat Rd	☐
WA8-2	Investigate control options to restrict access in these areas e.g. signage, fences or assign a habitat restoration works area. Investigate education options e.g. signage, information packs on the degradation of foreshore areas by boat launching	☐
WA8-3	Implement educational and control options	☐

WA9 Monitor conflicts between users in the Lake

Priority: Medium

Timeframe: Medium term (within 3 - 5 years)

Implementation Ranking: **9** (scale 1 to 11)

Responsibility: MCC, NSW Maritime Authority, MPA

Indicative cost: Staff time

Additional information: Some educational options may include:

- a suggestions box at Frothy Coffee on the edge of the Lake,
- open days with NSW Maritime and DPI to promote awareness of the wide variety of activities that occur within and around the Lake and the rules that govern these activities

Indicative steps involved:

No.		Achieved
WA9-1	Investigate options for feedback from waterway users	☐
WA9-2	Record any conflicts that arise through complaints to NSW Maritime, MCC or other relevant authorities.	☐
WA9-3	Assess complaints on a regular basis (monthly) and investigate issues where necessary.	☐

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