



Coastal Zone Management Plan for the Richmond River Estuary

Volume 1: CZMP





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August 2011

Synopsis

This Coastal Zone Management Plan (Volume 1) provides details on the actions required to achieve the objectives for the management of the Richmond River Estuary, as identified in the Estuary Management Study (Volume 2).

Acknowledgement

Ballina Shire Council, Lismore City Council, Richmond Valley Council and Richmond River County Council have prepared this document with financial assistance from the NSW Government through the Office of Environment and Heritage. This document does not necessarily represent the opinions of the NSW Government or the Office of Environment and Heritage.

Cover Photos: Clockwise from left: Richmond River Estuary educational signage in lower estuary; Backswamps of the Richmond River floodplain in flood (Source: B. Eggins); and clean up after a major fish kill in the Richmond (Source: M. Riches).

Prepared on behalf of Ballina Shire Council, Lismore City Council, Richmond Valley Council and Richmond River County Council by Hydrosphere Consulting.

Suite 6, 26-54 River Street
PO Box 7059, BALLINA NSW 2478
Telephone: 02 6686 0006
Facsimile: 02 6686 0078
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PROJECT 10-008 – RICHMOND RIVER ESTUARY MANAGEMENT STUDY AND COASTAL ZONE MANAGEMENT PLAN

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FOREWORD

The estuaries of New South Wales are an invaluable natural resource providing immense value from an ecological, social and economic perspective. NSW has over 130 estuaries that vary in size from small coastal creeks and lagoons to large lakes and rivers. Similarly, the State's estuaries vary widely in their natural attributes, degree of development, and their use and productivity.

The estuary of the Richmond River on the north coast of NSW is a significant natural community asset. For millennia the estuary and surrounding floodplain supported the local aboriginal communities. European settlement in the area began during the early 1800s and as the local populations grew and thrived, increasing development and land-use changes has impacted the estuary's health. Historical and current day activities such as broad scale vegetation clearing, drainage of the floodplain wetlands and changes to vegetation species has led to widespread reduction in the overall vitality and resilience of the estuary and surrounding floodplain. As the community grows into the future, the estuary will be subject to greater use and predictably greater impacts.

In the words of Ngujung Lawrence - Tribal elder of the Bungalung people (22-7-1930 / 23-2-2007), when describing the wetland restoration at Mynumi Lagoon in West Coraki in 2005:

"Nature used to look after these places one time... but now they get damaged unintentionally or intentionally and so we need people to look after it"

In recognition of the ecological, social and economic importance of NSW state's estuaries and concern about their degradation, the NSW Government developed the Estuary Management Policy. The general goal of the Policy is to achieve an integrated, balanced, responsible and ecologically sustainable use of the State's estuaries, which form a key component of coastal catchments. The policy forms part of a suite of catchment policies which provide for the assessment of estuarine values and uses, the resolution of conflicts, and the production of a unified and sustainable management plan for each of the State's estuaries. In support of the policy the Government's Estuary Management Program provides financial and technical assistance to local councils to prepare and implement coastal zone management plans for estuaries within their local government area. The Guidelines for Preparing Coastal Zone Management Plans (NSW Government, 2010) provides guidance and the management process for preparing such plans.

The Richmond River Estuary is a special place to the local community and supports a highly productive network of natural ecosystems, land uses and human activities. Agriculture, fishing and recreational/tourism activities interact with each other and with the environment that supports them. Often there is conflict and the health of the natural systems generally suffers. To address these issues the Coastal Zone Management Plan for the Richmond River Estuary has been prepared by Ballina Shire, Lismore City, Richmond Valley and Richmond River County Councils and presents the methodology and mechanism for the councils to manage the estuary into the future.

The Plan is founded on the Richmond River Estuary Processes Study (2006) which outlines the physical, chemical and biological processes within the estuary and the impact of human activities on these processes. The precursor of the Plan is the Richmond River Estuary Management Study (Volume 2 of this Plan) which identifies and prioritises estuary management issues, values, objectives and strategies.

With increased knowledge and through on-going monitoring our understanding of the Richmond River Estuary and estuaries in general will improve. Accordingly, the Coastal Zone Management Plan for the Richmond River Estuary will need to be reviewed and amended to account for changing environmental conditions, community desires and management responses.

The health and vigour of the Richmond River Estuary will only improve through increased awareness of the issues impacting the estuary and a commitment to better management practices now and into the future. This will require a concerted effort by community, local councils and government to better manage this important natural community asset for the benefit of current and future generations.

EXECUTIVE SUMMARY

Introduction

The Draft Coastal Zone Management Plan (CZMP) for the Richmond River Estuary provides a ten (10) year strategic plan for the implementation of key actions to address identified estuary issues. The primary goal is to achieve integrated, balanced, responsible methods to restore and maintain the ecological sustainability of the estuary as well as the recreational and commercial activities associated with it.

The Draft CZMP is the culmination of the coastal zone management process for the Richmond River estuary. The Plan has been developed from the recommendations and outcomes reported in the Richmond River Estuary Management Study (EMS, Volume 2) and is supported by the scientific knowledge from the Estuary Processes Study (EPS, WBM, 2006; ABER 2007; ABER 2008).

Management Framework

The CZMP supports the goals and objectives of the NSW Coastal Policy 1997 and the NSW Sea Level Rise Policy Statement, 2009 and will assist in implementing integrated coastal zone management for the Richmond River estuary. The draft CZMP was prepared in accordance with Part 4A of the Coastal Protection Act, 1979 and NSW Government's Guidelines for Preparing Coastal Zone Management Plans (DECCW, 2010a). The Draft CZMP will be referred to the Minister for certification under section 55g of the Coastal Protection Act, 1979.

A substantial component of the Draft CZMP was prepared prior to finalisation of the 2010 Guidelines. However, following public exhibition of the Draft CZMP, the plan was amended to ensure consistency with the minimum requirements of the Guidelines. None of the amendments changed the intent of the plan but rather ensured the inclusion of information and actions and actions required by the Guidelines.

Strategy Development Process

The Draft EMS (Volume 2) followed a structured approach to assessing management options built on current scientific understanding of the estuary and the established values and objectives for management of the estuary. Options were assessed in terms of their capacity to address the identified issues, taking into consideration social, environmental and economic factors. The prioritised options were grouped into 13 strategies for on-ground implementation and it is these strategies that form the basis of this Draft CZMP. The priorities assigned in the EMS have been used in the development of the strategies and are reflected in the scheduled timing and recommended level of resources.

Summary of Management Strategies

Administration and governance, planning for climate change and on-going monitoring and evaluation were recognised as important for long-term effective management of the estuary and the successful implementation of this plan. As such, these strategies were not prioritised in the same way as other strategies but are included as fundamental management activities.

Issues associated with floodplain infrastructure management and farm management are the greatest management challenges for the estuary and a high level of resources has been recommended for implementing strategies addressing these issues. Medium priority strategies identified in this plan include actions relating to riparian zone management, bank erosion, floodplain vegetation management, community education, waterway usage, wastewater management and urban runoff. All

are considered to have a key role in improving estuary health and resilience. Cultural heritage and fishery management are related to important values of the Richmond River estuary.

Strategy 1: Administration and Governance - Determining efficient and effective administrative arrangements for estuary management is important in order to minimise lack of coordination, administrative gaps or overlaps and to streamline decision making. Improved governance arrangements will rely on clearly defined responsibilities and adequate funding to implement these responsibilities. To ensure effective implementation of the CZMP, the governance and administration arrangements for management of the estuary should be resolved as a priority.

Strategy 2: Climate Change Adaptation - The combined effects of sea level rise and increased storminess are considered key threats to the health of the estuary. Climate change is an overarching issue that needs to be an integral consideration for each management strategy which should include planning for sea level rise and climate change impacts.

Strategy 3: Monitoring, Evaluation and Review - Monitoring and evaluation is a key component of the Draft CZMP which should evaluate overall estuary health, identify sources of contamination, assess the success of management efforts and enable direction of future efforts.

Strategy 4: Floodplain Infrastructure Management - Floodplain infrastructure including drains, levees and floodgates has greatly altered the Richmond River floodplain from its natural state and is recognised as a major contributor to estuary degradation. The CZMP contains a suite of actions to reduce the environmental impacts of floodplain infrastructure while maintaining the balance required for drainage and flood mitigation functions.

Strategy 5: Farm Management - Past and present farm management practices have been identified as having a high degree of impact on the estuary and improved practices and land uses are expected to result in major benefits to estuary health and subsequent benefits to tourism and other commercial industries. The CZMP acknowledges the value of agriculture in the local economy and seeks to work with landholders and industry bodies to improve land management practices while maintaining long-term economic outcomes.

Strategy 6: Riparian Zone Management and Erosion - The poor condition of the majority of the riparian zone along the estuary means that complete restoration is an immense task. Resources have been allocated to prioritising sites for rehabilitation to direct on-ground rehabilitation works for maximum benefit. The CZMP also provides for the dedication of buffer areas to direct future planning to conservation of the riparian zone.

Strategy 7: Vegetation Management - The CZMP seeks to manage aquatic weeds and to retain and improve areas of remnant or regrowth floodplain vegetation. Conservation of remaining floodplain vegetation is considered to be of particular importance on a local scale due to the largely cleared landscape.

Strategy 8: Education - The CZMP provides the scope for an estuary-wide program of education and consultation to improve the current understanding of estuary management.

Strategy 9: Waterway Usage - Strategic planning for waterway usage will be of increasing importance in the future as population growth continues and demand for boating facilities and water pursuits increases. The CZMP recognises that although usage conflicts are currently rare, there will be increased pressure on the Richmond River estuary in the future and strategic planning is important to maintain estuary values.

Strategy 10: Wastewater Management and **Strategy 11: Urban Runoff** - Wastewater discharge and urban runoff are important issues for the community, particularly in regard to water quality impacts. In addition, review of sewerage system risk to estuary health and continuation of the various existing council programs to manage on-site sewerage systems and stormwater is recommended.

Strategy 12: Cultural Heritage - There are issues associated with the protection and preservation of cultural heritage sites within the estuary, and this has been recognised throughout the estuary planning process to date. The CZMP seeks to identify unregistered sites and develop cultural management plans where appropriate to ensure on-going protection of cultural heritage around the estuary.

Strategy 13: Fishery Management - Many of the major fisheries related issues (i.e. fish kills) are addressed by this plan by focussing on the source of issues, such as reducing environmental impacts of floodplain infrastructure (Strategy 4) and improving land management practices (Strategy 5). Other fisheries related issues are generally regulated by state government (principally Department of Primary Industries) and the actions contained in the CZMP are related to improving community understanding of fisheries and aquaculture management in the local area and addressing specific concerns related to oyster harvest closures.

Monitoring, Evaluation and Review of the CZMP

The ability to achieve the management objectives will be determined through the success of the management actions. Evaluation will require coordinated monitoring across the estuary as well as on-going review of performance against defined targets (Strategy 3: Monitoring, Evaluation and Review). The success of the defined management actions should be measured through achievement of the key performance indicators (KPIs) so that any required amendments can be identified. An adaptive management approach should be implemented through:

- Review and reporting of KPIs for each action as part of the council State of the Environment (SoE) Reporting;
- A ten year review of the CZMP considering results of the SoE reviews, any barriers identified to the effective implementation of actions or overall success of actions, data provided by the estuary monitoring program, any new or updated scientific knowledge, prevailing community attitudes, estuary management issues, objectives and government policy; and
- Adoption and gazettal of the amended CZMP as required.

Implementation of the CZMP

Table 1 provides an overview of the recommended strategies, listing the key actions, responsibilities, management area and indicative costs estimated over the ten year implementation period. The total cost of the CZMP implementation is estimated to be approximately \$16.5 million over ten years.

The CZMP strategies are expected to be funded through Council and State Government contributions, grants and in-kind contributions. Identification of grants and successful application is an important component of this CZMP.

On-going community involvement and liaison with industry bodies, private landholders and community groups will be required to ensure successful implementation of the CZMP.

Table 1: Overview of the CZMP implementation schedule

Action		Lead Organisation *	Support Organisations *	Management Zones	10 Year Cost (\$k)	Potential Funding
FUNDAMENTAL MANAGEMENT STRATEGIES						
Strategy 1: Administration and Governance						
1a	Form a CZMP Implementation Committee	BSC, LCC, RVC, RRCC	-	Estuary-wide	0	-
1b	Review estuary governance and administration	CZMP Implementation Committee	BSC, LCC, RVC, RRCC, OEH, DPI-Fisheries, NRCMA, DPI-Crown Lands	Estuary-wide	200	NSW Estuary Management Program, BSC, LCC, RVC, RRCC (through Council contributions)
Strategy 2: Climate Change Adaptation						
2a	Assessment and mapping of tidal inundation extent including potential sea level rise	BSC, RVC	OEH, DPI	Zones 1, 2, 3, 4, 6	not estimated	NSW Floodplain Management Program, BSC, NSW Estuary Management Program, RVC
2b	Planning for sea level rise and climate change impacts incorporating Government policy and guidelines, current research and best-practice management	BSC, LCC, RVC, RRCC	OEH, DPI-Fisheries, NRCMA, DPI-Crown Lands, SCU	Estuary-wide	100	NSW Estuary Management Program and Coastal Management Program, Habitat Action Program, Natural Disaster Resilience Grants Scheme, Caring for Our Country, Caring for Our Coast, BSC, LCC, RVC, RRCC (through Council contributions)
Strategy 3: Monitoring, Evaluation and Review						
3a	EcoHealth monitoring program	CZMP Implementation Committee	BSC, LCC, RVC, RRCC, OEH, DPI-Fisheries, NRCMA, DPI-Crown Lands, SCU	Estuary-wide	2,000	NSW Estuary Management Program, BSC, LCC, RVC, RRCC (through Council contributions), NRCMA
3b	Develop catchment/water quality modelling tool to support decision making	CZMP Implementation Committee	BSC, LCC, RVC, RRCC, OEH, DPI-Fisheries, NRCMA, DPI-Crown Lands, SCU	Estuary-wide	45	NSW Estuary Management Program, BSC, LCC, RVC, RRCC (through Council contributions)
3c	Review of CZMP progress and monitoring of KPIs	BSC, LCC, RVC, RRCC	OEH, DPI-Fisheries, FNCW, NRCMA	Estuary-wide	not estimated	Council State of the Environment Reporting
3d	10 year review of CZMP	CZMP Implementation Committee	BSC, LCC, RVC, RRCC, OEH, DPI-Fisheries, DPI-Crown Lands, NRCMA	Estuary-wide	100	NSW Estuary Management Program, BSC, LCC, RVC, RRCC (through Council contributions)
HIGH PRIORITY#						
Strategy 4: Floodplain Infrastructure Management						
4a	Identify, prioritise and optimise drains and levees	RRCC	BSC, LCC, RVC, DPI-Fisheries, NRCMA, DPI-Crown Lands, OEH, landholders, relevant agricultural industry bodies	Estuary-wide	3,420	NSW Estuary Management Program, RRCC (through Council contributions), Caring for Our Country, NSW Flood Management Program, BSC, LCC, RVC
4b	Review floodgate management protocols	RRCC	BSC, LCC, RVC, DPI-Fisheries, NRCMA, DPI-Crown Lands, OEH, landholders, relevant agricultural industry bodies	Estuary-wide	55	NSW Estuary Management Program, RRCC (through Council contributions), Caring for Our Country, NSW Flood Management Program, BSC, LCC, RVC
Strategy 5: Farm Management						
5a	Scientific investigations: strategies for retention of water on backswamp areas	DPI	BSC, LCC, RVC, RRCC, SCU, NRCMA, OEH, landholders, relevant agricultural industry bodies	Zones 7,10,11	300	NSW Estuary Management Program, BSC, LCC, RVC, RRCC (through Council contributions), ARC Centre of Excellence Scheme
5b	Farm management planning	DPI	BSC, LCC, RVC, RRCC, SCU, NRCMA, landholders, relevant agricultural industry bodies	Estuary-wide	5,000	Caring for Our Country
5c	Liaise with agriculture industry bodies to improve education and ensure estuary friendly practices are incorporated into industry guidelines	DPI	BSC, LCC, RVC, RRCC, SCU, NRCMA, OEH, relevant agricultural industry bodies	Estuary-wide	90	Caring for Our Country, BSC, LCC, RVC, RRCC (through Council contributions)
MEDIUM PRIORITY#						
Strategy 6: Riparian Zone Management and Erosion						
6a	Identify priority riparian areas and rehabilitate	CZMP Implementation Committee	BSC, LCC, RVC, DPI-Crown Lands, NRCMA, FNCW, OEH, landholders, relevant agricultural industry bodies	Estuary-wide	2,300	NSW Estuary Management Program, BSC, LCC, RVC, RRCC (through Council contributions), Habitat Action Program, Urban Sustainability Program, Maintaining Australia's Biodiversity Hotspots Program, NRCMA
6b	Riparian buffer establishment (planning)	BSC, LCC, RVC	DPI-Crown Lands, OEH	Estuary-wide	30	NSW Estuary Management Program, BSC, LCC, RVC, RRCC (through Council contributions), Habitat Action Program, Urban Sustainability Program, Maintaining Australia's Biodiversity Hotspots Program
Strategy 7: Vegetation Management						
7a	Retain, rehabilitate and conserve existing native floodplain vegetation	BSC, LCC, RVC, NRCMA	OEH-NPWS, RRCC, DPI-Crown Lands, FNCW, landholders, relevant agricultural industry bodies	Estuary-wide	930	BSC, LCC, RVC, Habitat Action Program, Urban Sustainability Program, Maintaining Australia's Biodiversity Hotspots Program, NRCMA
7b	Aquatic weed management	FNCW, RRCC	BSC, LCC, RVC, DPI-Fisheries, OEH, landholders	Estuary-wide	1,000	NSW Estuary Management Program, RRCC (through Council contributions), FNCW (through Council contributions), BSC, LCC, RVC, Habitat Action Program, Urban Sustainability Program, Maintaining Australia's Biodiversity Hotspots Program

Action		Lead Organisation *	Support Organisations *	Management Zones	10 Year Cost (\$k)	Potential Funding
Strategy 8: Education						
8a	Estuary-wide community education and consultation program	CZMP Implementation Committee	BSC, LCC, RVC, DPI-Crown Lands, NRCMA, FNCW, DPI-Fisheries, OEH, relevant agricultural industry bodies	Estuary-wide	500	NSW Estuary Management Program, BSC, LCC, RVC, RRCC (through Council contributions), Caring for Our Coast, Caring for Our Country, Environmental Education Grants, Working on Country Program
Strategy 9: Waterway Usage						
9a	Develop strategic plan for estuary usage	CZMP Implementation Committee	BSC, LCC, RVC, NSW Maritime, DPI-Crown Lands, DPI-Fisheries	Estuary-wide	75	NSW Estuary Management Program, BSC, LCC, RVC
9b	Cost benefit analysis of dredging operations in lower estuary	BSC	DPI-Crown Lands, DPI-Fisheries, OEH, NSW Maritime	Zones 1,2	20	NSW Estuary Management Program and Coastal Management Program, BSC
Strategy 10: Wastewater Management						
10a	Sewerage system risk assessment and prioritisation study	CZMP Implementation Committee	OEH, BSC, LCC, RVC	Estuary-wide	25	NSW Estuary Management Program, BSC, LCC, RVC
10b	On-going on-site sewerage management inspections and improvements	BSC, LCC, RVC	-	Estuary-wide	not estimated	Council environmental health services and sewerage service budgets
Strategy 11: Urban Runoff						
11a	Stormwater Management	BSC, LCC, RVC	OEH	Estuary-wide	not estimated	Stormwater management levy, Council rebate programs, developer contributions, property owner contributions
LOW PRIORITY#						
Strategy 12: Cultural Heritage						
12a	Identification and recording of cultural sites available to council planners	CZMP Implementation Committee	OEH, BSC, LCC, RVC, Aboriginal representatives/ groups	Estuary-wide	100	NSW Estuary Management Program, BSC, LCC, RVC, Indigenous Heritage Program, Caring for Our Coast, NSW Heritage Office Aboriginal Heritage Projects
12b	Cultural Site Management Plans	BSC, LCC, RVC	OEH, Aboriginal representatives/ groups	Estuary-wide	155	NSW Estuary Management Program, BSC, LCC, RVC, Indigenous Heritage Program, Caring for Our Coast, NSW Heritage Office Aboriginal Heritage Projects
Strategy 13: Fishery Management						
13a	Ensure key research findings in the fishing and aquaculture sector are communicated to the public	DPI-Fisheries	BSC, LCC, RVC, RRCC, SCU	Estuary-wide	Included in Strategy 8	-
13b	Identify and manage contamination sources in the estuary to minimise oyster harvest closures	DPI-Fisheries	BSC	Zones 1,2,4	40	NSW Estuary Management Program, BSC
Total CZMP 10 year implementation program					16,510	

The classification of strategies as low priority for management is not a reflection of the level of importance of these factors, but rather an indication of the capacity of the actions contained in these strategies to achieve the defined objectives in terms of overall estuary health.

* BSC – Ballina Shire Council, LCC – Lismore City Council, RVC – Richmond Valley Council, RRCC – Richmond River County Council, OEH – Office of Environment and Heritage, EPRG – Environment Protection and Regulatory Group, DPI – Department of Primary Industries, NRCMA – Northern Rivers Catchment Management Authority, FNCW – Far North Coast Weeds, SCU – Southern Cross University.

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1. INTRODUCTION

1.1 Purpose of this Coastal Zone Management Plan

This Coastal Zone Management Plan (CZMP) for the Richmond River Estuary consists of a scheduled sequence of recommended actions that are required to achieve the objectives for management of the Richmond River Estuary (as identified in Volume 2: Draft Estuary Management Study, EMS).

The main aim of the CZMP is to increase resilience of the estuary and to protect and enhance the key values. This will be achieved through the implementation of integrated, balanced, responsible methods to restore and maintain the ecological sustainability of the estuary as well as the recreational and commercial activities associated with it. The CZMP provides links to other related management strategies which will assist in achieving the objectives of the CZMP.

1.2 The Study Area

The Richmond River estuary is located on the far north coast of NSW. The estuary is situated within three local government areas (Ballina Shire Council, BSC; Lismore City Council, LCC; and Richmond Valley Council, RVC) as shown on Figure 1. An additional three councils (Clarence Valley, Kyogle and Byron Shire) have jurisdiction in the upper catchment. Richmond River County Council (RRCC) is responsible for flood mitigation activities on behalf of the local Councils.

The study area includes the tidal waterways, foreshore and adjacent lands of the Richmond River estuary, including the entrance and lower reaches of the major tributaries. The study focuses on the immediate catchment of the estuary as this is considered to have the most impact on the health of the estuary and is an important component for future estuary management. The upper catchment is also considered where there is a clear influence on issues to be addressed by this CZMP.

1.3 The Richmond River Coastal Zone Management Program

Coastal councils are required to prepare a coastal zone management plan (CZMP) in accordance with the Minister's guidelines adopted in 2010 under section 55D of the Coastal Protection Act, 1979 (DECCW 2010). The draft CZMP was prepared in accordance with Part 4A of the Coastal Protection Act, 1979 and CZMP guidelines (DECCW, 2010a).

A substantial component of the Draft CZMP was prepared prior to finalisation of the 2010 Guidelines. However, following public exhibition of the Draft CZMP, the documents were amended to ensure consistency with the minimum requirements of the Guidelines (refer Appendix 1) including the addition of actions required to address some of the minimum requirements during the implementation of the Plan. None of the amendments have changed the intent of the plan, but rather have enhanced the plan to ensure the inclusion of the required information and actions.

The CZMP supports the goals and objectives of the NSW Coastal Policy 1997 and the NSW Sea Level Rise Policy Statement, 2009 and assists in implementing integrated coastal zone management for the Richmond River estuary.

The Draft Estuary Management Study (EMS, Volume 2 of the CZMP) brings together the available information to identify the estuary management issues and formulate options for management. The EMS is a culmination of the Data Compilation Study (WBM, 2004) and the Estuary Processes Study (EPS, WBM, 2006; ABER, 2007; ABER, 2008). This Draft CZMP draws on the findings of the Draft EMS. Figure 2 illustrates the process followed during the preparation of the draft CZMP.



Figure 1 - The Richmond River Catchment and Estuary Management Study Area

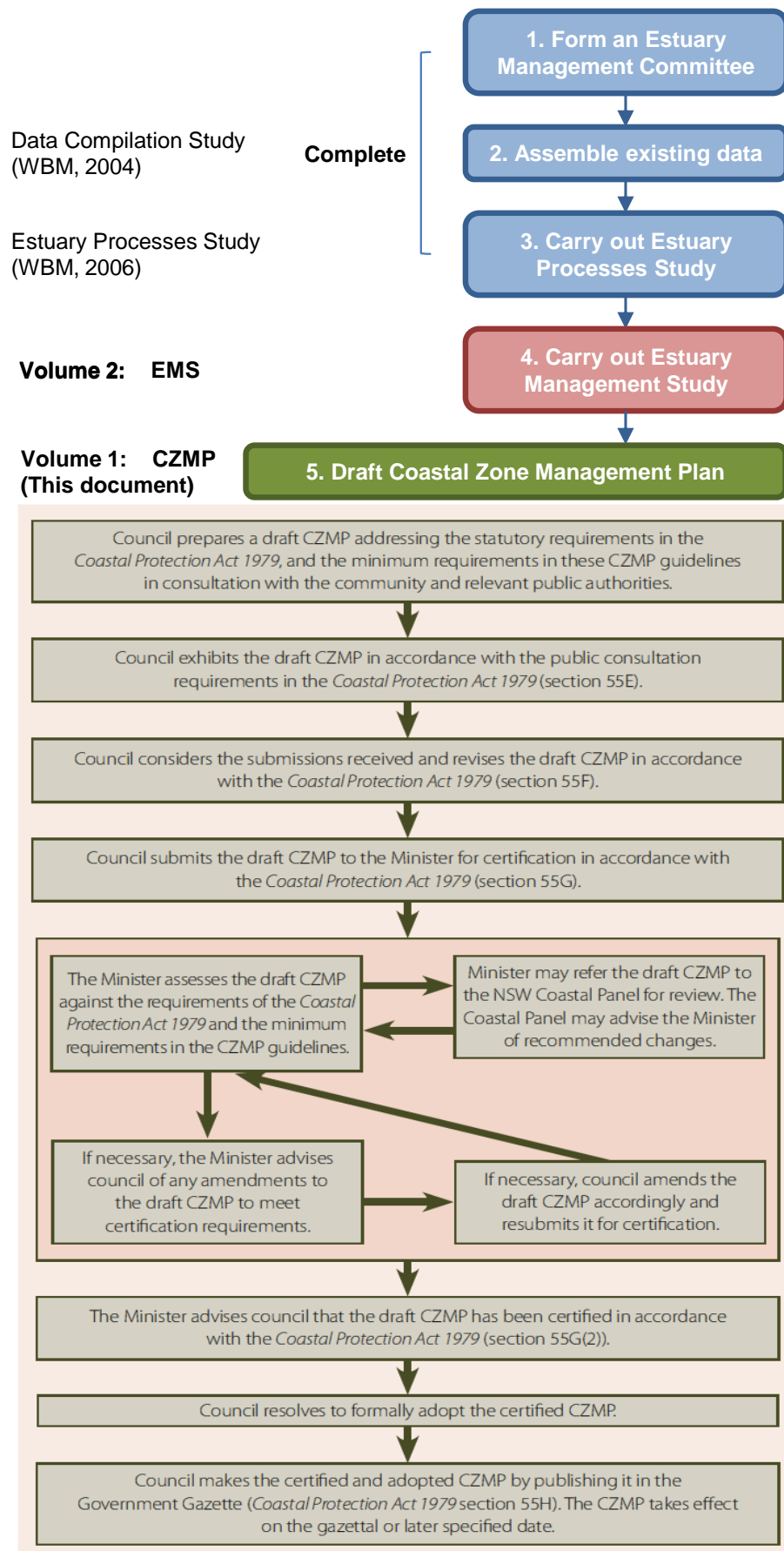


Figure 2 - CZMP preparation and certification process for the Richmond River Estuary

Source: Modified from DECCW, 2010a

This document has been prepared with financial assistance from the NSW Government through the Office of Environment and Heritage (OEH).

This CZMP will be adopted by RRCC, BSC, LCC and RVC. Following local government adoption, the plan will be referred to the Minister for certification under section 55g of the Coastal Protection Act, 1979. Once certified, the Plan is to be finalised by the Councils and published in the Government Gazette. The management strategies contained in this CZMP will direct future strategic planning of the Councils, as well as other government agencies with responsibility for management of the Richmond River Estuary.

The NSW Coastal Zone Management Program is discussed in further detail in Section 2.1 of the Estuary Management Study (Volume 2).

1.4 Stakeholder Consultation

Various forms of stakeholder consultation have been conducted throughout the Estuary/Coastal Zone Management Planning Process. The Richmond River Estuary Management Committee was formed in 2002 to oversee the process from data compilation study and EPS to development of the Draft EMS and CZMP. The Floodplain Management Committee was formed in 2000 by RRCC. Its role is to contribute to floodplain management and environmental improvement. The Richmond River Estuary Technical Team was established to oversee the development of the studies and management plans.

The Richmond River EPS (WBM, 2006) included a community consultation phase via a community survey. Australian Wetlands conducted a wide range of stakeholder engagement activities on behalf of the Estuary Management Committee in 2007/08, including consultation with community groups, focus groups as well as canvassing of the broader community through local radio, newspapers and information stalls.

The Draft EMS and CZMP were placed on public exhibition between 14 March and 6 May 2011 to provide the community with the opportunity to assess what is proposed for the estuary, the means and implications of the proposed strategies and to provide feedback on the management plan. A public meeting was held and submissions were invited.

Feedback from stakeholders has been considered in the preparation of the Draft CZMP for the Richmond River Estuary. Section 5 and Appendix 3 of the Draft EMS (Volume 2) provide further detail on the consultation activities and the key estuary management issues raised by the stakeholders.

1.5 Estuary Significance and Values

The Richmond River is one of the major coastal drainage systems in northern NSW with a catchment area of approximately 6,850 km². The Richmond River is unique, with a large flood plain (approximately 1,000 km²) relative to catchment area and a small water surface area of 19km² (WBM, 2006). Features of national and state significance within the estuary include high biodiversity areas, National Parks, wetlands of conservation significance including habitat for migratory waders and federally listed threatened species, Nature Reserves, fisheries and rare and threatened communities as defined under the Threatened Species Conservation Act, 1995. Agriculture, commercial and recreational fishing, aquaculture, tourism and recreation are major economic drivers for the region.

The Richmond River estuary is highly valued by the community and is a focal point for local commerce, tourism and recreation. The estuary with its associated wetlands and waterways support a rich biodiversity and a range of important environmental functions and local industry. Despite these recognised values, the system is under pressure from past and existing development, catchment disturbance and hydrological modification, land use management and large-scale vegetation changes. Looking forward, the estuary faces continued pressure from land use change within the catchment as well as increasing direct use of the estuary by a growing population.

1.6 Development of the Management Strategies

Management issues for the estuary have been identified from the available background data in the EPS (WBM, 2006; ABER, 2007; ABER 2008) and recent scientific research. The significance and values of the estuary have been derived from the scientific understanding of the estuary and the outcomes of the consultation with stakeholders. These identified values have been used to develop management objectives for the estuary. The management objectives are broadly consistent with the goals and objectives of the NSW Coastal Protection Act, 1979, Coastal Policy, 1997 and Sea Level Rise Policy Statement, 2009.

For each major topic, the identified issues, related objectives and potential management options were identified and prioritised for implementation (refer EMS, Volume 2 and Figure 3 below).

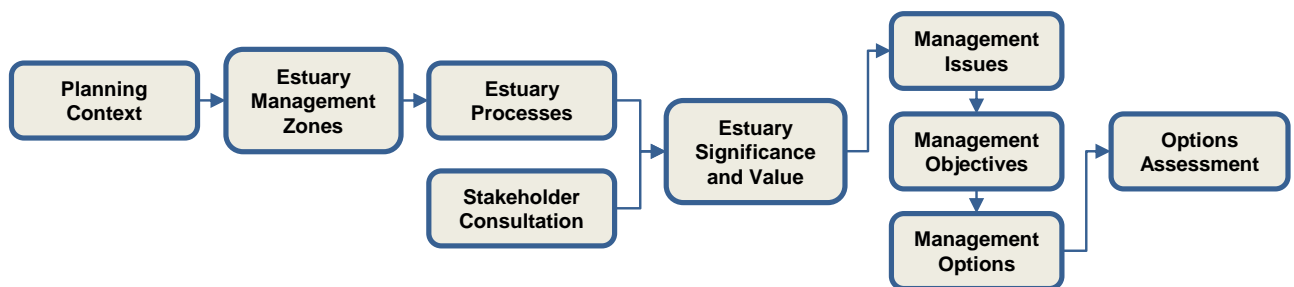


Figure 3 - Development of the Estuary Management Study (Volume 2 of the CZMP)

The management actions described in this CZMP are based on the options developed within the Draft EMS and the options assessment and prioritisation process as follows:

- All management issues were ranked to focus management effort on those issues regarded as a priority in achieving the objectives of the CZMP; and
- The individual options were assessed to determine:
 - their effectiveness in addressing the priority issues;
 - their ability to achievement the management objectives,
 - the social, environmental and economic consequences (of implementing as well as not implementing the option);
 - expected community and agency support; and
 - 10 year implementation costs.

The EMS identified 41 options for a range of purposes including studies that are required to further refine or prioritise management actions and options that could potentially address the identified management issues. The options have been bundled into 13 management strategies which were assigned a low, medium or high priority based on their capacity to address the identified issues and their overall benefit. Administration and Governance, Climate Change and Monitoring and Evaluation are considered to be fundamental management strategies for the CZMP and have not been prioritised in the same way as the other strategies.

The management strategies consist of actions required to achieve the desired outcomes of the strategy (refer Section 2.2). An additional strategy relating to CZMP monitoring, evaluation and review is also included (Strategy 14).

This CZMP describes the tasks required to implement the strategies to achieve the management goals for the Richmond River estuary.

2. IMPLEMENTATION REQUIREMENTS

2.1 Management Zones

Estuary management zones were developed by the Richmond River Floodplain Committee to divide the floodplain into manageable units that provide a more suitable scale to illustrate geographic features and issues for this expansive floodplain. The twelve management zones were described in detail in Section 3 of the Draft EMS (Volume 2) and key features and issues for each zone were mapped. The 12 estuary management zones are shown in Figure 4.

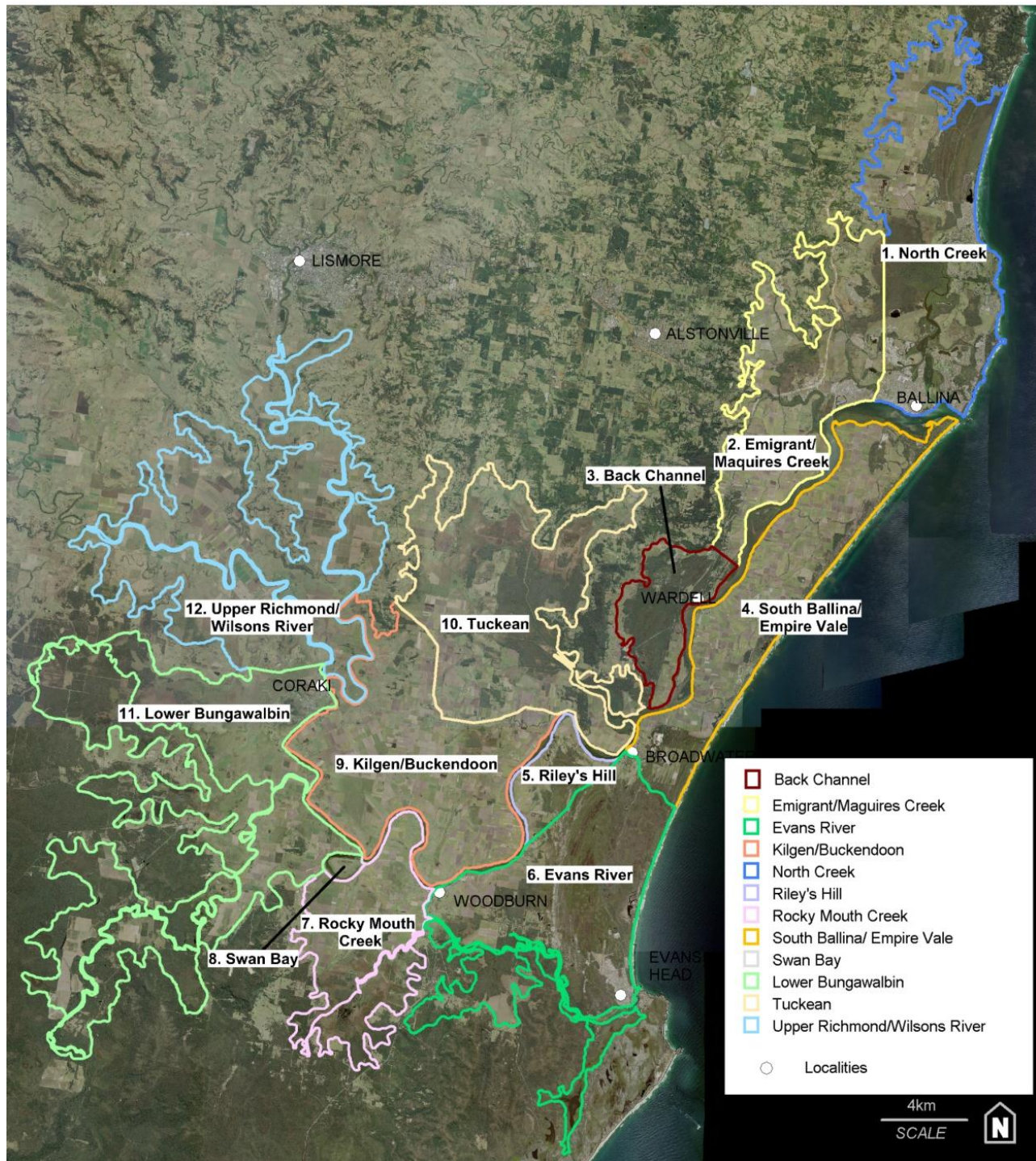


Figure 4 - Richmond River Estuary Management Zones

The Councils have identified a desire for a management zone approach to the implementation of the CZMP, however many of the identified issues are relevant to the whole estuary and need to be managed on an estuary-wide basis. In developing this CZMP, the location of recommended management actions have been indicated as either occurring estuary-wide or within specific zones where this information is known (refer Section 3: Management Strategies).

As a first step in many of the recommended management strategies for on-ground works, prioritisation has been recommended to ensure management effort is directed where it will achieve the greatest benefit. When more information is known about priorities of on-ground works, it may be possible to develop individual management plans for each zone, should this be deemed necessary.

2.2 Management Actions

The Implementation Schedules (Section 3) include a list of actions or steps which have been developed to provide the desired outcomes for each of the management strategies.

Actions consist of a combination of studies, investigations and on-ground works. Generally, all strategies require some research or assessment prior to implementation of on-ground works. This is to ensure the appropriate effort, funding and geographical focus of on-ground works is undertaken. In addition, due to the complexity of the current administrative arrangements, partnerships between the responsible agencies, landholders and community groups are required to be developed to achieve the required outcomes.

Management strategies and actions have been developed for a ten year period. The CZMP and the progress of the management actions should be reviewed to ensure the actions remain relevant and the implementation of the plan is being achieved.

2.3 Responsibilities

Section 2 of the Draft EMS described the management responsibilities for the Richmond River estuary. The various roles of the local Councils, County Council, state and federal government agencies and statutory authorities in the management of the estuary are summarised in Appendix 2. Responsibilities for implementation of the management strategies have been assigned to the relevant agencies. In addition to the listed organisations, support from various local non-government organisations and groups, including industry bodies, private landholders and community groups, will be essential in the implementation of the plan.

The Lead Organisation/s assigned to the management actions is/are the agency/ies which are best placed to undertake or facilitate the action. This is required to focus future management effort and provide direction in seeking funding through grants or providing the necessary resources. The actions also identify Support Organisations which may be required and/or requested to assist in implementation of the action, either through their regulatory role or land management function or as a potential funding or information source.

Public authorities with "Lead Organisation" responsibilities under the draft CZMP have provided formal concurrence and agreement to submitting the CZMP to the Minister for certification.

2.4 Timeframe

Based on the priorities developed in the Draft EMS (Volume 1, refer Section 8), timeframes for management actions have been developed. Implementation is expected to commence from the start of the 2012/13 financial year (i.e. July 2012). Management strategies in Section 3 have been scheduled according to the following timeframes:

- Immediate (2012/13);
- On-going: starting year 1 and implemented over the 10 year life of the CZMP with possible extension beyond that period;
- Short Term: year 1 – 3 (2012/13 – 2015/16);
- Medium term: year 4 – 6 (2016/17 – 2018/19); and
- Long term: year 7 – 10 (2019/20 – 2022/23).

High priority actions have been programmed to start either immediately or within the short term. Further details of recommended timeframes is provided within each specific action in Section 3, and tabled in the implementation program (Section 3.14).

2.5 Concurrent/Parallel Programs

The Councils, government agencies and statutory bodies are implementing management programs in parallel with the preparation of this CZMP. Many of these initiatives are related to the management strategies presented here and have been considered in the development of the various management actions. For example, the management actions build on and support concurrent initiatives where they are directly relevant to achievement of the CZMP objectives, where these are matched to available funding and where support from landholders and other agencies is expected to be achieved.

Council programs include:

- RVC, BSC, LCC and RRCC flood mapping and Floodplain Risk Management Studies and Plans – refer Strategy 2: Climate Change Adaptation;
- RVC coastal zone planning for the Evans River Estuary refer Strategy 2: Climate Change Adaptation;
- BSC coastline management planning;
- Augmentation and upgrade of West Ballina STP (BSC) – refer Strategy 10: Wastewater Management;
- Recreational boating study (BSC) – refer Strategy 9: Waterway Usage;
- LCC - Biodiversity Management Strategy - in preparation;
- Council (BSC, LCC and RVC) stormwater management programs (refer Strategy 11: Urban Runoff);
- Swan Bay restoration project undertaken by RRCC in 2008/09 – refer Strategy 7: Vegetation Management; and
- Dungarubba Creek riparian planting project undertaken by RRCC in 2008/09 – refer Strategy 6: Riparian Zone Management and Erosion.

Agency programs include:

- Northern Rivers CMA Catchment Action Plan;
- DPI - Richmond Floodplain and Estuary – Backswamp Project: 2011/12 – 2012/13 (refer Strategy 4: Floodplain Infrastructure Management);
- DPI - Fisheries assessment of waterfront structures – refer Strategy 9: Waterway Usage;
- DPI – Agriculture landholder education programs (refer Strategy 8: Education);
- Northern Rivers CMA programs including community capacity building (refer Strategy 8: Education);
- Northern Rivers Regional Biodiversity Management Plan (DECCW, 2010b); and
- Shorebirds of Northern NSW (DECCW, 2010c).

Council/Agency partnership programs include:

- The Richmond and Brunswick Catchment Model - a regional education initiative of Rous Water, RRCC, LCC, Byron Shire Council, BSC, RVC and Kyogle Shire Council (refer Strategy 8: Education); and
- RRCC, BSC, LCC, and RVC, OEH and NRCMA program to promote the sustainable use of the Richmond River Estuary - "The Richmond River Estuary - Our Community's Natural Asset" - (refer Strategy 8: Education).

In addition, community groups are actively involved in the management of the estuary and the continuation of these programs (e.g. Landcare) should be encouraged.

2.6 Funding

The CZMP strategies are expected to be funded through Council and State Government contributions, grants and in-kind contributions. Identification of grants and successful application is an important component of this CZMP. Collaboration with universities may also provide opportunities for research projects. The responsible agency/ies have been identified for each strategy, together with potential funding sources. It is important to note that many grants and funding sources are only available up to a limited budget and as such, the available grants are changing from year to year. It will be necessary to keep abreast of current funding availability throughout the implementation of the CZMP.

Where actions are implemented through a concurrent program, additional expenditure and funding have not been included. Similarly, where a study/review is required to determine the appropriate level of expenditure, the cost of the future works has been broadly estimated, but should be confirmed or updated by the results of the review. Cost estimates provided in the action descriptions are preliminary only and based on the best available information.

A summary of potentially relevant and available grant schemes is given in Appendix 3. In most cases it is expected that in-kind contributions will be provided from responsible Councils or agencies and this has been identified for each action.

2.7 Community Involvement

On-going community involvement will be required to ensure successful implementation of the CZMP. This will include:

- Ongoing consultation with interested and committed community groups;
- A high degree of engagement and collaboration with landholders;

- On-ground participation in management actions, particularly local community groups such as Landcare and fishing groups;
- Consultation and collaboration with local Aboriginal representatives and groups; and
- Education programs.

Achievement of the management plan objectives is reliant on community understanding and effective involvement in the management process.

2.8 Measures of success of the CZMP

Most of the management objectives defined in the Draft EMS (Volume 2) are aspirational in that they are high level goals that may not be achievable within the life of this plan. However they remain as long-term desires held by the Richmond River estuary stakeholders. Continuous improvement towards these objectives across the full range of issues should be seen as the first measure of success.

Success of the CZMP will be indicated by the implementation of substantial measures to address the root cause of issues facing the estuary, as well as conclusive documentation of the effectiveness of such measures. Success of the CZMP will be gauged by:

- Stakeholder acceptance;
- Certification by the Minister for Environment;
- Adoption and gazettal of the plan by the Councils;
- Incorporation of the plan recommendations into business planning for the responsible agencies;
- Securing sufficient funds to implement these actions;
- Implementation of actions in an efficient and timely manner;
- Uptake of actions by stakeholders and others;
- Positive stakeholder feedback on improvements; and
- Measured improvements in estuary health such as improved water quality and reduction of frequency and severity of adverse environmental events such as fish kills.

Key Performance Indicators (KPIs) have been identified where appropriate for each management action to provide a target for achievement of the major steps in each action.

3. MANAGEMENT STRATEGIES

The following tables summarise the components of the estuary management strategies. Each strategy contains:

- A brief introduction which provides an overview of the strategy development process reported in the Draft EMS (Volume 2);
- A table for each action making up the strategy. Where there is more than one action, a summary table is provided of the key details after the strategy introduction. Each action table includes:
 - Desired Outcome - the specific goal to be achieved by implementation of each action;
 - Lead Organisation – the body or bodies responsible for implementation of the action;
 - Support Organisation – provide assistance in the implementation and contribution of staff, resources and/or funding;
 - EMS Option No. – link to the option number assigned in the Draft EMS and used in prioritisation. Note that in some cases multiple options from the Draft EMS have been grouped into a single action for implementation;
 - Cost Estimate – broad estimate of costs for implementation over the 10 year life of the plan. In some cases actions are implemented only in the first few years, and others are on-going actions, to be implemented continuously over the 10 years. Refer to Section 3.14 - Implementation Program for a breakdown of action costs for each financial year;
 - Potential Funding – identified possible sources of funding from currently available grants and contributions although it is acknowledged that resources will change over the course of the plan and new sources of funding will need to be sought on a regular basis;
 - Timing – indicative timeframe for implementation ;
 - Management Zones – location of actions either estuary-wide or within specific zones;
 - Objectives – list of objectives developed in the Draft EMS relevant to the action;
 - Description of Tasks – an outline of the scope of works required; and
 - KPIs (Key Performance Indicators) – target(s) for each action which can be used to measure the level of success.

3.1 Strategy 1: Administration and Governance

Priority: Fundamental

The development and implementation of the CZMP will require collaboration between a range of stakeholders including RRCC, the constituent councils, state government, statutory bodies, industry, landholders and the community. Management of the Richmond River estuary can be improved through better coordination, a more holistic approach and efficient delivery of management programs. Improved governance arrangements will rely on clearly defined responsibilities and adequate funding to implement these responsibilities. The Draft EMS identified the need for a review of the estuary administration and governance model for the Richmond River.

To ensure effective implementation of the CZMP, the governance and administration arrangements for management of the estuary should be resolved as a priority. The first action requires the formation of a new committee to oversee the implementation of the CZMP.

Table 2: Summary of Administration and Governance actions

Objectives: O2- To ensure strategic planning instruments and programs are consistent with and where applicable, directly address the aims of the CZMP O3 - To ensure efficient and effective management of the estuary through appropriate governance, funding and monitoring O4 - To increase knowledge of the impact of existing practices on estuary values and facilitate continuous improvement					
Action (short name)	EMS Option no.	Ten Year Cost Estimate (\$)	Timing	Zones	Lead Responsibility
Form a CZMP Implementation Committee	-	-	Immediate	Estuary-wide	BSC, RVC, LCC
Review estuary governance and administration	1	\$200,000	Immediate (year 1)	Estuary-wide	CZMP Implementation Committee

Action 1a: Form a CZMP Implementation Committee

Desired Outcome	A committee consisting of Councils and relevant public authorities is established to oversee the implementation of the CZMP
Lead Organisation	BSC, LCC, RVC, RRCC
Timing	Immediate (year 1)
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>As a priority, a new committee with responsibility for implementation of the CZMP should be formed. The CZMP Implementation Committee should consist of representatives from the Councils, RRCC and the relevant public authorities. The new Committee will be responsible for the actions which relate to the whole or the majority of the estuary and where it is appropriate that an overriding body is responsible for the action.</p> <p>Action 1b: Review estuary governance and administration requires a review of the responsibilities for management of the estuary (and implementation of the CZMP). Until this review is completed and new administrative responsibilities are in place, the CZMP Implementation Committee will be responsible for the following actions:</p> <ul style="list-style-type: none"> • Action 1b: Review estuary governance and administration • Action 3a: EcoHealth monitoring program • Action 3b: Develop catchment/water quality modelling tool to support decision making • Action 3d: 10 year review of CZMP • Action 6a: Identify priority riparian areas and rehabilitate • Action 8a: Estuary-wide community education and consultation program • Action 9a: Develop strategic plan for estuary usage • Action 10a: Sewerage system risk assessment and prioritisation study • Action 12a: Identification and recording of cultural sites available to council planners. <p>It is expected that Action 1b will recommend alternative responsibilities where appropriate for these actions.</p>	
KPIs	○ CZMP Implementation Committee formed by October 2011.

Action 1b: Review estuary governance and administration

Desired Outcome	A preferred model for estuary governance and administration that provides an appropriate structure and associated resources to achieve effective estuary coordination and management.
Lead Organisation	CZMP Implementation Committee
Support Organisation	BSC, LCC, RVC, RRCC, OEH, DPI-Fisheries, NRCMA, DPI-Crown Lands
Cost Estimate (10 year)	\$200,000
Potential Funding	NSW Estuary Management Program, BSC, LCC, RVC, RRCC (through Council contributions)
Timing	Immediate (year 1)
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>The review should be commenced as soon as possible as it will increase the efficiency and timeliness of implementation of the remaining management actions. The review needs to:</p> <ul style="list-style-type: none"> • Define the range of responsibilities (legal and otherwise) related to estuary management and future management tasks; • Identify any conflicting policies within and between agencies; • Identify the pros and cons of the existing governance and administration arrangements; • Investigate powers to implement actions such as land use regulation for catchment protection; • Consider alternative models and their successes and failings (e.g. cost benefit analysis approach); • Review estuary management funding requirements and potential sources; • Develop a range of assessment criteria that a new governance model is required to achieve; • Develop a range of potential models that would achieve the assessment criteria; • Consider legal implications of the potential models; • Consult with all relevant stakeholders, including the community regarding preferred models; • Recommend a preferred model; • Identify the steps required to implement the preferred model; and • Identify key management and reporting requirements such as annual reporting, business planning, asset management strategies, capital works planning and financial planning. <p>The results of the review should be publicly available. It is recommended that an independent facilitator is appointed to conduct the review. Legal advice is also expected to be required.</p>	
KPIs	<ul style="list-style-type: none"> ○ Completed review by June 2013. ○ New governance arrangements in place by June 2015.

3.2 Strategy 2: Climate Change Adaptation

Priority: Fundamental

Climate change is an important consideration for strategic planning, particularly in coastal areas where the combined effects of sea level rise and potentially increased storminess are considered key threats. The Draft EMS (refer Section 7.3) identified that predicted sea level rise may result in impacts associated with tidal inundation, bank erosion, shoreline recession, implications for draining and flooding, damage to infrastructure, inundation of low lying ecosystems and landward migration of ecological communities. The increase in frequency and intensity of storm events and altered flooding patterns will also potentially exacerbate erosion, bank stability and water quality issues.

Climate change is considered to be an overarching issue that will affect most of the issues associated with the estuary. It will be necessary, therefore, to consider the impact of climate change as an integral part of each management option and strategy.

Table 3: Summary of Climate Change Adaptation actions

Objectives: O4 - To increase knowledge of the impact of existing practices on estuary values and facilitate continuous improvement O9 - To minimise constraints to estuary adaptation to climate change					
Action (short name)	EMS Option no.	Ten Year Cost Estimate (\$)	Timing	Zones	Lead Responsibility
Assessment and mapping of tidal inundation extent including potential sea level rise	39	Not estimated	Immediate (year 1)	Zones 1, 2, 3, 4, 6	BSC, RVC
Planning for sea level rise and climate change impacts	41	\$100,000	On-going (year 1 - 10)	Estuary-wide	BSC, LCC, RVC, RRCC

Action 2a: Assessment and mapping of tidal inundation extent including potential sea level rise

Desired Outcome	Clear definition of potential risks due to tidal inundation for the Richmond River Estuary is used to facilitate adaptation to climate change
Lead Organisation	BSC, RVC
Support Organisation	NRCMA, DPI-Crown Lands, OEH
Cost Estimate (10 year)	Not estimated
Potential Funding	NSW Floodplain Management Program, BSC, NSW Estuary Management Program, RVC
Timing	Immediate (year 1)
Management Zones	Zones 1, 2, 3, 4, 6
DESCRIPTION OF TASKS:	
<p>The NSW Government's adopted guidelines (DECCW, 2010a) in relation to sea-level rise (i.e. 40cm rise above 1990 levels by 2050, and 90cm by 2100) should be used to identify risks from tidal inundation under current day and due to sea level rise.</p> <p>As part of the Ballina Floodplain Risk Management Study, the flood risk model for the Richmond River should be used to identify areas that are potentially impacted for current day and under sea-level rise scenarios in order to define the geographical area in which planning for sea level rise is a priority. This should include assessment and mapping of the tidal inundation extent for the estuary incorporating the NSW sea level rise benchmarks for the 1, 50 and 100 year (average recurrence interval (ARI) events for the present day, 2050 and 2100 planning periods. Given the expected influence of sea level rise and the existing occasional tidal inundation in Ballina and its proximity to the coast, the lower River is the priority for this study (Zones 1, 2, 3 and 4). This work will be undertaken through the existing BSC flood management planning process.</p> <p>As part of the coastal zone management planning for the Evans River, RVC will prepare a CZMP for the Evans River estuary and Evans Head coastline which will consider coastal hazards and identify management requirements. This will include assessment and mapping of tidal inundation extent for the Evans River estuary over the relevant ARIs and planning horizon incorporating the NSW sea level rise benchmarks.</p> <p>The assessment of tidal inundation risk in the lower Richmond River and the Evans River should identify property risk and response categories for all properties located in the coastal hazard areas.</p>	
KPIs	<ul style="list-style-type: none"> Sea-level rise tidal inundation maps produced and available by December 2012.

Action 2b: Planning for sea level rise and climate change impacts

Desired Outcome	Catchment and estuary specific information regarding climate change is used to facilitate adaptation to climate change
Lead Organisation	BSC, LCC, RVC, RRCC
Support Organisation	OEH, DPI-Fisheries, NRCMA, DPI-Crown Lands, SCU
Cost Estimate (10 year)	\$100,000
Potential Funding	NSW Estuary Management Program and Coastal Management Program, Habitat Action Program, Natural Disaster Resilience Grants Scheme, Caring for Our Country, Caring for Our Coast, BSC, LCC, RVC, RRCC (through Council contributions)
Timing	On-going (year 1-10)
Management Zones	Estuary-wide

Action 2b: Planning for sea level rise and climate change impacts (cont.)**DESCRIPTION OF TASKS:**

- Climate change implications need to be considered in all long-term management decisions affecting the estuary. Action 2a will identify areas susceptible to risks from sea level rise and tidal inundation. Changes in rainfall patterns and anticipated increases in 'storminess' are less defined however all planning decisions influenced by these factors should evaluate the implications of these changes for long-term estuary condition.
- The following specific tasks have been identified:
- Ensure that the management of the floodplain drainage network, including the operation of flood gates, modification of levees and drains as well as planning for future floodplain management considers climate change effects. In particular, the possibility of more tidal flooding, more saline intrusion and potential for intense storms and flooding events and how responses to these issues may affect estuarine health should be evaluated. These factors need to be considered in terms of long-term drain retirement, maintenance of flood-gate and levee systems and land use and should be incorporated into a long-term asset management strategy (refer Strategy 4: Floodplain Infrastructure Management);
- Map predicted future estuarine wetland habitat distribution in response to changes in sea level, tide propagation and salinity regime within the estuary, building on existing research/models where appropriate (for example the SLAMM modelling; Akumu et al., 2010). This mapping should identify barriers to upslope transgression (e.g. current development, road embankments, etc.) and highlight key areas of importance for maintaining the balance of future habitats within the estuary. This information should be compiled as a set of GIS layers which are made available to each of the constituent councils for land use planning and development controls;
- A strategic plan for long-term estuarine habitat management should be prepared to ensure that upslope migration of key habitats can be accommodated within the long-term land use adjoining the estuary. This should include provision for buffer zones and offsets as appropriate to achieve no net loss of mangrove, saltmarsh habitats and priority riparian habitats within the study area (refer Strategy 6: Riparian Zone Management and Erosion and Strategy 7: Vegetation Management).
- Estimate the extent of erosion risk within the estuary from predicted tidal inundation levels (under NSW sea level rise benchmarks) as well as the interaction of tidal waters with catchment flows. Areas susceptible to erosion risk (including risks to persons, development and infrastructure) and the requirement for mitigation measures such as buffer zones, riparian vegetation management or other erosion mitigation measures can then be determined (refer Strategy 6: Riparian Zone Management and Erosion and Strategy 9: Waterway Usage).
- All catchment/estuary specific information regarding climate change and potential risks for the estuary should be made available to decision makers in the catchment. This should include provision of a resource base (e.g. sea level rise maps, habitat management strategies, etc.) to be utilised in LEP reviews, development assessment, education campaigns (refer Section 3.8 - Strategy 8: Education) and strategic planning.

KPIs

- Estuarine habitat transgression in response to Sea Level Rise (SLR) identified and strategic plan to cater for habitat migration developed by June 2014;
- Risks and projected extent of bank erosion identified and mitigation measures identified by June 2014;
- Richmond River estuary climate change resource base developed and made available to decision makers within the catchment by June 2014.
- Review and update of resource base on an annual basis.

3.3 Strategy 3: Monitoring, Evaluation and Review

Priority: Fundamental

An effective environmental monitoring and reporting system is regarded as a key component of an estuary management program in order to measure the overall health of the estuary, identify relative sources of contamination, and to assess the success of management efforts implemented as part of the CZMP. Monitoring of estuary status and obtaining feedback on the success of management initiatives is a critical aspect of effective management of the Richmond River estuary. Performance indicators need to incorporate evaluation of the status of key values in the estuary, as well as documenting trends in underlying ecological processes. Monitoring of environmental condition and processes, estuary stressors and community opinions should all be undertaken to provide a solid information base for future decision making.

All monitoring should seek to capitalise as much as possible on existing information to provide a baseline from which the success of management actions can be measured and effort can be targeted to appropriate actions. However, as full characterisation of estuarine dynamics cannot be achieved, monitoring should be prioritised to address high risk/high priority outcomes. The monitoring program should provide robust scientific data while considering the limited human and financial resources available. Council and agency staff should be involved in the development of the program.

The existing Council monitoring programs (e.g. as required by the Environment Protection Licences) should continue, however the estuary monitoring program should capitalise on all available information and consider these information sources in the overall monitoring program design.

The NRCMA has commenced a pilot project in Bellingen for the Northern Rivers Ecosystem Health Monitoring Program (EcoHealth) and proposes to implement this across the whole Northern Rivers Region. The program aims to bring together the aquatic sampling programs of government and natural resource management agencies and partners into a standardised, region-wide system. This program is expected to be an appropriate model for monitoring of the Richmond River Estuary. Consideration of the CZMP in the design stages of the EcoHealth program will offer the opportunity to measure the success of management actions implemented through this plan on a catchment-wide basis.

The development of a decision support tool for the estuary is also recommended as part of the monitoring and evaluation strategy. The tool would aim to determine the benefits of estuary improvement works on water quality and could be used in the prioritisation of works and justification for funding.

The ability to achieve the management objectives will be determined through the success of the management actions. This will require coordinated monitoring across the estuary as well as on-going review of performance against defined targets. Ongoing reporting of progress of the CZMP will be undertaken as part of the Council State of the Environment (SoE) Reporting. A major 10 year review of the CZMP is also required.

Table 4: Summary of Monitoring and Evaluation actions

Objectives: O2 - To ensure strategic planning instruments and programs are consistent with and where applicable, directly address the aims of the CZMP O3 - To ensure efficient and effective management of the estuary through appropriate governance, funding and monitoring O4 - To increase knowledge of the impact of existing practices on estuary values and facilitate continuous improvement					
Action (short name)	EMS Option no.	Ten Year Cost Estimate (\$)	Timing	Zones	Lead Responsibility
EcoHealth monitoring program	2, 31	\$2,000,000	On-going (year 1-10)	Estuary-wide	CZMP Implementation Committee
Develop catchment/ water quality modelling tool	3	\$45,000	Immediate	Estuary-wide	CZMP Implementation Committee
Review of CZMP progress and monitoring of KPIs	-	-	Ongoing (every four years)	Estuary-wide	BSC, LCC, RVC, RRCC
10 year review of CZMP	-	\$100,000	Long term (year 10)	Estuary-wide	CZMP Implementation Committee

Action 3a: EcoHealth monitoring program

Desired Outcome	Implementation of a co-ordinated catchment-wide monitoring program to monitor estuary health, measure the success of management actions and inform decision making in accordance with the NSW Natural Resources Monitoring, Evaluation and Reporting (MER) Strategy.
Lead Organisation	CZMP Implementation Committee
Support Organisation	BSC, LCC, RVC, RRCC, OEH, DPI-Fisheries, NRCMA, DPI-Crown Lands, SCU
Cost Estimate (10 year)	\$2,000,000
Potential Funding	NSW Estuary Management Program, BSC, LCC, RVC, RRCC (through Council contributions), NRCMA
Timing	On-going (year 1-10)
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>The NRCMA commissioned a scoping study for the EcoHealth program for the whole Northern Rivers Region in 2006. The future program for the Richmond River catchment should be designed with consideration of the outcomes of this CZMP. To meet the requirements of this CZMP, the EcoHealth program for the Richmond River Catchment is recommended as appropriate providing the following items are considered:</p> <ul style="list-style-type: none"> Monitoring design (sites, indicators, and timing) should be specific to management issues identified in the Draft EMS (e.g. sources of acid runoff and blackwater), community concerns identified through consultation phases (e.g. agri-chemicals) and actions implemented as part of the CZMP to address issues. Measuring trends in water quality in areas affected by management efforts will be required to measure the success of actions and confirm issues or identify further management requirements. The catchment-wide approach of the EcoHealth program also offers a means to compare the effect of localised management on the health of the estuary as a whole and therefore assist in future management direction. Establishment of the baseline ecosystem health status, considering all important health indicators and ongoing assessment of change against this baseline. Assessment of known point sources such as STP discharges, stormwater outlets and industrial and agricultural discharges will be important to compare impacts from these sources in comparison to diffuse pollution sources. The sampling regime should allow for assessment of average conditions and also capture high risk events for the estuary such as summer floods. Catchment-wide reporting will allow for an assessment of relative contributions of pollutants to the estuary and help to direct further management actions. The program will need to be consistent with the NSW Natural Resources Monitoring, Evaluation and Reporting (MER) Strategy. Communication of the findings of the program to the wider community is a key requirement. It will be important to produce simple, easily understandable reports to inform the community about the health and specific needs of the estuary related to their local catchments and management efforts. Well-designed report cards offer a means to convey results in simple, visual terms and are easily distributed as single page leaflets or web downloads. A review should be undertaken annually to optimise and update the program. Costs for the program were estimated using (indexed) costs identified by the scoping study for the Richmond River Catchment EcoHealth Program (WBM, 2007). This equated to approximately \$200,000 per annum for the Richmond River Catchment. Currently \$80,000 to \$150,000 has been allocated to the pilot program to be conducted over a 4-year period (pers comm, N. Blake, 2010). 	
KPIs	<ul style="list-style-type: none"> Design of the Richmond River EcoHealth monitoring program by March 2013. Program commenced by June 2013. Annual reports and community report cards prepared for each year of the program.

Action 3b: Develop catchment/water quality modelling tool to support decision making

Desired Outcome	An effective decision support tool tailored to the Richmond River estuary
Lead Organisation	CZMP Implementation Committee
Support Organisation	BSC, LCC, RVC, RRCC, OEH, DPI-Fisheries, NRCMA, DPI-Crown Lands, SCU
Cost Estimate (10 year)	\$45,000
Potential Funding	NSW Estuary Management Program, BSC, LCC, RVC, RRCC (through Council contributions)
Timing	Immediate development (year 1) followed by review every 3 years
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>The key tasks are:</p> <ul style="list-style-type: none"> Review available tools and existing models developed for the Richmond River Catchment (e.g. E2 (Source Catchments) developed by eWater, and the Coastal Eutrophication Risk Assessment Tool (CERAT) developed by DECCW). Select an appropriate tool for the Richmond River Catchment. Develop the tool with regard to issues identified in the Draft EMS and management actions proposed as part of the CZMP to model expected outcomes of the actions. Communicate modelled results to community. Review and update the tool every three (3) years to consider monitoring results and update management scenarios. 	
KPIs	<ul style="list-style-type: none"> Modelling tool available by June 2013 Review and update every three years

Action 3c: Review of CZMP progress and monitoring of KPIs

Desired Outcome	Continuous improvement towards the CZMP objectives across the full range of issues
Lead Organisation	BSC, LCC, RVC, RRCC
Support Organisation	OEH, DPI-Fisheries, FNCW, NRCMA
Cost Estimate (10 year)	Included in SoE reporting
Potential Funding	n/a
Timing	2016, 2020
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>Success of the CZMP will be indicated by the implementation of substantial measures to address the root cause of issues facing the estuary. Conclusive documentation of the effectiveness of these measures will be required and should be reported. KPIs have been identified where appropriate for each management action to provide a target for achievement of the major steps in each action. This task requires annual review and reporting of progress towards the KPIs as part of the Council State of the Environment (SoE) Reports.</p>	
KPIs	<ul style="list-style-type: none"> Review and reporting undertaken as part of SoE reporting – 2016, 2020.

Action 3d: 10 year review of CZMP

Desired Outcome	Management strategies remain appropriate for the long term
Lead Organisation	CZMP Implementation Committee
Support Organisation	BSC, LCC, RVC, RRCC, OEH, DPI-Fisheries, DPI-Crown Lands, NRCMA
Cost Estimate (10 year)	100
Potential Funding	NSW Estuary Management Program, BSC, LCC, RVC, RRCC (through Council contributions)
Timing	Long term (year 10)
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>The CZMP and the specified management actions should be reviewed to ensure they are being achieved and are resulting in the desired outcomes.</p> <p>A ten year review (or earlier if warranted by legislative or management changes or improved scientific understanding) of the CZMP is required to consider:</p> <ul style="list-style-type: none"> • Results of the four-yearly KPI reviews (Action 3c); • Any barriers identified to the effective implementation of actions or overall success of actions; • Any new or updated scientific knowledge; • Data provided by the estuary monitoring program (Action 3.1); and • Prevailing community attitudes, government policy, strategic planning and estuary management issues. 	
KPIs	<ul style="list-style-type: none"> ○ Review and reporting undertaken by year 10. ○ Adoption and gazettal of the amended CZMP as required.

3.4 Strategy 4: Floodplain Infrastructure Management

Priority: High

The Richmond River floodplain has been significantly altered from its natural state, through vegetation clearing and draining to create suitable conditions for agriculture and to protect land from flooding. Drainage infrastructure was first installed in the late 1800s and today consists of a complex network of constructed drains, modified canals, artificial levee banks and floodgates (refer to Section 7.3 of the Draft EMS for further details). There is now recognition of the significant negative impacts of floodplain modification on the overall health of the estuary and specifically associated with acid sulfate soil impacts, blackwater events following flooding, contribution to general decline in water quality, increasing the frequency and severity of fish kills and loss of biodiversity on the floodplain. Addressing the environmental impacts of floodplain infrastructure and management, while maintaining adequate protection against flooding, is a key challenge for managing the on-going health of the estuary.

In general, any management actions that move towards the reinstatement of more natural flows and restoring floodplain ecosystems would be a step towards improving water quality and general estuary health. There are a range of management options that have been developed through technical research and scientific trials both within the Richmond River catchment and at other locations. The effective application of various management options is dependent on a number of site specific factors and a case by case assessment is required to recommend appropriate actions.

This strategy comprises actions with a number of tasks incorporating identification and prioritisation studies as well as on-ground works.

Several of the floodplain management options identified in the EMS were associated with agricultural activities on the floodplain. In developing this plan it was considered to be appropriate and practical to group these actions within the farm management strategy for implementation (refer Section 3.5).

Table 5: Summary of Floodplain Infrastructure Management actions

Objectives: O7 - To minimise the frequency and severity of environmental events such as fish kills O8 - To optimise flood mitigation works and flow control structures to improve estuarine water quality					
Action (short name)	EMS Option no.	Ten Year Cost Estimate (\$)	Timing	Zones	Lead Responsibility
Identify, prioritise and optimise drainage and levees	4,5 and 21	\$3,420,000	On-going (year 1-10)	Estuary-wide	RRCC
Review floodgate management	6	\$55,000	Immediate (year 1)	Estuary-wide	RRCC

Action 4a: Identify, prioritise and optimise drains and levees

Desired Outcome	Reduce the environmental impacts of drains and levees on the estuary while maintaining required drainage and/or flood mitigation functions
Lead Organisation	RRCC
Support Organisation	BSC, LCC, RVC, DPI-Fisheries, NRCMA, DPI-Crown Lands, OEH, landholders, relevant agricultural industry bodies
Cost Estimate (10 year)	\$3,420,000
Potential Funding	NSW Estuary Management Program, RRCC (through Council contributions), Caring for Our Country, NSW Flood Management Program, BSC, LCC, RVC
Timing	Immediate (Prioritisation Study) and on-going implementation (year 1-10)
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>This action involves the identification and evaluation of drains and levees for on-ground works to optimise the structures to minimise impacts of blackwater, acid sulfate soils and restore more natural flows. In the case of drains, optimisation works will involve either shallowing of channels, construction of sills or weirs to partially infill the drain or infilling if drains are no longer needed. The type of works will be dependent on a number of factors including the operational status and condition of the drain. Levees may be optimised by redesign and/or remodelling to improve flows while still retaining flood control facilities where needed. Any modification of drains and levees will require the consent of affected landowners.</p> <p>Current responsibility for the management of floodplain infrastructure is split between RRCC, constituent councils and private landholders.</p> <p>The initial task is a prioritisation study which would consist of the following steps:</p> <ul style="list-style-type: none"> • Compile inventory of existing drains and levees (refer RRCC existing inventory and add others from Local Council databases); • Document condition of drains and levees; • Document past and current management (include description of floodgate management, past infilling or reshaping works); • Spatial analysis including mapping of drainage assets and overlay with topographic, social and environmental data e.g. DEM and ASS priority areas, land tenure/ownership. The recently completed Richmond River Flood Model should be utilised during this analysis; • Consideration of potential climate change effects (refer Section 3.2 - Strategy 2: Climate Change); • Document approval requirements for proposed works; • Prioritise drains and levees for action. Prioritisation should consider at a minimum the following criteria: <ul style="list-style-type: none"> ○ Current status of the drain or levee (whether or not it is still required for drainage and/or flood mitigation, or is it redundant and can be filled-in); ○ Potential benefit of modifications (e.g. degree at which works will address the issues and achieve positive outcomes for estuary health); ○ Groundwater extraction licences in the area and potential effects of extraction allowances on ASS; ○ The expected costs of the on-ground works specific to the site; ○ Other consequences of the works (e.g. inundation of private lands); ○ Complementary works, where other management actions are being implemented in the location and the combination of the two actions together may improve the benefit of each over the two being conducted in isolation; ○ Land tenure and ownership; ○ Potential funding sources; and ○ Landholder support (consent to undertake works affecting their properties). 	

DESCRIPTION OF TASKS (continued):

- Produce a 5-year work plan (reviewed annually) for the on-ground optimisation works detailing timing, locations, responsibilities and costing for on-ground works.

Follow up monitoring and annual review should be conducted to determine the effectiveness of works, accuracy of cost estimation and to recommend on-going work. Any future management should consider the information available through the EcoHealth monitoring program and should be linked with the Decision Support System (refer Strategy 3: Monitoring, Evaluation).

This action is one of the highest cost items recommended by the plan and is one of the highest priorities for management assessed in the Draft EMS. For the purposes of this plan, costs for this action were estimated using a number of assumptions from available data and taking into consideration the high priority of this strategy in estuary management. The actual implementation costs will be highly dependent on the results of the initial prioritisation study, and contractor costs at the time of tendering on-ground works. Assumption were as follows:

- \$40,000 has been allowed for initial prioritisation study and work plan (drains and levees);
- \$30,000 has been estimated as a nominal allowance for infilling and reshaping works for each drain or levee. Depending on the length and requirements (partial, infilling etc.) and results of the review and prioritisation study the cost could vary significantly between sites; and

A total annual allowance of \$340,000 for optimisation works has been estimated. This equates to allowing for optimisation of 10 sites (drains or levees) per annum. Follow up maintenance and re-shaping is also likely to be required over time which should be achievable within this budget.

KPIs

- Prioritisation Study and 5 year works program completed by June 2013.
- Annual target(s) for optimisation works is suggested at 10 sites, although this should be confirmed by the prioritisation study.

Action 4b: Review floodgate management protocols

Desired Outcome	Reduce the environmental impacts of floodgate management on the estuary while maintaining required function (protection of assets and property)
Lead Organisation	RRCC
Support Organisation	BSC, LCC, RVC, DPI-Fisheries, NRCMA, DPI-Crown Lands, OEH, landholders, relevant agricultural industry bodies
Cost Estimate (10 year)	\$55,000
Potential Funding	NSW Estuary Management Program, RRCC (through Council contributions), Caring for Our Country, NSW Flood Management Program, BSC, LCC, RVC
Timing	Immediate (year 1)
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>Active floodgate management is one way to address water quality and environmental impacts associated with floodplain drainage systems. RRCC actively manages a number of floodgates on the Richmond River floodplain with a view to preserving the flood protection functions while correcting adverse impacts (utilising the 2006 Best Practice Floodgate and Drain Management Guidelines).</p> <p>Given the high level of impact floodgate management can have on estuarine water quality, a review of floodgate management protocols currently undertaken and associated impact on water quality is considered to be appropriate in order to take stock, measure successes and identify any required changes or improvements in protocols.</p> <p>Key tasks are:</p> <ul style="list-style-type: none"> • Background information review (i.e. drivers, responsibilities, legislative requirements, environmental impacts); • Review floodgate requirements on a case by case basis with reference to potential land use changes and sea-level rise implications; • Compile data on current floodgate management protocols including map of locations; • Conduct review of water quality monitoring data where available to provide information on the success of floodgate management as evidenced by water quality improvements (refer to ABER, 2008 for background); • Identify any information gaps and any further information requirements; and • Recommend updates to the Best Practice Floodgate and Drain Management Guidelines and direct further management as necessary. 	
KPIs	<ul style="list-style-type: none"> ○ Review and recommendations by June 2013

3.5 Strategy 5: Farm Management

Priority: High

Management of agricultural lands in the catchment has a major influence on water quality and riparian vegetation condition within the estuary. Section 7.5 of the Draft EMS (Volume 2) discusses issues related to farm management and highlights the importance of evaluating alternative farm management practices and land uses, liaising with industry bodies and ensuring that educational and support material is available to landholders. In addition, several of the issues discussed in Section 7.3 (Floodplain Management), and particularly those related to blackwater indicated that changes to farm management practices including changes in pasture management, were key to addressing the heart of these issues. As such, several of the potential management options put forward in the floodplain management section of the Draft EMS such as scientific trials for retention of water on back swamps and cost benefit analysis of backswamp farming activities have been amalgamated into this farm management strategy for implementation.

A key action identified in this plan is for the development of farm management plans for priority properties. These plans will identify estuary-friendly land management practices and document farm-by-farm implementation strategies which aim to preserve the economic benefits of agriculture in the catchment while meeting the needs of the estuary.

Table 6: Summary of Farm Management actions

Objectives: O1 - To encourage economically viable and environmentally sustainable land use practices in the catchment O5 - To reduce pollutant loads to the estuary O7 - To minimise the frequency and severity of environmental events such as fish kills O9 - To minimise constraints to estuary adaptation to climate change O13 - To protect and enhance visual amenity/ aesthetic appeal of the estuary O14 - To enhance sustainable commercial return from industries relying on the estuary and the floodplain					
Action (short name)	EMS Option no.	Cost Estimate (10 year)	Timing	Zones	Lead Responsibility
Scientific Investigations	8	\$300,000	Short-term (year 1-3)	7, 10, 11 (priority blackwater areas)	DPI
Farm management planning	7, 9, 10, 11, 12, 14	\$5,000,000	On-going (year 1-10)	Estuary-wide	DPI
Liaise with agriculture industry bodies	13	\$90,000	Short-term (year 1-3)	Estuary-wide	DPI

Action 5a: Scientific investigations: strategies for retention of water on backswamp areas

Desired Outcome	To fill gaps in understanding about the on-ground implementation of water retention on backswamp land to enable recommendations for broad-scale implementation
Lead Organisation	DPI
Support Organisation	BSC, LCC, RVC, RRCC, SCU, NRCMA, OEH, landholders, relevant agricultural industry bodies
Cost Estimate (10 year)	\$300,000
Potential Funding	NSW Estuary Management Program, BSC, LCC, RVC, RRCC (through Council contributions), ARC Centre of Excellence Scheme
Timing	Short-term (year 1 - 3)
Management Zones	Identified priority blackwater zones e.g. 7, 10 and 11
DESCRIPTION OF TASKS:	
<p>Preliminary work has indicated that there are a number of potential blackwater management options. One technique with particular promise is the retention of post-flood water on backswamp areas, but there are a number of gaps in the current understanding that need to be filled before implementation can be recommended on a broad-scale. Gaps include specific details of on-ground application and also the extent to which specific management options will affect overall estuary health. Scientific trials to investigate floodwater retention on backswamps were recommended by Walsh (2010) and some scoping of this action has already been undertaken. Results of this initial work should be considered in implementing this action when available. The key tasks are:</p> <ul style="list-style-type: none"> Review current and past trials conducted at other locations (e.g. Clybacca and Little Broadwater) and build on existing knowledge. Identify suitable trial sites through review of past studies, mapping of key landscape features such as elevation (DEM) and drainage as well as through landholder liaison. Securing trial sites may involve lease or buyback arrangements with landholders at potentially significant additional cost. Develop scientific methodology for trials. A key part of the trials will be the design of a monitoring program to measure success of the management action and any required variations. The monitoring program design will include identification of suitable indicators, monitoring locations, timing and event response where required. Trials should aim to account for confounding factors and provide scientifically robust conclusions regarding the effectiveness of the nominated strategies. Develop an Implementation Plan for the trials incorporating the above tasks, responsibilities, timing, costs and funding arrangements. It is likely that trials will need to be conducted over a number of years to be able to assess effectiveness of this option through a representative range of climate conditions and weather events. For the purposes of this CZMP it is estimated that trials will be conducted in the first three years of the plan. Compile and analyse monitoring data and review results. A high level of data analysis and interpretation will be required to clearly document results of the trials and determine levels of success. This will be a key part in developing future management recommendations. Recommendations for future retention of water on backswamp areas. 	
KPIs	<ul style="list-style-type: none"> Implementation Plan completed by June 2013 Completion of on-ground trials by June 2015 Recommendations completed by December 2015

Action 5b: Farm management planning

Desired Outcome	Farm management plans developed for high priority farms to address specific environmental issues while providing for long-term economic planning to facilitate changes to more estuary-friendly land uses in the catchment
Lead Organisation	DPI
Support Organisation	BSC, LCC, RVC, RRCC, SCU, NRCMA, landholders, relevant agricultural industry bodies
Cost Estimate (10 year)	\$5,000,000
Potential Funding	Caring for Our Country
Timing	Immediate (Prioritisation Study) and on-going implementation (year 1-10)
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>Farm management planning should be undertaken for properties where changes in farm management practices are likely to lead to improvements in estuary health. The following tasks are recommended:</p> <ul style="list-style-type: none"> • Prioritisation of properties for farm management planning through desktop assessment methods as well as discussions with landholders. The criteria for prioritisation should include: <ul style="list-style-type: none"> ○ Hydrological proximity to the estuary or sensitive habitats; ○ Farming activity and likely level of impact; ○ Interaction with other issues (e.g. sea level rise, acid sulfate soil drainage) and opportunity to address multiple issues through the same process; ○ Results of the drain/levee prioritisation study (refer Action 4.1, Section 3.4); ○ Willingness of the property owner to participate; ○ Neighbouring properties and opportunity to maximise the benefits of strategic planning across multiple properties; and ○ Opportunity to showcase the property as an example for others to follow. • Review, investigation and documentation of alternative options for farm management (e.g. wet pasture management, crop changes, buy back or retirement and revegetation, etc.) • Cost benefit analysis (CBA) of farming activities - based on the documented alternative options and an established base case scenario, CBA to be carried out on an individual property basis. The CBA would be carried out on priority properties identified in task 1. The desired outcome of the CBA is recommendation of actions likely to provide the best outcomes for the estuary which are acceptable to individual landholders. • Individual farm management plans should be produced to address specific environmental issues including stock impacts, riparian zone degradation, soil loss and erosion, fertiliser and pesticide use and storage, drainage, pasture/crop harvesting and management. The plans should encompass day-to-day operations as well as developing a long-term strategy for adjustment to more estuary-friendly land uses where this need is identified; and • Provision of support and incentives for land holders to continue to implement monitoring and evaluation of the effectiveness of farm management initiatives over time. <p>This action provides a mechanism to address some of the highest priority issues for the estuary. It follows that a high level of resources is recommended to be directed towards this action. To implement this action \$500,000 p.a has been allowed for ten years which would include extension officers to develop plans, liaise with landholders, prioritise and implement works.</p>	
KPIs	<ul style="list-style-type: none"> ○ Prioritisation Report by December 2012 ○ Farm Management Plans adopted and implemented (e.g. 2 high priority farms per annum)

Action 5c: Liaise with agriculture industry bodies to improve education and ensure estuary friendly practices are incorporated into industry guidelines

Desired Outcome	Industry guidelines updated (where necessary) to include information on estuary friendly practices
Lead Organisation	DPI
Support Organisation	BSC, LCC, RVC, RRCC, SCU, NRCMA, OEH, relevant agricultural industry bodies
Cost Estimate (10 year)	\$90,000
Potential Funding	Caring for Our Country, BSC, LCC, RVC, RRCC (through Council contributions)
Timing	Short-term (year 1-3)
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>Liaison with individual landholders is a key strategy for facilitating positive change and it is necessary to ensure that farmers have industry support and can access management information, industry incentives and marketing initiatives that maximise positive outcomes for the estuary as well as the agriculture industry.</p> <p>The following tasks are recommended:</p> <ul style="list-style-type: none"> • Review agricultural landuse within the catchment and identify relevant agriculture industry bodies/agencies to discuss agriculture related issues in the Richmond River estuary; • Encourage agriculture industry bodies to incorporate standards for estuary-friendly farm management practices and accreditation/certification; • Linkage of industry information sources (e.g. web sites) with estuary management resources to enable better information provision to landholders; • Identify and review industry documentation such as best practice guidelines, codes of practice, waterway health certification, etc. and where relevant, provide additional information and suggested amendments; • Investigate industry incentives and collaborative opportunities for reducing agricultural impacts on the Richmond River estuary such as joint promotion of estuary health improvement initiatives and 'green' branding; and • Identify grants, low interest loans and other incentives that may be available to assist landholders in implementing actions to improve estuary health and promote these opportunities through industry and estuary management channels. 	
KPIs	<ul style="list-style-type: none"> ○ Identification of relevant industry bodies and associated guidelines, certification criteria, etc. by 2013 ○ Review and successful incorporation of estuary-friendly practices in industry documentation by 2014 ○ Identification and promotion of industry incentives (grants, accreditation, support services) that may assist landholders in implementing positive change (On-going)

3.6 Strategy 6: Riparian Zone Management and Erosion

Priority: Medium

The riparian zone bordering the Richmond River Estuary and tributaries is degraded for much of the study area, with limited coverage and poor condition. This issue has been identified as one of the key issues affecting overall estuary health. The establishment of suitable vegetation for riparian biodiversity corridors and natural vegetation for stabilisation of denuded banks would result in a significant reduction in bank erosion and sediment displacement while enhancing ecosystem values and improving water quality for the estuary as a whole.

This strategy focuses on two primary actions. The first is to conduct an estuary-wide prioritisation study of riparian areas to identify priority sites for rehabilitation. The study will take a strategic approach to riparian zone management in the study area and presents many advantages including targeted works to maximise benefits, promotion of works at visible sites and continued support for funding based on an overriding plan. This will consider the erosion risk due to predicted tidal inundation levels and the influence of sea level rise (refer Strategy 2: Climate Change Adaptation). The second action involves the consideration of adequate protection of the riparian zone within existing and future planning instruments. The outcomes of the prioritisation study could be used in planning for the dedication of riparian buffer areas on streams and waterways.

Encouraging farmers to protect and enhance the riparian zone through actions such as fencing of stock is a key part of riparian vegetation and erosion management. Associated actions are discussed as part the farm management planning in Strategy 5: Farm Management.

Table 7: Summary of Riparian Zone Management and Erosion actions

Objectives: O6 - To protect and enhance the riparian zone O15 - To minimise risk to the health and safety of users of the estuary					
Action (short name)	EMS Option no.	Ten Year Cost Estimate (\$)	Timing	Zones	Lead Responsibility
Identify priority riparian areas and rehabilitate	23	\$2,300,000	On-going (year 1-10)	Estuary-wide	CZMP Implementation Committee
Riparian buffer zone establishment (planning)	22	\$30,000	Immediate (year 1)	Estuary-wide	BSC, LCC, RVC

Action 6a: Identify priority riparian areas and rehabilitate

Desired Outcome	Improved cover and condition of riparian areas of waterways along the Richmond River Estuary and tributaries
Lead Organisation	CZMP Implementation Committee
Support Organisation	BSC, LCC, RVC, DPI-Crown Lands, NRCMA, FNCW, OEH, landholders, relevant agricultural industry bodies
Cost Estimate (10 year)	\$2,300,000
Potential Funding	NSW Estuary Management Program, BSC, LCC, RVC, RRCC (through Council contributions), Habitat Action Program, Urban Sustainability Program, Maintaining Australia's Biodiversity Hotspots Program, NRCMA
Timing	Immediate (Prioritisation Study) and on-going implementation (year 1-10)
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>The action requires the identification and prioritisation of riparian areas for rehabilitation. Managers can then assess the areas that will provide the greatest benefits for the effort expended or 'best bang for buck'. There are several examples of preliminary work and mapping tasks that have been carried out to date (e.g. RRCC, WetlandCare and Australian Wetlands) and the study would aim to draw these together for prioritisation. Prioritisation should consider a number of factors including:</p> <ul style="list-style-type: none"> Coastal hazards contributing to erosion risk such as tidal inundation, the interaction of tidal waters with catchment flows and increased storminess (refer Strategy 2: Climate Change Adaptation); Identification of high impact land use, where vegetated buffers will provide benefits in soil retention/interception and improvement of overland runoff, thus improving water quality; Identification and prioritisation of bank erosion areas that would benefit from riparian planting (Strategy 2: Climate Change Adaptation); The location of key habitats (e.g. shorebirds) and enhancement of these areas through greater connectivity created by riparian restoration; Targeted programs to address riparian weeds; The location of sites in terms of public visibility to promote activities and act as demonstration sites and to enhance aesthetic qualities of the estuary; Land ownership and landowner willingness; Identification and prioritisation of rehabilitation areas based on factors discussed above; and Develop a 10-year work schedule for the rehabilitation of prioritised riparian areas. <p>Follow up monitoring and annual review should be conducted to determine the effectiveness of works, accuracy of cost estimation and to recommend on-going work. Any future management should consider the information available through the EcoHealth monitoring program and Decision Support Tool (as per Strategy 3: Monitoring, Evaluation).</p> <p>For the purposes of this plan, costs for this action were estimated using a number of assumptions from available data. In reality the actual implementation costs will be dependent on the results of the initial prioritisation study and contractor costs at the time of tendering on-ground works. Assumption were as follows:</p> <ul style="list-style-type: none"> \$50,000 has been allowed for initial prioritisation study; and \$50,000 per ha has been estimated as a nominal allowance for rehabilitation. Depending on the extent of works (fencing, replanting or weed maintenance) and results of the review and prioritisation study the cost could vary significantly between sites. This estimate does not include long-term follow up weed maintenance (after year 3). There may also be a need for survey of property boundaries. A total annual allowance of \$250,000 has been estimated to allow for rehabilitation of 5 ha per year. 	
KPIs	<ul style="list-style-type: none"> Prioritisation study completed by December 2012 Target rehabilitation of 5 ha per year Annual review of work schedule and project costing

Action 6b: Riparian buffer establishment (planning)

Desired Outcome	Identification of riparian buffers on waterways to highlight the importance of these areas in future planning controls and on-going management
Lead Agency	BSC, LCC, RVC
Support Agencies	DPI-Crown Lands, OEH
Cost Estimate (10 year)	\$30,000
Potential Funding	NSW Estuary Management Program, BSC, LCC, RVC, RRCC (through Council contributions), Habitat Action Program, Urban Sustainability Program, Maintaining Australia's Biodiversity Hotspots Program
Timing	Immediate (Year 1)
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>This task requires a review of planning and policy controls to ensure adequate protection of riparian areas against development, clearing and maintenance of ecological values (e.g. E2 or E3 zoning in LEPs could be appropriate in some areas, zoning of Crown Land parcels for conservation may be appropriate in others). The key output will be policy outcomes acknowledging the environmental values for these areas for use in land use planning and management.</p> <p>The establishment of riparian buffers will be determined based on the results of the prioritisation study completed as part of Action 6.1 (Riparian Prioritisation Study) including the bank erosion hazard assessment (Strategy 2: Climate Change Adaptation). In addition, climate change impacts and upslope migration of key habitats can be accommodated within the planning for long-term land use adjoining the estuary (refer Strategy 2: Climate Change).</p>	
KPIs	<ul style="list-style-type: none"> ○ Review completed by June 2013

3.7 Strategy 7: Vegetation Management

Priority: Medium

While the vast majority of the study area has been cleared for agriculture, there are several areas of remnant or regrowth vegetation that provide valuable habitat and ecological functions. Most of these areas are protected within the States reserve system such as National Parks, Council reserves or protected under conservation agreements between private landholders and state agencies. Other areas on private lands remain unprotected under existing legislation. On a local scale, the protection and enhancement of these remnant or regrowth areas is of high importance to retain as much of the remaining vegetation on the floodplain as possible. On a broader scale, rehabilitation of degraded habitats, particularly riparian and floodplain communities is required, focussing on improving ecological condition (e.g. weed control) and connectivity (e.g. protection and replanting) throughout the catchment. Preliminary work by WBM (2006) and others provides a good background for identification of areas to be addressed. Further planning is required to prioritise and direct on-ground works.

Aquatic weeds are known to occur in several locations in the study area. They not only reduce ecosystem values of the estuary, but can also contribute to water quality problems including the build-up of MBOs in drains within ASS environments. In addition to the current routine aquatic weed management, a more holistic approach to management should be considered by addressing ecological issues that contribute to aquatic weeds such as improve tidal flushing, restoring a more natural hydrology, and increasing riparian planting for shade and as a nutrient buffer. RRCC currently contracts a mechanical weed harvester as a preferred method to reduce herbicide application and remove nutrient load from waterways.

Table 8: Summary of Vegetation Management actions

Objectives: O1 - To encourage economically viable and environmentally sustainable land use practices in the catchment O10 - To protect and enhance the biodiversity values of the estuary O13 - To protect and enhance visual amenity/ aesthetic appeal of the estuary					
Action (short name)	EMS Option no.	Ten Year Cost Estimate (\$)	Timing	Zones	Lead Responsibility
Retain, rehabilitate and conserve existing native floodplain vegetation	25	\$930,000	On-going (year 1-10)	Estuary-wide	BSC, LCC, RVC, NRCMA
Aquatic weed management	24	\$1,000,000	On-going (year 1-10)	Estuary-wide	FNCW, RRCC

Action 7a: Retain, rehabilitate and conserve existing native floodplain vegetation

Desired Outcome	Retention and enhancement of remaining floodplain vegetation
Lead Organisation	BSC, LCC, RVC, NRCMA
Support Organisation	RRCC, DPI-Crown Lands, FNCW, OEH-NPWS, landholders, relevant agricultural industry bodies
Cost Estimate (10 year)	\$930,000
Potential Funding	BSC, LCC, RVC, Habitat Action Program, Urban Sustainability Program, Maintaining Australia's Biodiversity Hotspots Program, NRCMA
Timing	Immediate (Prioritisation Study) and On-going (year 1 – 10)
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>The conservation and rehabilitation of existing vegetation of the floodplain is considered to be an important component of the CZMP considering that the majority of the catchment has been largely cleared of native vegetation.</p> <p>There are two stages to the action. The first stage is a prioritisation study to identify existing tracts of remnant or regrowth vegetation for targeted improvement programs. The study should consider:</p> <ul style="list-style-type: none"> • Review of mapping of high conservation value habitat and existing corridors (e.g. NPWS Vegetation survey and mapping, 1995; NPWS Forest Ecosystem Mapping, 1999; NPWS Key Habitats and Fauna Corridor mapping, 2002; Northern Rivers Regional Biodiversity Management Plan, DECCW 2010; LCC Biodiversity Management Strategy (under development) and other local council vegetation mapping layers where available; • The impact of land uses within the catchment (e.g. drainage, ASS hotspots etc.); • The outcomes of the feral animal eradication programs and contributions to the protection and conservation of existing native floodplain vegetation; • Prioritise threatened species habitats and EECs in the study area; • Document the current level of protection of vegetation such as land use, land ownership/zoning, conservation agreements and planning controls; and • Develop a prioritised list of land use planning changes to adequately protect important habitats considering a number of factors including mapping as above and landowner willingness, mitigation of water quality issues etc. <p>The second stage of this action is the rehabilitation of prioritised vegetation areas. The on-ground works will need to be developed on a case by case basis and a schedule of works developed for each site.</p> <p>The actual implementation costs will be dependent on the results of the initial prioritisation study and contractor costs at the time of tendering on-ground works. Assumption were as follows:</p> <ul style="list-style-type: none"> • \$30,000 has been allowed for initial prioritisation study; and • \$100,000 per annum has been estimated as a nominal allowance for rehabilitation at 2ha per year. 	
KPIs	<ul style="list-style-type: none"> ○ Prioritisation Study by December 2012 ○ Target for rehabilitation of 2 ha per year

Action 7b: Aquatic weed management

Desired Outcome	Provide for holistic approach to aquatic weed management through improvements in catchment management (minimise nutrient export, manage flows etc.) and also control aquatic weed outbreaks as they occur
Lead Organisation	FNCW, RRCC (depending on location and nature of outbreak)
Support Organisation	BSC, LCC, RVC, DPI-Fisheries, OEH, landholders
Cost Estimate (10 year)	\$1,000,000
Potential Funding	NSW Estuary Management Program, RRCC (through Council contributions), FNCW (through Council contributions), BSC, LCC, RVC, Habitat Action Program, Urban Sustainability Program, Maintaining Australia's Biodiversity Hotspots Program
Timing	On-going (year 1-10)
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>Aquatic weed control is currently undertaken by RRCC as part of routine drain maintenance activities and also in response to landholder requests. Management of aquatic weeds may also be required from time to time in areas of the estuary not associated with drainage infrastructure. Continued management of aquatic weeds is required to maintain flows, minimise visual amenity and environmental considerations such as water quality impacts and to reduce factors in MBO formation.</p> <p>A holistic approach to aquatic weed management is desirable by implementation of various land management improvements as part of other actions in this plan including minimising nutrient export to waterways and improving shading through reinstatement of riparian vegetation (refer Strategy 5: Farm Management and Strategy 6: Riparian Zone Management and Erosion). In addition the continuation of aquatic weed control is suggested in association with RRCC drain maintenance activities. The use of mechanical harvesting of aquatic weeds using a weed harvester will reduce herbicide application and remove nutrient from the water body. The program will need to have minimum requirements to maintain infrastructure and minimise environmental impacts and be flexible to be able to respond to events giving rise to aquatic weed blooms occurring both in the vicinity of drainage infrastructure and elsewhere in the estuary.</p> <p>An annual review of works should be conducted for the life of the CZMP.</p>	
KPIs	<ul style="list-style-type: none"> ○ Adequate maintenance of drainage infrastructure to ensure correct function ○ Control of serious aquatic weed outbreaks as they occur

3.8 Strategy 8: Education

Priority: Medium

Community education is relevant to all estuary management issues and the achievement of objectives is reliant on community understanding and effective involvement in the management process.

The Draft EMS (Section 7.13) identified the following issues that need to be addressed:

- The complex administration and governance arrangements (refer Section 1.1) results in confusion amongst community members regarding management responsibilities;
- Opinions and perceptions are sometimes based on old or inaccurate information;
- Information is not always available to the people best placed to make a difference;
- Social acceptability of management options will increase as community understanding of the issue increases;
- Conflict between users can be alleviated with the provision of objective information; and
- Community satisfaction with estuary management is sometimes based on perception rather than fact.

It will be important to support education projects or programs that develop or widen the community's knowledge of, skills and commitment to protecting the Richmond River Estuary. Existing education programs (such as those undertaken by I & I NSW, NRCMA, RRCC and the Councils discussed in Section 2.5) should be supported through the estuary management process.

Action 8a: Estuary-wide community education and consultation program

Desired Outcome	Improve current understanding of estuary management in the community and among decision makers
Lead Organisation	CZMP Implementation Committee
Support Organisation	BSC, LCC, RVC, DPI-Crown Lands, NRCMA, FNCW, DPI-Fisheries, OEH, relevant agricultural industry bodies
EMS Option No.	16, 37
Cost Estimate (10 year)	\$500,000 (\$50,000 p.a)
Potential Funding	NSW Estuary Management Program, BSC, LCC, RVC, RRCC (through Council contributions), Caring for Our Coast, Caring for Our Country, Environmental Education Grants, Working on Country Program
Timing	On-going (year 1-10)
Management Zones	Estuary-wide
Objectives:	All
DESCRIPTION OF TASKS:	
<p>Future education programs should build on the existing programs such as the local Catchment Activity Model, and particularly focus on:</p> <ul style="list-style-type: none"> Local ecological processes; Education of decision makers regarding priority issues for the estuary and required allocation of effort and funding; The importance of human behaviours and their impacts on the estuary; Improving community understanding of what an estuary is and its value as an asset; Significant flora and fauna issues (such as migratory shorebirds); and Local issues that help to connect the local community with the health of the estuary and its subsequent impact on the local lifestyle. <p>Education tools include activity days, fact sheets, brochures and school education programs. Information and resources should be available through a central location such as libraries or websites. Data provided by monitoring programs (refer Section 3.3) should also be made available for key issues or important geographical locations. To enable dissemination of key information to the community, local Councils need to be aware of current initiatives and outcomes.</p> <p>Capacity-building will be a key component of the education program as empowerment and training of individuals and groups will improve the success of the outcomes and promote a greater understanding of the issues. Existing groups such as Landcare should be supported. Coordination of efforts with other organisations such as the Marine Discovery and Resource Centre at Ballina High School would also assist with resourcing and facilities. The participation of indigenous groups in future management actions should also be encouraged through education and training programs.</p> <p>Key steps are:</p> <ul style="list-style-type: none"> Design a targeted education program considering key management issues, knowledge gaps, available funding and administrative responsibilities (refer Section 3.3); Obtain funding; Implement the education program; Review the success of the program through follow-up community surveys; and Amend the program as necessary. 	
KPIs	<ul style="list-style-type: none"> Improved community understanding of issues demonstrated through follow-up survey results.

3.9 Strategy 9: Waterway Usage

Priority: Medium

The waterways of the Richmond River Estuary provide for a number of uses including commercial ventures such as fishing, tourism etc. and recreational pursuits including fishing, boating, sailing and swimming. The CZMP aims to direct management action to address identified issues associated with waterway use to protect the values of the estuary while facilitating sustainable waterway uses (including continuing and undiminished public foreshore access). A number of options were identified to address issues in the Draft EMS.

Table 9: Summary of Waterway Usage actions

Objectives: O1 - To encourage economically viable and environmentally sustainable land use practices in the catchment O6 - To protect and enhance the riparian zone O10 - To protect and enhance the biodiversity values of the estuary O11 - To provide for increased use of the estuary while minimising environmental impact and conflict between users O14 - To enhance sustainable commercial return from industries relying on the estuary and the floodplain O15 - To minimise risk to the health and safety of users of the estuary					
Action (short name)	EMS Option no.	Cost Estimate (10 year)	Timing	Zones	Lead Responsibility
Develop strategic plan for estuary usage	15, 26, 27, 28, 32, 33, 34	\$75,000	Short-term (year 3)	Estuary-wide	CZMP Implementation Committee
Cost benefit analysis of dredging operations in lower estuary	38	\$50,000	Short-term (year 3)	Zones 1&2	BSC

Action 9a: Develop strategic plan for estuary usage

Desired Outcome	Forward-looking plan for estuary use that covers the entire estuary
Lead Organisation	CZMP Implementation Committee
Support Organisation	BSC, LCC, RVC, NSW Maritime, DPI-Crown Lands, DPI-Fisheries
Cost Estimate (10 year)	\$75,000
Potential Funding	NSW Estuary Management Program, BSC, LCC, RVC
Timing	Short- term (year 3)
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>The formulation of an integrated strategic plan for use of the Richmond River Estuary will address the identified issues associated with estuary uses and plan for current and future requirements. The strategic plan will incorporate several of the options identified during the Draft EMS.</p> <p>The plan will incorporate:</p> <ul style="list-style-type: none"> • Review of the Lower Richmond River Recreational Boating Study recommendations (completed by BSC in 2005). It contains a suite of actions related to boating with particular focus on provision of boating facilities in the lower estuary. The plan should expand the study area to include the whole estuary. • Public access to foreshore areas now and into the future to ensure continuing and undiminished access to the waterway and to manage environmental or safety impacts from current access arrangements. • A review of waterfront structures licensing has been recently undertaken by I & I NSW (Fisheries). This plan should be available in the near future and the outcomes should be considered in developing this strategic plan. • Consideration of erosion within the estuary (lower Richmond River) caused by tidal waters and the interaction with catchment floodwaters and the development of management actions to reduce risks to persons, development and infrastructure (coastal hazards identified through . • Consideration of key vegetation and habitat areas (e.g. shorebird nesting and breeding areas) and requirements for protection. • Estuarine vegetation signage / education to protect sensitive areas. The consideration of usage zones may be appropriate to restrict certain activities from sensitive areas such as water craft with propellers restricted from seagrass areas. While estuarine vegetation is protected under the Fisheries Management Act 1994, education and appropriate signage is required to protect these areas for waterway users. • Investigate usage conflicts and need for management. The estuary management planning process identified that there was concern for usage conflicts within the estuary, and the strategic plan should consider the growing number of waterway users and the increasing diversity of waterway uses as population increases. • Review boat passage areas impacted by erosion and recommend management. This will involve investigation of active bank erosion noted as occurring in Emigrant Creek and North Creek where boat wash was considered to be the primary cause. <p>The assessment of coastal hazards (including erosion caused by tidal waters and the interaction with catchment floodwaters and the implications for infrastructure and property) will be considered by RVC as part of the coastal zone management planning process for the Evans River Estuary.</p>	
KPIs	<ul style="list-style-type: none"> ○ Strategic Plan developed by June 2015

Action 9b: Cost benefit analysis of dredging operations in lower estuary

Desired Outcome	Logical consideration of the costs and benefits of dredging in the lower estuary based on fact, not perception (to be conducted only if deep water access is proposed)
Lead Organisation	BSC
Support Organisation	DPI-Crown Lands, DPI-Fisheries, OEH, NSW Maritime
Cost Estimate (10 year)	\$50,000
Potential Funding	NSW Estuary Management Program and Coastal Management Program, BSC
Timing	Short-term (Year 3)
Management Zones	Zones 1 & 2
DESCRIPTION OF TASKS:	
<p>There is a recurring perception within the community that dredging is required in the lower estuary to improve navigation safety at the Richmond River bar as well as other specific points in the estuary such as Emigrant Creek. Boat users in the estuary are generally well aware of navigability risks and either defer travel or exercise appropriate caution in adverse conditions. The lack of deep water access does limit the type of vessel that can utilise facilities in the Richmond and therefore has an influence on the development of marine support facilities within the estuary. It is considered that any detailed review of dredging costs, impacts and benefits would only be progressed if sufficiently justified by future navigability requirements.</p> <p>The key tasks to be undertaken are:</p> <ul style="list-style-type: none"> • Confirmation of recreational and commercial boating requirements including the future transit requirement for deep (e.g. >2.5m) draft vessels. Particular reference should be made to the recommendations provided in the Lower Richmond River Recreational Boating Study (GHD, 2005) and future directions regarding marine precinct facilities in the lower estuary. • A review of the technical feasibility and effectiveness of dredging. This review should refer to previous dredging operations in the Richmond and consider sediment movement patterns, infill rates and dredging frequency required to maintain the required channels as well as other factors such as spoil disposal. • An assessment of the environmental and social effects of dredging in the lower estuary. Preliminary studies have indicated that dredging may exacerbate oceanic flooding within Ballina (reduced retardation of high tides and storm surge up the estuary) and this should be considered in concert with predictions for sea-level rise. Other issues that need to be evaluated include, but are not limited to, the impact on estuarine habitats, particularly shorebird habitat and seagrasses in the vicinity of dredging operations, impact on recreational users and commercial activities (e.g. surfers and learn to surf businesses using the sandbar at the entrance to North Creek) and increased wave erosion of threatened species habitats of the lower estuary including Mobbs Bay. A key issue that needs to be addressed is the likely reduction in sand supply to northern beaches and therefore the likely effect of sand extraction (as a result of dredging) in the Richmond River estuary on coastal erosion. • An investigation into the potential commercial return that could be gained from the utilisation of dredged spoil as a resource (e.g. sand for the building industry or beach nourishment) or the social benefit that may result from dredging. This investigation should consider the costs and benefits of the operation with a view to determining the long-term economic sustainability of operations relying on dredging. 	
KPIs	No KPIs are recommended. Progression of this action would be dependent on the results of the above tasks, or receipt of firm proposals for enhanced marina facilities within the estuary.

3.10 Strategy 10: Wastewater Management

Priority: Medium

Eight STPs discharge to the Richmond River Estuary (Casino, South Lismore, East Lismore, Alstonville, Ballina, Wardell, Rileys Hill and Coraki STPs, refer Sections 3 and 7.8 of the Draft EMS). The impact of the STPs on estuarine water quality depends on discharge flows and loads of pollutants such as nutrients and faecal coliforms.

Sewerage systems (including STPs and overflow structures) are regulated by the EPA (DECCW) through Environment Protection Licences (under the Protection of the Environment Operations Act, 1997) held by the respective Councils. Where required by the EPA, the licences include Pollution Reduction Programs to improve the performance of the STPs. The Draft EMS identified that STP discharges are increasing the load of nutrients and other contaminants to the estuary but the magnitude of impacts is unknown. Generally, loads from sewerage systems are considered to be minor during significant rainfall events, compared to the major inputs from diffuse pollution sources (e.g. agricultural runoff). However, pollutant loads from urban inputs become relatively more important to water quality during the dry season when catchment inputs are low, although a comprehensive assessment of risk across the study area has not been conducted to date.

Rural and rural residential areas without reticulated sewerage have on-site systems including composting toilets, septic systems, aerated wastewater systems, pump-out systems and grey water treatment systems. Responsibility for performance of on-site sewage systems remains with the property owner, regulated by the local councils under the Local Government Act, 1993. Many on-site sewage management systems in the catchment are not registered and condition and impact of on-site sewage management systems on water quality in the catchment is unknown. Council backlog sewer programs have identified some areas to be connected to the Council sewerage system based on the risks of on-site systems to public health, aquatic ecosystems, groundwater supplies and contamination of shellfish areas and inappropriate soils, lot size and topographic conditions.

Reduction of point source pollution such as nutrients and faecal coliforms from sewerage systems is consistent with the aims of the estuary management program.

Table 10: Summary of Wastewater Management actions

Objectives: O5 - To reduce pollutant loads to the estuary O4 - To increase knowledge of the impact of existing practices on estuary values and facilitate continuous improvement					
Action (short name)	EMS Option no.	Ten Year Cost Estimate (\$)	Timing	Zones	Lead Responsibility
Sewerage system risk assessment and prioritisation study	19 and 20	\$25,000	Short-term (year 2)	Estuary-wide	CZMP Implementation Committee
On-going on-site sewerage management inspections and improvements	41	Not estimated	On-going (year 1-10)	Estuary-wide	BSC, LCC, RVC

Action 10a: Sewerage system risk assessment and prioritisation study

Desired Outcome	Assessment of the relative risk of sewerage systems to estuary health
Lead Organisation	CZMP Implementation Committee
Support Organisation	OEH, BSC, LCC, RVC
Cost Estimate (10 year)	\$25,000
Potential Funding	NSW Estuary Management Program, BSC, LCC, RVC
Timing	Short-term (Year 2)
Management Zones	Estuary-wide, particularly Zones 1 – North Creek, 2 – Emigrant/ Maguires Creek, 3 – Back Channel, 5 – Riley's Hill, 11 – Lower Bungawalbin, Zone 12 – Upper Richmond/ Wilsons
DESCRIPTION OF TASKS:	
<p>The management and regulation of sewerage systems should continue outside of the estuary management process as part of the EPA regulatory process. To ensure consistency with this CZMP, the impact of sewerage system discharges on estuary health should be considered as part of the regulatory process.</p> <p>Although the Council sewerage systems are generally meeting EPA licence requirements, there is a need for an assessment of the risks to water quality from STP discharges and sewerage system overflows. The study would:</p> <ul style="list-style-type: none"> • Review current STP treatment processes and performance in relation to receiving water quality; • Review frequency and volume of sewerage system overflows; • Review Council strategies for sewerage system management; • Determine sensitivity of receiving environments; • Determine priorities for sewerage system improvements to reduce impact on estuary health; and • Develop a long term upgrade program to inform the EPA regulatory process. 	
KPIs	<ul style="list-style-type: none"> ○ Review completed by June 2014

Action 10b: On-going on-site sewerage management inspections and improvements

Desired Outcome	Improvements in the performance of on-site sewerage management systems resulting in reduction of contaminants transported to the estuary
Lead Organisation	BSC, LCC, RVC
Support Organisation	-
Cost Estimate (10 year)	Not estimated
Funding	Council environmental health services and sewerage service budgets
Timing	On-going
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>The Councils undertake on-site sewage and wastewater management programs including specification of design requirements and audit and inspection of on-site systems. Adequate funding should be allocated to these programs as part of the Council environmental health service budgets. In addition, a review of the need for improved wastewater management systems in unsewered areas is required as part of Council's sewerage services functions. The review should include:</p> <ul style="list-style-type: none"> • A review of on-site system technologies and performance; • The sensitivity of receiving environments (including impacts on aquaculture as discussed in Strategy 13: Fishery Management); • Priority backlog sewerage areas to reduce impact on estuary health; and • Preparation of village wastewater strategies. 	
KPIs	<ul style="list-style-type: none"> ○ Council On-site Wastewater Management Strategies are fully implemented ○ Review of all un-sewered areas completed by 2020.

3.11 Strategy 11: Urban Runoff

Priority: Medium

Stormwater from urban areas can often discharge significant loads of pollutants to receiving water bodies. The Draft EMS (refer Section 7.9, Volume 1) reported that the impact of urban stormwater to overall estuarine water quality is a significant issue for the public and councils. The importance of managing urban stormwater will also become increasingly important as the extent of urban development increases to accommodate the increase in population within the study area.

The reduction of urban pollution such as nutrients and faecal coliforms is consistent with the aims of the estuary management program. Stormwater management is a core responsibility of the local Councils (refer Section 2.3).

Action 11a: Stormwater management

Desired Outcome	On-going improvements in stormwater management resulting in reduction of contaminants transported to the estuary
Lead Organisation	BSC, LCC, RVC
Support Organisation	OEH
EMS Option No.	16, 17, 18
Cost Estimate (10 year)	Not estimated
Potential Funding	Stormwater management levy, Council rebate programs, developer contributions, property owner contributions
Timing	On-going (year 1-10)
Management Zones	Estuary-wide
Objectives:	<p>O5 - To reduce pollutant loads to the estuary</p> <p>O15 - To minimise risk to the health and safety of users of the estuary</p> <p>O13 - To protect and enhance visual amenity/ aesthetic appeal of the estuary</p> <p>O4 - To increase knowledge of the impact of existing practices on estuary values and facilitate continuous improvement</p>
DESCRIPTION OF TASKS:	
<p>The management of urban runoff should continue to occur outside the estuary management process as a core responsibility of the local Councils. This includes:</p> <ul style="list-style-type: none"> On-going review and update of Stormwater management plans; On-going review and update of Development Control Plans and development guidelines; Community education (refer Strategy 8: Education); Incorporating water sensitive urban design in new developments; Retrofitting stormwater/water quality controls to existing urban developments; and The State Government BASIX program; <p>A key component of any stormwater management program is education on the impacts of urban runoff and potential improvements. This should be incorporated into existing Council programs as well as estuary-wide community education programs (refer Section 3.8).</p>	
KPIs	<ul style="list-style-type: none"> Stormwater Management Plans are reviewed every 3 years.

3.12 Strategy 12: Cultural Heritage

Priority: Low

While the protection of Aboriginal cultural heritage sites is provided for under several pieces of State Government legislation, there is recognition that further work is required to identify, assess and register remaining sites within the Richmond River catchment. There were two key options identified in the Draft EMS (refer Section 7.10) to address the recognised issues:

- The identification and registration of remaining sites in and around the Richmond River Estuary would assist with future land use planning and development controls; and
- The development of Cultural Site Management Plans may be appropriate at certain locations and this would need to be decided in consultation and collaboration with local Aboriginal communities.

Table 11: Summary of Cultural Heritage actions

Objectives: O12 - To protect the cultural heritage values of the estuary					
Action (short name)	EMS Option no.	Ten Year Cost Estimate (\$)	Timing	Zones	Lead Responsibility
Identification and recording of cultural sites available to council planners	35	\$100,000	Short-term to long-term (year 3-8)	Estuary-wide	CZMP Implementation Committee
Cultural Site Management Plans	36	\$155,000	Short-term to long-term (year 3-10)	Estuary-wide	BSC, LCC, RVC

Action 12a: Identification and recording of cultural sites available to council planners

Desired Outcome	Identify and register sites that are currently known to community members but not recorded on planning registers to ensure the appropriate level of protection
Lead Organisation	CZMP Implementation Committee
Support Organisation	OEH, BSC, LCC, RVC, Aboriginal representatives/ groups
Cost Estimate (10 year)	\$100,000
Potential Funding	NSW Estuary Management Program, BSC, LCC, RVC, Indigenous Heritage Program, Caring for Our Coast, NSW Heritage Office Aboriginal Heritage Projects
Timing	Years 3-8
Management Zones	Estuary - wide
DESCRIPTION OF TASKS:	
<p>Cultural heritage sites (where known) are listed on the NPWS Aboriginal Heritage Information Management System (AHIMS). Access to accurate and up to date information regarding cultural sites and their management requirements is important for Council strategic planning and development controls. This tasks will be implemented in accordance with the APEC principles (Aboriginal People, the Environment and Conservation, DECC, 2008).</p> <p>Key tasks are:</p> <ul style="list-style-type: none"> • Review of background information and current registers (e.g. DECCW AHIMS, Council registers); • Consultation with local Aboriginal groups to develop an appropriate methodology to identify and record sites. It will be necessary to consult with a number of different groups in the local area to gain a comprehensive overview. • Undertake the established methods to identify sites that are known and not currently recorded on relevant register (as per issue raised by the EPS).; and • Recording of sites on registers available to council planners. 	
KPIs	<ul style="list-style-type: none"> ○ Identification and recording of sites by June 2019

Action 12b: Cultural Site Management Plans

Desired Outcome	To provide for effective protection and management of cultural sites and where appropriate provide access and signage to promote the cultural values of the estuary
Lead Organisation	BSC, LCC, RVC
Support Organisation	OEH, Aboriginal representatives/ groups
Cost Estimate (10 year)	\$155,000
Potential Funding	NSW Estuary Management Program, BSC, LCC, RVC, Indigenous Heritage Program, Caring for Our Coast, NSW Heritage Office Aboriginal Heritage Projects
Timing	Years 3-10
Management Zones	Estuary - wide
DESCRIPTION OF TASKS:	
<p>It may be appropriate to develop Cultural Site Management Plans for certain sites. The aim of the plan(s) would be dependent on a range of site specific factors including the type, location and cultural sensitivities. In general cultural plans would aim to both improve the knowledge and understanding of the Aboriginal cultural heritage of the Richmond River Estuary, and provide a suite of recommendations and mechanisms for the appropriate management and protection of these important places and values.</p> <p>Consultation is required with local Aboriginal people/groups and organisations that have associations with, or obligations for, cultural heritage matters in the Richmond River Estuary.</p> <p>Key tasks in the development of Cultural Site Management Plans are:</p> <ul style="list-style-type: none"> • Research and Consultation. A review of any background information including legislative and planning context will be required. It will be necessary to identify and consult with the Aboriginal people and organisations having cultural associations with the site or other links with the area; • Identification of management issues and options in partnership with the Aboriginal stakeholders; • Identification of management directions and actions for the sites (e.g. educational signage, walkways etc.); and • Preparation of the Plan and review by relevant stakeholders. 	
KPIs	<ul style="list-style-type: none"> ○ Cultural Site Management Plans for identified sites completed as required. The number of Management Plans developed will be dependent on the outcomes of the first 3 stages of this strategy.

3.13 Strategy 13: Fishery Management

Priority: Low

Public perception of commercial and recreational fishing impacts as well as knowledge regarding the state of the Richmond River estuary fishery is often based on incomplete knowledge. There is a need to ensure that accurate information relevant to the fishery is available to the public and that key facts or research findings are publicised as they become available in order to reduce uninformed conflict between users. The actions to be undertaken in this regard focus on providing an efficient information link between agencies undertaking research or monitoring and those providing regular communications with the public. Fishery productivity has been identified as a community concern in relation to the Richmond River and the NSW coast and more publicly available information is required. The tasks listed in Action 13.1 are specific to the fisheries interest sector, but overlap with the education strategy in Section 3.8.

The issue of water quality impacts on oyster aquaculture is discussed in the Draft EMS and remains an on-going concern for the industry. Contamination sources, particularly of faecal coliforms, but also potentially heavy metals or pesticides, pose the most concern due to accumulation within the oyster and subsequent threat of harvest closures. Although the triggers for QX disease are not fully understood, it is generally believed that degraded water quality in general affects oyster resistance to this disease. The tasks in Action 13.2 are aimed at identifying and managing priority contamination sources in order to minimise harvest closures and increase the saleability of oyster products from the Richmond River estuary.

Table 12: Summary of Fishery Management actions

Objectives: O4 - To increase knowledge of the impact of existing practices on estuary values and facilitate continuous improvement O5 - To reduce pollutant loads to the estuary O7 - To minimise the frequency and severity of environmental events such as fish kills O8 - To optimise flood mitigation works and flow control structures to improve estuarine water quality O11 - To provide for increased use of the estuary while minimising environmental impact and conflict between users O14 - To enhance sustainable commercial return from industries relying on the estuary and the floodplain					
Action (short name)	EMS Option no.	Cost Estimate (10 year)	Timing	Zones	Lead Responsibility
Ensure key research findings in the fishing and aquaculture sector are communicated to the public	29	-	On-going (year 1-10)	All	DPI-Fisheries
Identify and manage contamination sources in the estuary to minimise oyster harvest closures	30	\$40,000	Short-Medium Term (year 3-4)	1,2 & 4	DPI-Fisheries

Action 13a: Ensure key research findings and regulations in the fishing and aquaculture sector are communicated to the public

Desired Outcome	Improve understanding of estuary fisheries and aquaculture management in the community to encourage estuary-friendly uses
Lead Organisation	DPI-Fisheries
Support Organisation	BSC, LCC, RVC, RRCC, SCU
Cost Estimate (10 year)	Included in Education Action
Potential Funding	n/a
Timing	On-going (year 1-10)
Management Zones	Estuary-wide
DESCRIPTION OF TASKS:	
<p>Key tasks to achieve this are:</p> <ul style="list-style-type: none"> • Ensure that key research findings relevant to fisheries dependent on the Richmond River estuary are communicated to agencies involved in regular public communications. Most fishery related research is undertaken by I & I NSW, however other organisations such as Southern Cross University, RRCC as well as the councils undertake collaborative investigation and research that may have interest to the recreational or commercial fishing sectors. It is recommended that I & I NSW provide regular summaries of current relevant research or monitoring activities and provide these as a resource to organisations represented by the CZMP Implementation Committee for use in communication with their constituents; • Ensure information about Indigenous Fishing Rights is communicated to the public; • Councils should provide fisheries related updates and articles as appropriate within their newsletters and websites with the aim of increasing public awareness of current knowledge relevant to the Richmond River estuary fishery; and • Common forums (e.g. letters to the editor, fishing web sites) which include public discussion of fisheries related topics should be monitored for mis-information and proactive provision of appropriate material should be considered. 	
KPIs	<ul style="list-style-type: none"> ○ Identification of personnel responsible for maintaining communication links between agencies and reviewing public discussion boards by 2013; ○ On-going provision on information and incorporation into public information sources (e.g. newsletters) as appropriate.

Action 13b: Identify and manage contamination sources in the estuary to minimise oyster harvest closures

Desired Outcome	Improve understanding of issues affecting oysters in the Richmond to inform management action to address issues and work towards improving viability of the industry
Lead Organisation	DPI-Fisheries
Support Organisation	BSC
Cost Estimate (10 year)	\$40,000
Potential Funding	NSW Estuary Management Program, BSC
Timing	Short to medium term (year 3-4)
Management Zones	1, 2 and 4.
DESCRIPTION OF TASKS:	
<p>The key tasks are:</p> <ul style="list-style-type: none"> Review the history of oyster harvest closures with reference to available water quality information, climatic data and to characterise conditions (e.g. rainfall thresholds) leading up to harvest closures. This should be undertaken in discussion with affected oyster growers, who will have insights into the environmental risk factors as well as providing a source of water quality information for the study; Design and implement an interactive water quality sampling program during high risk periods in order to track down major sources of contaminants for problem sites. This should consider the harvest area risk assessment that is required by the NSW Shellfish Program as this includes shoreline inspections and bacteriological surveys to characterise the harvest catchment. Water quality assessment should include faecal (thermotolerant) coliforms (principally <i>E. coli</i>) which directly contribute to harvest closures. Other parameters that should be considered are toxic algal species, common residual pesticides, and key physico-chemical indicators such as pH and dissolved oxygen. Where practical, water quality investigations should be coordinated or integrated with estuary-wide Ecohealth monitoring (section 3.3) for efficiency. Actions to manage sources of contamination will be source or site specific and in the case of faecal coliforms may include both animal (e.g. cattle, birds, urban pets) and human (e.g. failed septic systems) sources. Management of these sources should be prioritised on proximity and level of influence on designated oyster culture areas, likely management effectiveness and degree of risk posed with respect to other estuary users. 	
KPIs	<ul style="list-style-type: none"> Oyster harvest closure review undertaken and key risk parameters established by June 2016 Investigative program developed and implemented 2017 Contamination sources identified 2017-2018 Source specific management actions identified and implemented (2019 onwards)

3.14 Implementation Program

The management strategies have been compiled into a ten year implementation program as shown in Table 13.

Implementation costs for some strategies are not yet determined and have not been included here.

Table 13: CZMP Implementation Program (\$'000)

Priority #	Strategies and Actions	Lead Organisation	Support Organisations	Management Zones	Ten Year Cost (\$k)	2013*	2014	2015	2016	2017	2018	2019	2020	2021	2022
Fundamental	Strategy 1: Administration and Governance														
	1a	Form a CZMP Implementation Committee	BSC, LCC, RVC, RRCC	-	Estuary-wide	not estimated									
	1b	Review estuary governance and administration	CZMP Implementation Committee	BSC, LCC, RVC, RRCC, OEH, DPI-Fisheries, NRCMA, DPI-Crown Lands	Estuary-wide	200	200								
	Strategy 2: Climate Change														
	2a	Assessment and mapping of tidal inundation extent including potential sea level rise	BSC, RVC	OEH, DPI	Zones 1, 2, 3, 4, 6	not estimated									
	2b	Planning for sea level rise and climate change impacts incorporating Government policy and guidelines, current research and best-practice management	BSC, LCC, RVC, RRCC	OEH, DPI-Fisheries, NRCMA, DPI-Crown Lands, SCU	Estuary-wide	100	55	5	5	5	5	5	5	5	5
	Strategy 3: Monitoring, Evaluation and Review														
	3a	EcoHealth monitoring program	CZMP Implementation Committee	BSC, LCC, RVC, RRCC, OEH, DPI-Fisheries, NRCMA, DPI-Crown Lands, SCU	Estuary-wide	2,000	200	200	200	200	200	200	200	200	200
	3b	Develop catchment/water quality modelling tool to support decision making	CZMP Implementation Committee	BSC, LCC, RVC, RRCC, OEH, DPI-Fisheries, NRCMA, DPI-Crown Lands, SCU	Estuary-wide	45	30		5			5			5
	3c	Review of CZMP progress and monitoring of KPIs	BSC, LCC, RVC, RRCC	OEH, DPI-Fisheries, FNCW, NRCMA	Estuary-wide	not estimated									
	3d	10 year review of CZMP	CZMP Implementation Committee	BSC, LCC, RVC, RRCC, OEH, DPI-Fisheries, DPI-Crown Lands, NRCMA	Estuary-wide	100									100
High	Strategy 4: Floodplain Infrastructure Management														
	4a	Identify, prioritise and optimise drains and levees	RRCC	BSC, LCC, RVC, DPI-Fisheries, NRCMA, DPI-Crown Lands, OEH, landholders, relevant agricultural industry bodies	Estuary-wide	3,420	360	340	340	340	340	340	340	340	340
	4b	Review floodgate management protocols	RRCC	BSC, LCC, RVC, DPI-Fisheries, NRCMA, DPI-Crown Lands, OEH, landholders, relevant agricultural industry bodies	Estuary-wide	55	55								
	Strategy 5: Farm Management														
	5a	Scientific investigations: strategies for retention of water on backswamp areas	DPI	BSC, LCC, RVC, RRCC, SCU, NRCMA, OEH, landholders, relevant agricultural industry bodies	Zones 7,10,11	300	100	100	100						
	5b	Farm management planning	DPI	BSC, LCC, RVC, RRCC, SCU, NRCMA, landholders, relevant agricultural industry bodies	Estuary-wide	5,000	500	500	500	500	500	500	500	500	500
	5c	Liaise with agriculture industry bodies to improve education and ensure estuary friendly practices are incorporated into industry guidelines	DPI	BSC, LCC, RVC, RRCC, SCU, NRCMA, OEH, relevant agricultural industry bodies	Estuary-wide	90	30	30	30						

Priority #	Strategies and Actions		Lead Organisation	Support Organisations	Management Zones	Ten Year Cost (\$k)	2013*	2014	2015	2016	2017	2018	2019	2020	2021	2022
Medium	Strategy 6: Riparian Zone Management and Erosion															
	6a	Identify priority riparian areas and rehabilitate	CZMP Implementation Committee	BSC, LCC, RVC, DPI-Crown Lands, NRCMA, FNCW, OEH, landholders, relevant agricultural industry bodies	Estuary-wide	2,300	50	250	250	250	250	250	250	250	250	250
	6b	Riparian buffer establishment (planning)	BSC, LCC, RVC	DPI-Crown Lands, OEH	Estuary-wide	30	30									
	Strategy 7: Vegetation Management															
	7a	Retain, rehabilitate and conserve existing native floodplain vegetation	BSC, LCC, RVC, NRCMA	OEH-NPWS, RRCC, DPI-Crown Lands, FNCW, landholders, relevant agricultural industry bodies	Estuary-wide	930	30	100	100	100	100	100	100	100	100	100
	7b	Aquatic weed management	FNCW, RRCC	BSC, LCC, RVC, DPI-Fisheries, OEH, landholders	Estuary-wide	1,000	100	100	100	100	100	100	100	100	100	100
	Strategy 8: Education															
	8a	Estuary-wide community education and consultation program	CZMP Implementation Committee	BSC, LCC, RVC, DPI-Crown Lands, NRCMA, FNCW, DPI-Fisheries, OEH, relevant agricultural industry bodies	Estuary-wide	500	50	50	50	50	50	50	50	50	50	50
	Strategy 9: Waterway Usage															
	9a	Develop strategic plan for estuary usage	CZMP Implementation Committee	BSC, LCC, RVC, NSW Maritime, DPI-Crown Lands, DPI-Fisheries	Estuary-wide	75			75							
	9b	Cost benefit analysis of dredging operations in lower estuary	BSC	DPI-Crown Lands, DPI-Fisheries, OEH, NSW Maritime	Zones 1,2	50			50							
	Strategy 10: Wastewater Management															
	10a	Sewerage system risk assessment and prioritisation study	CZMP Implementation Committee	OEH, BSC, LCC, RVC	Estuary-wide	25		25								
	10b	On-going on-site sewerage management inspections and improvements	BSC, LCC, RVC	-	Estuary-wide	not estimated										
	Strategy 11: Urban Runoff															
11a	Stormwater Management	BSC, LCC, RVC	OEH	Estuary-wide	not estimated											
Low	Strategy 12: Cultural Heritage															
	12a	Identification and recording of cultural sites available to council planners	CZMP Implementation Committee	OEH, BSC, LCC, RVC, Aboriginal representatives/ groups	Estuary-wide	100			20	20	20	20	20			
	12b	Cultural Site Management Plans	BSC, LCC, RVC	OEH , Aboriginal representatives/ groups	Estuary-wide	155			25	25	25	25	25	10	10	10
	Strategy 13: Fishery Management															
	13a	Ensure key research findings in the fishing and aquaculture sector are communicated to the public	DPI-Fisheries	BSC, LCC, RVC, RRCC, SCU	Estuary-wide	not estimated - included in Strategy 8										
	13b	Identify and manage contamination sources in the estuary to minimise oyster harvest closures	DPI-Fisheries	BSC	Zones 1,2,4	40			5	35						
	Totals					16,510	1,885	1,700	1,850	1,630	1,590	1,590	1,595	1,555	1,555	1,560

#The classification of strategies as low priority for management is not a reflection of the level of importance of these factors, but rather an indication of the capacity of the actions contained in these strategies to achieve the defined objectives in terms of overall estuary health.

*Note: Years shown correspond to end of financial year i.e. 2013 is Year 1 (start 1st July 2012, end 30th June 2013) etc.

GLOSSARY AND ABBREVIATIONS

Acid sulfate soils (ASS)	Holocene soils occurring in low lying floodplain areas with high concentrations of iron pyrite, formed as the by-product of sulfate reduction. ASS formed approximately 7,000-3,000 years before present when post-glacial sea levels reached their current level creating vast intertidal mangrove swamps.
Algal bloom	The rapid growth of phytoplankton resulting in a high biomass in the water column.
Anoxic	An oxygen-free environment.
Antecedent	Preceding the present.
Anthropogenic	Any phenomenon caused by human activities.
BASIX	Building Sustainability Index
Benthic microalgae (BMA)	Microscopic algae living in the surface sediments
Benthic	Belonging to the bottom, or sediments, of the estuary.
Bio-available	Nutrient forms (usually inorganic) available for plant growth.
Biological oxygen demand (BOD)	A measure of the amount of oxygen that will be consumed by biological processes over a given time period (usually 5 days).
Biomass	The living weight of plant or animal material (organic matter).
Blackwater	A collective term used to describe low oxygen floodwaters emanating from backswamp areas and floodplains.
BSC	Ballina Shire Council
CAP	Catchment Action Plan
Chemical oxygen demand (COD)	A measure of the amount of oxygen that will be consumed by chemical processes over a given time period (usually 5 days).
Chlorophyll-a	The green pigment in plants used to capture and use energy from sunlight to form organic matter (see photosynthesis). Concentrations of chlorophyll-a are used as an indicator for phytoplankton and benthic algae biomass.
CMA	Catchment Management Authority
CZMP	Coastal Zone Management Plan.
DECCW	(former) Department of Environment, Climate Change and Water
Diffuse Source Pollution	Non-point source pollution such as sediment or nutrients from catchment runoff or groundwater inputs.
DPI	NSW Department of Primary Industries
Ecosystem	Refers to all the biological and physical parts of a biological unit (e.g. an estuary, forest, or planet) and their interconnections.
EMC	Estuary Management Committee
EMS	Estuary Management Study
EPRG	Environment Protection and Regulation Group (OEH)
Eutrophication	The process of nutrient enrichment of a water body resulting in the increase in plant biomass (algal blooms) and bacterial decay (heterotrophic activity). Often results in a reduction in species diversity, visual amenity, and the prevalence of toxic algal species.
Foodchain	The predator / prey interactions of an ecosystem component.
Foodweb	Foodchain interactions of the whole ecosystem.
Freshwater flushing time	The time (in days) that freshwater stays within an estuary before being transported to the sea by advection and tidal mixing.
Grazing	The eating of plants (e.g. phytoplankton) by animals (e.g. zooplankton).

Hypoxic	Critically low concentrations of dissolved oxygen (see anoxic).
I & I NSW	(former) Industry and Investment NSW
LCC	Lismore City Council
LEP	Local Environmental Plan
Light attenuation	The absorbance of sunlight by dissolved and particulate matter in a water body.
LPMA	Land and Property Management Authority (formerly Department of Lands)
Monosulfidic Black Ooze (MBO)	An iron sulfide compound formed as a by-product of sulfate reduction. MBOs commonly form in acid environments with high organic matter supply and have a high chemical oxygen demand.
NOW	NSW Office of Water
NPWS	National Parks and Wildlife Service
NRCMA	Northern Rivers Catchment Management Authority
NRM	Natural Resource Management
Nutrient budget	A simple model quantifying nutrient loadings (by weight) to a waterway from different sources over a given time period (e.g. one year).
Nutrient limitation	The restriction of phytoplankton growth by the low concentration (availability) of a nutrient.
OEH	NSW Office of Environment and Heritage
Physico-chemical	Basic water quality parameters e.g. temperature, pH, conductivity, turbidity.
Phytoplankton	Microscopic single-cell plants growing in the water column.
Point Source Pollution	A single point of pollutant discharge. For example, effluent from a sewage treatment plant.
Primary production	The formation of organic matter by autotrophs (e.g. phytoplankton).
Pristine	Undisturbed by human activities such as urban and agricultural development, pollution, erosion, weed infestations etc.
Reticulated Sewage System	Sewage piped to a centralised sewage treatment plant for treatment and disposal.
RRCC	Richmond River County Council
RVC	Richmond Valley Council
SEPP	State Environmental Planning Policy
Sulfate reduction	The bacterial breakdown of organic matter in anoxic sediments using sulfate instead of oxygen. Produces hydrogen sulfide, the 'rotten egg gas' smell common in muddy sediments.
STP	Sewage Treatment Plant. Raw sewage is collected from homes and businesses and transported via a network of pipes and pump stations to the sewage treatment plant, a centralised system for treatment and disposal.
Turbidity	A measure of the amount of light-attenuating particles in a water body.
Well-mixed	Where there is a little difference in salinity (or dissolved oxygen) between the surface and bottom water in the water column of an estuary.

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Appendix 1: Minimum Requirements of the CZMP Guidelines (DECCW, 2010a)

Coastal councils are required to prepare draft plans in accordance with the CZMP guidelines adopted by the Minister for Climate Change and the Environment as guidelines under section 55D of the Coastal Protection Act 1979 (DECCW, 2010a). The Guidelines specify the minimum requirements that are to be met when preparing a draft CZMP, in addition to the requirements in the Act. The minimum requirements in the guidelines relate to:

- Preparation of the CZMP;
- Coastal risk management;
- Coastal ecosystem health; and
- Community uses of the coastal zone.

The following tables summarise the minimum requirements and how they have been met in the CZMP, the EMS (Volume 2) and other related planning processes.

Table 14: Minimum Requirements: CZMP planning process content and outcomes

Minimum Requirement	Reference
CZMPs are to contain a description of:	
<ul style="list-style-type: none"> • how the relevant Coastal Management Principles have been considered in preparing the plan 	Table 15, below.
<ul style="list-style-type: none"> • the community and stakeholder consultation process, the key issues raised and how they have been considered 	Section 5 and Appendix 3, Draft EMS (Volume 2)
<ul style="list-style-type: none"> • how the proposed management options were identified, the process followed to evaluate management options, and the outcomes of the process 	<ul style="list-style-type: none"> • Section 1.6, CZMP (Volume 1) • Section 7, Draft EMS (Volume 2)
CZMPs are to contain proposed management actions over the CZMP's implementation period in a prioritised implementation schedule which contains:	
<ul style="list-style-type: none"> • proposed funding arrangements for all actions, including any private sector funding 	Section 2.6, CZMP (Volume 1)
<ul style="list-style-type: none"> • actions to be implemented through other statutory plans and processes 	Section 2.5, CZMP (Volume 1)
<ul style="list-style-type: none"> • actions to be carried out by a public authority or relating to land or other assets it owns or manages, where the authority has agreed to these actions (section 55C(2) (b) of the Coastal Protection Act 1979). 	Section 3, CZMP (Volume 1). Relevant authorities have been involved in the preparation of the Draft CZMP through the Technical Team (refer Section 2.2.4, EMS (Volume 2). Formal concurrence and agreement to submitting the Draft CZMP to the Minister for certification has been obtained from the public authorities with "Lead Organisation" responsibilities under the CZMP.
<ul style="list-style-type: none"> • proposed actions to monitor and report to the community on the plan's implementation, and a review timetable. 	Section 3.3 - Strategy 3: Monitoring, Evaluation and Review, CZMP (Volume 1)

Minimum Requirement	Reference
CZMPs are to be prepared using a process that includes:	
<ul style="list-style-type: none"> evaluating potential management options by considering social, economic and environmental factors, to identify realistic and affordable actions 	<ul style="list-style-type: none"> Section 1.6, CZMP (Volume 1) Section 8 and Appendix 4, Draft EMS (Volume 2)
<ul style="list-style-type: none"> consulting with the local community and other relevant stakeholders. The minimum consultation requirement is to publicly exhibit a draft plan for not less than 21 days, with notice of the exhibition arrangements included in a local newspaper (section 55E of the Coastal Protection Act 1979) 	<ul style="list-style-type: none"> Section 1.4, CZMP (Volume 1) Section 5.2.3, Draft EMS (Volume 2)
<ul style="list-style-type: none"> considering all submissions made during the consultation period. The draft plan may be amended as a result of these submissions (section 55F of the Coastal Protection Act 1979). 	<ul style="list-style-type: none"> Section 1.4, CZMP (Volume 1) Section 5.2.3, Draft EMS (Volume 2)
CZMPs are to achieve a reasonable balance between any potentially conflicting uses of the coastal zone.	Section 3.9, Strategy 9: Waterway Usage, CZMP (Volume 1)

Coastal Management Principles have been developed to inform strategic considerations in coastal management, including the preparation of CZMPs. The Principles have been considered in the evaluation of the coastal management actions documented in this CZMP as discussed below.

Table 15: Coastal Management Principles addressed by the CZMP for the Richmond River Estuary

Principle	Reference
1 Consider the objects of the Coastal Protection Act 1979 and the goals, objectives and principles of the NSW Coastal Policy 1997 and the NSW Sea Level Rise Policy Statement 2009	<p>The Planning Context is discussed in:</p> <ul style="list-style-type: none"> Section 1.3, CZMP (Volume 1) Section 2 and Appendix 1, Draft EMS (Volume 2)
2 Optimise links between plans relating to the management of the coastal zone	<p>Concurrent/Parallel programs are discussed in Section 2.5, CZMP (Volume 1).</p> <p>Some activities are managed and regulated by other administrative processes and these activities will continue outside but complimentary to the CZMP process (e.g. Strategy 10: Wastewater Management and Strategy 11: Urban Runoff).</p> <p>The Management Strategies (Section 3) include links to other statutory plans and processes including environmental planning instruments and non-statutory plans prepared by the Councils.</p>
3 Involve the community in decision-making and make coastal information publicly available	<p>Stakeholder consultation activities are discussed in:</p> <ul style="list-style-type: none"> Section 1.4, CZMP (Volume 1) Section 5 and Appendix 3, Draft EMS (Volume 1)

Principle	Reference
<p>4</p> <p>Base decisions on the best available information and reasonable practice; acknowledge the interrelationship between catchment, estuarine and coastal processes; adopt a continuous improvement management approach</p>	<p>The Richmond River Estuary Processes Study (EPS - WBM, 2006) and technical review (ABER, 2007; ABER, 2008) provide scientific understanding of the key processes controlling ecological patterns within the estuary and identify the issues and knowledge gaps to be considered in the development of the EMS and CZMP. These documents provide an overview of the key physical, chemical and biological processes operating within the estuary and how these processes interact and influence each other. They provide a description of the processes involved for each issue and the flow of impacts through the system. The combination of the documents provides a good scientific basis on which to build management strategies for the Richmond River. The key findings of these documents are discussed in this Draft EMS.</p> <p>Key performance indicators have been identified for all management actions to gauge the success of the actions and facilitate continuous improvement.</p>
<p>5</p> <p>The priority for public expenditure is public benefit; public expenditure should cost-effectively achieve the best practical long-term outcomes</p>	<p>The options assessment and prioritisation process (Section 8 and Appendix 4 of the Draft EMS, Volume 2) has prioritised the management strategies as low, medium or high priority based on their capacity to address the identified issues and their overall benefit. Administration and Governance, Climate Change and Monitoring and Evaluation issues are considered to be fundamental management strategies for the management plan, and have not been prioritised in the same way as the other strategies.</p>
<p>6</p> <p>Adopt a risk management approach to managing risks to public safety and assets; adopt a risk management hierarchy involving avoiding risks where feasible and mitigation where risks cannot be reasonably avoided; adopt interim actions to manage high risks while long-term options are implemented</p>	<p>As above. The Implementation Schedules (Section 3) include a list of actions or steps which have been developed to provide the desired outcomes for each of the management strategies. Actions consist of a combination of studies, investigations and on-ground works. Generally, all strategies require some research or assessment prior to implementation of on-ground works. This is to ensure the appropriate effort, funding and geographical focus of on-ground works is undertaken. In addition, due to the complexity of the current administrative arrangements, partnerships between the responsible agencies and landholders are required to be developed to achieve the required outcomes.</p> <p>Coastal hazards (beach erosion, shoreline recession, entrance instability, coastal inundation and cliff or slope instability) are being addressed by BSC in a separate CZMP and RVC in the CZMP for the Evans River. Flooding risks are addressed by Council flood studies and floodplain management plans.</p>

Principle	Reference
7 Adopt an adaptive risk management approach if risks are expected to increase over time, or to accommodate uncertainty in risk predictions	As above.
8 Maintain the condition of high value coastal ecosystems; rehabilitate priority degraded coastal ecosystems	The main aim of the coastal zone management planning process for the Richmond River estuary is to increase resilience within the estuary and to protect and enhance the key values. The primary goal of this CZMP is to implement integrated, balanced, responsible methods to restore and maintain the ecological sustainability of the estuary as well as the recreational and commercial activities associated with it.
9 Maintain and improve safe public access to beaches and headlands consistent with the goals of the NSW Coastal Policy	The CZMP aims to direct management action to address identified issues associated with waterway use to protect the values of the estuary while facilitating sustainable waterway uses (Strategy 9: Waterway Usage). Coastline management is being addressed by Ballina Shire Council in a separate coastline management strategy and Richmond Valley Council in the CZMP for the Evans River.
10 Support recreational activities consistent with the goals of the NSW Coastal Policy	As above.

Table 16: Minimum Requirements for Coastal Risks (DECCW, 2010a)

Minimum Requirement	Reference
A CZMP which addresses coastal risks should include:	
<p>A description of:</p> <ul style="list-style-type: none"> coastal processes within the plan's area, to a level of detail sufficient to inform decision-making the nature and extent of risks to public safety and built assets from coastal hazards projected climate change impacts on risks from coastal hazards (section 55C(f) of the Coastal Protection Act 1979). This is to include incorporation of the sea level rise benchmarks from the NSW Sea Level Rise Policy Statement 2009 suitable locations where landowners could construct coastal protection works (provided they pay for the maintenance of the works and manage any offsite impacts), subject to the requirements of the Environmental Planning and Assessment Act 1979, and property risk and response categories for all properties located in coastal hazard areas 	<ul style="list-style-type: none"> EPS (WBM, 2006; ABER, 2007; ABER, 2008); Draft EMS, Section 3, 4 and 7 (Volume 2); Section 3.2 - Strategy 2: Climate Change Adaptation, CZMP (Volume 1); RVC, BSC, LCC and RRCC flood mapping and Floodplain Risk Management Studies and Plans; CZMP for Ballina Coastline (BSC, in preparation); and CZMP for Evans River (RVC, in preparation).

Minimum Requirement	Reference
Proposed actions in the implementation schedule to manage current and projected future risks from coastal hazards, including risks in an estuary from coastal hazards. Actions are to focus on managing the highest risks (section 55C(d) and (e) of the Coastal Protection Act 1979)	<ul style="list-style-type: none"> Section 3.2 - Strategy 2: Climate Change Adaptation, Section 3.6 - Strategy 6: Riparian Zone Management and Erosion and Section 3.9 - Strategy 9: Waterway Usage, CZMP (Volume 1); RVC, BSC, LCC and RRCC flood mapping and Floodplain Risk Management Studies and Plans; CZMP for Ballina Coastline (BSC, in preparation); and CZMP for Evans River (RVC, in preparation).
Where the plan proposes the construction of coastal protection works (other than emergency coastal protection works) that are to be funded by the council or a private landowner or both, the proposed arrangements for the adequate maintenance of the works and for managing associated impacts of such works (section 55C(g) of the Coastal Protection Act 1979)	<ul style="list-style-type: none"> CZMP for Ballina Coastline (BSC, in preparation); and CZMP for Evans River (RVC, in preparation).
<p>An emergency action subplan, which is to describe:</p> <ul style="list-style-type: none"> intended emergency actions to be carried out during periods of beach erosion such as coastal protection works for property or asset protection, other than matters dealt with in any plan made under the State Emergency and Rescue Management Act 1989 relating to emergency response (sections 55C(b) and (g) of the Coastal Protection Act 1979) any site-specific requirements for landowner emergency coastal protection works, and the consultation carried out with the owners of land affected by a subplan. 	<ul style="list-style-type: none"> CZMP for Ballina Coastline (BSC, in preparation); and CZMP for Evans River (RVC, in preparation).
The minimum criteria for assessing the extent of coastal hazards are:	
Beach erosion - Storm bite due to a beach erosion event with an average recurrence interval (ARI) of approximately 100 years plus an allowance for reduced building foundation capacity	<ul style="list-style-type: none"> CZMP for Ballina Coastline (BSC, in preparation); and CZMP for Evans River (RVC, in preparation).
Shoreline recession - Estimated recession due to sediment budget deficit and projected sea level rise	
Coastal lake or watercourse entrance instability - Qualitative assessment of entrance dynamics based on historical records	
Coastal inundation (including estuaries) - Estimate of wave run-up level and overtopping of dunes resulting from an extreme ocean storm event	
Coastal cliff or slope instability - Slope stability assessment	

Minimum Requirement	Reference
Tidal inundation (including estuaries) - Estimate of areas inundated from still water levels with a 1, 50 and 100-year ARI under current and projected 2050 and 2100 conditions	<ul style="list-style-type: none"> Section 3.2 - Strategy 2: Climate Change Adaptation, Section 3.6 - Strategy 6: Riparian Zone Management and Erosion and Section 3.9 - Strategy 9: Waterway Usage, CZMP (Volume 1); and RVC, BSC, LCC and RRCC flood mapping and Floodplain Risk Management Studies and Plans. CZMP for Evans River (RVC, in preparation).
Erosion within estuaries caused by tidal waters, including the interaction of those waters with catchment floodwaters Estimate of estuary foreshore erosion due to physical processes and flood events	<ul style="list-style-type: none"> Section 3.2 - Strategy 2: Climate Change Adaptation and Section 3.6 - Strategy 6: Riparian Zone Management and Erosion, CZMP (Volume 1). CZMP for Evans River (RVC, in preparation).

Table 17: Minimum Requirements for Coastal Ecosystems (DECCW, 2010a)

Minimum Requirement	Reference
A CZMP which addresses coastal ecosystem management is to include:	
<p>A description of:</p> <ul style="list-style-type: none"> the health status of estuaries within the plan's area the pressures affecting estuary health status and their relative magnitude projected climate change impacts on estuary health (section 55C(f) of the Coastal Protection Act 1979). This is to include incorporation of the sea level rise benchmarks from the NSW Sea Level Rise Policy Statement 2009 	<ul style="list-style-type: none"> EPS (WBM, 2006; ABER, 2007; ABER, 2008); Draft EMS Section 3, 4, 5 and 7 (Volume 2); and Strategy 2: Climate Change Adaptation, CZMP (Volume 1).

Minimum Requirement	Reference
Proposed actions in the implementation schedule to respond to estuary health pressures (section 55C(e) of the Coastal Protection Act 1979)	<ul style="list-style-type: none"> • Strategy 2: Climate Change Adaptation; • Strategy 3: Monitoring, Evaluation; • Strategy 4: Floodplain Infrastructure Management; • Strategy 5: Farm Management; • Strategy 6: Riparian Zone Management and Erosion; • Strategy 7: Vegetation Management; • Strategy 8: Education; • Strategy 9: Waterway Usage; • Strategy 10: Wastewater Management; • Strategy 11: Urban Runoff; and • Strategy 13: Fishery Management.
An entrance management policy for intermittently closed and open lakes and lagoons (ICOLLS)	No ICOLLS in Richmond River estuary (Salty Lagoon is included in Zone 6 – Evans River but the system has its own catchment and is not hydrologically connected to the Richmond River or Evans River).
An estuarine monitoring program, consistent with the NSW Natural Resources Monitoring, Evaluation and Reporting (MER) Strategy.	<ul style="list-style-type: none"> • Strategy 3: Monitoring, Evaluation

Table 18: Minimum Requirements for Community Uses (DECCW, 2010a)

Minimum Requirement	Reference
CZMPs are to contain:	
Proposed actions in the implementation schedule that protect and preserve beach environments and beach amenity, and ensure continuing and undiminished public access to beaches, headlands and waterways, particularly where public access is threatened or affected by accretion (section 55C(c) of the Coastal Protection Act 1979)	<ul style="list-style-type: none"> • Strategy 9: Waterway Usage; • CZMP for Ballina Coastline (BSC, in preparation); and • CZMP for Evans River (RVC, in preparation).
<p>A description of:</p> <ul style="list-style-type: none"> • the current access arrangements to beaches, headlands and waterways in the plan's area, their adequacy and any associated environmental impacts, • any potential impacts (e.g. erosion, accretion or inundation) on these access arrangements, and • the cultural and heritage significance of the plan's area. 	<ul style="list-style-type: none"> • CZMP for Ballina Coastline (BSC, in preparation); • CZMP for Evans River (RVC, in preparation); • EPS (WBM, 2006; ABER, 2007; ABER, 2008); and • Draft EMS Section 7.10 (Volume 2). • Draft EMS Section 7.13 (Volume 2).
Proposed actions in the implementation schedule to manage any environmental or safety impacts from current access arrangements, and to protect or promote the culture and heritage environment	<ul style="list-style-type: none"> • CZMP for Ballina Coastline (BSC, in preparation); • CZMP for Evans Head Coastline (RVC, in preparation); • Strategy 9: Waterway Usage; and • Strategy 12: Cultural Heritage.

Appendix 2: Roles and Responsibilities

Organisation	Key Roles and Responsibilities in relation to the Richmond River Estuary
<p>Local Councils – Ballina Shire (BSC), Lismore City (LCC) and Richmond Valley (RVC)</p>	<p>Council functions are conferred or imposed by the Local Government Act, 1993. Depending on the individual council's structure, some of these functions are shared with County Councils and state government agencies. Relevant functions include:</p> <ul style="list-style-type: none"> • Planning functions and consent authority for land development; • Environmental planning; • Pollution control; • Roads; • Community services and facilities; • Cultural, educational and information services and facilities; • Sporting, recreational and entertainment services and facilities; • Environment conservation, protection and improvement services and facilities; • Waste removal, treatment and disposal services and facilities; • Pest eradication and control services and facilities; • Public transport services and facilities; • Water, sewerage and drainage works and facilities; • Stormwater drainage and flood prevention, protection and mitigation services and facilities; • Use and management of community land including community land categorised as foreshore and watercourse; • Fire prevention, protection and mitigation services and facilities; • Land and property development; • Industry development and assistance; and • Tourism development and assistance.
<p>Richmond River County Council (RRCC)</p>	<p>Delegated with responsibility for flood mitigation activities including management of flood control infrastructure and related natural resource management activities.</p>

Organisation	Key Roles and Responsibilities in relation to the Richmond River Estuary
Far North Coast Weeds (FNCW)	<p>Local Control Authority responsible for administering the Noxious Weeds Act, 1993 in the Northern Rivers region of NSW. Responsibilities include:</p> <ul style="list-style-type: none"> • Controlling noxious weeds on public land including roadside weed management and aquatic noxious weeds on rivers and public lagoons; • Conducting inspections of private property for presence of noxious weeds; • Enforcement of control of noxious weeds through requests and fines as necessary; and • Provide advice on weed management issues.
Estuary Management Committee (EMC)	Preparation of the Estuary/Coastal Zone Management Program for the Richmond River.
Office of Environment and Heritage (OEH)	<ul style="list-style-type: none"> • Climate change and greenhouse issues; • Sustainability programs; • Policy and regulation for air and water quality, noise control, chemicals, radiation and forestry (Environment Protection and Regulatory Group, EPRG); • Management of national parks and reserves (National Parks and Wildlife Service, NPWS), and marine parks (Marine Park Authority); • Biodiversity, threatened species and native vegetation policy and programs • Protection of soils and land and policies for catchment management (Catchment Management Authority); • Coastal lakes and estuaries; • Reliable water supply for critical human and industry needs and the secure and sustainable allocation of water between communities, industry, farmers and the environment; and • Aboriginal cultural heritage and historic sites.
Northern Rivers Catchment Management Authority	<ul style="list-style-type: none"> • Develop and deliver a regional Catchment Action Plan (CAP) • Provide loans, grants, subsidies or other financial assistance for catchment activities • Provide contracts or undertaking of works for the purposes of catchment activities • Assist landholders to achieve the objectives of the CAP • Provide educational and training courses and materials in connection with NRM • Perform any other function relating to NRM as prescribed by the Catchment Management Authorities Regulations 2005

Organisation	Key Roles and Responsibilities in relation to the Richmond River Estuary
Department of Planning (DoP)	<ul style="list-style-type: none"> • Sustainable land management and population growth; • Effective management of natural, environmental and cultural resources and values through protection from inappropriate development; • Diversity and adequacy of housing; and • Integrated delivery of regional infrastructure and government activities.
Department of Primary Industries, DPI – Agriculture, Fisheries and Aquaculture)	Partnership with industry and other public sector organisations to foster profitable and sustainable development of primary industries in New South Wales.
DPI – Crown Lands Division	<ul style="list-style-type: none"> • Land and property information; • Management of state-owned (Crown) Lands and Crown Reserves; and • Commercial environmental consultancy services.
NSW Maritime	Marine safety, regulation of commercial and recreational boating and oversight of port operations.
Department of Sustainability, Environment, Water, Population and Communities (DSEWPC)	<ul style="list-style-type: none"> • Environment protection and conservation of biodiversity • Land contamination • Natural, built and cultural heritage • Environmental research • Water policy and resources • Co-ordination of sustainable communities policy • Population policy • Built environment innovation <p>Environment, water and heritage issues are also managed by other levels of government.</p>

Appendix 3: Potential Grant Funding

Agency	Program Name	Description	Criteria/Objectives
<i>State Government</i>			
OEH	NSW Estuary Management Program and Coastal Management Program	<p>The NSW Government's Coastal Management Program's primary objective is to provide support to local councils to manage the risks from coastal hazards such as coastal erosion. A secondary objective of the program is to restore degraded coastal habitats. The primary objective of the Government's Estuary Management Program is to provide support to councils to improve the health of NSW estuaries and understand the potential risks from climate change. The support provided to councils under these programs includes financial assistance to:</p> <ul style="list-style-type: none"> • prepare coastline, estuary and coastal zone management plans and supporting studies. • carry out projects to reduce risks associated with coastal hazards, improve coastal environments and improve estuary health. 	<p>A review of these programs has resulted in a revised focus on funding, with a greater emphasis placed on:</p> <ul style="list-style-type: none"> • updating coastal hazard studies to incorporate sea-level rise benchmarks • updating estuary plans to consider climate change impacts, including sea level rise • estuary health monitoring and improvement • focusing on high-hazard coastal areas and stressed estuaries. <p>Grant offers are subject to availability of funds for each financial year and State-wide priorities. Funding of up to 50% of a project's costs will normally be offered for successful grant applications. Grants can generally only fund projects that are to be completed within 12 months of the grant offer, with a maximum of 18 months in adequately justified situations.</p>
OEH	NSW Floodplain Management Program	<p>The Floodplain Management Program supports the implementation of the NSW Government's Flood Prone Land Policy as outlined in the NSW Government's Floodplain development manual. The primary objective of the policy is to reduce the impacts of flooding and flood liability on communities and to reduce private and public losses resulting from floods, utilising ecologically positive methods wherever possible. The Floodplain Management Program provides financial support to councils and eligible public land managers to:</p> <ul style="list-style-type: none"> • make informed decisions on managing flood risk by preparing floodplain risk management plans (and associated background studies) under the floodplain risk management process . • implement floodplain risk management plans to reduce flood risk to both existing and future development, and reduce losses through a range of property, flood and response modification measures as outlined in the manual. • provide essential information to the State Emergency Service to enable the effective preparation and implementation of local flood plans to deal with flood emergency response. 	<p>Continuing staged projects and new projects that may be funded include:</p> <ul style="list-style-type: none"> • floodplain risk management plans and other associated background studies, including flood studies and floodplain risk management studies • a review of floodplain risk management plans and associated background studies • projects which implement floodplain risk management plan actions, which include but are not limited to: <ul style="list-style-type: none"> – investigation, design and environmental assessment for works projects – structural works projects such as levees, detention basins, flood gates and flow conveyance improvements – investigation and implementation of flood warning systems – permanent works to support emergency management – voluntary house raising – voluntary purchase – projects for the rehabilitation of public levees protecting urban areas. <p>Assistance under the program is normally offered by the State Government providing \$2 for every \$1 provided by the council.</p>

Agency	Program Name	Description	Criteria/Objectives
DPI (Fisheries and Aquaculture)	Habitat Action Program	<p>Supports the improvement of recreationally important fish populations, engages recreational anglers in fish habitat actions through the Fishers for Fish Habitat project, provides devolved habitat action grants to enhance fisheries in NSW.</p> <p>The Habitat Action Program is funded by the revenue raised by the NSW recreational fishing fee.</p> <p>Habitat Action Grants - Angling clubs, individuals, community groups, local councils and organisations interested in rehabilitating fish habitats in freshwater and saltwater areas throughout NSW can apply for grants.</p>	<p>Habitat rehabilitation projects which may be funded include:</p> <ul style="list-style-type: none"> removal or modification of barriers to fish passage rehabilitation of riparian lands (river banks, wetlands, mangrove forests, saltmarsh) re-snagging waterways with timber structure removal of exotic vegetation from waterways bank stabilisation works reinstatement of natural flow regimes <p>Habitat Action Grants are available in August each year and require the completion of a habitat-specific Funding Application form. Funding applications must relate to the enhancement of recreational fishing through the improvement of fish habitat. Successful projects are usually funded for one year, however funding may be sought for multi-stage projects that take place over a number of years (e.g. two or three year projects).</p>
NSW Government	Natural Disaster Resilience Grants Scheme (NDRGS)	<p>The NSW Government in partnership with the Commonwealth Government under the Natural Disaster Resilience Program is offering the Natural Disaster Resilience Grants Scheme (NDRGS). The NDRGS replaces the Natural Disaster Mitigation Programme and makes grants available to local governments and agencies to undertake a wide range of natural disaster risk assessments and risk reduction works; which contribute to safer, sustainable communities which are more resilient to the effects of natural disasters.</p> <p>Generally, the Australian and New South Wales Governments contribute up to one third each of approved project costs. Local agencies and in some cases private sector contributors make up the balance.</p>	<p>A wide range of natural disaster risk reduction works which contribute to safer, sustainable communities which are more resilient to the effects of natural disasters, qualify for funding under the NDRGS. They may include:</p> <ul style="list-style-type: none"> natural disaster risk management studies disaster mitigation strategies investment in disaster resilient public infrastructure structural works to protect against damage (e.g. disaster proofing of existing buildings at risk, levees, retarding basins and channel improvements, permanent fire breaks, other engineered works that offer protection from natural disasters) disaster warning systems community awareness and readiness measures audits of levees and warning systems research to improve knowledge of natural disaster risk and mitigation Geographic Information Systems (GIS) based hazard and flood data for disaster mitigation purposes land and building purchase schemes in high-risk areas.
OEH	Environmental Education Grants	<p>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.</p>	<p>The Objectives of the Environmental Education Program are:</p> <ul style="list-style-type: none"> to help attain one or more of the outcomes in the NSW Government's Environmental Education Plan, Learning for Sustainability to facilitate changes in behaviour of individuals and groups which affect specific environmental problems to develop and promote education projects which improve the environment.

Agency	Program Name	Description	Criteria/Objectives
OEH	Urban Sustainability 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. Through these projects, the Program also aims to improve the capacity of communities and organisations to protect, restore and enhance the sustainability of our urban environment.	<p>The objectives of the Program are to:</p> <ul style="list-style-type: none"> improve urban water management with particular focus on stormwater and urban runoff to achieve sustainable water quality and conservation outcomes improve resource conservation through effective waste management, avoidance, reuse, recycling and support for sustainable products and services improve and protect urban bushland and creeks, urban wildlife and habitats of rare and endangered flora and fauna improve the quality of the local urban environment, through integrated approaches that address a combination of the following examples: air quality, noise, odour, chemical use, biodiversity, litter and dumping improve the sustainability performance of local councils, small businesses and community organisations and householders in urban areas.
NSW Office of Water (DPI)	Country Towns Program	Through the Country Towns Water Supply and Sewerage Program the Office of Water provides technical support and financial assistance to local water utilities throughout New South Wales so they can better plan and manage their water supply and sewerage businesses.	<p>To be eligible for financial assistance under this program, all local water utilities must comply with the Best-Practice Management of Water Supply and Sewerage Guidelines, August 2007.</p> <p>The Country Towns Water Supply and Sewerage Program goal is to provide appropriate, affordable, cost effective and well managed water supply and sewerage services in urban areas of country NSW. The water supply and sewerage services should meet community needs, protect public health and achieve sustainable environmental outcomes, while making best use of regional resources.</p> <p>Financial assistance is available to local water utilities towards the capital cost of the backlog component of approved water supply and sewerage infrastructure.</p>
NSW Maritime	Partnerships	A 'Partnership' would apply to any funding or value in kind (VIK) made available to individuals or organisations to support specific programs or events deemed mutually beneficial.	<p>Programs or events that help deliver, align with, or raise awareness of key objectives outlined in the Results and Services Plan are eligible and cover:</p> <ul style="list-style-type: none"> ports to support a growing economy safe and sustainable waterways; and improved infrastructure and access to waterways. <p>Any application for a Partnership with NSW Maritime would be considered against the backdrop of financial responsibility of public money and resources. This reinforces the need for all partnerships to demonstrate a clear and direct benefit to the boating, maritime and/or maritime property community aligned with appropriate objectives.</p>

Agency	Program Name	Description	Criteria/Objectives
<i>Federal Government</i>			
Australian Government	Caring for Our Country	Caring for our Country is the Government's natural resource management initiative. It integrates delivery of the Commonwealth's previous natural resource management programs, the Natural Heritage Trust, the National Landcare Program, the Environmental Stewardship Program and the Working on Country Indigenous land and environmental program.	<p>Caring for our Country focuses on achieving strategic results in six national priorities:</p> <ul style="list-style-type: none"> • the National Reserve System • biodiversity and natural icons • coastal environments and critical aquatic habitats • sustainable farm practices • natural resource management in northern and remote Australia, and • community skills, knowledge and engagement. <p>The Australian Government calls for investment proposals for projects through annual Caring for our Country business plans.</p> <p>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.</p>
Australian Research Council (ARC)	ARC Centre of Excellence	<p>The ARC Centres of Excellence scheme aims to enhance and develop Australia's research excellence through highly innovative and collaborative research, as well as build Australia's human capacity in a range of research areas. The objectives of the ARC Centres of Excellence scheme are summarised as:</p> <ul style="list-style-type: none"> • undertake highly innovative and potentially transformational research; • link existing Australian research strengths and build critical mass with new capacity for interdisciplinary, collaborative approaches; • develop relationships and build new networks with major national and international centres and research programs; • build Australia's human capacity in a range of research areas; • provide high-quality postgraduate and postdoctoral training environments; • offer Australian researchers opportunities to work on large-scale problems over longer periods of time; and • establish Centres of such repute in the wider community. 	<p>The National Research Priorities are:</p> <ul style="list-style-type: none"> • An Environmentally Sustainable Australia; • Promoting and Maintaining Good Health; • Frontier Technologies for Building and Transforming Australian Industries; and • Safeguarding Australia.

Agency	Program Name	Description	Criteria/Objectives
National Water Commission	Raising National Water Standards Program	<p>To guide investment in high priority activities to improve water management and advance national water reform, the Commission developed two investment pathways for the Raising National Water Standards Program: a strategic commissioning pathway and a competitive call pathway.</p> <p>In 2007, a National Groundwater Action Plan was initiated by the Commission under the Raising National Water Standards Program to fund projects to progress the groundwater reforms agreed to under the National Water Initiative.</p> <p>More than 175 Raising National Water Standards projects have been funded under the following themes:</p> <ul style="list-style-type: none"> • Water accounting • Emerging water markets • Water planning and management • Knowledge and capacity building • Irrigation and other rural water • Water-dependent ecosystems • Integrated urban water management 	<p>This \$250 million program offers support for projects that are improving Australia's national capacity to measure, monitor and manage our water resources.</p> <p>Funds from the Raising National Water Standards Program are directed at activities across three strategic investment areas:</p> <ul style="list-style-type: none"> • advancing the implementation of the National Water Initiative • improving integrated water management across Australia • improving knowledge and understanding of our water resources. • Groundwater • Northern rivers • National assessment of water resources • Northern Australia water futures assessment
DSEWPC	Indigenous Heritage Program	<p>The Indigenous Heritage Program (IHP) is an Australian Government initiative that supports the identification, conservation, and promotion (where appropriate) of Indigenous heritage.</p>	<p>Individual project funding for organisations will in general be available up to a maximum of \$100,000 (GST exclusive). Individual applicants will generally be eligible for funding up to \$5000. Applications for more than these amounts may be considered where the applicant demonstrates special circumstances or a genuine requirement for additional funds.</p> <p>The IHP may also help identify places likely to have outstanding Indigenous heritage value to Australia suitable for inclusion on the National Heritage List.</p>

Agency	Program Name	Description	Criteria/Objectives
NSW Heritage Office	Aboriginal Heritage Projects	Provides funding for projects that conserve, promote and increase understanding of Aboriginal heritage in NSW. Grants up to \$75,000 are available for Aboriginal heritage projects. \$ for \$ grants are available to local government for Aboriginal heritage projects.	<p>Eligible projects are project that:</p> <ul style="list-style-type: none"> • Provide or assist in the interpretation of culturally significant Aboriginal places, including physical site interpretation such as walkways, signs, trails, mapping of tracks or places • Record or document significant Aboriginal community events, including contemporary community events • Focus on mission housing and reserves • Focus on grave sites and cemeteries conservation and restoration • Focus on travelling stock routes and trading routes • Focus on industries including pastoralism, fishing and forestry • Shared history projects and social themes including showgrounds, race courses, world wars etc • Contribute to Aboriginal tourism • Encourage communities to record oral histories and collections to increase understanding between generations and communities • Research of a place, an area or event/s • Educate communities on their cultural heritage through media such as brochures, DVDs and publications • Undertake physical conservation works arising from site planning and history projects
DSEWPC	Working on Country	In recognising Indigenous people's relationship to and aspirations for country, and that protecting the environment is a shared responsibility, the Australian Government established Working on Country. This program builds on Indigenous knowledge of protecting and managing land and sea country, and provides funding for the employment for Indigenous people to deliver environmental outcomes.	<p>Working on Country aims to:</p> <ul style="list-style-type: none"> • support Indigenous aspirations in caring for country • protect, conserve and manage Australia's environment and heritage values contribute to Closing the Gap targets by providing a career pathway and opportunity for Indigenous people to enter into real jobs in the land and sea management sector • provide nationally accredited training for Indigenous people in land and sea management, in partnership with industry and others.

Agency	Program Name	Description	Criteria/Objectives
DSEWPC	Maintaining Australia's Biodiversity Hotspots	<p>The Maintaining Australia's Biodiversity Hotspots (MABH) programme is about taking a cost-effective, proactive approach to managing threats in high conservation value areas that are still relatively intact and maintaining their biodiversity values. Managing the threats effectively requires taking a whole of landscape approach, across all tenures, to promote active, on-going conservation management.</p> <p>The MABH programme aims to improve the conservation of biodiversity hotspots on private and leasehold land by enhancing active conservation management and protection of existing terrestrial and freshwater ecosystems as habitat for native plants and animals.</p>	<p>The programme supports two activities in hotspot areas; stewardship payments for on-ground biodiversity improvements and voluntary acquisitions.</p> <p>The stewardship payments offer direct financial support to land-holders to help them protect existing natural habitats with high conservation values. The payments will provide support to those land managers that have already made a commitment to maintaining the biodiversity values of their properties. Investments will be determined on the basis of a competitive tender process, where the 'best value for money' conservation services to deliver the specified biodiversity outcomes will be purchased.</p> <p>Large properties with outstanding biodiversity values are those most likely to be targeted for voluntary acquisitions. Funding will be provided to registered charitable organisations on condition they manage the properties for conservation in perpetuity and can demonstrate organisational capacity and prior extensive property acquisition and management experience.</p>
<i>Other</i>			
Terrestrial Ecosystem Research Network (TERN)	Australian Centre for Ecological Analysis and Synthesis (ACEAS)	ACEAS is a virtual and physical Facility within the Terrestrial Ecosystem Research Network for both disciplinary and inter-disciplinary integration, synthesis and modelling of ecosystem data to aid in the development of evidenced-based environmental management strategies and policy at regional, state and continental scales.	Up to \$50,000 funding to co-ordinate diverse working groups to solve identified problems and get tangible outcomes
Landcare Australia	Junior Landcare grants program	Junior Landcare is about encouraging young people to play an active role in ensuring the safe future of their environment.	Through the Junior Landcare Grants Program, any school or organisation that would like to involve their students in landcare projects, in conjunction with local landcare groups, can apply for grants to assist them with the cost of their projects.

Agency	Program Name	Description	Criteria/Objectives
NRCMA	Caring for Our Coast	<p>This suite of large-scale projects will engage coastal community organisations in the delivery of coastal and marine rehabilitation, restoration and conservation on-ground works and capacity building activities within the Northern Rivers CMA region.</p> <p>The Northern Rivers CMA will devolve funds either directly through community organisations, or else through land managers, land owners and other organisations that actively engage coastal community organisations in the delivery of projects.</p>	<p>Activities that large-scale projects should focus on include one or more of the following as defined in the Caring for our Country Business Plan:</p> <ul style="list-style-type: none"> • on-ground actions that protect the conservation values of coastal and marine ecosystems and environments; • protection, rehabilitation and enhancement of coastal and marine habitats, waterways and wetlands to stabilise dunes, prevent coastal erosion, establish wildlife corridors and enhance remnant coastal vegetation; • implementation of actions in recovery plans of threatened coastal and marine species and threat abatement plans, such as removing marine debris; • minimising disturbance to and protecting sensitive coastal and marine areas, including working with Indigenous communities to protect Indigenous cultural landscapes and culturally sensitive sites; • implementation of best-practice sustainable near-shore coastal land and resource use (e.g. fishing pressure), including Indigenous traditional use; • reduction of local stressors (e.g. poor water quality) on near-shore coastal ecosystems such as inshore reefs and seagrass meadows; • preventing the decline of water quality in coastal and marine habitats through management of point-source pollution, establishment of buffer zones and off-stream stock watering points; • increasing participation of individuals and communities in coastal and marine conservation projects, including enhancing skills, knowledge and raising community awareness; • enhancing the skills and knowledge of Indigenous Australians, volunteers and communities in the delivery of on-ground actions in Saltwater Country through the use of traditional ecological knowledge, existing Land and Sea Country Management Plans, local knowledge and the best available science.