6.6 Ocean induced salinity

Salinity resulting from ocean influences occurs in the coastal flats of the Port Albert and Foster Salinity Management Areas and the Gippsland Lakes and associated wetlands. This includes the Wellington Salinity Management Area and parts of the Reeve Salinity Management Area and potentially the Wilsons Prom Salinity Management Area. The process of salinisation in these areas is very different to the irrigation induced salinity and dryland salinity discussed in the previous sections and therefore, requires a different set of management options. A summary of the management options is provided in Table 50.

Many of the management options outlined to address assets affected by dryland and irrigation salinity also impact on the assets being protected from the management actions identified to address ocean induced salinity. Therefore, the resource condition targets for ocean induced salinity are stated in the Surface Water Salinity section (Table 54) and include:

- Resource Condition Target S1 relating to Clydebank Morass
- Resource Condition Target S2 relating to Dowd Morass
- Resource Condition Target S3 relating to Lake Coleman
- Resource Condition Target S4 relating to Lake Wellington
- Resource Condition Target S5 relating to relating to instream salinity.

- **Table 50: Management Action Targets for Ocean Induced Salinity Management Areas**

Management Action	MAT Number	5 Year Management Action Targets	Salinity Management Program		Asset Class							Priority
			Surface drainage (structures)	Surface drainage (sea walls)	Water	Land	Biodiversity	Atmosphere	People	Infrastructure	Production	
Assess feasibility of engineering control structures in McLennan Straits and wetlands	**OA1.1**	Completion of input to Dowd Morass and Lake Coleman Water Management Plans being developed by Parks Victoria. Completion of feasibility study into engineering structure in McLennan Straits and beginning of implementation if found to be feasible	●	○	●	●	●	○	○	○	●	Priority 4
Assess feasibility of engineering control structures in Clydebank Morass and Dowd Morass	**OA1.2**	Feasibility study into engineering options for Clydebank Morass and Dowd Morass completed.	●	○	●	●	●	○	○	○	●	Priority 4
Implementation of engineering control structures in Dowd Morass and Clydebank Morass	**OA1.3**	Implementation of agreed engineering structures for Dowd Morass and Clydebank Morass if studies find them to be feasible	●	○	●	●	●	○	○	○	●	Priority 4
Review effectiveness of sea walls	**OA2**	Drainage plans completed and implemented for key coastal areas affected by salinity	○	●	●	●	○	○	○	●	●	Priority 4

6.6.1 Engineering Structures in the Gippsland Lakes

On-ground strategy

Although the construction of the permanent opening between the ocean and the Gippsland Lakes at Lakes Entrance has resulted in the salinisation of Lake Wellington and contributed to increased salinity levels in adjacent wetlands, the economic and social benefit from the entrance is too high to contemplate closing. For instance, the entrance to the Lakes supports Victoria's second biggest fishing fleet and is a key tourism asset for recreational fishing and general boating. Also, the current permanent exchange of lake and ocean water reduces the incidence of toxic algal blooms in the lakes. Other alternative methods need to be found to address the salinity resulting from a permanent influx of ocean water to the lakes system. This plan favours the investigation of engineering structures to prevent saline water from backing up into Lake Wellington and adjacent wetlands. Such engineering structures require extensive investigation into their technical feasibility and social, economic and environmental costs and benefits before they can be legitimately recommended.

There are already engineering structures in place to prevent saline water from entering wetlands. For example, Dowd Morass has two culverts between the wetland and the adjacent Latrobe River that can be used to manipulate the flow of water between the river and wetland. During times of high river flow, the fresh water from the river can be allowed to enter the wetland via the culverts. Conversely, during times of low river flow and high lake levels, saline water backed up the Latrobe River from the lakes can be prevented from entering the wetlands by closing the culverts. Similar structures are also present between Lake Wellington and Lake Coleman.

Implementation Mechanisms

Parks Victoria is the responsible agency for managing the wetlands adjacent to Lake Wellington and is currently developing wetland water management plans. These water management plans are the most appropriate mechanism for addressing the operation of existing engineering structures and the potential introduction of new structures. Studies of the salt and water balances of Clydebank Morass (SKM, 2003), Dowd Morass (SKM, 2004) and Lake Coleman (2004) all outline various engineering options to reduce the salinity of these important wetlands. The salinity program will provide assistance to Parks Victoria in evaluating the cost effectiveness of these engineering options. The salinity program will also aid Parks Victoria evaluate other mechanisms to reduce the impact of salinity in these wetlands as detailed in the various dryland and irrigated programs (eg groundwater pumping and revegetation programs).

There is also the potential to explore the option of an engineering structure located in McLennan Straits to prevent the backflow of saline water from Lake Victoria into Lake Wellington. Such a structure has the potential to have a substantial salinity benefit to Lake Wellington itself, adjacent wetlands such as Dowd Morass, Clydebank Morass and Lake Coleman and also the lower reaches of the Latrobe and Avon Rivers. A submerged structure would potentially block the deep and denser saline water from entering Lake Wellington but allow fresher water exchange between Lake Wellington and Lake Victoria. This option is particularly attractive because it could potentially reduce the salinity degradation in a number of key wetland assets with the one structure. The salinity program will aid Parks Victoria and the Gippsland Coastal Board review the technical feasibility and the economic, social and environmental costs and benefits.

Barriers to adoption

The key barrier to the adoption of engineering structures in wetlands and McLennan Straits is the economic feasibility and community acceptance of the idea. There are many competing interest

groups including recreational boat users, fisherman and duck hunters who all need to be consulted on any changes to the water regimes in these wetlands.

Knowledge gaps

The key knowledge gaps for the construction of engineering structures in wetlands and McLennan Straits are:

- The effectiveness of these structures to reduce salinity in wetlands and Lake Wellington; and
- Whether it is technically feasible to construct engineering structures in McLennan Straits.

Recommended actions, prioritisation and management action targets

Recommended actions and projects based on the above discussion are outlined in Table 51.

Table 51: Surface drainage structures management actions to address ocean induced salinity

Management options	Potential future actions	Type of project	Benefit-risk score	Overall priority	2004/05^	5 year management actions					5 year Management Action Target	Impact on salinity over 30 years	WGCMA partners
						2005/06	2006/07	2007/08	2008/09	2009/10			
OA. Engineering options – surface drainage													
OA1: Structures to prevent lake inflow to rivers and/or wetlands	**OA1.1:** Aid Gippsland Coastal Board assess the feasibility of an engineering control structure at McLennan Straits to reduce saline lake water entering Lake Wellington. Aid Parks Victoria in developing water management plans for other key wetlands to determine best uses of engineering structures to prevent saline inflow.	Research and Investigation	**39**	**Priority 4**							**MAT OA1.1:** Completion of input to Dowd Morass and Lake Coleman Water Management Plans being developed by Parks Victoria. Completion of feasibility study into engineering structure in McLennan Straits and beginning of implementation if found to be feasible	Reduction in wetland and adjacent land salinisation	Parks Victoria and Gippsland Coastal Board
	OA1.2: Feasibility study into engineering options for Clydebank Morass and Dowd Morass	Research and Investigation	**Not assessed**	**Priority 4**							**MAT OA1.2:** Feasibility study into engineering options for Clydebank Morass and Dowd Morass completed.	Reduction in wetland and adjacent land salinisation	Parks Victoria and Gippsland Coastal Board
		On-ground works	**Not assessed**	**Priority 4**							**MAT OA1.3:** Implementation of agreed engineering structures for Dowd Morass and Clydebank Morass if studies find them to be feasible	Reduction in wetland and adjacent land salinisation	Parks Victoria and Gippsland Coastal Board

^ 2004/2005 management actions are being undertaken in 2004/05 and were recommended by the draft West Gippsland Salinity Management Plan.

6.6.2 Coastal Sea walls

On-ground strategy

A large area of low lying coastal flats in the Port Albert Salinity Management Area are protected from tidal influences by approximately 65 kilometres of sea walls constructed in the late 19th century. Combined with surface drains, these sea walls have allowed agriculture to establish and prosper in this area. Despite the influx of seawater into the area being a natural process, the agriculture in this area is an asset potentially requiring protection from salinity depending on the economic, social and environmental costs and benefits. However, the draining of the area has also damaged the environmental significance of the coastal tidal flats reducing habitat and breeding grounds for birds and fish. Therefore, there is an important trade off between the environmental rehabilitation of the coastal flats and the continued protection of agricultural land in the region. A thorough assessment of the environmental, social and economic costs and benefits of the surface drainage schemes and seawalls needs to be undertaken before there is any additional investment in these assets.

Implementation mechanisms

The sea walls in the Port Albert Salinity Management Area are in various states of disrepair and require substantial investment to upgrade to ensure their long term effectiveness (SKM, 1999). The West Gippsland CMA's Rural Drainage Plan recommends the development of 'drainage management plans' for priority areas including Lower Tarwin area, Sandy Point, Hedley, Corner Inlet, Pound Creek and Waratah. These drainage management plans should review the condition of the current drainage schemes, assess the need for maintenance and upgrade of existing systems and conduct an analysis of the economic, social and environmental costs and benefits of additional works. The plans would also review the public and private benefits and recommend appropriate cost sharing arrangements for any additional investment. The Lower Tarwin region was identified in the Regional Rural Drainage Management Strategy as the highest priority in South Gippsland. This current program of drainage management plan development is the most appropriate mechanism for justifying future investment in sea wall maintenance. The salinity program has a role to play in aiding the West Gippsland CMA develop these drainage management plans. If the drainage management plans for the area identify the need for upgrading of sea walls, the almost entirely private benefit from such an action would need to be funded by the beneficiaries.

Knowledge gaps and barriers to adoption

The key knowledge gaps and barriers to adoption for the upgrading of sea walls are:

- The lack of investigation and debate on the economic, social and environmental trade-offs between continued protection of agricultural land from sea water intrusion and the protection of environmental habitat; and
- The uncertainty about ownership and responsibility for maintenance and upgrade of existing drainage and sea wall infrastructure.

Recommended actions, prioritisation and management action targets

Recommended actions and projects based on the above discussion are outlined in Table 52.

- **Table 52: Ocean induced engineering options – surface drainage (sea walls)**

Management options	Potential future actions	Type of project	Benefit-risk score	Overall priority	2004/05^	5 year management actions					5 year Management Action Target	Impact on salinity over 30 years	WGCMA partners
						2005/06	2006/07	2007/08	2008/09	2009/10			
OA. Engineering options – surface drainage													
OA2: Sea walls	**OA2:** Provide support to West Gippsland CMA for the implementation of the their Rural Floodplain and Drainage Plan	Research and Investigation On-ground works	**28**	**Priority 4**							**MAT OA2:** Drainage plans completed and implemented for key coastal areas affected by salinity	Reduction in area of land salinisation in coastal areas	WGCMA only

^ 2004/2005 management actions are being undertaken in 2004/05 and were recommended by the draft West Gippsland Salinity Management Plan.