

# APPENDIX 1

## WATERSHED TORBAY RESEARCH PROGRAM

The research program for Torbay Watershed addresses five broad themes:

1. Environmental flows
2. Managing the lower drainage system
3. Algal blooms: processes and drivers
4. Catchment nutrient sources
5. Social and economic issues

This appendix provides brief description of projects underway or planned within each of these themes.

### 1. Environmental Flows

#### **Environmental Water Requirements for Marbellup Brook and Lake Powell**

##### **Objectives**

To define environmental water requirements (flows, duration, timing and volume) for Marbellup Brook to protect environmental values of the Brook.

To determine environment water requirements (water level regimes) for Lake Powell and Lake Manurup, and to provide information for optimising the operation of the drainage system.

#### **Water Demands from Marbellup Brook and other Tributaries**

##### **Objectives**

To better understand likely demands for water from Marbellup Brook and other tributaries in the short to medium term.

#### **Environmental Water Requirements for Estuaries, including Torbay Inlet**

##### **Objectives**

To define environmental water requirements for Torbay Inlet.

#### **Typha invasion in Lake Powell**

##### **Objectives**

To identify the changes in distribution of Typha and other foreshore vegetation in Lake Powell, predict future distribution, determine the factors associated with Typha growth, and recommend control methods.

## 2. Managing the lower drainage system

### **Water Balance and Operation of Lower Drainage district**

#### **Objectives**

To develop a water balance model which documents the current water balance and operation of the lower drainage and enables the testing of a variety of water routing options compared to defined performance criteria. The criteria need to be developed through discussions with stakeholders, and through an understanding of EWRs for Lake Powell and Torbay Inlet. If possible, the model needs to account for movement of different quality water from different sources as a management option to minimise environmental impacts.

## 3. Algal blooms: processes and drivers

### **Sediment Nutrient Supply and Release**

#### **Objectives**

To determine the role of sediments in taking up and releasing nutrients in Lake Powell and Torbay Inlet and to provide quantitative estimates to enable determination of a nutrient balance for the waterbodies.

## 4. Catchment nutrient sources

### **Identifying current and historical catchment land uses**

#### **Objectives**

To capture current and historical (particularly point source) land use information for the catchment, and provide a procedure/prototype for capturing future land use change information.

### **Catchment Nutrient Balance**

#### **Objectives**

To develop an overall nutrient model (budget and pathways) for the catchment to assist with understanding the key sources and exports of nutrients from the catchment, and those points in the landscape where intervention will be most effective (from a source perspective).

### **Identifying Streams with Best Management Attributes**

#### **Objectives**

To identify streams in the Torbay catchment that can ameliorate phosphorus or nitrogen or both from adjacent land uses. This is important because:

- riparian buffers have been proposed as a management tool to reduce nutrient loss
- riparian buffers work best when their surface related functions come into play by

- filtering suspended sediment and nutrients
- recent work in the National Riparian Zone Program (NRZP) suggests that bypass pathways exist in catchments with sandy soils, thereby reducing the potential for these surface related functions to operate
  - this recent work also shows that implementing riparian buffers on previously unmanaged streams may reduce N discharge by about one third, P discharge does not change in amount, but does change in form with an increase in FRP of about 65%
  - these changes have potential to alter the N:P ratio and P bioavailability in downstream waterways such as Torbay Inlet, which may alter the dominant algal species in these waterways.
  - Identification of the attributes which control the nutrient movement pathways through these zones, and potential changes in form would allow managers to choose an appropriate mix of managed/unmanaged streams for waterbodies in the Torbay catchment, once a decision about desired inputs and ratios for each waterbody had been determined.

### **Characterising Groundwater Inputs of Nutrients**

#### **Objectives**

To determine if input of nutrients via groundwater to Lake Powell is a significant source in terms of supporting the annual algal bloom cycle.

## 5. Social and economic issues

### **Best Practice Community Change Processes**

#### **Objectives**

To review case studies on promoting community change linked with project initiatives in the natural resources management area, identify what has been successful, and adopt the techniques and approaches for application in the Torbay catchment.

### **Economic Incentives**

#### **Objectives**

To investigate economic barriers to widescale adoption of priority actions in the Torbay catchment, investigate and identify the winners and losers associated with landuse change for public benefit, and identify economic incentives to overcome barriers.

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