



## Gippsland Lakes Environmental Study - Fact Sheet No. 1

# Modelling the Gippsland Lakes – Why and How?

### Gippsland Lakes

The Gippsland Lakes are a series of shallow, interconnected coastal lagoons about 200 km east of Melbourne. The Lakes, which run almost parallel with the Ninety Mile Beach of Bass Strait, are almost 70 km long and 10 km wide at the widest point. They have a combined surface area of 365 km<sup>2</sup> and drain a catchment area of 20,600 km<sup>2</sup>.

Since the 1860s land use and other changes have altered the quality and quantity of catchment inflows to the Lakes. Additionally, maintenance of a navigable channel at Lakes Entrance since 1889 has allowed the intrusion of sea water into the Lakes.

These changes have transformed what was once a freshwater lake and marsh system to a saline, high nutrient environment. Several ecological changes have accompanied this transition of which some, such as algal blooms and oxygen deficiency in deeper water areas, have the potential for profound social, economic and environmental consequences should they continue to increase in frequency and extent.

### Water Quality Monitoring Project

To better understand the functioning and to assess options for improving the environmental amenity of the Lakes, the Gippsland Coastal Board commissioned the Gippsland Lakes Water Quality Modelling Project in 1999. The project was established as a partnership between the Department of Natural Resources and Environment and CSIRO for the Gippsland Coastal Board and stakeholders including government agencies and regional industry, catchment and water authorities, with each contributing funds towards the project. In addition CSIRO, University of Melbourne, EPA, Marine and Freshwater Resources Institute, Monash Water Studies Centre, and Gippsland Ports, provided in-kind contributions to the project.

A series of scenarios were defined to test the likely ecological outcomes associated with major changes in nutrient loads, freshwater inputs, or exchanges with the sea. In all sixteen broad-scale scenarios were investigated.

### Models

The prediction of the likely responses to each scenario requires an understanding of system inputs, water circulation and ecological processes. The approach adopted by the project was to simulate this understanding in computer models. The models referred to are a series of mathematical equations run using the processing power of specially written computer programs.

The modelling process provides predictions of a set of environmental indicators including algal and dissolved oxygen concentrations in the waters of the Lakes. The models applied were a hydrodynamic model required to simulate water flow and mixing within the Lakes and a biogeochemical model that simulated the chemical and ecological response of the Lakes.

