Wilson Inlet 4

Report to the Community

Government of Western Australia

Water and Rivers Commission
Wilson Inlet Management Authority

October 2001

Phytoplankton (microalgae) and nutrients

Peter Thompson of the University of Tasmania and Luke Twomey, a postgraduate student from Curtin University were selected to examine the relationship between nutrient supply from the catchment and nutrient release from the sediment. Their first step was to analyse the water quality and phytoplankton data collected by the WRC in the previous 3 years. Wasele Hosja of the WRC in Perth provided phytoplankton identifications from the inlet each week.

Having determined the seasonal changes and differences from year to year, the researchers turned their attention to laboratory based work to understand what promotes or limits algal growth in the inlet. This is why Luke's many visits (over 20) over all seasons were short since he had to rush water samples back to the laboratory at Curtin. By growing the algae in water where temperature and light were controlled, bioassays were conducted to find out

They set about answering these questions through a combination of field experiments and laboratory growth experiments similar to those run for phytoplankton. Cores from the inlet containing both sediment and seagrass were transported back to the growth labs at the University of Western Australia where different levels of nutrients were added to determine which affected growth.

Bernard Dudley also constructed chambers (considerably less sophisticated than the AGSO ones) to place over the seagrass in the inlet to measure the rates of nutrient removal at a range of actual conditions of light, temperature and salinity. From this work we will be able to estimate how important the epiphytic algae are in both absorbing and releasing nutrients compared to the *Ruppia*. This knowledge allows us to understand the implications of increased nutrient loading to the estuary and estimate what would happen if for some reason the *Ruppia* was lost from the estuary.

Putting the story together

These three studies were designed as an integrated program to provide the key to understanding the processes involved in the many cycles of uptake and loss of nutrients as they move through the inlet. Now that these studies are complete the major task is to integrate the findings of the NEMP funded work with complementary catchment and estuary sampling conducted by the WRC, and with previous studies. Synthesis workshops have been held throughout the project to bring the three groups together to discuss their findings. A final report was presented to the community during a public meeting in December 2000.

Not only the estuary

Wilson Inlet Catchment Compendium

Following comments made at the first NEMP workshop in Narrikup in 1996, a project was funded by NEMP locally to compile all of the existing information on the catchment. Staff from the WRC and AgWest, assisted by the Wilson Inlet Catchment Committee and Jack Mercer, completed the resulting Compendium in 1999.

The Wilson Inlet Catchment Compendium contains descriptive information on the catchment such as climate, soils, flora and fauna, hydrology and geology. The Compendium outlines some of the land and water management issues in the catchment and discusses some of the techniques being used to manage the problems. It is designed to provide information to the community about the catchment where they live and is available to community groups to assist in catchment management activities. It will be updated as new material becomes available.

Insert Communication day photo here **[What phot?????]**

Communicating the NEMP

NEMP projects were conducted in four catchments around Australia representing different facets of algal bloom problems. Full details can be found on the NEMP website http://www.nemp.aus.net/. Communicating the process of research in Wilson Inlet NEMP projects is an important part of the overall program and Greenskills of Denmark were contracted for this role. Many of you will be aware of the community open days down at the River Mouth Caravan Park and the NEMP annual meeting held at the Cove.

Study findings will guide management actions

More detailed accounts of the findings will be discussed in subsequent reports; the key findings for management as summarised below will be incorporated into the Wilson Inlet Action Plan.

Phytoplankton

The amount of phytoplankton in the inlet was stable between 1995 to 2000. Major spring blooms occur most years approximately 50 days after the bar is opened and are triggered by the sequence:

Bar opening ⇒ Stratification ⇒ Anoxia ⇒ Nutrients

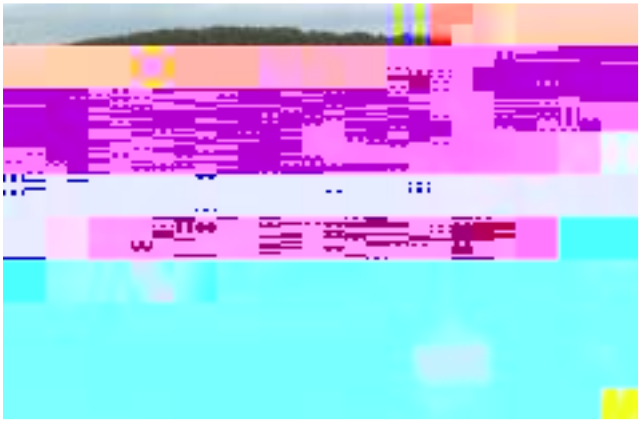
The spring bloom of either harmless diatoms or, rarely, dinoflagellates captures a large proportion of dissolved nutrients from the estuary water.

Any increase in available N or P in the estuary will lead to more blooms which will in turn increase the probability of toxic blooms. With the current nutrient inputs there is a relatively low risk of toxic blooms.

Sediments

The sediments were found to be the largest pool of nutrients and a very large source of nitrogen compared to other sources. Nitrogen in the form of ammonia was continuously released from the sediments through all seasons. Most of the phosphorus entering the inlet was trapped in the sediments making them a source of phosphorus.

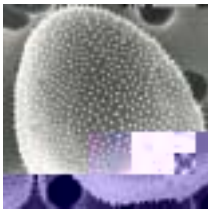
Denitrification is the process where nitrogen is converted into nitrogen gas by bacteria and lost to the atmosphere. This was found to be the most important means of removing nitrogen from the inlet so any action which causes a decrease in the rate at which nitrogen is removed would make more nitrogen available for algal growth. Low oxygen levels (anoxia) on the bottom will slow this process.



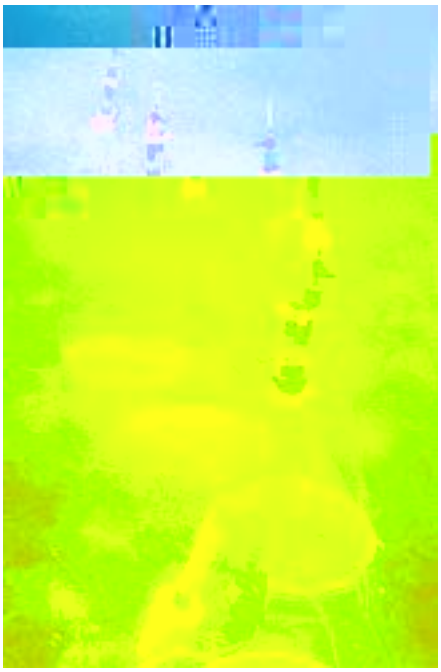
AGSO benthic chamber being lowered into the inlet (to accompany sediments results section)

We use the term stratification to describe the condition

Nutrient uptake measurements of Ruppia *in the laboratory at UWA*



Prorocentrum minimum *under the electron microscope. Spring blooms involve this solitary Dinoflagellate and occasionally other species of Prorocentum.*
(length = 20 to 40µm, width = 15 to 25µm)



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For more information contact