

RIVERVIEW



We've moved! See back page for details.

No.5

SWAN RIVER TRUST

Jan/Feb 1996

New Water and Rivers Commission to support Trust

FORMATION of the new Water and Rivers Commission has integrated water resource and waterways management in Western Australia. Previously, management of our water resources was undertaken by three separate organisations.

The Trust will continue to operate as an independent statutory authority under the *Swan River Trust Act, 1988*, managing the Swan and Canning estuaries. Staffing and administrative support, previously provided by the Waterways Commission, will now be provided by the new Commission.

The WA Estuarine Research Foundation, established by the Government in 1994 to promote research into our rivers and estuaries, will also remain independent of the new Commission. Coordination of the Swan River Trust's and the Water and Rivers Commission's operations and policies will be achieved through Trust representation on the new Commission's Rivers and Estuaries Council.

The Trust is now located on the third floor of the Hyatt Centre (enter from Adelaide Terrace, cnr Plain Street. See back page for details). The head office of the Water and Rivers Commission is located on the second and third floors of the Hyatt Centre. Entrance to the new Commission is off Plain Street.

Public education and involvement programs previously run by the Waterways Commission, including the Ribbons of Blue program and the Swan Integrated Catchment Management (ICM) Resource Centre project, have been brought into the new Commission. ■



WATER AND RIVERS
COMMISSION

UWA students in post grad. bid to help the Swan

Students at the University of Western Australia are helping find solutions to water quality problems in the Swan River.

Four students in the university's Department of Environmental Engineering chose topics for their honours thesis specifically because they believe their research can have practical implications for the health of the Swan.

Andrew Mack is looking into algal blooms - comparing physical and chemical data on such variables as water temperature and salinity against data on plant life in the river. The aim is to identify the conditions under which blooms occur.

Linda Kalnejais is working on a small scale fibreglass model of the Swan, from Heirisson Island to Fremantle. The model can be used to simulate a wide range of conditions such as tidal movements and freshwater discharges.

Audrey Welsh is looking into the problem of heavy metals in the Swan. She has monitored chromium and zinc levels adjacent to the Claisebrook Main Drain - a real "hot spot" as far as these are concerned. Audrey is looking into the chemical, physical and biological factors that affect the concentrations of these metals in the water with a view to lowering levels.

A fourth student, Wayne Astill, is investigating possible engineering solutions to the estuary's problems. He is identifying various ways to decrease nutrients in the river through the use of chemicals and bubble plumes as well as dredging options. One cost-effective option is the removal of the Kent Street Weir to improve flushing of the upper Canning River.

The students all agree their hard work, including late nights over the computer and field trips in adverse weather conditions, will have been worth it if they contribute to improving the health of the estuary.

"The Swan River represents the type of lifestyle we place so much value on and supports a great diversity of flora and fauna. We must maintain the river in a healthy condition," said Andrew. ■



University of Western Australia students (from left) Andrew Mack, Linda Kalnejais and Wayne Astill with the fibreglass model of the Swan River estuary.

The battle is on to tackle the problem of algae blooms in the Swan and Canning Rivers. Scientists from Western Australia's major research organisations and government agencies are putting phytoplankton under the microscope to help us understand and prevent the risk of further serious algae blooms.

ALGAE ALERT!

Why do we need a Cleanup Programme?

Phytoplankton in the river are getting a very bad name. Like an overbearing relative, familiarity has bred contempt. There's just too much of the stuff around.

Phytoplankton, or microalgae, are, however, an essential part of the river ecosystem – and are present in some quantity in all waterways. The problem for us living on the Swan River estuary is the presence of excess nutrients that cause overabundant growth in algae at certain times of the year leading to algae "blooms".

Although blooms do occur in most river and wetland systems, the frequency, duration and size of blooms in the Swan-Canning system have increased in recent years.

Blooms become a concern to the community when they cause a nuisance (strong smelling, slimy scum on the water) or become toxic and may cause health problems. For example, if mussels containing toxic algae species are eaten, serious illness, even death, may result. Dogs that swim in lakes containing toxic algae may also become sick and die.

It was the presence of toxic blue-green algae in the Canning River during January 1994 that prompted the Swan River Trust to issue warnings to the community not to swim or eat fish taken from the river. These blooms were also part of the reason the State government established the WA Estuarine Research Foundation to promote research into our rivers and estuaries. In May 1994 the Government also initiated the Trust-led Swan-Canning Cleanup Programme.

The Government has provided \$6.2 million over five years for research into algae blooms and to investigate ways to reduce nutrients built-up in the river system over time. Another key issue is to reduce nutrients entering the system from its water catchment – particularly Ellen Brook, Bayswater Main Drain, and Southern River. These subcatchments, together with the Avon catchment, have been identified by the Trust as the main sources of phosphorus entering the river in surface water and groundwater, in either soluble form or attached to sediment particles.

While the Cleanup Programme is directing research into short and long-term solutions to the problems, a great deal of work has been done to advance our understanding of the way algae function. The Cleanup Programme – through catchment management projects, the role of the Cleanup Task Force, and in-river research projects – has also been the catalyst for a new era of integration and cooperation between government departments, research institutions such as the CSIRO and the universities. The WA Estuarine Research Foundation has been particularly successful in promoting new research that will lead to better management of our estuaries and rivers.

Catchment management

The Cleanup Programme's emphasis on community involvement has improved communication between community groups and local and State agencies. The Trust is assisting a number of catchment coordinating groups that have been, or are being, established in the subcatchments of the Swan-Canning, including Bayswater, Canning, Bennett Brook and Ellen Brook.

The Cleanup Programme is also operating in partnership with the Swan-Avon Integrated Catchment Management Program. The two programs are interconnected and success in one area encourages success in another. For example, improved fertiliser management in the Avon Valley will ultimately contribute to a reduction in the risk of serious algae blooms in the upper reaches of the Swan River in the future.

The Environmental Protection Authority, in cooperation with the Trust, recently released the Draft Environmental Protection Policy for the Swan and Canning Rivers in which targets have been set for the reduction of phosphorus loads from the subcatchments of the Swan and Canning Rivers by the year 2010. Meeting these targets means improving the way we treat our environment and repairing some of the damage done in the past

through mismanagement of our natural resources.

It is still early days for the Cleanup Programme and a great deal of research has yet to be concluded. The job of the Cleanup Task Force – made up of representatives from those institutions with responsibilities for the health of the river – is to review the research and decide on action to be taken to reduce the threat of future algae blooms.

While there are about 15 core projects funded by the Government, Cleanup Programme manager John Jones has identified about 40 other projects being carried out by a variety of agencies and organisations under various funding sources whose success is directly related to the objectives of the Cleanup Programme.

"Activities of the Cleanup Programme are very much focused on the estuary, while the Swan-Avon ICM Program takes the lead in management of the whole catchment," Mr Jones said.

"The Cleanup Programme is concerned not only with the use of fertilisers in the catchment, but also management of stormwater and wastewater. Matters such as tree planting and urban landuse planning, while important to the Cleanup Programme's long-term success, are not on the programme's agenda. There is overlap between the Cleanup Programme and the Swan-Avon ICM Program, but we make sure there is no duplication."

Mr Jones said the Cleanup Task Force was currently considering which of the many issues relating to the river's health are the most important. The next step will be to propose a set of "key issues" and seek recommendations on the appropriate methods of rectifying the problems. The Task Force will then devise actions which lead to a cleaner river.

"This is a continuing process, as some of the current research projects have one or two years ahead of them," Mr Jones said. "As we understand better what is happening in the river, we will be better able to improve things."

continued page three



The BLUE-GREEN menace

Blue-green algae are related to bacteria and are widely distributed wherever there is water. Not all blue-greens are toxic but some species can pose a threat to human and animal health because they contain potent toxins. Contact with blue-green algae may cause skin irritation and swallowing water containing blue-greens may cause nausea and vomiting. Even when blue-green algae die they will release their toxins into the water. Boiling the water will not necessarily destroy many of these toxins. As the blue-greens die, their dormant reproductive cysts settle into the sediment and become the seed stock for future blooms – when conditions become favourable again. In WA, blooms of blue-green algae have been recorded in the Sleeman, Serpentine, Blackwood, Kalgan, Avon and Canning Rivers and in many lakes, wetlands and estuaries. The Dawesville Channel at Mandurah was constructed primarily to prevent toxic nodularia blooms in the Peel-Harvey estuary.

Officers from the Swan River Trust and CSIRO travel the river weekly monitoring water quality at regular locations on the river. The information is fed into a central database accessible to other research institutions. Microalgae samples are also taken and Vas Hosja from the Trust's Phytoplankton Ecology Unit analyses the information to produce a weekly report.

"The Trust is collecting samples on an integrated basis so that the data are not only comparable between sites but also between waterways," Mr Hosja said.

"If you just take surface samples you won't necessarily get a true representation of the condition of the river. Algae move up and down the water column, blooms are affected by tide, wind and light during the day. Integrated sampling reduces this variability."

The information gathered by the Trust is summarised in the "Riverwatch" column in Monday's Earth 2000 supplement of *The West Australian* during the summer months.

Integrated ecological model

In May 1994, the WA Estuarine Research Foundation was established to support the Cleanup Programme by promoting research into river ecology and management. The Foundation has funded three projects for the Swan estuary. The main project is an integrated ecological model of catchment hydrology and water quality for the Swan and Canning Rivers.

The function of this model is to bring together existing information about the river and to fund new research to build a complete picture of how the river functions. There are around 12 projects across various organisations under the model's research umbrella.

A great deal of the research to support several of the model's main projects is taking place on a BankWest sponsored research barge currently moored in the upper reaches of the Swan River. Here, WA's leading estuarine scientists are delving into the life of algae, looking at how and where they grow, and at the way changes in the environment influence their potential to bloom.

The Swan River between the Narrows and Guildford is vulnerable to large algae blooms during October to March – particularly in late Spring when the amount of available nutrients from winter rain runoff is high.

The river in this section has deep holes into which nutrients attached to fine sediment have been deposited over many years. The rich black organic sludge is more than a metre thick in parts and may be important in supplying nutrients to the water column to be used by algae as river flow decreases in the summer months.

Dr Grant Douglas from the CSIRO's Water Resources Division is examining the conditions under which nutrients are released from the river's sediment.

"The relative importance of sediment in supplying nutrients to the water column in spring and summer has yet to be fully quantified," Dr Douglas said.

"We need to compare this to other sources – from stormwater drains, from the catchment, from underground sources – to determine where we should focus our management priorities."

Dr Douglas' preliminary findings suggest the bottom sediments may contribute significant amounts of nutrients to the overlying water column.

As part of the Cleanup Programme, the Trust will soon begin investigating ways to reduce the problem of built-up nutrients in the river bed through sediment remediation.

The ecological model will also benefit from the results of a joint project between CSIRO, Curtin University and the Centre for Water Research at UWA that is looking at the flow of nitrogen through algae and into the creatures that graze on algae.

"In terms of nutrients, inputs of nitrogen are at least as important as phosphorus for the growth of algae during summer," said David Hamilton from the Centre for Water Research.

This project also involves short-term, intensive monitoring of some algae species as they move through the water column – allowing them to use available light and nutrients more efficiently.

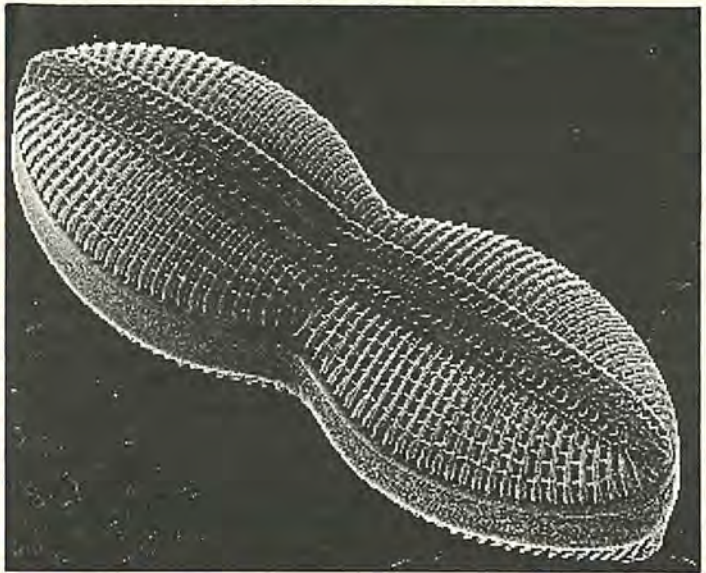
From the research barge a number of related parameters are also being monitored at 15 minute intervals – light, temperature, pH, dissolved oxygen and salinity – and this work illustrates the variability of the river over short time intervals.

CSIRO phytoplankton ecologist Dr Peter Thompson leads a small research team collecting data fundamental to the ecological model. Of particular significance are data on phytoplankton growth and on the number of phytoplankton consumed by very small animals (microheterotrophs) found in the river. They also collect data on which of the many forms of nitrogen phytoplankton use to grow.

"Like all living creatures, algae need nitrogen and phosphorus in a ratio approximating 15:1, N:P," Dr Thompson said.

"Given that there is plenty of both nitrogen and phosphorus in the Swan River, you are going to get faster and more effective

▽ Diatom *Diploneis*, which glides on the surface of seaweed and mudflats (length 50µm); from Gustaaf Hallegraeff's *Plankton: a microscopic world*.



Once were algae

WHEN the earth was first formed, the atmosphere as we know it did not exist. There was no oxygen in the air and no protective ozone layer. Then about 2,000 million years ago, tiny organisms appeared – part of the ancestral slime from which life as we know it evolved. These organisms lived in water and produced oxygen which entered the atmosphere.

The oxygen produced by these early creatures was of such large quantities and released over such long ages, that the atmosphere in which we live was created.

Among the first living organisms were the microscopic diatoms. These tiny plants live within glass-like shells made from soluble silica. These shells have amazing shapes – some look like jewels, others like spaceships. Many species of diatom are found in Western Australia.

When these creatures die, they sink to the bottom of the river or ocean. Here, their empty shells accumulate and form deposits called diatomaceous earth. This earth is now mined as diatomite for use in a variety of modern ways including as a cutting agent in car polish, in filter systems and as a thickener in paint.

Algae are the major component of plankton – the floating mass of tiny organisms that form the basis of the aquatic food chain. They provide the basic food source for many filter-feeding shellfish, crustaceans and fish.

results by drawing down the levels of the one that the algae need most – nitrogen."

However, if you reduce the nitrogen levels in the river, toxic blue-green species may begin to dominate. Blue-green species do not rely on nitrogen in the water because they can take their nitrogen from the air – which is 80 per cent nitrogen.

"Ideally, we need to reduce all nutrient inputs to the river system," Dr Thompson said.

The river today is cleaner now than it has been since the 1950s in terms of traditional types of pollution. Sources of pollution to the river via sewage disposal, industrial effluent and leaching from tip sites have been largely eliminated.

The challenge for the community now is to improve water management across the catchment. We still have urban stormwater runoff bringing relatively large amounts of nutrients into the river and other pollutants such as heavy metals from roads. We still need to improve fertiliser use in urban and agricultural areas and revegetate our rivers and watercourses to filter pollutants and reduce water velocity to control erosion. Many of these problems will be tackled as part of the Cleanup Programme and by other agencies contributing to improved catchment management. ■

ICM taking off across Swan-Canning

In recent months several new groups have been established to direct environmental management in the 2000 sq km Swan-Canning River catchment.

The Bennett Brook, Ellen Brook, and Belmont Main Drain catchments have joined Bayswater and Canning River in their drive for integrated catchment management (ICM).

The **Bennett Brook** Catchment Group was formed following a community meeting on November 25. Representation in the group comes from Bassendean Council, Swan Valley Nyungah Community, Success Hill Action Group, Bassendean Preservation Group, Water Corporation (formerly Water Authority) and Whiteman Park. The group will also seek representation from other appropriate organisations including the Department of Transport.

Urban expansion and associated transport links are issues of concern to the future health of the brook and its wetlands. About half of Bennett Brook's streamload comes from groundwater from the Gngangara Mound. For information call Kaye Pearson on ph. 377 3710.

Key stakeholders in the **Ellen Brook** catchment met at the Chittering Shire Offices in Bindoon on 11 November to discuss management issues for the mostly rural catchment. They resolved to establish an ICM group to guide catchment management in the area (see box).

The **Belmont Main Drain** Committee has also been formed to direct pollution management in the drains around the Ascot area. Issues relating to horse effluent, the protection of groundwater and new residential developments, such as Ascot Waters, will be the main focus for the group.

In the **Southern River** area, Gosnells Senior High School has joined forces with Huntingdale Primary and Wirrabirra Primary to form the Southern River Schools Catchment Group.

The group meets once a term to discuss projects and plan actions, divide up areas of responsibility along the river and produce a newsletter for distribution to people living in the catchment. Current focus for the group is the Southernwood Park and Gwalia Place drains. The search is also on for the Quenda, a rare and secretive marsupial which lives along the riverbank. For more information contact Jim Pollock on ph. 398 2300.

Small vessels inquiry releases draft report

MEMBERS of the public have expressed concern about the speed, safety and noise of some vessels using our waterways in a draft report released for comment.

Trust chairman Geoff Totterdell said the inquiry into the effects of vessels on the Swan and Canning Rivers was established to consider a number of issues including the level and environmental impact of vessel use on the river system. The inquiry committee considered 120 submissions from the community and State and local government.

Mr Totterdell said the submissions reflected public concern about the speed, safety and noise of some vessels, and other issues including disturbance to wildlife, pollution and river bank erosion resulting from bow waves.

Many submissions expressed concern about the noise associated with jet skis and the behaviour of some of their operators.

The draft report is open for public comment until 31 January. A final report will then be prepared for consideration by the Government.

Copies are available from the Swan River Trust and the Department of Transport, Essex Street Fremantle.

Community meeting sets course for Ellen Brook

A meeting held at the Chittering Shire offices in November resolved to form the Ellen Brook Integrated Catchment Group (EBICG). The meeting was attended by representatives from the Shires of Swan, Chittering and Gingin as well as Gingin and Chittering Valley Land Conservation Districts (LCDs), Agriculture WA, Swan River Trust and the Water and Rivers Commission.

Mr Hartley Read, chairman of the Chittering Valley LCD, said the group's role would be to help coordinate and direct future planning and research in the Ellen Brook catchment.

"The EBICG will not take over responsibilities of other groups," Mr Read said. "We will work with existing groups to help coordinate activities and develop a framework to ensure everyone is working towards the same goal."

Mr Read said there would be many opportunities for the community to get involved in improving the health of Ellen Brook. Activities are likely to range from working groups to look at specific issues to hands-on activities, such as tree planting and water quality monitoring, in association with on-the-ground groups.

The EBICG is an initiative of the Swan-Canning Cleanup Programme and Swan-Avon ICM Program — State and Federal government initiatives to improve the health of the Swan and Avon River system.

The Swan River Trust has appointed Wes Horwood as catchment coordinator for the Ellen Brook area. Mr Horwood will be working with the EBICG and the community to develop a catchment management plan.

The first formal meeting of the EBICG will be held in late January. For further information, or if you would like to become involved in catchment management activities, contact Mr Horwood at the Swan River Trust on 278 0405.

Available from the Swan River Trust unless otherwise stated.

**HOT OFF
THE
PRESS**

Reports

- * *Swan River Trust Annual Report 1994-95.*
- * *Draft Environmental Protection Policy for the Swan and Canning Rivers*, with the Environmental Protection Authority, 1995, ph. 222 7000.
- * *Inquiry into the effects of vessels on the Swan and Canning Rivers: Draft report to the community*, Report No.26, 1995.
- * *Action for the Future: The Swan and Canning Rivers Cleanup Program.*
- * *Urban Integrated Catchment Management: A handbook for local government and community groups*, Bryce Bunny & Mike Mouritz, available from the Department of Environmental Protection, ph. 221 3840.

Pamphlets

Catchment Management Series

- * No.1, *Canning River Catchment Management Plan.*
- * No.2, *Southern-Wungong River Catchment Management Plan.*

- * No.3, *Ellen Brook Catchment Management Plan* (in production).
- * *Living Streams: Bringing water-courses back to life*, Waterways Advice No.12, 1995 (revised).

Poster

- * *Controlling weeds in waterways and wetlands*, with the Department of Environmental Protection, 1995.



**SWAN
RIVER
TRUST**

We've moved! Our new address is:

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Protecting the Swan-Canning River system for the future