RIVERVIEW

No.10 SWAN RIVER TRUST Nov-Dec 1996

Algae problems predicted after heavy winter rains

Winter rains are likely to result in changes in the frequency and intensity of algal blooms over the coming summer.

Swan River Trust chairman Geoff Totterdell said recent high flows in the river are likely to have carried nutrient-rich soil and sediment further into the estuary increasing the risk of algal blooms and weed growth downstream of the Narrows. He said high river flows may also have increased nutrient release from the sediment into the water column.

The location and extent of blooms will vary according to daily weather conditions – such as atmosphere and water temperature, wind and tide. In the coming months there is a risk of:

- nuisance microalgae blooms in the upper Swan River being larger and more frequent than in previous years
- nuisance microalgae blooms in Perth Water being more frequent than in previous years
- nuisance microalgae blooms in Melville Water, and
- macroalgae blooms of green *Enteromorpha* and *Rhizoclonium* along sections of the Mosman Bay-Peppermint Grove foreshores.

"We haven't had a wet season like this for many years, so it's a bit hard to predict exactly what's going to happen in the estuary over the summer," Mr Totterdell said. "But our best estimates suggest conditions will be different from previous years when we experienced relatively dry winters."

Mr Totterdell said nuisance blooms, common in the Swan River, were non-toxic but could be an inconvenience to swimmers.

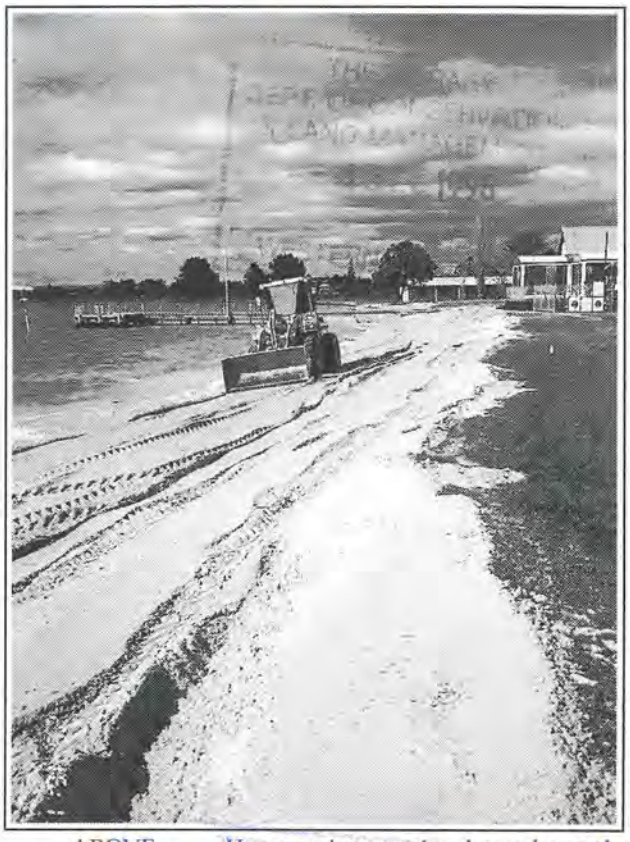
"Some algae produce slime which can cause staining of clothing and irritation to sensitive skin. The Trust will issue algal warnings to the community when these blooms occur," Mr Totterdell said.

"Scientific information gathered by the Water and Rivers Commission is being assessed to develop further our capacity to predict and manage algal blooms."

As ocean water moves upstream during spring, the layering of fresh water over heavier salt water (stratification) also produces conditions conducive to the development of algal blooms by forcing nutrients built up in the sediment into the water column for algae to feed on. Destratification (mixing of waters) and sediment modification to reduce the risk of nutrients being released from the sediment will be trialed in the coming months.

The outcome of these trials will be included in an action plan being developed as part of the Swan-Canning Cleanup Program to improve water quality in the Swan and Canning Rivers.

See also feature page two



Photos: David Fardig

ABOVE Heavy winter rains have kept the Swan River Trust field crew busy this year. Between August and October the Trust moved almost 200 tonnes of sand to replenish denuded river beaches, as here at South Perth.

BELOW Swan River Trust officers direct the removal of trees and weeds blocking the Canning River in Kelmscott.

Loose litter leads to a whole lot of rubbish

ROADSIDE litter is a major source of water pollution – both in the river and the marine environment.

In 1995-96, Swan River Trust field crew picked up 123 tonnes of litter from the river foreshores. While not all of this would have come from stormwater drains, reducing roadside litter will go a long way to helping improve the health of our rivers.

The Keep Australia Beautiful Council and the Water Corporation have joined with the Swan River Trust in a tagged litter survey to see where roadside rubbish goes when it enters our stormwater drains.

During September, 150 small plastic bottles were dropped into Perth stormwater drains. Each bottle has a label with information to be filled in when the bottles are found and returned to KABC.

Pictured above are Mario Putrino and Savin Tak from North Perth Primary School with KABC's Kim Barker, Swan River Trust's Darryl Miller and the Water Corporation's Graeme Cargeeg during the release of tagged litter in North Perth.

At the time of going to print, Kim Barker said that 45 bottles had been returned. ❐

Algae in the Swan and Canning Rivers

What to expect for the coming dry season

From early spring the potential exists for algal blooms in the Swan and Canning rivers. The algal bloom season runs from October to March – depending on weather patterns. Algae and algal blooms are a natural part of the system, however, excess nutrients have caused an increase in their frequency and intensity over recent years.

What is an algal 'bloom'?

Some types of algae are large (macroalgae or 'weeds') while others can only be seen with the help of a microscope. Microscopic algae are a major component of plankton which forms the basis of the aquatic food chain. When conditions are right, both types of algae can grow in great abundance. If moderate to large microscopic algal cells exceed 15,000 cells per millilitre in water, sampled from a range of depths (integrated sample), it is referred to as a'bloom'. Small microscopic cells will cause discolouration of the water at around 100,000 cells per millilitre.

Some algal blooms cause water discolouration and some species may cause skin irritation or stain clothing. These are called nuisance blooms. Other species are 'toxic' and can be a threat to animal life and cause illness in humans.

Algal blooms are fueled by nutrients – nitrogen and phosphorus – which enter the river from the catchment, either dissolved in water or attached to soil particles. Soil has built up on the river bottom over many years providing a ready store of nutrients which are released into the water column under certain conditions – adding to the risk of algal blooms.

Blooms during summer appear mainly in the upper reaches of the Swan River, particularly between Maylands and Guildford. Algae thrive in hot, still weather conditions and late season rain often triggers bloom activity. If fresh water sits on top of salt water in still, hot conditions, blooms usually appear at the water surface. The extent and frequency of blooms will be greatly increased by any summer rain.

Algae are always present in our waterways and blooms are considered a natural part of the system, but the frequency and intensity of blooms has increased in recent years. Understanding how algae respond to changes in atmospheric conditions, water temperature, rain, wind and tide will help scientists predict the likely occurrence of blooms in our waterways.

Algae alerts

Throughout the dry summer months, when bloom activity is of most concern, the Swan River Trust issues warnings to the community to caution against swimming where blooms might be occurring. Most blooms are not a risk to human health, but care should be taken to avoid obvious discolouration in any waterway.

Toxic blooms

Low numbers of potentially toxic blue-green species are always present in the river system and management to reduce nutrient input to the river from the catchment is the only way to prevent the long-term occurrence of toxic blooms in the Swan and Canning Rivers. Blue-green algae from lakes in parkland along the foreshore often drain into the river during late season rain – increasing the risk of the public coming into contact with blue-green algae. The Swan River Trust is working with local government authorities to reduce the risk of algae pollution entering the river in the coming months.

The last extensive toxic algae bloom in the Canning River occurred in 1994. It is believed the blue-green algae *Anabaena circinalis* and *Microsystis* began forming in the Canning River after the removal of the introduced nuisance weed *Hydrocotyle*.

Weed growth upstream of the Kent Street Weir reduces the risk of toxic blooms because the weed competes for nutrients that would otherwise be available to the fresh water blue-green algae species. The weir is in place to prevent salt water intruding upstream to maintain the quality of water used by riverside residents.

The small floating plants, *Azolla* and *Lemna,* grew to cover the Canning River above the Kent Street Weir during the early months of 1996. These native plants provide a habitat for insects, macroinvertebrates and feeding water birds. They also consume available nutrients, reducing the risk of serious microalgae blooms. Despite some community concern, the removal of these plant species for aesthetic reasons is not recommended. The weed *Potamageton* is also found submerged above the Kent Street Weir.

Improving river health

Catchment management to reduce soil loss and improve fertiliser use is the key to reducing the risk of algal blooms. In-river factors which encourage the formation of algal blooms, such as nutrient release from sediment, are only just being understood. Current research is finding answers to the way algae behave. This research will help guide future actions to reduce the risk of blooms in our rivers.

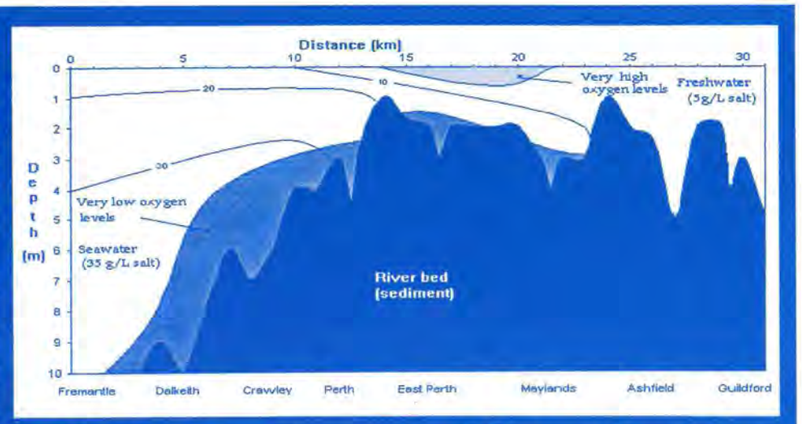
Trials of techniques to reduce nutrient release from the sediment are part of the Swan-Canning Cleanup Program. These trials will begin in the coming months and recommendations made to the Cleanup Task Force. The Task Force is developing an action plan to improve the health of our river system which will combine catchment and in-river remediation activities.

The Swan-Canning Cleanup Program operates in partnership with the Swan-Avon ICM Program to ensure a coordinated approach to improving the health of our river system and its 122,000 sq km catchment. A coordinated approach to managing the catchment is the key to controlling algal blooms and other problems in our rivers, such as erosion, silting, salination, industrial pollution and weed invasion.

Nutrient build-up in the river sediment has occurred over a period of 20 to 30 years. The benefits of current actions – including research, better drainage design, the revegetation of urban and rural catchments, and improved farming practices to reduce soil and fertiliser loss – may not be seen for many years to come. But the process of repair has begun.

AS WINTER rain decreases, ocean water begins its seasonal movement upstream. Because salt water is heavier than fresh water, the sea water moving upstream from early spring passes under the fresh water like a wedge. By the end of October the salt wedge had advanced as far as the Narrows after only two weeks of relatively dry weather.

The upstream movement of the wedge is known to be a contributing factor in the formation of algal blooms. One theory suggests the wedge forces water from the sediment releasing nutrients into the water column. In-river research will help us develop actions to reduce the frequency and intensity of algal blooms.



Spring movement of the salt wedge

At a glance: Algae and weed growth likely in the Swan and Canning Rivers, 1996-97

Season	Algae or weed	River location	Risks
Spring	*Chlamydomonas*	Bassendean-Guildford area and possibly as far downstream as Perth Water	Harmless. Bright green water discolouration. Can colour clothing.
	Skeletonoma	Melville Water	Harmless. Brown discolouration of water.
	Scrippsiella	CBD to Rivervale	Brown water could discolour clothing.
	Enteromorpha and *Rhizoclonium* (green macroalgae)	Possibly in Peppermint Grove-Mosman Park area	Rotting weed washed up on foreshore may cause offensive odour. May be a nuisance to boat moorings and propellers. Can hide cobbler fish with spines. Wear shoes. Can be uncomfortable for swimmers.
	Gracilaria and *Giffordia* (red and brown macroalgae)	Rivervale to Maylands	Floating weed.
Summer	*Gymnodium simplex*	Ascot to Midland	Staining of clothing.
	Gracilaria and other brown macroalgae (sea weed)	South Perth, along beaches beside Kwinana Freeway. Also lower Canning Estuary.	Rotting weed can cause offensive odours. Areas within Milyu Nature Reserve are not cleared – weed is an important food habitat for migratory wading birds.
	Rhizoclonium	Shelley to Riverton Bridges, Canning River	Green rotting weed washed up on foreshore can cause offensive odour. May be a nuisance to boat moorings and propellers.
	Azolla and *Lemna* (floating weed). Also submerged weed *Potamageton*	Canning River, above Kent Street Weir	May cover river. May restrict serious blue-green microalgae blooms. Habitat for insects and birds.
	Microcystis littoralis (Blue-green species)	Riverton Bridge	All blue-green algae have the potential to cause adverse skin reactions and are sometimes toxic.
Summer-autumn	*Cryptomonas* and *Heterosigma* (sticky)	Maylands to Guildford	Possible skin irritation. May cause fish deaths by clogging gills. Alerts to be issued if bloom is dense and prolonged.

Video gift for on-the-ground dedication

The first copy of the new *Living with Streams* video – a joint production between the Swan River Trust and the Water and Rivers Commission – has been presented to City of South Perth Environment Association (COSPEA) members Andrew Thomson (pictured) and John Feldman.

The video, a companion to the *Living on Groundwater* series, looks at how we have changed the way water travels through our cities and towns and what's being done to return our creeks to places we can explore and enjoy.

To win a *Living with Streams* video send a photo of yourself, family, school or community group involved in a river, wetland or catchment restoration project. It might be removing weeds from along a creek, picking up rubbish from the foreshore or local bushland, even planting native trees in your own backyard.

Send your photo to Tim Larcombe at the Swan River Trust, PO Box 6740 Hay Street East, East Perth 6892. Please include your address and phone number and a caption telling us the who, what, where and why of your activity.

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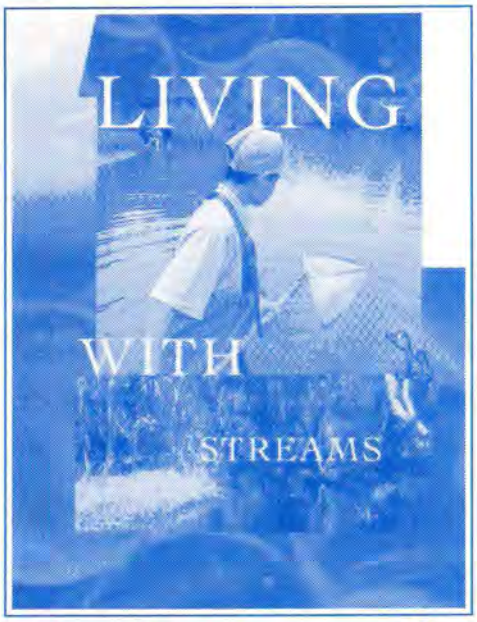
Andrew Thomson, from the City of South Perth Environment Association (COSPEA), removing wild gladioli and veldt grass from the Goss Avenue Bushland (Manning).

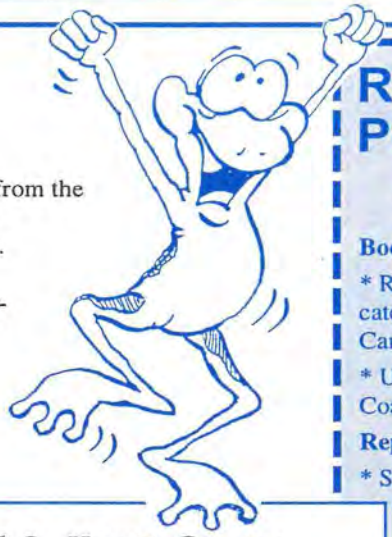
Group member John Feldman said COSPEA have removed more than 1000 litres of litter and rubbish from four bushland areas. Extensive weed removal has also been undertaken.

"The removal of rubbish and weed will reduce the potential fire hazard over summer and reduce the spread of exotic weeds and allow better growth of surviving native plants," Mr Feldman said.



Pocket-size water monitoring booklet

ANOTHER Swan-Canning Cleanup Program initiative from the Catchment team has been the production of the booklet Understanding Water Quality on the Swan Coastal Plain. Subtitled What Do The Numbers Mean?, the booklet provides guidelines and advice on water quality monitoring. The booklet is directed at people who know how to measure some indicators of water quality, but need clarification on what their results actually mean. The booklet is in a handy pamphlet size to fit into back pockets and bags when you're out in the field. For a copy call Tim or Wes on 278 0400.



Recent Publications

Available from the Swan River Trust unless otherwise stated.

Booklets

* Rivercare Directory, 1996. Rivercare, catchment and support groups of the Swan-Canning region.

* Understanding Water Quality on the Swan Coastal Plain: What do the numbers mean?

Reports

* Swan-Canning Cleanup Program and the WA Estuarine Research Foundation forum on the Health of the Swan Estuary, 12 April 1996, CSIRO auditorium, Floreat, Perth.

Videos

* Living with Streams. Swan River Trust and Water & Rivers Commission, available to purchase from Water Corporation on 420 2605. For loan from the Swan River Trust.

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Protecting the Swan-Canning River system for the future