Swan River Trust Resource Sheet 4 - 2000

Nutrient enrichment in the Swan River system

Nutrients are chemicals that are essential for plant and animal growth and wellbeing. They are important in the aquatic ecosystem because the rate of nutrient supply determines the rate of primary production (production of plant material) if light and temperature are also favourable for growth.

Plants and some animals obtain nutrients from mineral solutions in their environments. Some animals obtain them from eating plants, and some eat other animals. This creates a complex food web. Nutrients are returned to soil and water through the processes of decay, and become available to other plants and animals in a continuous 'recycling' process.

Excessive amounts of certain nutrients, such as nitrogen and phosphorus, in a wetland or waterway can be harmful. In a natural system, nutrients are constantly cycled and the process of build-up of nutrients coming in from the catchment is slow. However, human use of the catchment means that more nutrients are being added to it by artificial means (e.g. fertilising paddocks and gardens). Human land-use activities in the subcatchments of the Swan-Avon river system increase the 'export' of nutrients to rivers and streams, therefore increasing their nutrient load. This process of nutrient enrichment is called **eutrophication.** The most important nutrients contributing to the eutrophication of the Swan River estuary are **nitrogen and phosphorus.** They enter the river (in soluble form, as organic matter, or attached to sediment particles) directly, in runoff, or via groundwater.

Eutrophication disrupts the ecology of the aquatic ecosystem, causing a change in species composition, so that the natural community of plants and animals may come to be replaced by less diverse groups. Nutrient enrichment also results in **algal blooms,** especially in spring and summer. The Swan River has experienced a high number of algal blooms over recent years.

Excessive growth of algae and other plants can reduce light penetration, and some blooms are toxic. When an algal bloom dies, the process of rotting can use up all the oxygen in the water. Oxygen depletion in bottom waters can cause the death of worms, crabs and other invertebrates, and severe oxygen depletion can result in fish deaths.

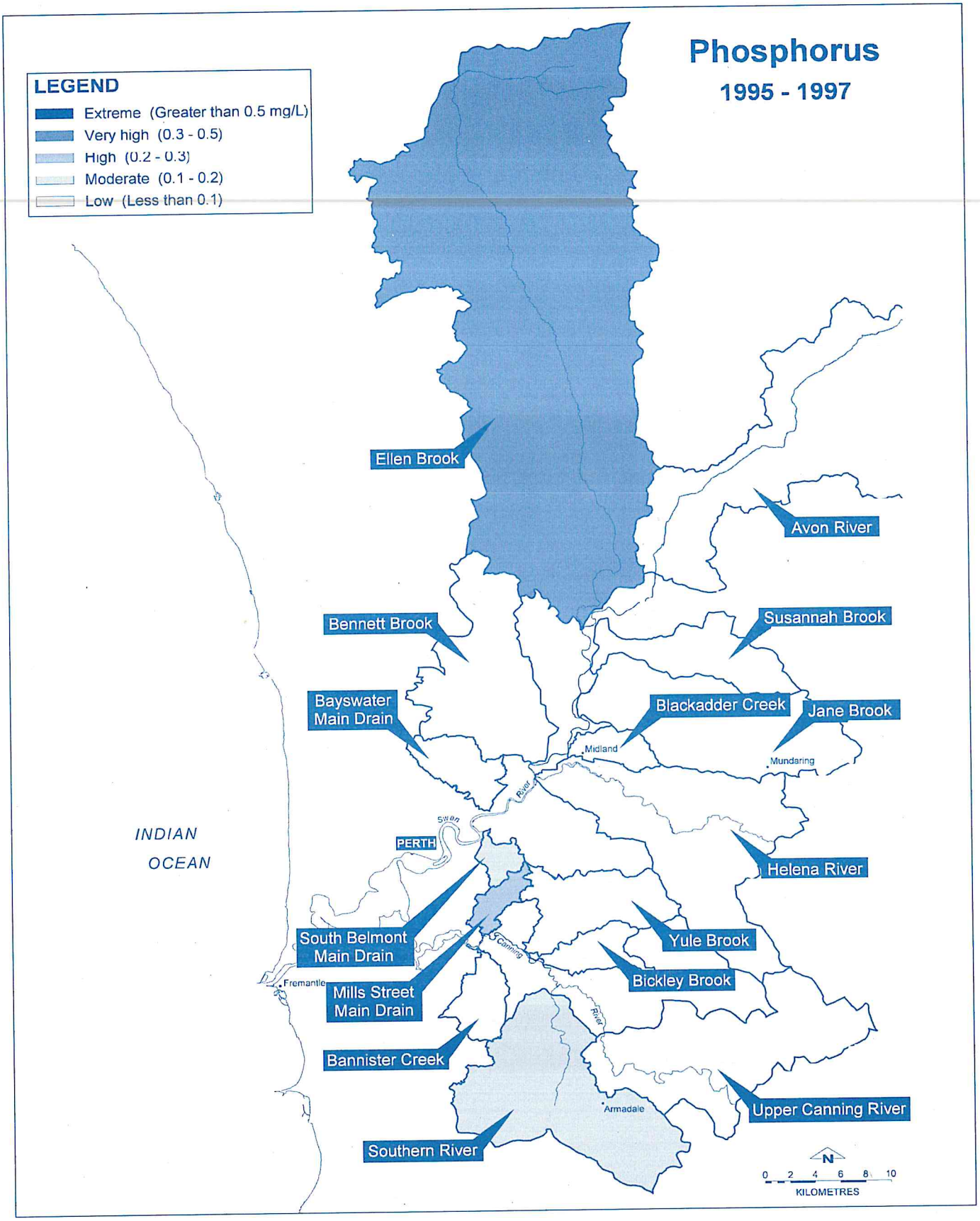
For humans, the slimy scum of algal blooms and offensive smell of rotting algae are a nuisance and a potential cause of health problems. Toxic blooms can make the river unsuitable for water-contact recreation.

Excess nutrients come from widespread sources in urban and agricultural areas in the Swan-Avon catchment. **Sources** of nitrogen and phosphorus include excess from commercial fertilisers applied to crops and pastures, effluent from animal feedlots and intensive animal industries (e.g. piggeries) and grazing areas, and wastes from agricultural industries (e.g. food-processing factories). In urban areas phosphates are concentrated in detergents, wastes from sewerage systems and industries, and runoff from lawns and gardens. Organic material, including the leaf litter from introduced deciduous trees, also adds nutrients to the waterbody.

The amount of nutrients exported from the various subcatchments depends on factors like the type of land use in the catchment (residential, industrial, agricultural, horticultural), the size of the catchment and extent of clearing (which affect streamflow volumes), the soil type (which affects the ability to hold nutrients) and water flows, including drainage in the catchment. Ellen Brook, the Mills Street Main Drain and the Southern River subcatchment contribute significant phosphorus and nitrogen loads to the Swan River system (see map of subcatchments overleaf).

Efforts to **manage** nutrient enrichment include promoting research into algal blooms, investigating ways of reducing nutrient build-up in rivers, exploring techniques such as oxygenation to make river conditions less suitable for algal blooms, implementing Best Management Practices, and education for urban and rural landholders to work together to tackle the problem at its source.

Phosphorus
1995 - 1997



Subcatchments of the Swan-Canning system have been classified according to total phosphorus concentrations measured in their freshwater streams and drains between 1995 and 1997. Concentrations of total phosphorus are measured in milligrams per litre (mg/L) and median concentrations have been used to classify subcatchments. Although algal blooms in the upper Swan are considered nitrogen 'limited', simultaneous reductions in both total nitrogen and phosphorus are required to ensure better water quality.

SWAN RIVER TRUST

THE GOVERNMENT OF WESTERN AUSTRALIA

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