What's happening in our harbours?

Princess Royal & Oyster Harbours – Albany

Environmental Protection Authority
Perth – Western Australia
Bulletin 341 August 1988
'A Part of the Albany Harbours Environmental Study'

Foreword

The protected waters of Princess Royal Harbour and Oyster Harbour are valuable to the people of Western Australia for recreation, for fishing, for industry, as boat harbours and for their scenic beauty.

Local people have long been concerned that these waterways be maintained in a healthy state, both for residents and the increasing number of tourists that visit the south coast. Particular mention must be made of the interest and support of local government and the work of the Albany Waterways Management Advisory Committee in pushing for better management.

The State Government recognises that undesirable changes have occurred in the harbours and has allocated over $200,000 to examine the problems and to recommend solutions. A further Government allocation of $290,000 over two years is being used to examine agricultural practices in the catchments draining to the Albany harbours. These programmes will be used to develop acceptable management options for both Princess Royal Harbour and Oyster Harbour. The objective is to restore these harbours to a condition suitable for a wide range of uses.

A review of land-use in the Albany catchments is now under way, with participation by the Environmental Protection Authority, Department of Agriculture, Waterways Commission, Water Authority of Western Australia, Town of Albany, Shire of Albany, Great Southern Development Authority, Albany Waterways Management Advisory Committee and Department of Conservation and Land Management.

This booklet is produced as part of the Government's State Conservation Strategy to promote community awareness and understanding of the environmental changes occurring in the Albany harbours.

Barry Hodge.

Hon. Barry Hodge, M.L.A.
Minister for the Environment

Satellite photograph showing Oyster Harbour and Princess Royal Harbour water catchments. Note the extensive areas cleared for agriculture shown in blue. Land-use activities in the King and Kalgan River catchments affect the water quality of Oyster Harbour. The water quality of Princess Royal Harbour is also affected by land-use activities within its three catchments, Township, Robinson Estate Drain and Limeburner Creek.

Legend

1. Kalgan River Catchment
2. King River and Yakamia Creek Catchment
3. Albany Township Catchment
4. Robinson Estate Drain Catchment
5. Limeburner Creek Catchment and other drains
6. Princess Royal Harbour
7. Oyster Harbour

catchment boundaries
heavily vegetated areas
cleared agricultural areas

0 20km

Why these harbours are important

Princess Royal Harbour and Oyster Harbour, on either side of the Albany township, are sheltered from ocean swells and strong winds. They provide safe, protected ports and offer ideal recreational areas for swimming, windsurfing, sailing and boating.

The harbours are also popular fishing sites for both professionals and amateurs. Because of their abundant food and shelter, these waterways provide excellent habitats for adult and juvenile fish. Leatherjackets, cobbler, whiting, Australian herring, mullet, garfish and flathead are commonly caught, as are squid, crabs, cockles and oysters.

The Albany region, with its spectacular open coastline, harbours and bays, is an important tourist destination, and tourism contributes significantly to the local economy. As Princess Royal Harbour and Oyster Harbour are popular with both local residents and tourists, it is vital that these harbours are maintained in a healthy and attractive condition.


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1. Fish (pilchards) being off-loaded in Oyster Harbour. The harbours are popular fishing locations for both amateurs and professionals. Approximately 2,600 tonnes of fish, the majority of which are pilchards, are taken annually by the professionals.

2. A wide range of water sports can be enjoyed in the sheltered waters of these harbours.

3. The Albany township is surrounded by spectacular rugged coastline and protected harbours and bays.

4. The sheltered beaches at Emu Point, Oyster Harbour, are popular for family recreation.


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The food web

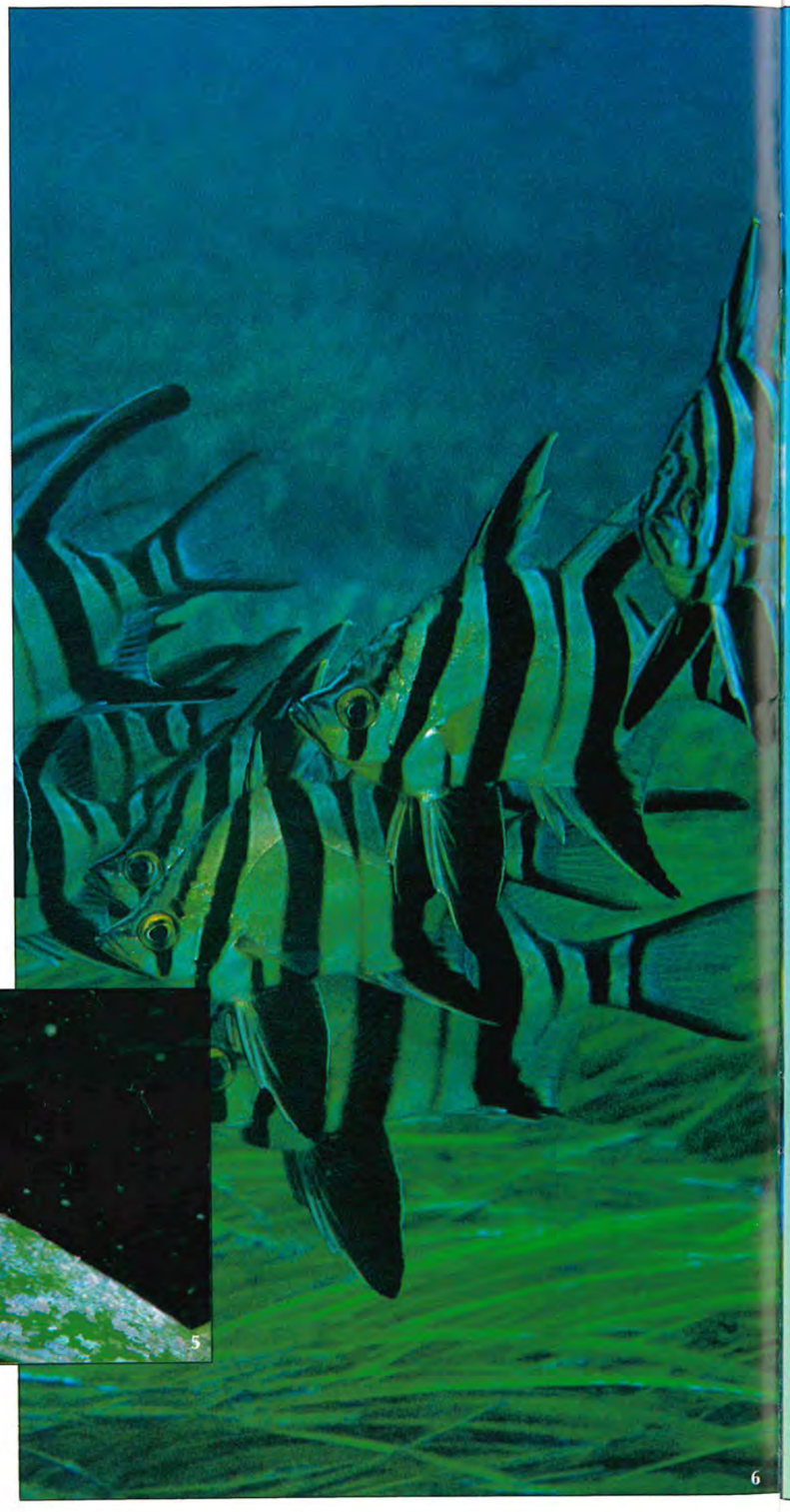
All plants and animals in the harbours are linked through a food web.

Plants form the basis of the food web. They use nutrients, carbon dioxide and the sun's energy to make food: this process is called photosynthesis. The main plants in the harbours are seagrasses. Seaweeds (algae) and floating single-celled plants (phytoplankton) are also found but are less important.

The living plants are eaten by animals such as marine snails. Decomposing remains of dead plants, called detritus, provide food for small organisms, such as bacteria and fungi. Crabs, worms, shrimps and small fish also feed on the detritus, and these in turn are eaten by larger fish and seabirds.

Any changes to this delicate web of life can have serious consequences. Because many animals in the harbours depend on the marine plants, changes to the base of the food web (the marine plants) will have more drastic effects than changes to the top of the food web (the fish).

In the Albany harbours, the survival of the seagrass plants is being threatened.

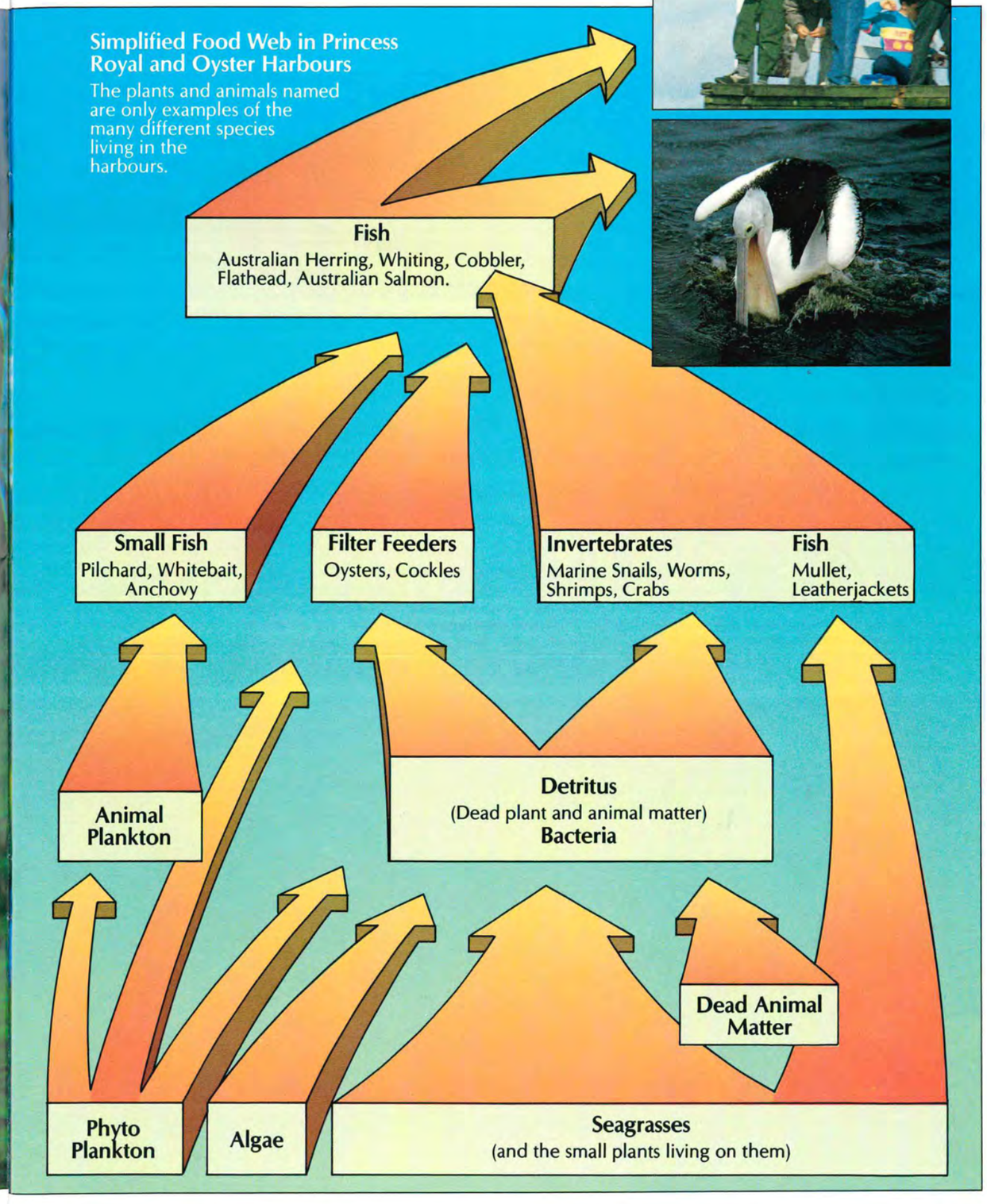


5. The marine snail (Prothalotia lehmanni) lives mainly in seagrass meadows where it feeds on the small plants attached to the seagrass leaves.

6. Schools of 'old wives' (Enoplosus armatus) are commonly seen around seagrass meadows. They probably feed on small animals living there.

Simplified Food Web in Princess Royal and Oyster Harbours

The plants and animals named are only examples of the many different species living in the harbours.



What is the problem?

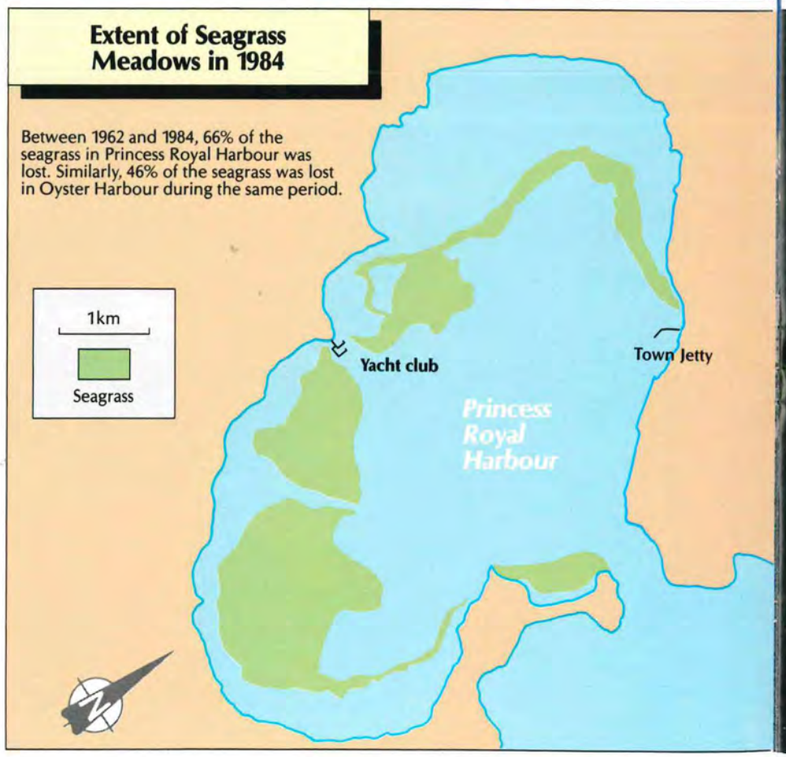
The Seagrass is Dying
The seagrass meadows in both Princess Royal Harbour and Oyster Harbour are rapidly declining. Since the 1960s approximately half of the seagrass meadows in each harbour have been lost. Instead of healthy seagrass meadows there is now mainly bare sand, bare sand covered in algae, or sparse seagrass meadows smothered in algae.

Why is Seagrass Important?
Healthy seagrass communities are highly productive. They produce as much organic matter (potential food) per year as a similar area of tropical rainforest. Seagrass meadows are important nursery areas for many animals such as fish and crabs. Most fish in the Albany waterways depend on these meadows. If seagrass cover is destroyed, the fish populations will be dramatically altered.

Seagrass plants protect the harbour sediments from erosion, because they have roots and rhizomes which bind the sediment. As seagrass meadows decline, the sediments are more readily stirred up by waves and currents causing the water to become murky.

Why are the Algae a Problem?
If the algae does not grow excessively it is a valuable and natural part of life in the harbours. A problem arises however, when the algae grows rapidly and builds up to nuisance levels. This is happening in the Albany harbours. An oversupply of nutrients (particularly nitrogen and phosphorus) appears to be responsible for this rapid growth of algae, although other factors may also be important.

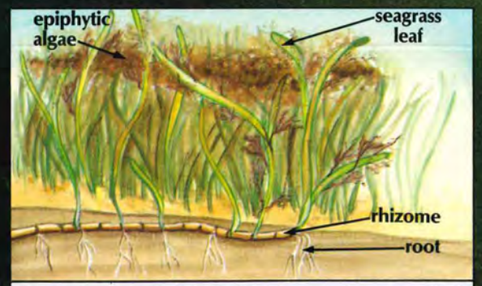
Unlike seagrass, algae do not have roots or rhizomes. Strong winds and water currents can move large quantities of algae onto the seagrass meadows, smothering them. This smothering reduces the amount of light reaching the seagrasses. Without light, seagrasses die. The algae may also wash onto beaches and decompose to a foul-smelling ooze which is unattractive to beach users.



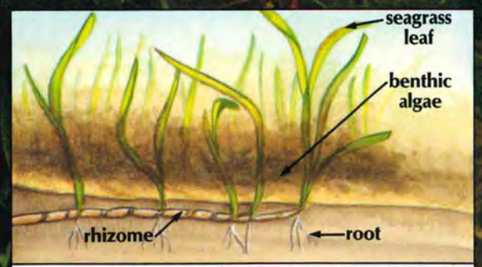
7. A school of Yellowtail (Trachurus novaezelandiae).

8. A dense seagrass meadow with little algal growth. Such healthy meadows provide abundant food and shelter for many animals.

9. An unhealthy seagrass meadow in Princess Royal Harbour. Note the sparse seagrass and massive amounts of algae growing between the plants. These algae may eventually smother and kill the seagrasses.



Seaweeds which attach themselves to seagrass leaves are called epiphytic algae. These algae reduce the amount of light reaching the seagrass leaves. Extended periods of reduced light may eventually kill the seagrass.



Seaweeds which rest on the sea floor are called benthic algae. Unlike seagrass, algae do not have any roots or rhizomes. Strong winds and water currents may move and deposit these algae onto seagrass meadows and smother them.

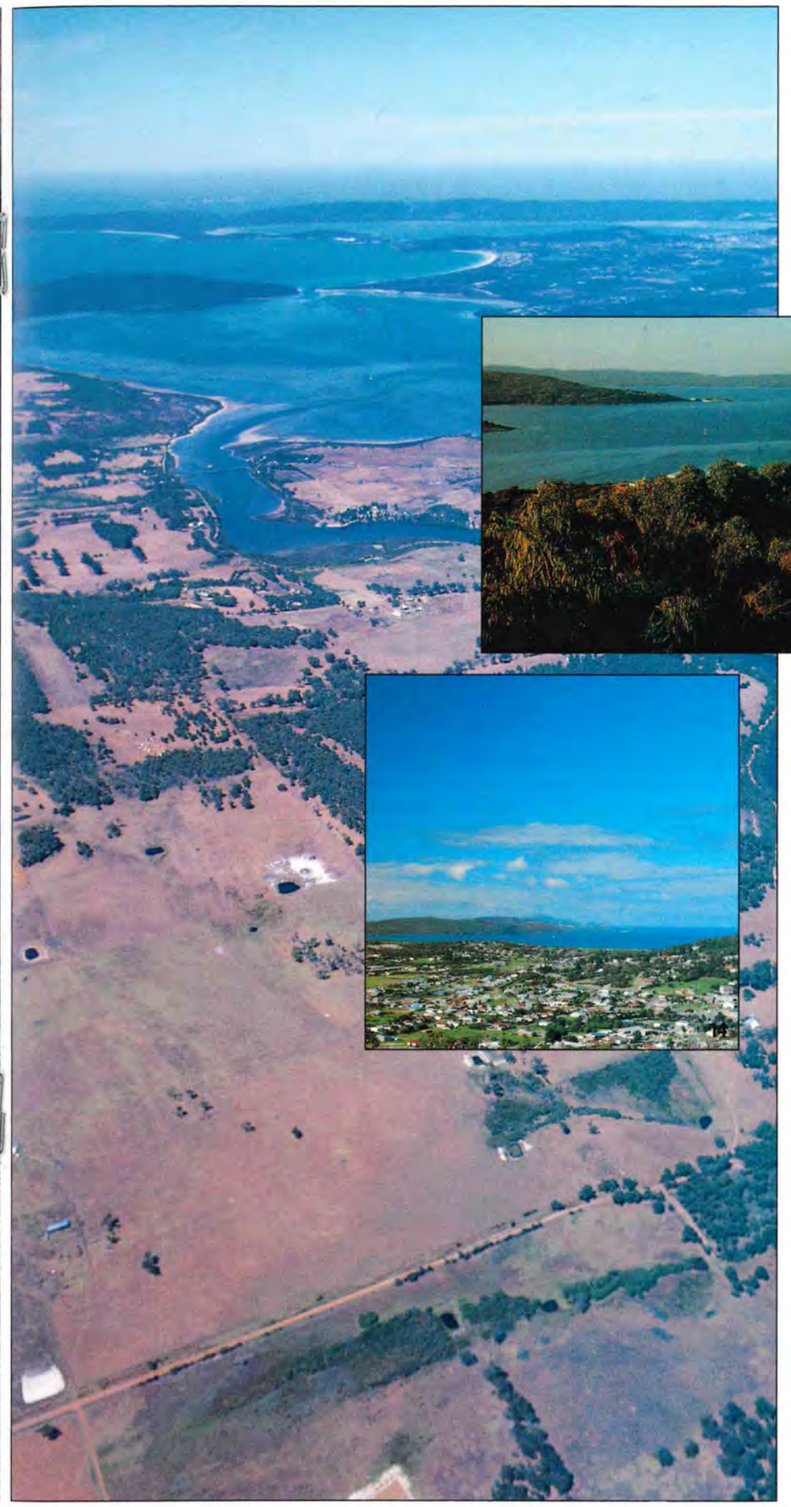
Possible causes

Nutrients
Excessive inputs of nutrients were responsible for the massive loss of seagrass in Cockburn Sound (near Fremantle) and the huge build-up of algae in the Peel-Harvey Estuary (near Mandurah). Studies are in progress to establish whether similar problems in the Albany harbours are also caused by an oversupply of nutrients.

Where do the nutrients come from?
The major sources of nutrients into the Albany harbours are industrial wastes, fertilizer runoff from agricultural lands, domestic sewage, and stormwater runoff from urban areas.
Industry – The meatworks, canneries, superphosphate works, woollen mills and railway yards all produce liquid wastes which contain nutrients in varying quantities.
Agriculture – To ensure growth of crops and pastures, nutrient-rich fertilizers have been added to the soils. Over the years there may have been excessive applications of these fertilisers to the sandy soils in the Albany catchments. Each year, rainfall washes these excess nutrients into the streams and drains, and eventually into the harbours.
Domestic Sewage – Sewage contains considerable quantities of nutrients and some of these find their way into the harbours.
Urban Runoff – Domestic detergents, garden fertilizers, septic tanks and rubbish tips can contribute nutrients to urban runoff. Normally this contribution is minor, however residential areas with septic systems can contribute significant amounts of nutrients to urban runoff.

Other Factors
Additional factors which may have contributed to the decline of the seagrass include pesticides, sediment runoff and dredging. Pesticides from urban and agricultural areas enter the harbours and can accumulate in marine plants and animals. This may have serious consequences for the food web.

Sediments washed off cleared land, or suspended by dredging activities, result in more turbid water which reduces the amount of light reaching the seagrass. Extended periods of reduced light may eventually kill the seagrass.



10. Industrial waste running into Princess Royal Harbour. Nutrients and some toxic substances can be found in industrial wastewater.

11. An industrial waste slick. These slicks are commonly observed in Princess Royal Harbour.

12. Eighty per cent of land in the Albany region has been cleared for farming. Fertilizer is applied to paddocks used for grazing and crops, and some of this fertilizer washes into the harbours.

13. This slick in Princess Royal Harbour came from the sewage treatment plant discharge to King George Sound. Studies are being undertaken to determine how much effluent reaches both Princess Royal Harbour and Oyster Harbour.

14. Nutrients from urban areas can be transported into the harbours by stormwater runoff. Garden fertilizers, septic tanks and rubbish tips are the most common sources of nutrients in urban areas.

15. Intensive agriculture, such as potato production, uses high amounts of fertilizer and pesticides. Potato fields are common around the western end of Princess Royal Harbour.

What we can do

Industry – Nutrient and pesticide levels from each industrial discharge to Princess Royal Harbour are currently being monitored. If these are too high there are a number of possible ways they could be reduced. These include:

- using more up-to-date technology with stricter pollution controls;
- co-ordinating the treatment and disposal of the wastes. This could include constructing a pipeline which connects all the industries and discharges the wastes into a well-flushed offshore area;
- relocating the industry to a more environmentally acceptable area.

Agriculture – There are a number of ways to reduce leaching of fertilizer from agricultural land. These include:

- reducing the amount of fertilizer being used. The Department of Agriculture is testing soils in the Albany and Denmark region to determine the minimum amounts of fertilizer farmers could apply without reducing production;
- changing to a new fertilizer called 'coastal super'. This would reduce nutrient losses from sandy soils;
- planting trees on cleared agricultural land. This could be agroforestry (combining agriculture and forestry) or converting pasture to commercial forest. Trees need less fertilizer and reduce runoff to the harbours because of their large water uptake.

Domestic Sewage – If significant amounts of nutrients discharged from the sewage treatment plants are found to be entering the harbours, then a number of options could be considered. These include:

- more treatment of the wastewater to further reduce nutrient levels;
- relocating the wastewater outlet to a well-flushed offshore location;
- relocating the sewage treatment plants to a more environmentally suitable area.

The Household – There are a number of ways the householder can reduce nutrient and pesticide levels in the urban runoff. These include:

- reducing the amount of fertilizer used on gardens;
- reducing the use of pesticides in the house and garden.

16. Agriculture brings the greatest economic input to the Albany region, however, over-clearing of land and the use of fertilizers have resulted in detrimental effects to the environment.

17. An attractive environment can be economically beneficial: tourism is very important in Albany and is at present the second largest source of income for the region.

18. Industry provides employment for Albany, however, waste products from industries have had damaging effects on the environment.

Changing community attitudes

Over the years, economic returns from industry and agriculture have been important for the growth of Albany. Industrial development was encouraged in the Albany region in the 1950s to provide employment.

Suitable sites for industries required convenient waste disposal and easy access for workers. Therefore many industries were located along the shoreline of Princess Royal Harbour, close to the township.

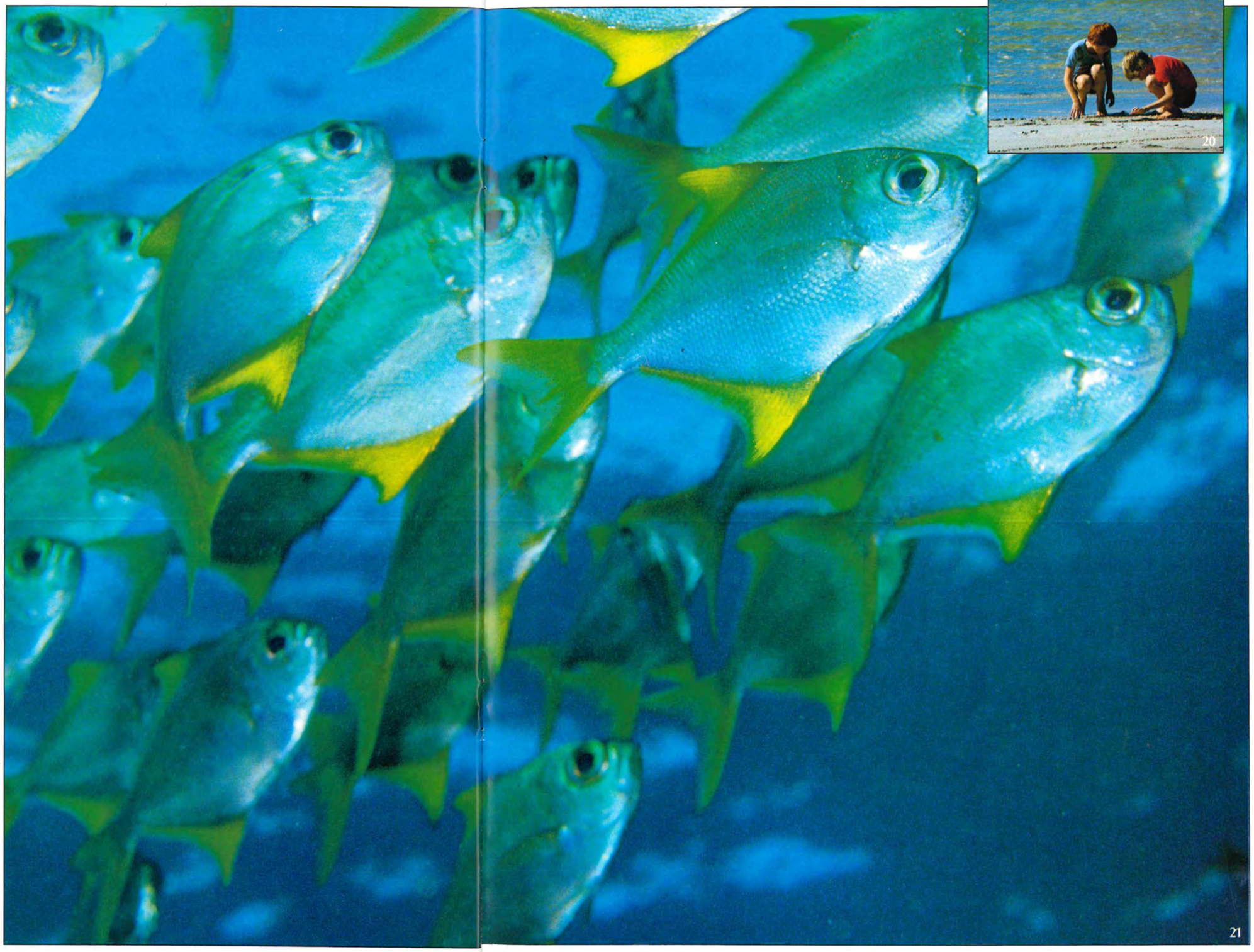
Since the turn of the century, farmers have cleared land, and fertilized pastures and crops for greater productivity. Some of this fertilizer has washed into the harbours.

Both industry and agriculture were promoted with little awareness being given to the environmental consequences. Now that people are becoming more environmentally aware, there is increasing pressure on industry and agriculture to reduce levels of pollution. However, the accumulation of nutrients and toxic wastes in the harbours has been occurring for decades, and we cannot expect the environmental problems to be solved overnight.

19. Industrial wastes can contain substances that are toxic to marine animals, such as lead and mercury. The western end of Princess Royal Harbour was closed in 1984, for the taking of marine life, because of the health risk from eating contaminated seafoods.

20. Unpolluted waters in the harbours allow our children to enjoy the beaches.

21. People are now becoming more environmentally aware and realise the importance of maintaining a pollution-free environment. Healthy harbours provide an ideal habitat for fish, such as the pomfret (Schuettea woodwardi), and many other marine animals.



The condition of other waterways

There are several waterways in the south-west of Western Australia that are currently suffering from nutrient-enrichment problems. Many others are at risk.

Extensive clearing for agriculture and fertilizer application in many catchments in the south-west of Western Australia, along with industry and other developments, have all contributed to increased levels of nutrients in the waterways. The State Government has recognised the problem, and has formed the Catchment Management Policy Group to co-ordinate research and management activities related to the land, water and vegetation of Western Australian catchments.

Information is still being gathered from nutrient-enriched waterways such as Cockburn Sound, Peel-Harvey Estuary, Leschenault Inlet, Vasse-Wonnerup Estuary, Wilson Inlet, Princess Royal Harbour and Oyster Harbour.

The Catchment Management Policy Group will use this information to help prevent the deterioration of Western Australian waterways.

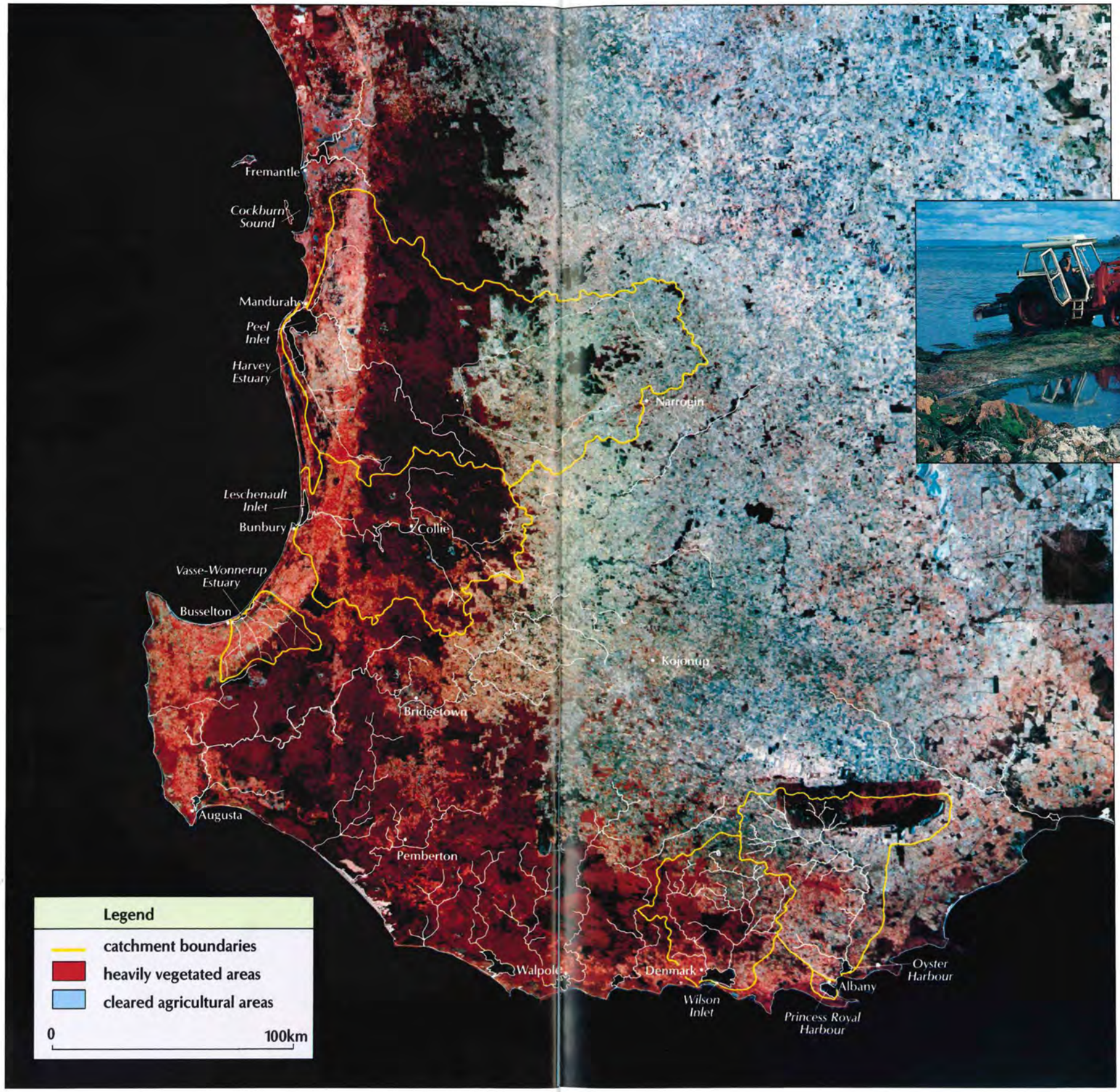
22. This drain which flows into Wilson Inlet contains high levels of nutrients leached from the surrounding horticultural area. These nutrients have caused the excessive weed growth in the drain.

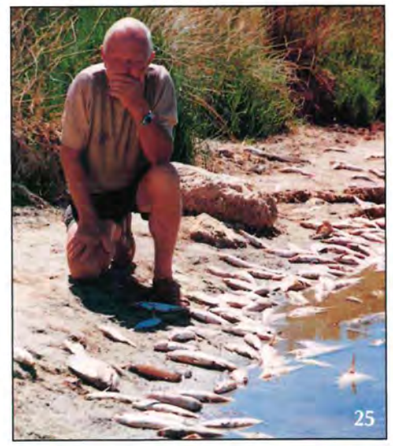
23. Massive build-up of large algae along a beach in Harvey Inlet.

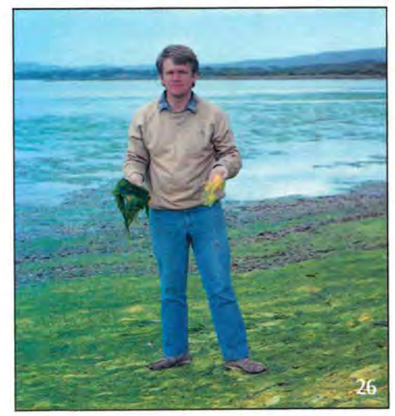
24. Rotting algae are unattractive to beach users. Maintaining weed-free beaches is expensive. Peel Inlet.

25. Poor water quality in the Vasse Estuary has caused the death of large numbers of fish.

26. Algae washed onto the beach at the western end of Princess Royal Harbour. The algae decompose to a foul-smelling ooze.







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Mercer Road, Albany

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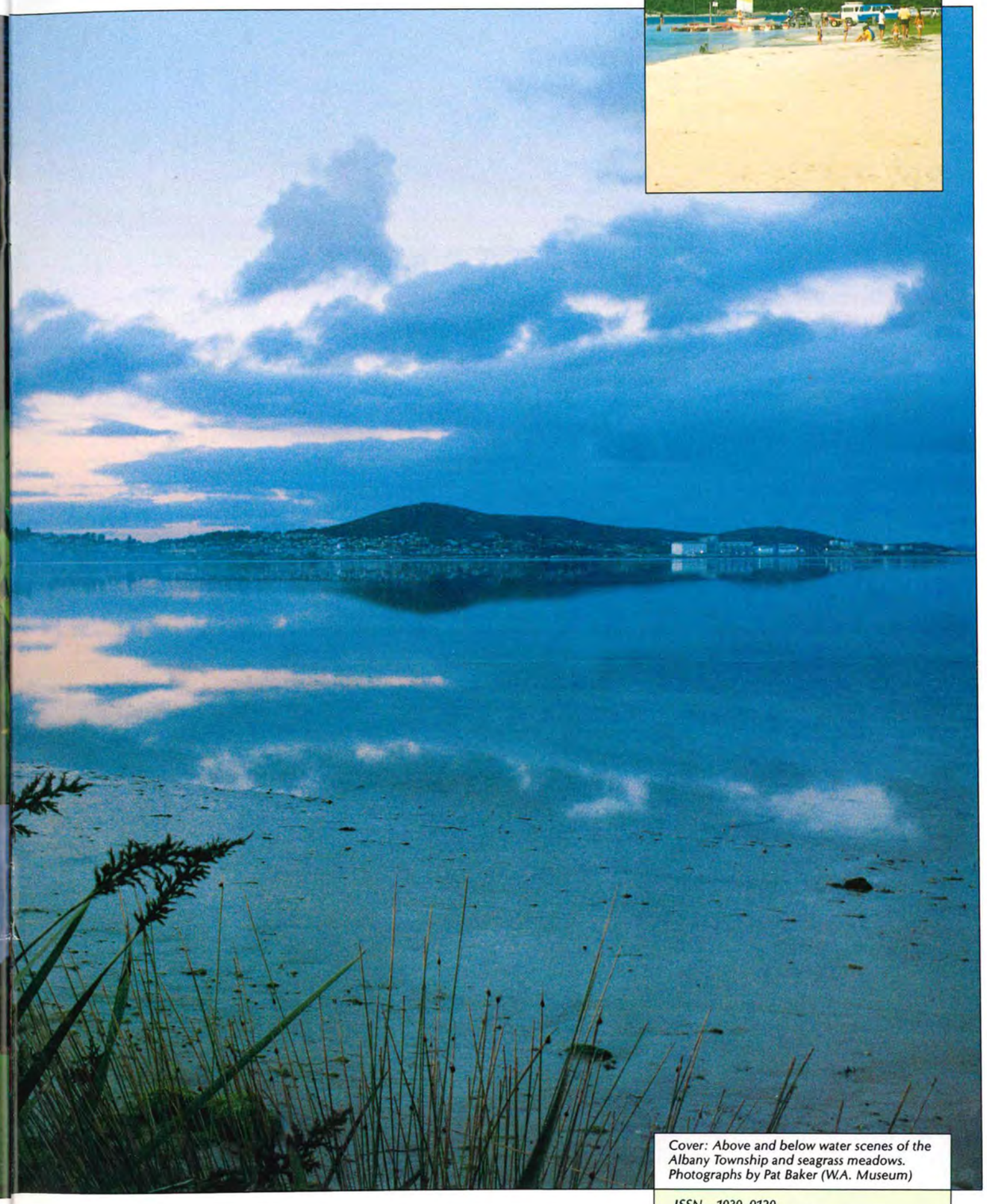
27. The Town of Albany and Shire of Albany have been working with the Environmental Protection Authority to determine the water quality of both Princess Royal Harbour and Oyster Harbour.

28. A biologist from the Centre for Water Research (CWR) assessing the amount of algal growth on artificial seagrass to determine shading effects. The CWR at the University of Western Australia are carrying out the major biological studies in the harbours on behalf of the Environmental Protection Authority.

29. The Department of Agriculture has been soil testing in the Albany and Denmark area to determine the minimum amount of fertilizer farmers could apply without reducing production.



Cover: Above and below water scenes of the Albany Township and seagrass meadows. Photographs by Pat Baker (W.A. Museum)

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