State of the Derwent
Year 2004 Report Card

The Derwent Estuary

The Derwent estuary lies at the heart of the Hobart metropolitan area and is an asset of great natural beauty and diversity. The Derwent was named in 1794 after the Celtic word 'clear water' and is an integral part of Tasmania's cultural, economic and natural heritage. The estuary is an important and productive ecosystem and supports a wide range of habitats and species.

The Derwent Estuary

Approximately 40% of Tasmania's population - 192,000 people - live around the estuary's margins. The Derwent is widely used for recreation, boating, fishing, marine transport and industry. Further upstream, the Derwent River supplies the majority of the region's drinking water supply and is a major source of hydroelectric power.

A number of environmental issues affect the Derwent estuary, in particular:

- heavy metal contamination;
- introduced marine pests;
- loss of estuarine habitat and species;
- intermittent faecal contamination of recreational waters;
- depressed oxygen levels and organically enriched sediments;
- elevated nutrient concentrations;
- environmental flows and barriers.

Although there have been significant improvements in the treatment of sewage and industrial wastes over the past decade, the Derwent still faces a number of environmental challenges. A strategic and coordinated planning approach across all levels of government, industry and the community is our best hope for a clean and healthy estuary in the future.

Management and restoration

The Derwent Estuary Program (DEP) was established in 1999 as a partnership to restore and protect the Derwent Estuary. The program has been highly successful in bringing together a wide range of stakeholders – firstly to build a common understanding, vision and management framework – and secondly to progressively implement this vision through formal partnership agreements and practical actions.

The program was initially designed to address environmental quality issues such as industrial and urban water pollution, contaminated sediments, introduced species and loss of estuarine ecosystems. More recently, foreshore issues have also been included within the program.

In December 2001, our Environmental Management Plan was finalised and endorsed by Tasmania's Premier, the Mayors of Brighton, Clarence, Derwent Valley, Glenorchy, Hobart and Kingborough Councils, and the Commonwealth. A five-year agreement was then signed to progressively implement this plan. In addition to the three levels of government, many other stakeholders participate in and support the DEP, including major industries and utilities, community groups and research institutions.

Key aspects of implementation include environmental monitoring and reporting, coordination of regional activities, and implementation of priority projects such as effluent reuse, stormwater management and wetland conservation.

Derwent Estuary Program

Environmental monitoring and reporting

A fundamental requirement for effective natural resource management is an on-going and reliable source of environmental data.

This principle formed the basis of the Derwent Estuary Monitoring Agreement, signed in August 2000 by the state government, six local councils and three commercial partners (Norske Skog Boyer, Zinifex Hobart Smelter and Hobart Water). The signatories agreed to coordinate their independent monitoring programs to provide better information on the estuary as a whole, and to report annually on environmental conditions and trends in the Derwent. In 2004, the Hobart Ports Corporation joined the DEP.

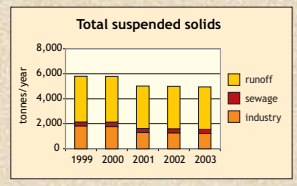
Monitoring Water Quality

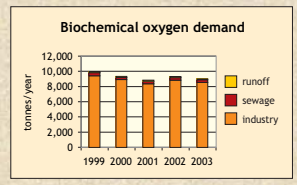
This document represents our fourth annual 'report card' to the community and summarises monitoring data and other relevant information collected during 2003/4. More detailed information can be accessed in the State of the Derwent Estuary report, available on our website at www.derwentriver.tas.gov.au.

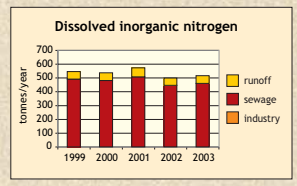
Monitoring activities carried out during 2003/4 included the following:

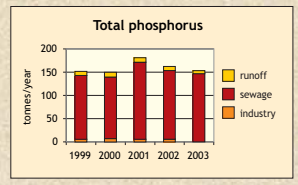
- weekly recreational water quality testing during summer months;
- monthly whole-of-estuary water quality monitoring;
- monthly monitoring of stormwater outfalls and rivulets;
- quarterly surveys of seagrass beds;
- annual surveys of mercury in flathead and heavy metals in shellfish.

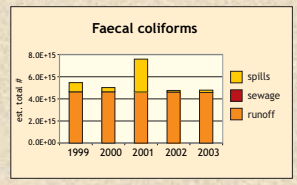
Pollution Sources, Loads and Trends

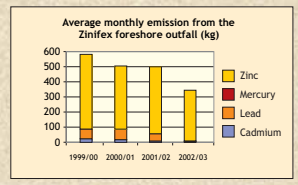












Pollution enters the Derwent Estuary from a number of sources that are commonly referred to as point sources or diffuse sources.

During 2003/4, point sources included 10 sewage treatment plants and two large industries (the Norske Skog paper mill and Zinifex Hobart zinc smelter). Diffuse sources included: urban runoff, tips and contaminated sites, catchment inputs carried by the Derwent and Jordan rivers, air pollution and wastes associated with shipping, ports and marinas. Some pollutants are also recycled from contaminated sediments within the estuary itself.

Contaminants associated with these various sources include pathogens, nutrients, organic matter, wood extractives such as resin acids, silt, litter, and a range of toxicants including heavy metals and hydrocarbons.

A review of the various sources and loads discharged to the Derwent indicates that, during 2003/4:

- Sewage treatment plants discharged the majority of nutrients;
- Stormwater accounted for the majority of faecal bacteria;
- Zinifex discharged the majority of heavy metals (primarily as groundwater emissions);
- Norske Skog discharged the majority of organic matter and resin acids.

There were some changes in pollutant loads entering the Derwent in 2003 as compared with 2002:

- A 30% reduction in metal loads discharged at the Zinifex outfall;
- A 5% decrease in organic loads measured as biochemical oxygen demand (BOD) discharged at the Norske Skog paper mill outfall;
- Mixed performance by sewage plants, with an overall increase in some contaminants (suspended solids up by 20%, dissolved nitrogen up by 5%) and a reduction in others (BOD down 10%).

Longer-term trends – from 1999 – indicate a significant decrease in heavy metal loads (>50%) and decreases in faecal bacterial loads (15%), TSS loads (10%) BOD loads (10%) and dissolved nitrogen (3%). Total phosphorus loads have increased slightly (3%).

Several significant management actions were completed or initiated in 2003/4. These include:

- Completion of several new stormwater treatment projects in Hobart, Clarence and Derwent Valley;
- Commencement of an extensive reuse scheme in Clarence using effluent from the Rosny sewage treatment plant;
- Commencement of major sewage treatment upgrades at Collinsvale.

Monitoring Stormwater Quality

The Derwent estuary receives stormwater by way of 13 major rivulets and over 270 large outlet pipes. Regional stormwater monitoring data has shown that:

- faecal bacteria in stormwater drains and rivulets frequently exceeds the recommended guidelines for recreation;
- stormwater delivers an estimated 45% of the urban sediment load to the estuary;
- oils and heavy metals accumulate in sediments near some stormwater outfalls;
- large amount of litter enters the Derwent through the stormwater system, particularly plastics and cigarette butts.

In July 2002, the Councils that border on the estuary, together with Waterwatch groups, joined the DEP's *Rivulet and Stormwater Monitoring Program*. Each participant monitors sites in rivulets and stormwater systems on the same day each month. Approximately 30 sites are being monitored in the region at both upper and lower catchment sites. Water is tested for faecal bacteria, sediments, metals, nutrients and oils. The aim of the program is to document water quality conditions in each municipality, to provide a basis for stormwater management decisions. The DEP analyses and summarises this data into an annual 'Stormwater Report Card'.

Derwent Water and Sediment Quality

Is it safe to swim in the Derwent?

Each summer, council and state government officers monitor recreational water quality weekly at about 30 beaches and bays around the Derwent (see map on flip side for specific locations). During the 2003/04 season, a single bacterial indicator was used (enterococci), in line with recently revised national guidelines.

Enterococci levels during the 2003/04 monitoring season were generally low, with occasional higher levels, particularly following heavy rainfall events. Most of the major swimming beaches south of the Tasman Bridge met the current primary contact guidelines for enterococci (33 counts/100 ml) for the season as a whole, although the eastern end of Nutgrove Beach was slightly above the guidelines (50/100 ml). The cleanest beaches in 2003/4 were at Opposum Bay, Hinsby/Taroona and Blackmans Bay.

In the middle sections of the estuary, seven sites did not meet the current guidelines for swimming: Marieville Esplanade (160/100 ml), Cornelian Bay (75/100 ml), Elwick Bay (63/100 ml), Browns River (57/100 ml), New Town Bay (39/100 ml) and Connewarre Bay (34/100 ml).

Are other indicators of water quality improving or declining?

The DEP coordinates a comprehensive whole-of-estuary monitoring program that integrates sampling carried out by DPIWE, Zinifex Hobart Smelter, Norske Skog and Hobart Water. Each month, a wide range of parameters (temperature, salinity, dissolved oxygen, suspended solids, nutrients, organic carbon, chlorophyll *a* and heavy metals) are measured at 28 sites throughout the estuary. Results are presented in regular technical reports (State of the Derwent 2003) and in this annual report card.

Water clarity in the Derwent is relatively good, compared to many other estuaries around Australia. Levels of suspended solids tend to be low, except after major flood events. Nuisance algal blooms are rare. During winter months, the estuary tends to be coloured by dark, tannin-rich river water from the upper catchment. ***Nutrients*** levels vary seasonally, with the highest values measured in winter months when nutrient-rich, sub-Antarctic waters extend north to southeastern Tasmania. Nutrient levels are generally highest at mid-estuary sites, in bays and at depth, reflecting inputs from sewage treatment plants and sediments.

Are levels of contamination in sediments increasing or decreasing?

Long-term data sets for ***heavy metals*** suggest 5 to 10-fold decreases in water column concentrations of zinc, cadmium and other metals over the past thirty years. However, zinc levels at mid-estuary sites are still above recommended trigger levels for further investigation.

CCI sediment sampling

Recent investigations of long cores collected at a number of sites around the Derwent, indicate a gradual reduction in sediment metal levels, particularly in some of the most highly contaminated mid-estuary sites. Nonetheless sediment metal concentrations remain high by national and international standards –particularly for mercury, lead, zinc and cadmium – and there are concerns that contaminated sediments could pose a risk to biota and humans in terms of both toxicity and bioaccumulation.

In June 2003, the DEP received a two-year $270,000 grant through the Commonwealth's Coastal Catchment Initiative to investigate heavy metal sources, sinks and processes, set indicators and targets, delineate major 'hot spots' and evaluate toxicity and bioaccumulation. The project includes the development of estuary models and assessment of management options to further reduce metal levels

New Recreational Water Quality Guidelines

The current national recreational water quality guidelines (NH&MRC, 1990) are being revised to reflect new international standards. A significantly different framework for recreational water quality assessment is proposed, whereby recreational waters will be assigned a risk category rather than using the current pass/fail system. Beaches will be graded on the basis of both measured water quality (using the enterococci indicator) as well as potential sources of faecal contamination identified through sanitary surveys (e.g. sewage outfalls, failing septic systems and stormwater drains). A single bacterial indicator – enterococci – is proposed as this is considered to be a more robust indicator of faecal pollution, particularly in coastal waters. Greater emphasis will also be given to bacterial levels associated with events (95% values), rather than the current use of median statistics (geomean values).

Next year's report card is likely to rate beaches very differently, using an A through D scoring system to reflect potential risk. The DEP is reviewing the current beach monitoring program and options to implement sanitary surveys at key beaches.

Derwent Habitat and Species

Are contaminant levels in seafood increasing or decreasing?

Heavy metals levels in Derwent estuary shellfish have been monitored by Zinifex Hobart Smelter for 13 years. Levels are well above the national guidelines – particularly for zinc in oysters and lead in mussels – with highest values in the area north of the Tasman Bridge, followed by Ralphs Bay and the Eastern Shore. There is considerable year-to-year variability in shellfish metal levels, and no clear long-term reductions, despite improved industrial practices in recent years.

Contaminated sediments probably play in important role in this as shellfish live near the sediment-water interface and typically filter about five litres of sediment-laden water each day. ***Shellfish should not be harvested or consumed from any part of the Derwent.***

Zinifex has monitored mercury levels in Derwent estuary flathead for the past 22 years. Flathead are a good indicator of mercury levels in fish as they live in the Derwent year-round and are bottom feeders. Over the past 5 years, mercury levels in legal-sized flathead have averaged 0.44 mg/kg with 39% of individual fish in excess of the 0.5 mg/kg recommended national food guideline. Larger flathead and flathead caught north of the Tasman Bridge and in Ralphs Bay tend to have somewhat higher levels.

Flathead G. Edgar

Is fish and wildlife habitat increasing or declining?

A recent baseline survey of Derwent estuary sub-tidal habitats showed that the vast majority (96%) of the Derwent seafloor is made up of unvegetated, soft muds. There are however, important macrophyte beds (underwater grasses) in the upper estuary, rocky reef habitats in the lower estuary, and some scattered seagrass beds in the middle and lower estuary. Large areas of intertidal flats, with associated salt marshes and wetlands also border the estuary, particularly in Ralphs Bay and above Dogshear Point.

Murphys Flat Wetland

Despite the historical loss of important habitat and poor sediment quality, the Derwent remains an important and productive ecosystem that still sustains a remarkable diversity of marine and aquatic fauna.

G. Edgar

Weedy Seadragon

Vast numbers of invertebrates and crustaceans, over 150 species of fish and over 90 species of resident and migratory birds live in and around the estuary. Many marine and aquatic mammals also live in or visit the Derwent, including a large population of platypus in the upper estuary.

What is the current status of marine pests in the Derwent?

Introduced marine pests pose a serious threat to the overall ecology and native species of the Derwent. Temperate, southern hemisphere estuaries such as the Derwent are susceptible to marine pest invasions from northern temperate areas as they provide comparable conditions for the species to thrive, but lack the controls to regulate their populations. Marine pests seem to particularly flourish in the Derwent, taking advantage of the disturbed environment.

In 2002, a baseline marine pest survey of the Derwent identified 77 introduced species. These included 8 nationally targeted pests, 35 non-target pests and 27 cryptogenic species (unclear if the species is native or introduced). A number of species are of particular concern, as they have invaded natural as well as artificial habitats and are generally abundant and widespread. These include target pests the northern Pacific seastar, Japanese seaweed, toxic dinoflagellate, and Pacific oyster; as well as non-target pests the New Zealand half crab, New Zealand seastar and New Zealand screw shell.

The rice grass eradication program was continued in 2003 by DPIWE's Marine Resources Division with outstanding success. Through careful surveys and treatment, the infested area in the Derwent has been reduced from over one hectare in 1997 to 3 small patches. These will be further monitored and treated by the DEP in future years.

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Recent Management Actions, Sampling Sites and Discharge Points

HYDRO CATCHMENT REVIEW

In 2003, Hydro Tasmania commenced the Derwent Catchment Water Management Review. This review process seeks to identify and address environmental issues and community concerns related to the way Hydro Tasmania manages its waterways and will result in a program for sustainable operation of these waterways. The process has four stages: information review, community consultation, technical studies and program development. The first two stages have now been completed for the Derwent catchment and a range of technical studies are now under way, including investigations of flow regimes, fisheries, and critical habitats and species. See http://www.hydro.com.au/home/Our+Environment/Water+Management+Reviews/ for further information.

CORNELIAN BAY STORMWATER WETLAND

Hobart City Council has designed and installed a stormwater treatment system at Cornelian Bay, which filters, cleans and stores stormwater before it reaches the bay. This system reduces pollutants such as litter, sediments, oils, nutrients and metals from washing into Cornelian Bay. Water is directed from the Cornelian Bay catchment (including sections of the Brooker Highway) into the system for treatment after light to medium rainfall. The "bio-retention system" has an innovative design where stormwater passes through a treatment train comprising:

- a gross pollutant trap collects litter, oils and coarse sediment
- a channel planted with native grasses and sedges stabilises the banks and helping to "clean" the stormwater
- a sand filter and gravel layer removes fine sediments and attached pollutants; biological processes in these filters also treat soluble pollutants
- an underground storage tanks collects and stores the treated stormwater, which is then slowly released into Cornelian Bay.

JORDAN RIVER CATCHMENT STATE OF RIVER REPORT

The Jordan River emerges from Lake Tiberias 15km south of Oatlands and flows through the driest region in Tasmania before draining into the Derwent near Bridgewater. The Jordan River is ephemeral and generally reduces to a series of pools in summer. The primary land use activities in the Jordan are grazing (predominantly sheep), dairy, cropping, forestry, with some industrial, rural and urban land uses. In 2003, DPIWE's Water Resources Division completed the Jordan River Catchment State of River Report. This report provides a compilation of data from routine monitoring and investigative studies describing the condition of water quality, hydrology, river habitat and riverine health. This information is analysed and reported in an integrated way to help identify issues for management and formulate potential actions that might alleviate problems in the future. See http://www.dpiwe.tas.gov.au/inter.nsf/WebPages/JMUY-5C76P7?open for further information

SULLIVANS COVE SEWAGE PUMP-OUT FACILITY

Ready access to a suitable pump-out facility is an important step in eliminating boat waste pollution. In 2003, Hobart Ports Corporation installed the region's first sewage pump-out facility for recreational and commercial vessels, with support from RiverWorks Tasmania. The facility is central to the 70-berth Kings Pier Marina, recreational and racing yachts using Constitution Dock and the fishing fleet housed at Victoria Dock. On-going maintenance and management of the facility will be provided by the Port. For more information about the pump out facility, environmental tips for recreational sailors and contact details go to www.hpc.com.au

SHELLFISH MONITORING IN THE MIDDLE ESTUARY

For the past 13 years heavy metals in wild (resident) oysters and mussels have been monitored at sites throughout the Derwent by Zinifex Hobart Smelter. However, due to variability associated with age, size, etc., the results have only served to confirm on an annual basis that shellfish from the Derwent Estuary remain at levels prohibitive of human consumption. To better understand how metal uptake may be changing over time, the program has been modified to an annual 6-week deployment of net bags containing uniform oysters, sourced from an oyster farm outside the Derwent. In 2005 the deployment will be complimented by an intensive study of the sources of metals to determine whether accumulation is primarily from sediments or the water column. Sampling of wild oysters and mussels will also still be conducted every three years to identify any step changes in metal contamination. The DEP and Zinifex Hobart Smelter will continue to work collaboratively to fill knowledge gaps and provide important data on the health of the estuary.

SPOTTED HANDFISH UPDATE

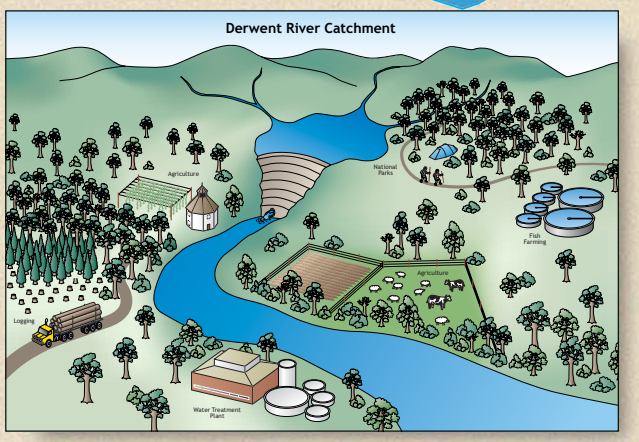
The spotted handfish is found only in the lower Derwent Estuary and adjoining areas. It was relatively abundant until about twenty years ago, but is now considered highly endangered. The known remaining handfish are clustered in three areas, with a total population of about 300-600 mature individuals. Diminished habitat and pollution appear to be the principle causes of their decline, exacerbated by a sharp increase in numbers of introduced northern Pacific seastars, which have decimated populations of stalked ascidians (sea tulips) - an important spawning substrate for handfish in the Derwent. A Spotted Handfish Recovery Plan has been drafted and some initial actions from the plan have been taken, focused on increasing reproductive success by providing suitable spawning substrate. Plastic rods inserted into the sediments by divers have been successful in some areas; more recently, transplanting of marine algae has been trialed. Initial results were encouraging, with a slight increase in handfish numbers observed. Follow-up surveys and additional algal transplants are planned during 2004/2005 with support from the NHT2.

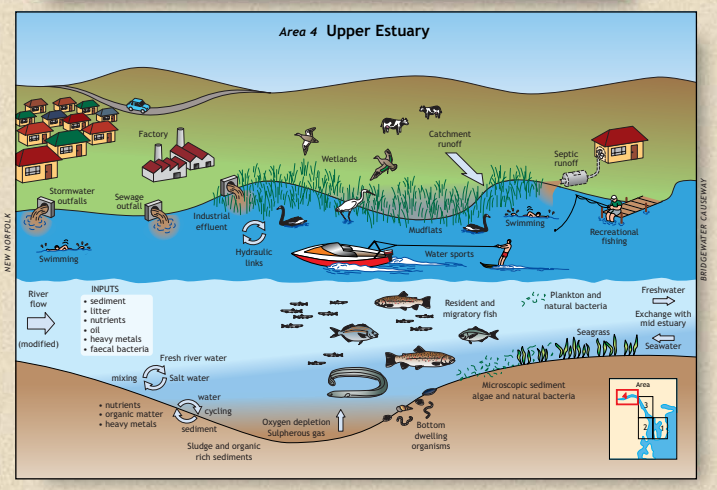
NEW TOWN RIVULET STORMWATER MANAGEMENT PLAN

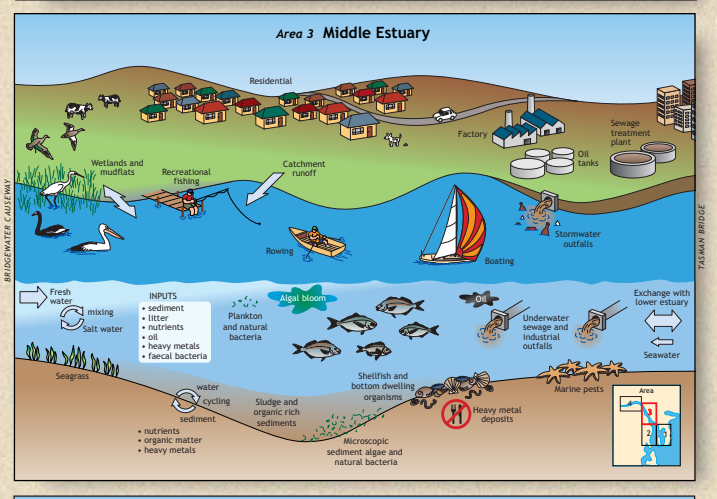
The Derwent Estuary Program has developed a model stormwater management plan, which focuses on cleaning up stormwater pollution flowing into urban creeks and the Derwent estuary. The Plan - developed in consultation with councils, community groups and the State - identifies the major stormwater pollution threats and provides practical ways to minimise this pollution. The Plan focuses on the New Town Rivulet as a demonstration catchment and can be used as a template for developing similar plans in other high priority catchments. Housing development, soil erosion, industries, sewage systems, litter and roads are identified as major sources of pollution that can enter the stormwater system and natural waterways. Recommendations include more community and industry education about stormwater, revegetation of urban creeks and the installation of devices such as litter and silt traps to clean up stormwater pollution. The Plan also encourages councils and developers to adopt water sensitive housing development in urban areas to reduce stormwater runoff and pollution. For more information see www.derwentriver.tas.gov.au/content_fs/stormwater_fs_management_plan.html

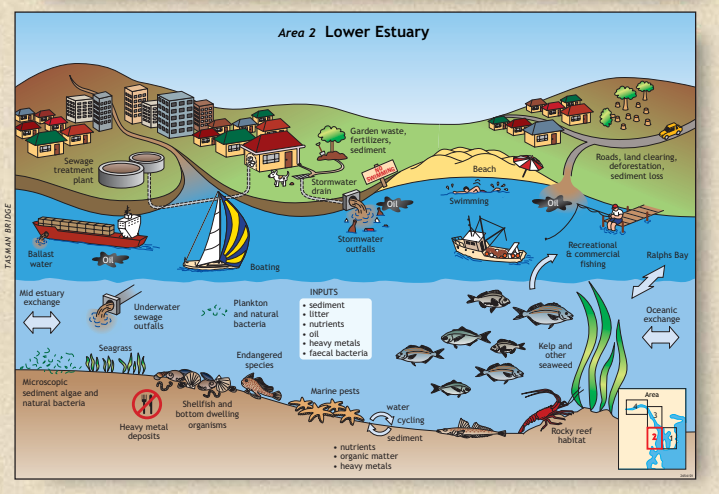
INVENTORY OF DERWENT LITTLE PENGUIN POPULATIONS

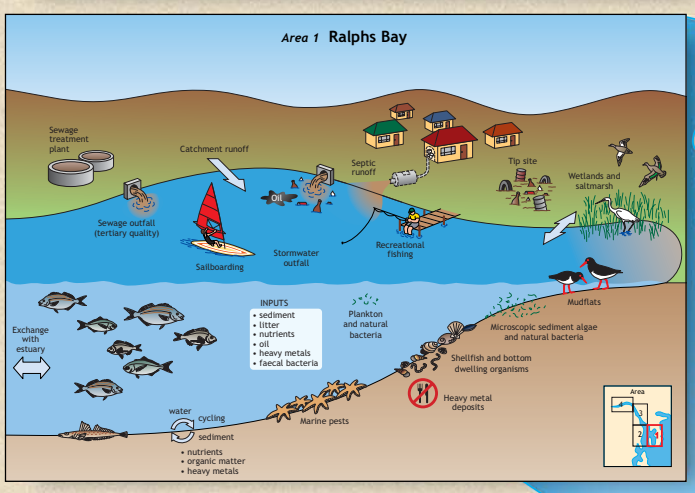
Little Penguins previously thrived in the Derwent estuary, but due to extensive coastal urbanisation their numbers are now critically low. Experience has shown that penguins respond well to a combination of appropriate management and community action. In 2004, the DEP launched the Derwent Community Penguin Project with support from Envirofund and a variety of local partners. The project will survey existing penguin populations, identify critical actions needed and provide penguin-friendly guidelines for land managers and the community.











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