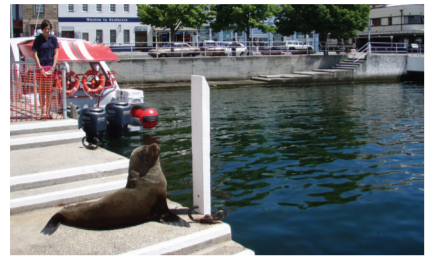


THE DERWENT ESTUARY

The Derwent estuary lies at the heart of the Hobart metropolitan area and is a waterway of great natural beauty and diversity. Named after the Celtic word 'clear water' in 1794, the Derwent 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.



Approximately 40% of Tasmania's population - 216,000 people - live around the estuary's margins. The Derwent is widely used for recreation, boating, fishing, marine transport and industry. Further upstream, the River Derwent 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;
- poor recreational water quality at some bays and beaches;
- low oxygen levels in the upper estuary during summer;
- locally elevated nutrient levels;
- low summer flows and barriers to fish migration;
- introduced marine pests and weeds;
- loss of habitats and species; and
- impacts of climate change, e.g. erosion, flooding and habitat loss

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 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 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. Key aspects of implementation include environmental monitoring and reporting, coordination of regional activities, and implementation of priority projects such as stormwater management, heavy metal remediation and conservation of key estuarine habitats and species.

The DEP is supported by the Tasmanian Government, six councils that border on the estuary (Brighton, Clarence, Derwent Valley, Glenorchy, Hobart and Kingborough Councils) and five business partners (Nyrstar Hobart, Norske Skog Boyer, Tas Water, TasPorts and Hydro Tasmania). Other project partners include the Australian Government, University of Tasmania, CSIRO, NRM South, local businesses and community groups.

In 2010, the DEP was awarded Australia's National Riverprize for excellence in river management.



ENVIRONMENTAL MONITORING AND REPORTING

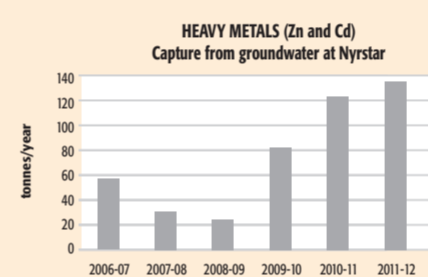
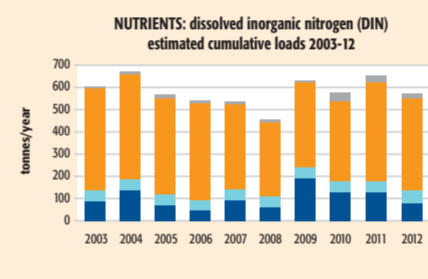
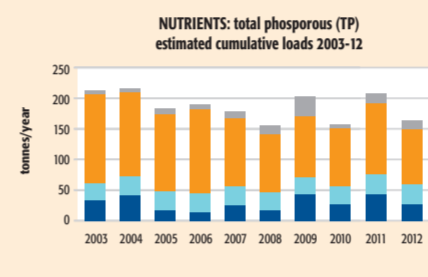
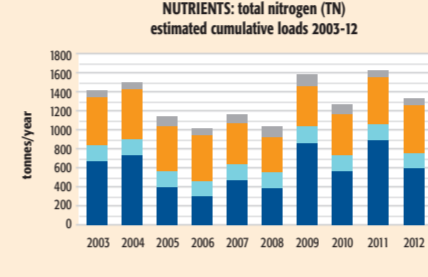
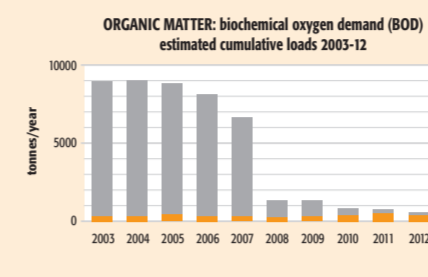
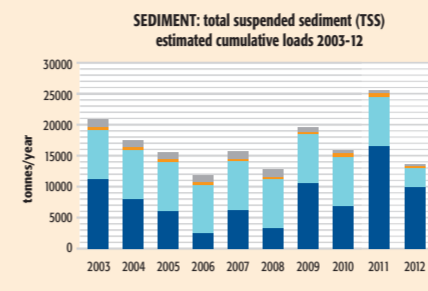
A fundamental requirement for effective natural resource management is an on-going and reliable source of environmental data. This principle forms the basis of the DEP's cooperative monitoring program between the state government, councils, industries and research institutes. Formerly independent monitoring programs are now coordinated so as to provide better information on the estuary as a whole, and to report annually on environmental conditions and trends in the Derwent.



This 'Report Card' summarises monitoring data collected by the DEP and our partners, as well as other relevant information collected during 2012 and the start of 2013, including:

- weekly recreational water quality testing during summer months;
- monthly whole-of-estuary water quality monitoring;
- surveys of heavy metal levels in fish and shellfish;
- biological surveys (little penguins, spotted handfish); and
- weed surveys and control actions (rice grass, karamu).

More detailed information is published in five-yearly State of the Derwent Estuary reports, available on our website: [www.derwentestuary.org.au](http://www.derwentestuary.org.au)



Pollution enters the Derwent estuary from many sources, commonly referred to as 'point sources' and 'diffuse sources'. Point sources include sewage treatment plants and large industries, such as the Norske Skog paper mill at Boyer and Nyrstar Hobart zinc smelter at Lutana.

Diffuse sources include stormwater runoff from urban areas and the larger catchment inputs carried by the Derwent and Jordan rivers. Other diffuse pollutant sources include landfills and contaminated sites, air pollution, aquaculture operations, and wastes associated with shipping, ports and marinas. Sediments within the estuary itself may also release pollutants into the overlying waters under certain conditions.

Contaminants released or transported into the Derwent from these various sources include pathogens, nutrients, organic matter, silt, litter and a range of toxicants including heavy metals, resin acids and hydrocarbons.

Sewage treatment plants are the largest point sources of bioavailable nutrients to the estuary. In 2012, discharges of treated sewage effluent decreased by about 19%, and associated nutrients, TSS and BOD also declined by an estimated 4% to 16%. Effluent reuse to support agriculture and other beneficial uses increased slightly in 2012 to 11% of the total effluent produced in the metropolitan area.

D'ENTRECASTEAUX CHANNEL PARTNERSHIP

The D'Entrecasteaux Channel and Huon Estuary are areas of great beauty and biodiversity, and an important centre for population growth, marine farming and recreational boating and fishing. The Channel also has a strong influence on the Derwent estuary, as there is a net flow of seawater from the Channel into the Derwent. In 2012, the D'Entrecasteaux Channel Project was launched as an initiative of Kingborough and Huon Valley Councils, Southern Water, Tassal and Huon Aquaculture, NRM South and the DEP. The DEP's role in the project is to provide technical and financial support, including a \$50,000 grant awarded through the International River Foundation's Twinning Program.

The main objectives of the project are to:

- Promote the values of the Channel and lower Huon Estuary
- Bring together existing science to better understand the waterways
- Improve the availability of information on the waterways to all stakeholders
- Initiate a collaborative approach to managing the Channel and lower Huon Estuary that addresses the full range of uses and issues

The Project was formally launched in December 2012, followed by publication of the *State of the D'Entrecasteaux and lower Huon Estuary 2012*. This report provides a comprehensive review of environmental data for the period from 1999 to 2012, and is a valuable resource for managers, scientists and the community. For more information about the project, including reports, see [www.kingborough.tas.gov.au/page.aspx?u=660](http://www.kingborough.tas.gov.au/page.aspx?u=660)

DERWENT WATER AND SEDIMENT QUALITY

CLIMATE IN 2012

Hobart rainfall in 2012 was 15% lower than average, resulting in lower river and stormwater flows, and consequently, lower levels of faecal bacteria, sediments, nutrients and litter.

SWIMMING IN THE DERWENT

Each summer, recreational water quality is monitored at about 35 beaches and bays around the estuary through a collaborative State and Local Government program. Sampling is conducted weekly from December through March, at the locations shown on the map overleaf. To describe the risk level to swimmers a colour coded system is used based on 5 years of monitoring data: green indicates good, yellow indicates fair and red indicates poor water quality.

Eight of the Derwent's 18 swimming sites are classified as having good water quality, seven are fair and three are poor. The highest rated sites are at Opossum Bay, Hinsby, New Norfolk, Kingston beach (middle), Tarooma and Little Howrah beach. Windermere beach, the western end of Nutgrove beach and middle of Howrah beach received poor water quality ratings.

Of the 19 bays, coves and other sites monitored, six have good water quality, four are fair and nine are poor (in particular at Hobart Rivulet, Marieville Esplanade, Lindisfarne Bay, Browns River and Geilston Bay).

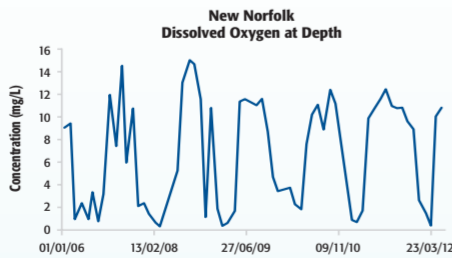
Several investigations commenced in 2012/13 to identify pollution sources at beaches with poor water quality, with a focus on stormwater run-off and sewerage infrastructure, and further work is planned in 2013/14.

**Most urban areas experience poor water quality after heavy rain. Swimming is not recommended in the Derwent for several days after heavy rain and never in the vicinity of stormwater drains or urban rivulets.**

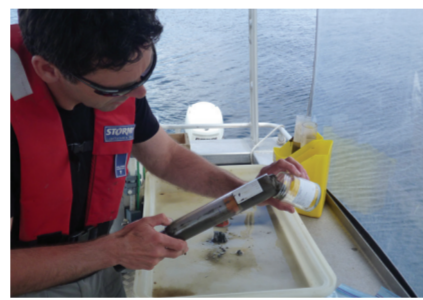
WATER QUALITY INDICATORS

The DEP coordinates a whole-of-estuary monitoring program that integrates sampling carried out by the DEP and EPA Division, Nyrstar Hobart, Norske Skog and TasWater. Water quality is monitored each month at 27 sites for indicators such as temperature, salinity, dissolved oxygen, suspended solids, nutrients, organic carbon, chlorophyll a and zinc. This information is used to document conditions and trends over time and to provide data for estuarine modelling and process studies.

Dissolved oxygen levels in the Derwent are generally high except periodically in the area between Bridgewater and New Norfolk. During summer months when water temperatures are high and river flows are low, the deeper channels in this area tend to be oxygen poor, with adverse impacts on bottom-dwelling organisms. Low oxygen levels can also result in the release of nutrients and heavy metals from underlying sediments.



Although nutrient enrichment and nuisance algal blooms have not been a significant issue in the Derwent to date, there are some indications of increasing bioavailable nutrients in the upper estuary. This may be related to changes in river flows and catchment land use, as well as point and diffuse nutrient sources. Continued monitoring of water quality, wetlands and seagrass/macrophyte beds are recommended to better understand and prevent adverse impacts.



CONTAMINATED SEDIMENTS

Levels of heavy metals in Derwent estuary sediments are among the highest in Australia. Derwent sediments tend to be fine-grained and organic-rich and significantly exceed national sediment quality guidelines for zinc, copper, mercury, lead, cadmium and arsenic. The DEP's ten-yearly sediment survey was carried out in 2011 - see text box below for key findings.

DERWENT ESTUARY SEDIMENT QUALITY SURVEY

In 2011 the DEP completed a survey of Derwent estuary sediments to assess any changes, as compared to a similar survey carried out in 2000. Samples were collected at 123 sites between New Norfolk and the Iron Pot Light and surface sediments were analysed for levels of heavy metals and organic matter. The results suggest that while levels remain high, there has been a decrease in some of the extreme levels of zinc, lead, cadmium and mercury at mid estuary sites. For example, the maximum recorded level of zinc in the 2000 survey was 59,000 mg/kg as compared to 14,600 mg/kg in 2011. There have also been some slight shifts in the areas of contamination, with lower levels found in the upper estuary and Ralphs Bay areas, and somewhat higher levels in Elwick Bay. It is important to note that reductions in sediment metal levels probably reflect a combination of improved site practices (e.g. covering or reprocessing of stockpiles at Nyrstar) together with the on-going natural burial of contaminated sediments with relatively cleaner sediments. Sediment cores collected at sites around the Derwent have shown that the highest metal levels are now typically found at a depth of 20 or more centimetres. This is an important consideration in managing any proposed projects in the Derwent that involve dredging or other sediment disturbance.

DERWENT HABITAT AND SPECIES

HEAVY METALS IN SEAFOOD

Oysters and mussels from the Derwent contain high levels of heavy metals, particularly zinc, lead and cadmium. While levels appear to have declined since 2003 in some areas (i.e. above the Tasman Bridge), they are still far in excess of national food standards.

Mercury levels exceed national food standards in several species of Derwent-caught fish - particularly black bream - and to a lesser degree flathead and trout. Limited sampling suggests that levels are lower in other recreationally-targeted fish (e.g. whiting, Australian salmon, mullet, cod and flounder).

Median mercury levels in Derwent-caught flathead decreased slightly in 2012; however there is considerable variability from year to year. A recent PhD study at the University of Tasmania suggests that much of this variability is related to fish length, age and regional growth rates, and that changes to the monitoring design may be warranted.

There has been no change in current health advice, which is outlined in the DEP's information pamphlet *Should I Eat Shellfish and Fish from the Derwent?* Key advice from the Director of Public Health is as follows:

- Don't eat shellfish collected from the Derwent (including Ralphs Bay)
- Don't eat any bream from the Derwent and Browns River
- Limit consumption of other Derwent-caught fish to no more than 2 meals/week, or 1 meal/week for pregnant and breastfeeding women, women planning to become pregnant and young children



ESTUARINE HABITAT & SPECIES

Surveys of estuarine habitats indicate that unvegetated, soft-bottom habitats are by far the most abundant habitats in the estuary (86%), followed by seagrass and macrophytes (7%; primarily in the upper estuary), tidal sandflats (6%; primarily in Ralphs Bay) and rocky reefs (1%; primarily in the lower estuary).



Surveys of several Derwent estuary spotted handfish colonies continued in 2012, with varied results. In particular, the number of handfish at the Battery Point site appeared to be stable or increasing, while numbers at Sandy Bay may have declined. Numbers of juvenile fish at all sites are critically low and over 2000 artificial spawning substrates have been planted out at key sites to improve breeding success.



Monitoring of Derwent little penguin colonies suggests an improvement in the number of breeding pairs with at least 111 pairs recorded, an improvement on 2010, and particularly 2011, when 25 birds were killed in a single dog attack. Councils, community groups and DEP staff have continued to enhance key sites through revegetation, fencing and signage, as well as installation of artificial burrows.

Industries have historically been the largest point sources of organic matter and heavy metals to the estuary; however inputs of these pollutants have declined significantly in recent years. Since 2007, organic loads from the Norske Skog paper mill at Boyer and Nyrstar Hobart zinc smelter at Lutana. Projects to collect and treat contaminated groundwater captured 105 tonnes of zinc and other heavy metals in 2012, and all stormwater discharges from the site were successfully intercepted and treated.

Urban stormwater contributes the majority of faecal bacteria to the estuary, derived from animal droppings, aging infrastructure, sewage overflows, and cross connections between the sewage and stormwater systems. Stormwater is also the main source of litter.

Catchment and Channel: Recent studies suggest that diffuse inputs of nutrients from both the River Derwent catchment and the D'Entrecasteaux Channel play a key role in the health of the estuary. The amount of water released from the catchment is also an important factor for both water quality and ecosystem health. To better understand current conditions and trends, a detailed review of D'Entrecasteaux Channel water quality data was carried out in 2012 (see below).

MARINE PESTS AND WEEDS

The Derwent estuary is extensively colonised by introduced marine species. At least 79 introduced species have been recorded, including 4 that have National Control Plans: northern Pacific seastar, European green crab, Japanese seaweed, and European dam. A number of other species (e.g. New Zealand half crab, New Zealand seastar, and New Zealand screw shell) also pose a significant threat to the ecology of the estuary.

Rice grass - an invasive intertidal weed - has been successfully managed in the Derwent through annual surveys and control actions, and the area of infestation had been reduced from two hectares in 1995 to zero in 2009 and 2010. However the 2011 and 2012 surveys found several small patches in the middle estuary region. These have been treated, and will continue to be monitored.

During 2012, the DEP also continued to survey and treat a major infestation of karamu - a recently introduced woody weed from New Zealand. Karamu is a serious threat to the upper Derwent wetlands, and had spread 5 km down-river from New Norfolk. A containment line has now been established near Boyer and over 2000 karamu plants were treated in Nov/Dec, pushing the containment line further upstream.

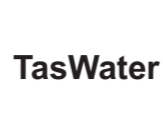
CLIMATE CHANGE

Regional risks associated with climate change include inundation of low-lying coastal communities and infrastructure, as well as the loss of critical estuarine ecosystems. Areas of particular vulnerability in the Derwent area include coastal roads, sewerage and stormwater systems, and low-lying rubbish tips and landfills. Estuarine habitats are also at risk from sea level rise, particularly tidal wetlands, saltmarshes and tidal flats, along with the birds, fish and other fauna that depend on these habitats.



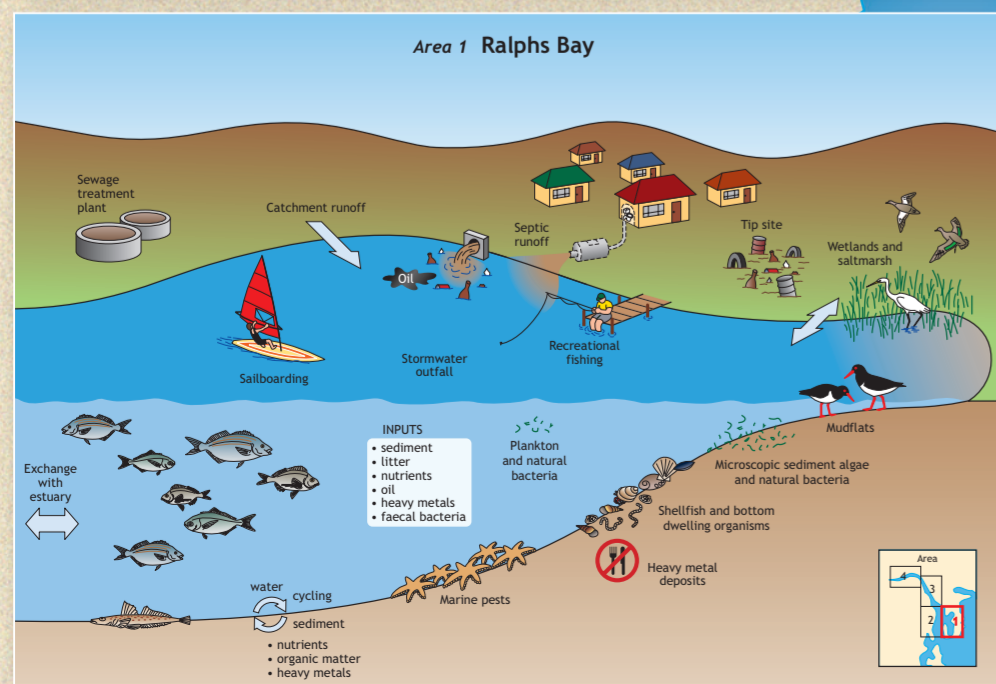
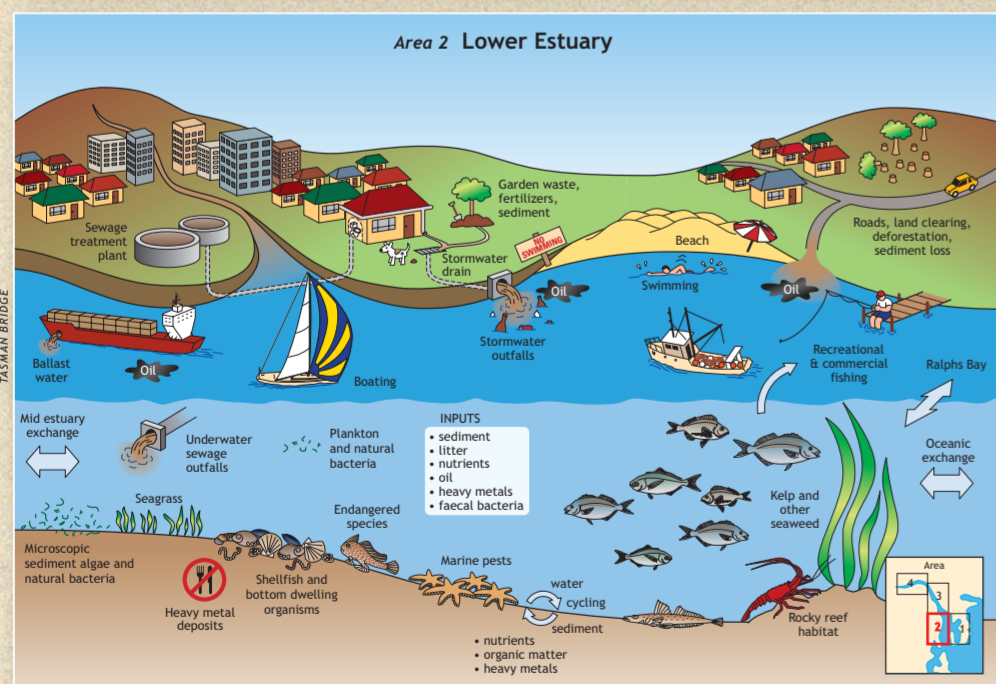
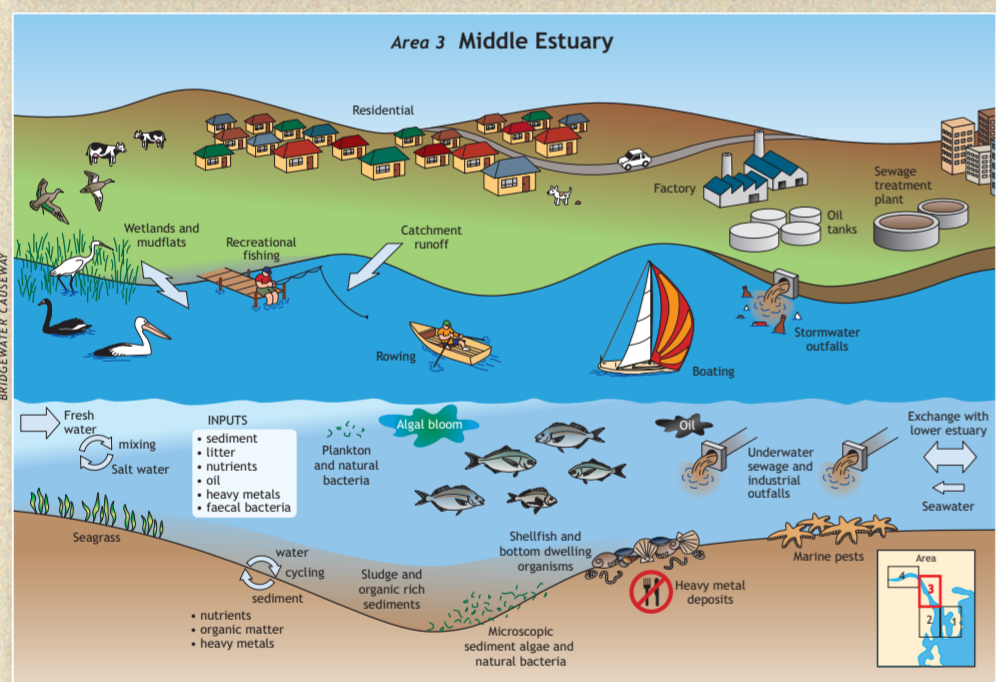
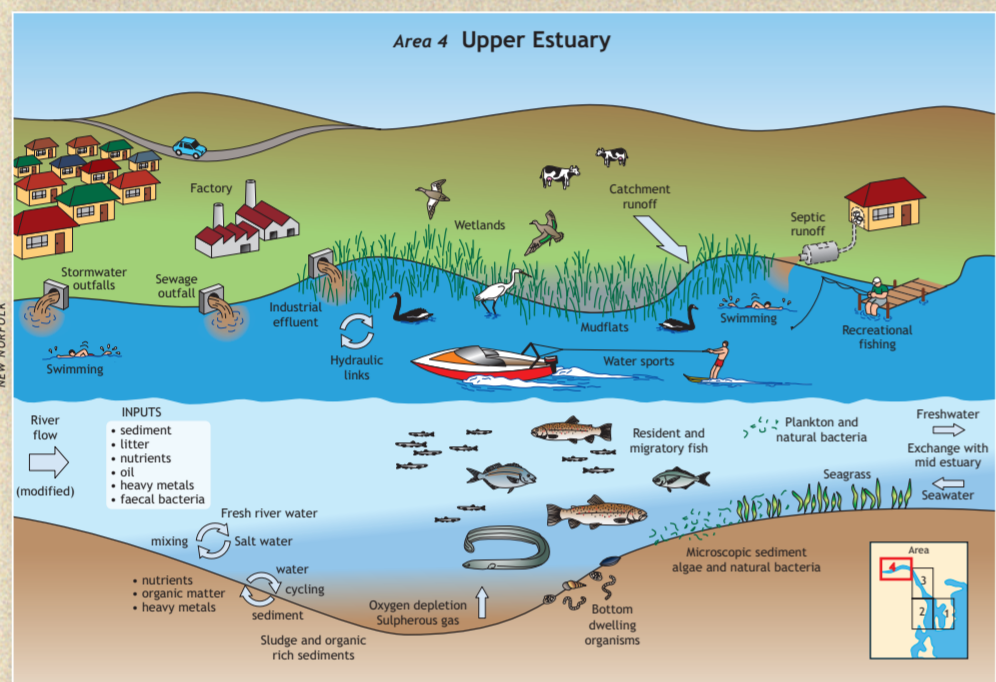
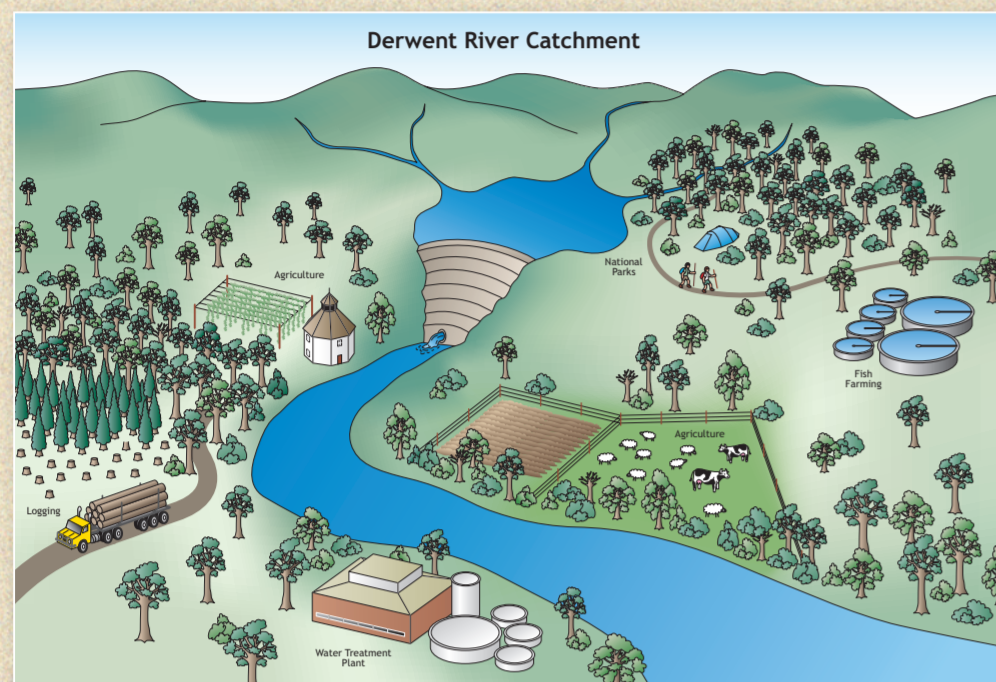
# RECENT MANAGEMENT ACTIONS, SAMPLING SITES AND DISCHARGE POINTS

Program partners:



## GREATER HOBART TRAILS WEBSITE

Keen for a walk, bike or horse ride around Hobart? Not sure where to go, or would like to try something new? The new Greater Hobart Trails website, which is smart phone and ipad friendly, lists 79 trails in the Hobart region to help you do just that. The website, containing content generously provided by Hobart, Kingborough, Clarence, Derwent Valley, Glenorchy and Clarence City Councils, can be used in a number of ways. There is an interactive map if you're interested in finding a walk in your local area, or if you have limited time, you can choose a walk based on its duration. Search options also cater for people looking for walks with dogs, prams, wheelchairs, or trails for bicycles, mountain bikes or horses. Another key feature is weather information, as each track has a real-time link to the closest weather station - provided by the Bureau of Meteorology. [www.greaterhobarttrails.com.au](http://www.greaterhobarttrails.com.au)



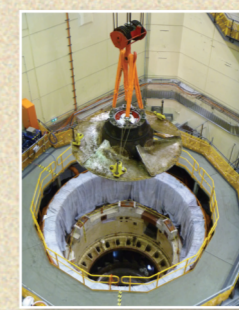
## STORMWATER POLLUTION REMOVAL AT WINDERMERE BAY

In 2012/13 a new stormwater treatment system was built at the Windermere Bay foreshore reserve based on water sensitive urban design principles. The system was designed to remove litter, sediments, heavy metals, oils and nutrients from a 10 hectare catchment that includes the nearby Claremont shopping centre, while also improving the amenity of the foreshore park. Features of the system include a gross pollutant trap, permeable rock walls and wetland areas populated with native plants. The stormwater is filtered through this 'treatment train' where plants and microscopic animals in the soil provide additional treatment before it is released to the Derwent. This project was funded through the Australian Government's Caring for Our Country program with additional support by the Glenorchy City Council. Consultants Syrnix designed and constructed the stormwater treatment system, and volunteers from the Understorey Network grew 6000 native plants for the site.



## NEW COMMUNITY SURVEY RESULTS

A telephone survey of 200 residents across the greater Hobart area revealed that the Derwent estuary and its health are very important to the majority of people living here (83% of respondents) with many reporting that they thought that the health of the estuary had improved in the last five years (48%). People use the estuary regularly for swimming (31%), boating/rowing/sailing (31%) and fishing (29%). Walking beside the estuary was by far the most popular activity (69%). Compared with a similar survey in 2007 there was a large increase in the physical activity associated with the estuary. What were the major environmental concerns for the Derwent estuary? The survey results indicated that people in greater Hobart are most concerned about industry, litter, sewage and stormwater pollution. These findings will inform the DEP's communication efforts. See the executive summary on the DEP website for details.



## OIL SPILL PREVENTION AT HYDRO DAMS

Hydro Tasmania is progressively implementing oil management plans at power stations across the state to minimise the risk of oil loss from their infrastructure, and any impacts as a result of a spill. Planning and site preparation are now underway at Meadowbank Power Station (on the Derwent River above New Norfolk), where the design and operation of the 40 year old Kaplan turbine would make trapping spilled oil difficult. The turbine is undergoing a major refurbishment and will be upgraded to an innovative oil-less design which will significantly reduce the risk of an oil spill. Other oil management improvements include; improved bunding around transformers; an upgrade of site specific equipment to support oil spill response; and replacing aged or inadequate oil pipe supports, valves or fittings to reduce failure risk. Site specific oil spill response plans are now in place for all Hydro Tasmania's power stations.



## NEW SEAFOOD SAFETY SIGNS FOR THE DERWENT

New signs installed around the Derwent reiterate health advice about eating fish and shellfish from the Derwent estuary. The signs at 32 locations from New Norfolk to South Arm and Tinderbox remind members of the public not to eat beam or shellfish from the Derwent, and to limit consumption of other Derwent caught fish. See the seafood safety section (overleaf) for further details about current public health advice on Derwent caught fish and shellfish.



## DUCKHOLE DAM BOOSTS RECYCLED WATER SUPPLIES

The South East Tasmania Recycled Water Scheme - currently operated by TasWater - was designed to reduce the discharge of treated sewage effluent into the Derwent. The scheme is supplied mainly from the Rosny and Rokeby sewage treatment plants and currently supplies 27 customers including golf courses, broad-acre cropping and vineyards. Demand for the water now exceeds supply, so in 2012/13 the 1000 megalitre Duckhole Dam was constructed near Richmond to act as a winter storage. The new dam will complement the existing 650ML of on-farm storage and assist in improving the reliability of supply to customers during peak irrigation periods. The dam will also reduce the impacts of salt water infiltration in the Rosny Sewage Treatment Plant catchment, providing a higher quality recycled water supply.



**WATER QUALITY MONITORING SITES IN 2012**

- ▲ Beach monitoring site (enterococci)
- ▲ Good water quality
- ▲ Intermediate water quality
- ▲ Poor water quality
- Ambient monitoring site (temperature, salinity, pH, dissolved oxygen, nutrients, chlorophyll a, metals)

**SEWAGE TREATMENT PLANT DISCHARGES IN 2012**

- ★ < 2500 kL/d
- ★ 2500 - 5000 kL/d
- ★ > 5000 kL/d

**INDUSTRIAL DISCHARGES IN 2012**

- > 50 000 kL/d