



Securing water quality
for a healthy future

YARRA RIVER ACTION PLAN



Our Water
Our Future



HISTORY OF THE YARRA – KEY MILESTONES



Above: An 1864 lithograph of Queen's Wharf looking up Market Street to Collins Street, etched and drawn by Francois Cogne. By permission of the National Library of Australia (Source: Kirstin Otto's *Yarra – a diverting history of Melbourne's murky river*, Text Publishing)

- 1835** John Wedge, Batman's private surveyor, names the Yarra after hearing it referred to as "Yarrow, Yarrow" by the local indigenous community.
- 1840s** Dights Falls are built to harness the power of water to drive a flour mill.
- 1850s** Melbourne is growing rapidly as goldseekers flood into Victoria. There is no running water and no drainage or sewerage infrastructure, and residents rely on the lower Yarra for both their drinking water supply and waste disposal. Typhoid and cholera are a public health concern.
- 1857** Melbourne gets its first piped drinking supply – from Yan Yean Reservoir in the Yarra catchment.
- 1890** More than 100,000 hectares of land around the source of the Yarra, high up in the Yarra Ranges, are permanently locked up to secure pristine water for the growing city of Melbourne.
- 1897** The Western Treatment Plant at Werribee starts treating sewage from Melbourne homes, bringing considerable improvements to water quality in the Yarra and public health.

- 1920** Melbourne Metropolitan Board of Works assumes drainage and waterways responsibilities, including the section of the Yarra downstream of Warrandyte.
- 1950s** Major post-war urban growth puts pressure on sewerage and drainage infrastructure.
- 1970s** Introduction of the Environment Protection Act leads to the diversion of industrial waste away from the river and large-scale sewerage of Melbourne's outer suburbs and rural areas. The first long-term water quality monitoring sites established on the Yarra and other waterways.
- 1980s** Construction of the major trail network on the Yarra and other waterways.



1990s Local councils, the development industry, Melbourne Water and EPA Victoria unite to tackle stormwater pollution. Native fish and platypus start to return to the river as a result of improvement projects and major advances in waterway management. Major efforts made to reduce sewer spills into rivers and creeks and expand monitoring of river health.

1993 Dights Falls fish ladder is constructed, opening up the waterway to several species of native migratory fish that had been excluded from the upper Yarra since the falls were built in the 1840s.



1999 The former Government endorsed an aspirational target for the lower Yarra (excluding the Port area) to be suitable for swimming. Melbourne leads the way in stormwater management when best practice guidelines and new environmental performance objectives are published to minimise the impact of urbanisation on the water cycle, and to reduce stormwater pollution.

2000 -2004 All municipalities in the Yarra catchment complete stormwater management plans and receive over \$3.6 million in grants to implement actions.

1999 -2005 Victorian Government invests over \$140 million during this period to improve the health of the Yarra over the long-term.



2005 Victorian Government steps up the water quality monitoring program and establishes Yarra Watch, announces a \$4.3 million litter education and collection program, \$3.8 million for community education and involvement in river health initiatives over three years, and the \$300 million Northern Sewerage Project to virtually eliminate sewer spills in key Yarra tributaries.

The Government's *Our Water Our Future* action plan placed a moratorium on new diversions from the Yarra until a study to determine the environmental needs of the river is completed and the Environmental Water Reserve is put in place.

TODAY The Yarra catchment is home to around two million people. Water quality in the Yarra is much better today than it was in the 1970s, although it has remained relatively stable over the last ten years. The forested upper reaches of the Yarra catchment are the source of 70% of Melbourne's drinking water – widely regarded as among the best in the world.



MESSAGE FROM THE DEPUTY PREMIER AND MINISTER FOR WATER

The Victorian Government's *Our Water Our Future* action plan, launched in 2004, recognises that healthy rivers are essential for a healthy community and economy.

The Yarra River is an icon of Melbourne. It is the major natural feature of Melbourne's landscape, and has shaped the city's development.

As a community, we have learned to value the Yarra, and our environmental expectations for it continue to increase.

Water quality in the Yarra is much better today than it was in the 1970s, and it has remained relatively stable over the last ten years despite increased pressure from continued urbanisation and population growth. The Yarra compares favourably with many metropolitan rivers overseas. Like all urban rivers, the Yarra is a reflection of the behaviour and activities of people and businesses living and working around it.

More needs to be done to manage the increasing stress being placed on the Yarra by our growing population, urban development, and intensification of agriculture. But there are no quick fixes or easy solutions; we all need to make a long-term commitment to improve the health of the Yarra.

This action plan outlines the state of water quality in the Yarra, and the main impacts on it.

The plan also features a package of significant projects totalling around \$600 million that build on the vast amount of work carried out by the community, organisations and individuals over many years.

In *Our Water Our Future* we assigned Melbourne Water as the caretaker of river health in the Port Phillip and Westernport region. Therefore, Melbourne Water will play a lead role in the implementation of this action plan. This role will be assisted and strengthened by the establishment of an independently chaired Yarra Coordinating Committee. This will greatly help to protect and improve the public and environmental health of the Yarra River, and to ensure that future generations can enjoy the river.

John Thwaites
Minister for Water



John Thwaites, Minister for Water

OUR YARRA



The Yarra River has played a key role in the way Melbourne has developed and grown. It supports industry and tourism, and is highly valued by the people who live and work here.

Our attitudes and expectations for this natural icon have changed significantly over the years. The river is no longer the dumping ground for industrial and domestic waste it once was and water quality is vastly better than in the days of 'Marvellous Smellbourne'.

Water quality in the Yarra improved significantly in the 1970s and 1980s, mainly because of massive investment in infrastructure projects, such as diversion of industrial waste away from stormwater drains and into the sewerage system and large scale sewerage of Melbourne's suburbs.

More recently, water quality initiatives have included additional sewerage system upgrades, better management of stormwater pollution and partnerships between farmers, community groups and water authorities in a range of Yarra River improvement programs. These initiatives helped maintain water quality in the Yarra over the last ten years, a significant achievement in the face of continued urbanisation, population growth and intensification of agriculture.

The Yarra compares favourably with many metropolitan rivers overseas*. However, population growth, urban development and agriculture continue to have a direct impact on water quality so we need to build on our good work to improve water quality further.

* Source: 2004 State of United National Environment Programme's Global Environmental Monitoring System/Water Global Network and data for the Yarra River at Princes Bridge.



Above: Hoddles Creek is a tributary of the Yarra River in the upper reaches of the catchment. It has good water quality and supports a variety of significant flora and fauna species.

The major focus of our energy over the next 10 years will be on managing environmental flows, sewerage and stormwater, litter reduction, involving the community in improvement projects, research, investigation and planning to ensure key areas of pollution are targeted, establishing improved governance arrangements for the management of the Yarra and ensuring the community has access to better information about the Yarra. The Government will invest around \$600 million to secure a healthier Yarra River for everyone to enjoy.

This Yarra River Action Plan supports the Government's *Our Water Our Future* plan and outlines projects that will meet the challenge of managing water quality in the Yarra River over the long-term.

It also outlines how the Government will protect and improve the health and amenity of the Yarra, and how the community can get involved in this process.

PRIORITY PROJECTS

TACKLING SOURCES OF POLLUTION

Reducing stormwater pollution

- > \$20 million to tackle stormwater pollution by implementing local government stormwater management programs. Projects will include the installation of wetlands, rain gardens, and other water sensitive urban design features, which are used to improve stormwater quality by controlling flows and filtering stormwater to remove pollutants such as solids, nutrients and litter before it enters rivers, creeks and the bays. \$10 million of this package is specifically allocated to the lower Yarra where significant stormwater quality issues have been identified.

Improving sewage management

- > Around \$300 million over six years for the Northern Sewerage Project to minimise local pollution in key Yarra tributaries, the Merri Creek and Moonee Ponds Creek, by constructing new sewers to cater for future growth and improving the capacity of some existing sewers.

- > Around \$250 million over the next 20 years to accelerate the replacement of around 18,500 septic tanks with a reticulated sewerage system.
- > A major program of eliminating key sources of faecal pollution, such as illegal connections of sewers to drains, once they have been identified (see page 24 *Monitoring and communicating the health of the river*).
- > Work with local government and retail water companies to improve the management of septic tanks to minimise their impact on the Yarra.

Meeting the litter challenge

- > \$4.3 million to reduce litter before and after the Commonwealth Games, including public education and awareness campaigns, placement of new recycling bins at key locations such as sporting grounds, and litter traps on the Yarra.

Planning for improved water quality

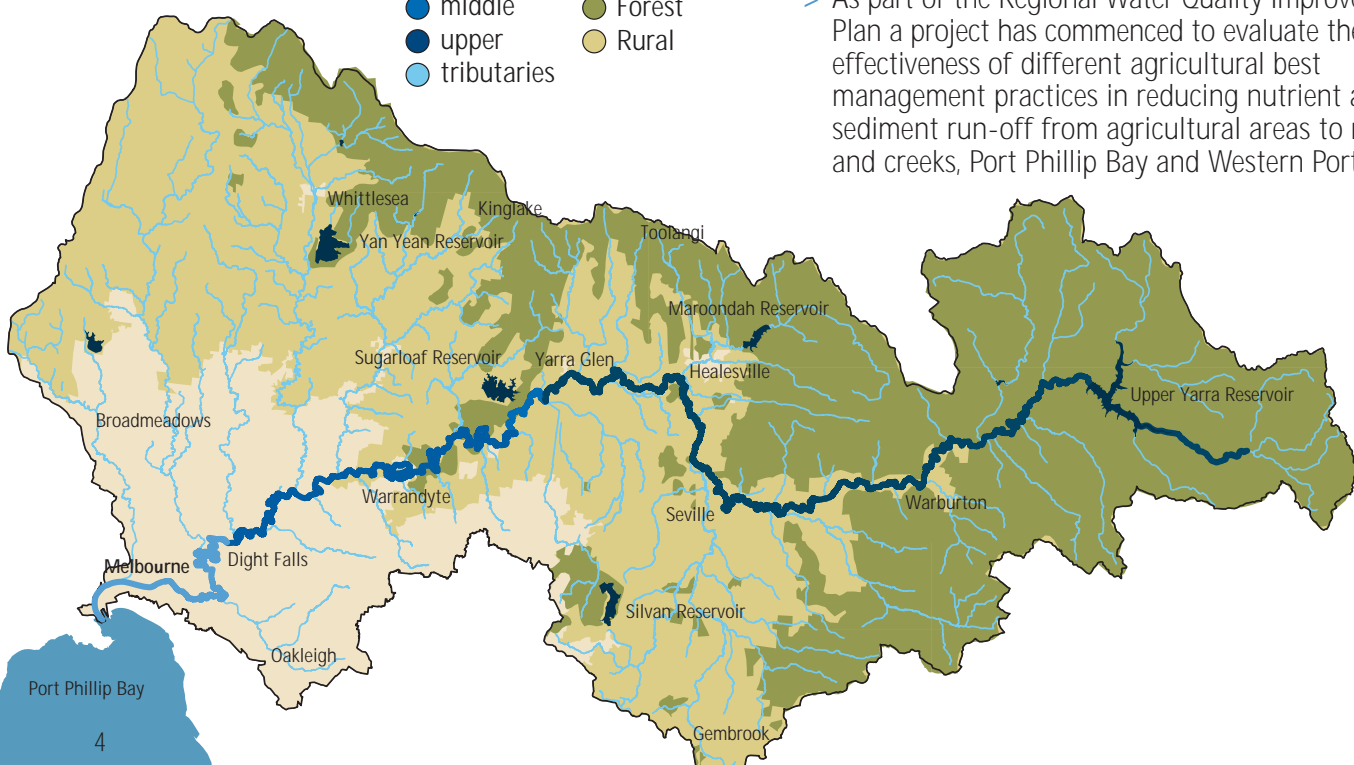
- > \$1 million to develop a Regional Water Quality Improvement Plan for Port Phillip and Westernport catchments to consolidate investment in catchment and water quality management. This includes \$450,000 funding from the Australian Government's Coastal Catchments Initiative. A draft for public comment will be released in 2007.

Addressing rural run-off

- > As part of the Regional Water Quality Improvement Plan a project has commenced to evaluate the effectiveness of different agricultural best management practices in reducing nutrient and sediment run-off from agricultural areas to rivers and creeks, Port Phillip Bay and Western Port.

Upper, Middle & Lower Yarra

- lower
- middle
- upper
- tributaries
- Urban
- Forest
- Rural



MONITORING AND COMMUNICATING THE HEALTH OF THE RIVER

- > \$930,000 over three years to track down key sources of faecal pollution, such as illegal connections of sewers to drains.
- > Provide the community with access to clear and accurate information on water quality in the Yarra, starting with user-friendly reporting on water quality condition for recreation through the Yarra Watch website (www.epa.vic.gov.au/YarraWatch).
- > Undertake more monitoring and research to improve our understanding of the impact of pollution on aquatic life and any restrictions on the suitability of fish for human consumption.

INVOLVING THE COMMUNITY

- > \$3.8 million over three years to encourage community support and involvement in caring for the Yarra River catchment, such as additional support for Melbourne Waterwatch and funding for community groups for activities such as tree planting.
- > This includes around \$140,000 over two years for a Yarra Riverkeeper boat that will monitor activity on the river and promote community care and appreciation of the river through river-based community awareness and education programs.

HEALTHY RIVER FLOWS

- > Ensure the Yarra receives sufficient flows for its environmental needs through the establishment of an Environmental Water Reserve.

MANAGING YARRA WATER QUALITY

- > Establish an independently chaired Yarra Coordinating Committee that will advise on the implementation of this action plan and improve the coordination between the key agencies with responsibilities for the health of the Yarra River.



Right: Rain gardens (tree pit style) filter pollutants in road run-off such as litter and sediment before it enters rivers and the bay.

FACTORS AFFECTING THE HEALTH OF THE YARRA

Urban stormwater

Today, urban stormwater is the most significant source of pollution in the city's rivers, creeks and wetlands.

Each year, some 500 billion litres of stormwater from urban areas, containing pollutants, waste, nutrients and litter, is washed down drains into rivers, creeks and the bays when it rains.

Plastic bags, fast-food packaging and cigarette butts are all too obvious. Stormwater also contains hydrocarbons from fuel and engine oil, heavy metals, paints, pesticides and animal droppings from possums in parklands, pets such as dogs and cats, and rats, bats and birds living in the catchment. Heavy metals such as zinc, copper and lead are particularly high in run-off from roads and industrial sites. Litter is especially high in run-off from commercial areas. (For actions to address these issues see page 18 *Reducing stormwater pollution*).

Sewer spills into drains, rivers and creeks

Melbourne's sewerage infrastructure serves us well and through the 1970s and 1980s investment in this infrastructure led to major improvements in the condition of the Yarra River. Occasionally flows in the sewerage system during wet weather can exceed the original design capacity. This can sometimes lead to spills of diluted sewage into rivers, drains and creeks (see page 19 *Improving sewage management*).

Spills can occur in dry weather when sewers become blocked or a sewer collapse occurs. Large scale blockages and collapses can be a significant source of faecal contamination. However, management of the sewerage system by the water authorities means that these large scale events are infrequent and generally of short duration.

Most smaller blockages occur when tree roots find their way into sewer pipes through small cracks. Blockages are managed by the water authorities through containment and then clean-up by maintenance crews. As a result, very few of these spills reach local stormwater drains or waterways. In 2004/2005 over 96% of blockages in Yarra Valley Water's and South East Water's systems were contained and did not reach a drain or waterway.

Spills can also occur from private property or where the property owner or plumber illegally connects the stormwater plumbing directly into the sewerage pipework.

This type of illegal connection can lead to sewerage systems being overloaded and spilling, mostly during wet weather.

A less common type of illegal connection is where a property's sewerage pipe is connected directly into the local stormwater drainage system. This type of illegal connection is a particular problem because the likelihood of faecal contamination is significantly increased and the connections are difficult to identify. A major investigation program is now underway to determine the extent of the problem and to identify and rectify any illegal connections (see page 24 *Monitoring and communicating the health of the river*).

Minimising sewer spills is important for protecting water quality for recreation. Although they rarely occur in dry weather, spills can sometimes occur after heavy rain, therefore the public is advised not to use the river for recreation during this time.

Melbourne Water, Yarra Valley Water, South East Water and City West Water have systematically and significantly reduced spills to the Yarra River in the past few years through sewerage system upgrades and sewer renewal works.

Septic tanks

Septic tanks are used to treat domestic wastewater in the outer suburban and rural areas where there is no reticulated sewerage system. Some 35,000 properties operate septic tanks in the Yarra catchment.

Septic tanks that are overloaded, malfunctioning or poorly maintained or that are sited on land that is not capable of appropriately disposing of domestic wastewater can contribute to elevated levels of pathogens, nutrients, toxicants and suspended solids in waterways. (For program to improve management of septic tanks, see page 19 *Improving sewage management*).

Rural run-off

Run-off from rural land is another source of contaminants, including nutrients (particularly nitrogen and phosphorus), toxicants (pesticides), sediment and faecal material from livestock.

Over-grazing, livestock access to rivers and creeks, poor irrigation and nutrient management practices, and run-off from unsealed roads, can all lead to pollution of rivers and creeks.

Urban sources of stormwater pollution

Source:
Shopping centres

Pollutant:
Litter

Potential action:
Education, enforcement, litter traps

Source:
Industrial sites

Pollutant:
Heavy metals, oils and other toxicants

Potential action:
Enforcement, education, water sensitive urban design

Source:
Building sites

Pollutant:
Sediment, building materials

Potential action:
Temporary controls (silt fences, good site practices), enforcement, education

Source:
Households

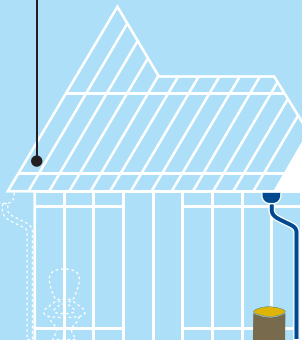
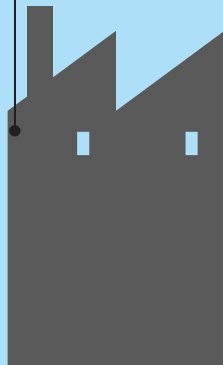
Pollutant:
Paint, animal droppings, garden run-off

Potential action:
Ensure paint and other waste goes to rubbish

Source:
Road and car park run-off

Pollutant:
Heavy metals, nitrogen, sediment, hydrocarbons

Potential action:
Water sensitive road design (swales, biofilters), cleaner fuels



Source:
Illegal connections of sewer to stormwater system

Pollutant:
Localised pathogens, nutrients and heavy metals

Potential action:
Sewerage investigations, faecal investigations, partnerships to address illegal connections where identified

Source:
Illegal connections of stormwater to sewerage system. Adds to the volume in the sewerage system so it may exceed system capacity resulting in sewer spills into creeks

Pollutant:
Localised pathogens, nutrients and heavy metals

Potential action:
Investigations, partnerships to address illegal connections where identified

Stormwater flows into creeks and rivers to the bays

To sewage treatment plant (or if system overloaded, spills into rivers and creeks)

OUR YARRA – RECREATIONAL WATER QUALITY



Our goal – Supporting a wide range of recreational activities

The ongoing recreational goal is for water quality in the Yarra River to be safe for water sports and that fish caught in the Yarra are safe for human consumption.

Over the decades, the Yarra has been used as a training ground for elite rowers and kayakers (including the Olympic gold medalist rowers the Oarsome Foursome), a competition venue for world-class water-skiers at the Moomba Masters, and a playground for thousands of kayakers, rowers, cyclists and walkers who use the river for recreation.

The Yarra is also popular for fishing and contains many different species of fish, including bream, mullet, flathead, salmon, Macquarie perch, Murray cod, minnows and eels.

While water quality has improved in recent years, the Yarra is a largely urban river, therefore people should use commonsense when using it for water-based recreation.

Water quality generally meets standards for boating except after heavy rainfall when stormwater flows are highest and carry the most pollutants and debris. Water-based recreation activities such as swimming, wading and kayaking are not recommended during this time.

Water quality at most sites in rural areas has generally met current standards* for all forms of recreation, including swimming, except sometimes after rain. At most sites in urban areas, *E. coli* levels have met the standard for water sports such as boating, canoeing and kayaking (except following heavy rain), but not for swimming.

* Water quality has been assessed against current Victorian environmental objectives within State environment protection policies prepared by EPA Victoria and endorsed by Government.



Above: Bike riders resting along the Yarra at Dights Falls.

In 1999, the former Government endorsed an aspirational target for the lower Yarra (excluding the Port area) to be suitable for swimming. This aspirational target has been the driver for further investigations into major sources of microbial contamination that have prevented the target from being met.

It is now clear that this target will be very difficult to achieve in the lower Yarra. However, as noted above, water quality is generally acceptable for the water sports that are currently undertaken in this stretch of the river.

Furthermore, swimming in the lower Yarra between the Gipps Street Bridge and the Bolte Bridge is not allowed because of the danger posed by boats. Exceptions, requiring a permit, are made during special events.

OUR YARRA – RECREATIONAL WATER QUALITY

Magnificent Moomba

The Yarra River has played host to the prestigious Moomba Masters water-skiing competition for over 30 years, and the event continues to attract the best skiers from all over the world.

Moomba Masters competitor Karen Jackson said the Yarra is a great place to ski: "I've skied in rivers across the world and the Yarra is much better than most."

Below: A Moomba competitor water-skiing on the Yarra River.



How the Yarra shapes up – factors affecting recreation

There are many factors that can affect water quality in the river, and therefore its suitability for recreation.

Micro-organisms

Micro-organisms are essential to a living river system and are found in all rivers. Some are harmless while others, known as pathogens, can cause disease. Levels of micro-organisms increase after rain when they get washed into rivers from the catchment.

E. coli is an indicator of the likely presence of pathogens. *E. coli* levels in the Yarra (measured at Princes Bridge) have shown a dramatic decrease since the 1970s. In the 1970s, annual means were generally in the 1000-5000 organisms per 100 millilitres range. In the last decade the annual means have been within the 400 to 900 organisms per 100 millilitres range. Over the last ten years *E. coli* levels have stabilised – a significant achievement in the face of continued urbanisation and population growth.

Storms and resultant stormwater flows have a strong influence on faecal contamination, and many high *E. coli* readings in the lower Yarra are associated with periods of high flow.

In dry weather when flows are lower, *E. coli* levels in the Yarra are generally lower. Similarly, contributions from stormwater drains are generally much lower during dry weather and low flows. However, preliminary results from the current Yarra faecal sources study have shown that a few drains have high bacterial readings during dry weather. These drains are being investigated further as part of the \$930,000 program to track down key sources of faecal pollution, and results will be available in the coming months.

Human sewage is one source that needs to be considered. Where further analysis indicates a human source, intensive investigation of the drainage system is being undertaken to identify the precise location of sewage contamination. Potential contributors are sewer blockages, seepage of sewage from the system, and cross connections between sewerage and stormwater pipes.

In the last few years, a small number of kayakers using the Yarra contracted *Leptospirosis*, a bacterial disease that can be spread to soils and water from animals such as cattle and rats. While these infections cannot directly be attributed to the Yarra, this cannot be excluded. *Leptospirosis* is not known to be contracted from human faecal contamination.

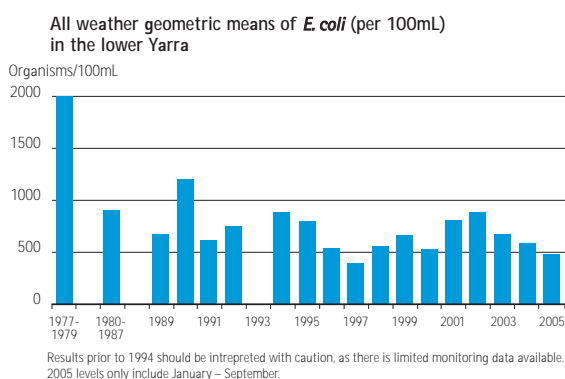
The widely reported eel deaths in the Yarra in early 2005 could not be linked to water quality in the river. Eel deaths were reported throughout Victoria and New South Wales last summer and, despite extensive testing, the cause of these deaths remains unknown.

Unlike our piped water supply, rivers and creeks are open systems and many micro-organisms can get washed into them from the catchment. Even pristine rivers contain micro-organisms, and therefore it is recommended that people should not ingest untreated water from rivers and creeks.

Toxicants

Consumption of fish that have accumulated chemical residues may have implications for human health. The Australian and New Zealand Food Standards Code (www.foodstandards.gov.au) provides guidance on the risk from consuming various foods that may contain traces of chemical residues. The Department of Human Services decides if the public should be notified about the safety of fish consumption.

Studies are being undertaken in a partnership between EPA Victoria, Melbourne Water and the Department of Human Services to improve our understanding of the levels of chemical residues in fish, and any restrictions on the suitability of fish for human consumption. A pilot study undertaken in the lower Yarra and Maribyrnong rivers in 2005 showed that heavy metal and organochlorine concentrations in a range of fish, including mulloway, black bream, short finned eels and sea mullet were within the standards set for human consumption. However, in the Yarra River, two eels (of 16 collected) had PCB levels above the food standard, and further investigations are now underway to determine if precautionary advice is necessary.



The Pollution Trail

Tracking down problem sources that vary over time involves painstaking research and requires the cooperation of multiple authorities, private landowners and businesses.

In 2005, a three-year \$930,000 investigation program commenced involving testing at 52 locations along the Yarra and its tributaries to track down likely sources of faecal pollution.

This program is already achieving results with a council drain leading from the Stonnington City Council Solid Waster Transfer Station identified as a source of organically polluted run-off. With the full cooperation of the Council, the drain was cleaned out, sealed and run-off from the Transfer Station diverted to the sewer.

Intensive investigations for additional sources of pollution, including the Prahran Main Drain, continue with the cooperation and assistance of the water retailers, private landowners, businesses and local councils under the direction of EPA Victoria and Melbourne Water.

This case study illustrates that careful investigations and working together between a range of parties can lead to the management of difficult sources of contamination.

Above: Water EcoScience lab technician tests Yarra River water as part of Melbourne Water's faecal investigation program.

OUR YARRA – A HEALTHY ENVIRONMENT



The living Yarra

- > The Yarra River is home to a number of native animals, such as frogs, platypus and fish, including many endangered species such as the growling grass frog and fish such as grayling, Macquarie perch and Murray cod.
- > Water quality is excellent in the upper forested reaches of the Yarra, declining to moderate in the rural sections. In the urban reaches downstream of Warrandyte, water quality is moderate to poor.
- > Nutrient and sediment levels have improved since the 1970s due to diversions of industrial waste, sewerage of catchments and major catchment works.
- > We all have a role to play to ensure the Yarra is a healthy place for animals and plants to live.



Above: The Yarra River is home to the largest population in Victoria of the endangered Macquarie perch. We can all help to ensure the Yarra is a healthy place for fish to live.

Left: Watts River in the central highlands of Victoria is a tributary of the Yarra River.

Our goal – Supporting river health

The ongoing environmental goal is for healthy rivers and creeks, with increased numbers of native fish, platypus and plants.

We want water quality to improve to support healthy native fish and platypus populations.

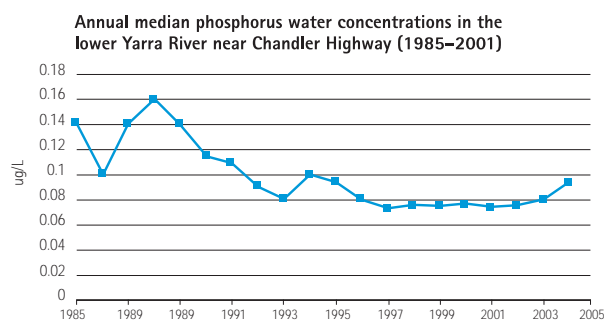
How the Yarra shapes up – factors affecting environmental water quality

Water quality is a key component of river health because it affects the animals, plants and micro-organisms that live in the water. Contaminants such as nutrients, sediment, toxicants and litter can affect water quality.

Nutrients

Nutrients (nitrogen and phosphorus) have a vital role in providing organisms with food for growth. However, excessive levels can result in problems such as nuisance weed and algal growth, and reduced biodiversity.

Nutrient levels in the Yarra River have improved significantly since the 1970s due to diversions of industrial waste and sewerage of catchments. Phosphorus levels have almost halved in the lower Yarra since monitoring began in the early 1970s. In the past 10 years, phosphorus levels in the lower Yarra have generally remained constant and nitrogen levels have increased slightly, most likely due to urban growth.



OUR YARRA – A HEALTHY ENVIRONMENT

Sediment

Sediment (turbidity and suspended solids) is a natural component of rivers and creeks. High loads of sediment can interfere with animal feeding and smother habitat. Nutrients and toxicants stick to, and are transported by, sediment.

Large reductions in sediment levels in the Yarra River have been achieved since the 1980s through catchment management works. Despite these reductions, the Yarra will continue to have a muddy appearance, which is caused by fine clay particles that are suspended in the water. These clay particles are a natural part of the Yarra catchment.

Toxicants

Toxicants, which include heavy metals such as zinc and lead as well as hydrocarbons, are present in many urban streams and can accumulate in the bed of the river where animals live and feed.

The presence of heavy metals can lead to reduced diversity and numbers of macroinvertebrates, such as insects, worms and crustaceans. This can limit the amount and type of food available for other species such as platypus.

Toxicants enter the river in stormwater, both dissolved in the water and attached to sediment.

Heavy metal levels in Yarra water have been changing over the last 20 years. For example, lead levels have fallen since the introduction of unleaded petrol.

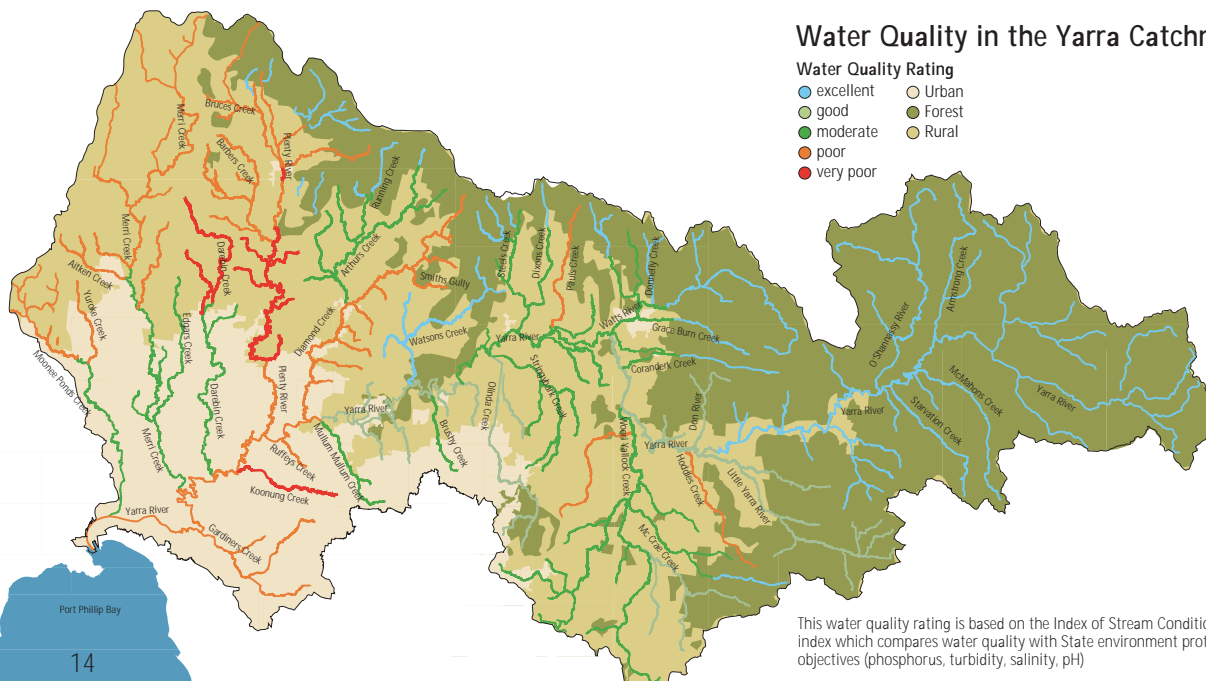
Heavy metal levels in water in the Yarra meet the standards* set for protection of the aquatic ecosystem, with the exception of copper, lead and zinc in the lower Yarra. However, copper and lead levels are substantially below the National Health and Medical Research Council's screening levels for chemicals in recreational water, both for aesthetics and public health measurements.

Zinc levels are also well below the National Health and Medical Research Council's screening levels for aesthetics (the Council has no public health limit for zinc – there are insufficient data to set a guideline value based on health considerations).

In sediments, the levels of some heavy metals are increasing in the rivers and creeks that have increased urbanisation in their catchments.

Actions to improve stormwater quality will help to address the levels of toxicants in our rivers and creeks, and further research is being undertaken to better understand the impact of toxicants on aquatic ecosystems. (See page 18 *Reducing stormwater pollution* and page 24 *Monitoring and communicating the health of the river*).

* Water quality has been assessed against current Victorian environmental objectives within State environment protection policies prepared by EPA Victoria and endorsed by Government.



Water Quality in the Yarra Catchment

Water Quality Rating

- excellent
- good
- moderate
- poor
- very poor
- Urban
- Forest
- Rural

This water quality rating is based on the Index of Stream Condition water quality index which compares water quality with State environment protection policies objectives (phosphorus, turbidity, salinity, pH)

Litter

Litter is unsightly and this is a concern for the community. It also poses a threat to animals when it is ingested or gets tangled around their bodies. It is estimated that 15–20% of platypus get plastic items caught around their bodies.

Generally, the community is much more litter-conscious today compared with 10 years ago. However, litter in rivers is still a major problem. A considerable amount of litter finds its way from our streets through the stormwater system and into the Yarra River.



At home with platypus

A platypus hide opened recently at Toorourrong Reservoir near Whittlesea provides one of the best opportunities around Melbourne to see platypus in their natural environment. Platypus are seen regularly in the Yarra River near the mouth of the Plenty River and at Toorourrong Reservoir, which is home to around 30 platypus. Platypus populations in the Yarra have been found as close to the heart of Melbourne as Heidelberg. The Australian Platypus Conservancy, which runs the Melbourne Water Urban Platypus Program, has also found platypus in Yarra tributaries: Diamond Creek (upstream of Eltham), Mullum Mullum Creek (on the outskirts of Donvale) and Olinda Creek (just outside Lilydale).

However, a recent study has shown that platypus are not found in inner-urban areas with elevated levels of heavy metal pollution. This is thought to be because heavy metals reduce the amount and type of food available for platypus. Reducing the level of toxicants and contaminants in urban rivers and creeks may help platypus return to these areas (See page 18 *Reducing stormwater pollution*, and see page 24 for further research being undertaken).

Above: Surveys conducted by Australian Platypus Conservancy biologist Geoff Williams show that platypus are occurring in larger numbers along the Yarra in Melbourne's middle suburbs, with sightings in Fairfield and Kew.

OUR YARRA – SECURING A HEALTHY FUTURE



The Yarra River is here for everyone to enjoy, and we must all work together to protect it for future generations.

Over the past five years the Government has spent around \$140 million on Yarra projects to protect the health of the Yarra. They include:

- > \$36 million invested by Melbourne Water on works in the Yarra catchment to improve waterway and stormwater quality and provide grants to volunteers and property owners with river frontage.
- > \$1 million invested by Melbourne Water to clean up and undertake repair work on the Yarra after the February 2005 floods.
- > More than \$100 million invested by Melbourne Water and Yarra Valley Water to maintain and upgrade the sewerage system, including connecting properties using septic tanks to the reticulated sewerage system and increasing the capacity of the system to reduce sewage spills. While the actual volume of sewage spilled depends on both the intensity and frequency of rainfall, from 1992/03 to 2004/05 the total number of wet weather spills in the Yarra catchment reduced from 950 to 144.
- > \$1.75 million invested by Parks Victoria on Yarra water-quality programs, including litter traps.
- > \$3.6 million invested by EPA Victoria on a number of Yarra improvement projects including new stormwater management designs and improving the control of diffuse sources of pollutants entering the Yarra River.
- > \$500,000 invested by the Department of Sustainability and Environment on planning and engagement, to better coordinate government and the community's efforts to improve water quality in the Yarra River.
- > \$200,000 for some councils in the Yarra catchment to develop domestic wastewater management plans to identify priority areas for the replacement of septic tanks with reticulated sewerage.

These and other initiatives have helped to generally maintain water quality levels in the Yarra in the past 10 years – a significant achievement in the face of continued urbanisation, population growth and intensification of agriculture.

PRIORITY PROJECTS

The following priority projects will be implemented to further protect and improve the health and amenity of the Yarra.

- > \$20 million to tackle stormwater pollution by implementing local government stormwater management programs. This includes \$10 million specifically allocated to the lower Yarra where significant stormwater quality issues have been identified.
- > Around \$300 million over six years for the Northern Sewerage Project to virtually eliminate sewer spills in two key Yarra tributaries.
- > Around \$250 million over the next 20 years to accelerate the replacement of about 18,500 septic tanks with a reticulated sewerage system.
- > A major program of eliminating key sources of faecal pollution, such as illegal connections of sewers to drains, once they have been identified.
- > Work with local government and retail water companies to improve the management of septic tanks to minimise their impact on the Yarra.
- > \$4.3 million to reduce litter before and after the Commonwealth Games.
- > \$1 million to develop a Regional Water Quality Improvement Plan for Port Phillip and Westernport catchments. This includes \$450,000 funding from the Australian Government's Coastal Catchments Initiative.
- > Evaluate the effectiveness of different agricultural best management practices in reducing nutrient and sediment run-off from agricultural areas to rivers, creeks and the bays.
- > \$930,000 over three years to track down key sources of faecal pollution, such as illegal connections of sewers to drains.
- > Provide the community with access to clear and accurate information on water quality in the Yarra.



Above: Wetlands help to remove pollutants, sediment and litter from stormwater.

PRIORITY PROJECTS continued

- > Undertake more monitoring and research to improve our understanding of the impact of pollution on aquatic life and any restrictions on the suitability of fish for human consumption.
- > Ensure the Yarra receives sufficient flows for its environmental needs through the establishment of an Environmental Water Reserve.
- > \$3.8 million over three years to encourage community support and involvement in caring for the Yarra catchment, including around \$140,000 over two years for a Yarra Riverkeeper boat that will monitor activity on the river and promote community care and appreciation of the river through river-based community awareness and education programs.
- > Establish an independently chaired Yarra Coordinating Committee.

TACKLING SOURCES OF POLLUTION

Reducing stormwater pollution:

Melbourne's drainage system was designed for the sole purpose of disposal of stormwater rapidly to minimise the risk to public health and safety.

This drainage system carries stormwater through a series of gutters, pipes and drains and discharges it into rivers and creeks. It is not connected to the sewerage system.

Stormwater carries pollutants such as litter, sediment and nutrients into our rivers.

What we have done

Today, we design stormwater systems to manage flood risk while also protecting the environment. Design features, such as wetlands, retarding basins, rain gardens and litter traps are being used to improve stormwater quality by controlling flows and filtering the water before it enters creeks, rivers and the bays.

Rain gardens are one way of filtering stormwater to remove pollutants such as solids, nutrients and litter, before it enters the piped drainage system. Rain gardens have been built at a variety of scales, from tree pits in urban areas to large regional systems.

These and other treatment technologies are increasingly being used in urban planning and development as part of what is known as water sensitive urban design (see melbournewater.com.au/wsud).

Councils within the Yarra catchment have developed **Stormwater Management Plans**. These plans identify actions to improve quality of stormwater before it enters rivers and creeks. They include infrastructure initiatives such as wetlands and litter traps, and other approaches including planning, education and enforcement programs.

The **Clearwater program**, being run by the Municipal Association of Victoria and the Stormwater Industry Association, is helping to build capacity within local councils to implement stormwater management plans and other stormwater initiatives by developing and delivering training programs and tools.

What we are doing

We aim to reduce toxicants, nutrients and faecal contaminants entering the Yarra River in stormwater:

PRIORITY PROJECT – \$20 million to tackle stormwater pollution by implementing **local government stormwater management programs**. Projects will include the installation of wetlands, rain gardens, and other water sensitive urban design features, which are used to improve stormwater quality by controlling flows and filtering stormwater to remove pollutants such as solids, nutrients and litter before it enters rivers, creeks and the bays. \$10 million of this package is specifically allocated to the lower Yarra where significant stormwater quality issues have been identified.

Improving sewage management:

What we have done

Government agencies have invested significant funds during the past five years to improve the sewerage system, including:

- > Investment of more than \$70 million by Yarra Valley Water to upgrade the local sewerage infrastructure, which has helped to reduce sewage spills.
- > Investment of about \$30 million by Melbourne Water to maintain and upgrade the major sewerage system to reduce sewage spills.

In addition, the Department of Sustainability and Environment has provided funding to councils, with significant numbers of septic tanks in their municipalities, to develop **Domestic Wastewater Management Plans**. As part of this, councils are considering a range of improvement options for managing septic tanks and the problems caused by them.

The Government has provided funding for the Municipal Association of Victoria to run a **Smart Septics** program for councils to improve their capacity to effectively manage septic tanks.



Tackling toxicants

A pilot toxicant filter installed in Campbellfield is believed to be one of the first in Australia designed to intercept heavy metals and other pollutants from an urban drain.

The results of the pilot will be fed into the Regional Water Quality Improvement Plan process.

The facility, located at a drainpipe into Merri Creek, is near industrial estates. Sampling along the creek bed has found elevated levels of heavy metals downstream from Campbellfield all the way to Dights Falls.

Melbourne Water is working closely with Hume City Council and EPA Victoria to help local industries improve workplace practices.

Above: Water EcoScience's Colin Mulvogue takes a sample of Yarra River water as part of the Melbourne Water monitoring program.

OUR YARRA – SECURING A HEALTHY FUTURE



What we are doing

Together, the following priority projects will reduce the amount of faecal contamination in the Yarra:

PRIORITY PROJECT – Around \$300 million for the Northern Sewerage Project to virtually eliminate sewer spills into key Yarra tributaries.

New sewers will be constructed over the next six years to connect the sewerage system near the Merri Creek at Coburg and the Moonee Ponds Creek in Pascoe Vale to Melbourne's North Western Sewer.

Over the last 12 years there have been close to 500 sewage spills into the Merri and Moonee Ponds creeks during heavy (up to one-in-five year) rainfall. These new sewers will eliminate these spills and improve the capacity of the sewerage system in the north of Melbourne so that it can better cope with high flows during heavy rainfall.

PRIORITY PROJECT – Around \$250 million over the next 20 years to accelerate the replacement of around 18,500 septic tanks in rural areas and outer suburbs with a reticulated sewerage system. This will improve water quality in the Yarra and its tributaries.

PRIORITY PROJECT – The Department of Sustainability and Environment will host a forum on septic tank management in the Yarra catchment. The forum will identify how all agencies involved can better manage septic tanks to reduce their impact on the Yarra. It will consider institutional roles and responsibilities and the regulatory framework for septic tank management to minimise off-site impacts. The outcome of the forum will be an action plan for improving septic tank management in the Yarra catchment.

PRIORITY PROJECT – Implementation of a major program of rectifying key sources of faecal pollution when found, such as illegal connection of sewers to drains.

Top left: Badger Creek Primary School kids help protect the Yarra from litter with drain stencilling activities.

Left: A litter trap in the Yarra River at Burnley captures rubbish washed from our streets into the stormwater system when it rains.

Meeting the litter challenge:

Litter is a concern for all of us and its management requires a coordinated approach involving the Government and the community.

What we have done

Some new approaches are being used to manage litter, especially in areas with high numbers of visitors and tourists.

For example, Melbourne Water is designing and installing a series of nets at the outlet of the Prahran Main Drain to capture litter coming from the Chapel Street area.

In addition, Parks Victoria has installed an extra **three floating litter traps** on the Yarra. These traps, will further reduce litter in the Yarra by an estimated 182 cubic metres a year.

The **Commonwealth Games litter barge**, launched one year ago, has cleared more than 1800 cubic metres of litter from the Yarra and Maribyrnong rivers – the equivalent of 8000 large household wheelie bins.

The solution to the litter problem requires coordinated efforts by the community, industry and government authorities. A range of approaches involving source controls, community awareness and education programs, and water sensitive urban design are being used to combat the litter problem. Councils (Stonnington, Boroondara, Yarra, Melbourne), Melbourne Water, Parks Victoria and Sustainability Victoria are working together to manage litter in the lower Yarra.

What we are doing

PRIORITY PROJECT – \$4.3 million is being invested in a project to reduce litter before and after the Commonwealth Games. The project includes public education and awareness campaigns and the placement of new recycling bins at key locations such as sporting grounds.



Above: A rain garden in Cremorne Street, Richmond filters stormwater before it enters the drain and river.

Planning for improved water quality:

What we have done

The **Port Phillip and Westernport Regional Catchment Strategy** sets out priorities for the management of natural resources in the region. The draft **Regional River Health Strategy** sets priorities for the management of rivers and creeks and establishes river health targets. Both these strategies have identified the need for a detailed water quality improvement plan.

What we are doing

PRIORITY PROJECT – the Australian and Victorian Governments have jointly invested \$1 million for the development of a **Regional Water Quality Improvement Plan** for Port Phillip and Westernport catchments under the Australian Government's Coastal Catchments Initiatives. The plan will determine priority areas and sources for action to improve water quality across a range of contaminants and therefore guide investment in regional water quality initiatives. A consultation draft will be released in 2007 for public review.

OUR YARRA – SECURING A HEALTHY FUTURE



Addressing rural run-off:

Rural run-off can contain nutrients, such as nitrogen and phosphorus, pesticides, sediment and faecal material, which can end up in rivers and creeks.

What we have done

Existing agricultural best management programs help land managers minimise the quantity and improve the quality of run-off into the Yarra and its tributaries. Landcare and primary industry programs, together with targeted incentive schemes, have increased awareness and knowledge.

For example, the Department of Primary Industries has developed tools to help land managers manage and develop the natural, human and financial resources of their business in an integrated and sustainable way. The technique, known as **whole farm planning**, uses aerial photography and mapping to help identify problems, solutions and new opportunities.

What we are doing

PRIORITY PROJECT – As part of the development of the **Regional Water Quality Improvement Plan** a project (with additional funding of \$425,000 from the Australian Government's Coastal Catchments Initiative) has commenced to evaluate the effectiveness of different agricultural best management practices in reducing nutrient and sediment run-off from agricultural areas to rivers and creeks, Port Phillip Bay and Western Port. The project is managed by the Department of Primary Industries and will provide information to assist resource managers to make decisions about what best management practices should be encouraged and will determine priorities for action to be included in the **Regional Water Quality Improvement Plan**.

Healthy river flows:

Healthy aquatic ecosystems require not only good water quality but also adequate environmental flows in rivers.

What we have done

A study to determine the environmental flow requirements of the Yarra is being finalised and will be released soon. This study will inform the development of the Environmental Water Reserve for the Yarra.

What we are doing

PRIORITY PROJECT – The Victoria Government will establish a sustainable Environmental Water Reserve in the Yarra by managing the amount of water that Melbourne can harvest from the Yarra and its tributaries.

Left: The Yarra River near Warburton, where water quality is rated as excellent.

MONITORING AND COMMUNICATING THE HEALTH OF THE RIVER

The Yarra River and its banks are used by thousands of people each year for recreation.

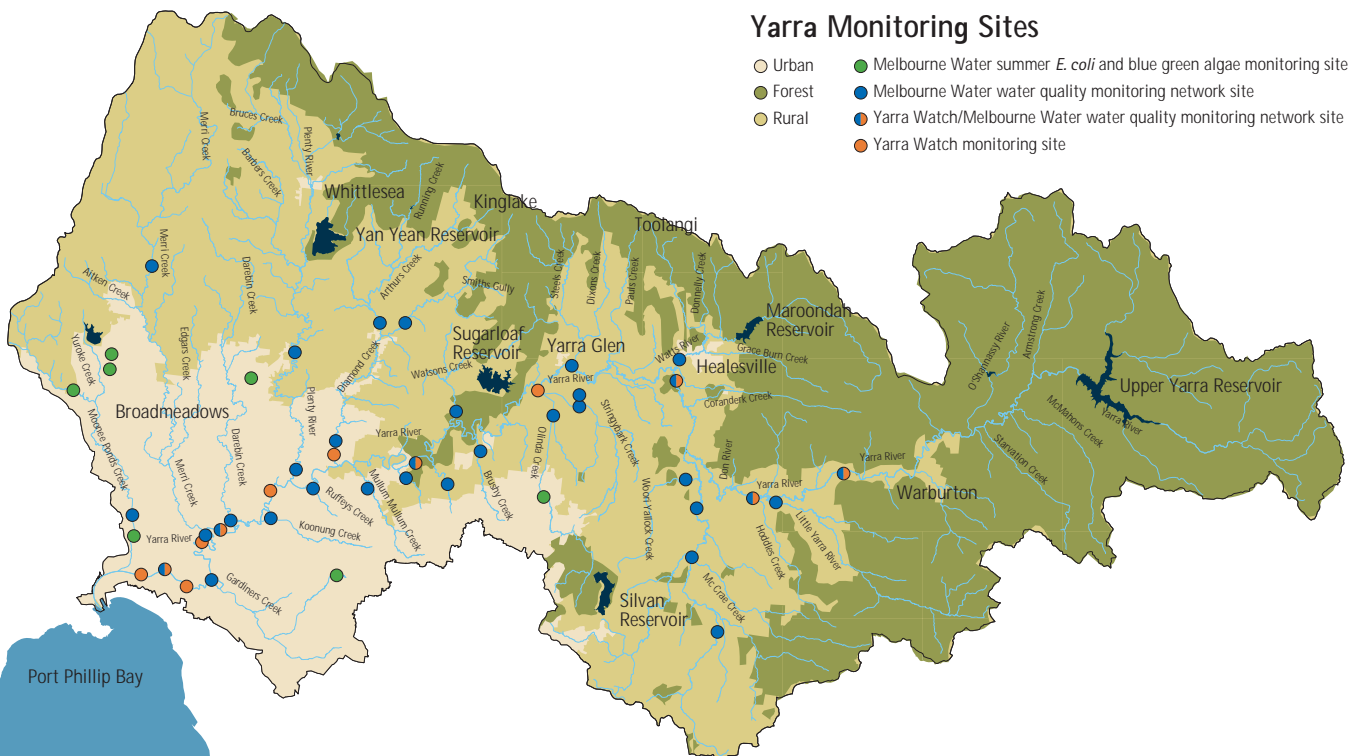
The Victorian Government recognises that everyone using the Yarra for recreation should receive clear and accurate information about its condition.

What we have done

Toxicants, nutrients, suspended solids, dissolved oxygen, *E. coli* and other water quality indicators are measured every month at 33 sites on the Yarra and its tributaries as part of Melbourne Water's **major monitoring program**. Summary results are published annually on the Melbourne Water website (melbournewater.com.au/river_data). This monitoring detects water quality changes over time and delivers information that is the basis for management decisions.



Above: Melbourne Water's Aquatic Scientist Edward Tsyrlin inspects his catch of aquatic invertebrates, one of the key indicators of the river's ecological state.



OUR YARRA – SECURING A HEALTHY FUTURE

Also, because *E. coli* are bacteria used to indicate the presence of faecal contamination, Melbourne Water has measured *E. coli* at additional key sites in the Yarra during the peak-use period of December to the end of March for over ten years.

Furthermore, in 2005, the Government expanded bacterial monitoring along the Yarra, introducing a program known as **Yarra Watch**. This involves moving from weekly monitoring over the peak-use summer period to a weekly monitoring program throughout the entire year.

As part of Yarra Watch, 12 sites from the Docklands to the upper reaches at Warburton are being monitored for *E. coli*. *Enterococci* is being trialled as an alternative indicator and is measured at eight of the sites. The results are collected by Melbourne Water and then used by EPA Victoria to give river users clear information about the condition of the river. The *E. coli* results are available to the public through the Yarra Watch website (www.epa.vic.gov.au/YarraWatch). Stormwater and river user alerts are also provided if heavy rain or pollution incidents are expected to significantly affect water quality.

In addition to these monitoring programs, more **detailed investigations** on rivers and creeks throughout Melbourne are undertaken to assess ecological health and identify local sources of pollution. The *E. coli* results of these investigations are available on the Melbourne Water website.

Melbourne Water also runs a **toxicant research program** in partnership with the Centre for Environmental Stress and Adaptation Research at Melbourne University. This research program is undertaking studies to better understand the impact of toxicants on aquatic ecosystems and animals.

Current testing regimes focus on the water and there is limited testing of sediments, which are a sink for many toxicants. There is also a need for more toxicological information describing the effects of toxicants on aquatic species such as fish and insects. These gaps will be addressed through the development of the **Regional Water Quality Improvement Plan**.

What we are doing

PRIORITY PROJECT – \$930,000 to track down key sources of faecal pollution.

A three-year investigation program is underway involving testing at 52 locations along the Yarra and its tributaries and main drains to track down likely sources of faecal pollution and to target problem areas for clean up.

PRIORITY PROJECT – Provide the community with access to clear and accurate information on water quality starting with user-friendly reporting of recreational water quality for Yarra Watch.

PRIORITY PROJECT – Undertake more monitoring and research to improve our understanding of the impact of pollution on aquatic life and any restrictions on the suitability of fish for human consumption.

Other projects

The Government has commissioned an **independent environmental audit** of the risk of harm or detriment to the land, groundwater and surface waters in the lower reaches of the Maribyrnong and Yarra rivers, around the Port. The audit will build on work that EPA Victoria has required businesses to undertake to assess and clean-up land and groundwater contamination from industrial and land reclamation activities that may have localised impacts on the rivers. Water, sediment and aquatic organisms (including fish) will be assessed as part of the audit and measures recommended to reduce any identified risks to acceptable levels.

INVOLVING THE COMMUNITY

Community standards and expectations for rivers and creeks have increased substantially in recent years. This has been reflected in community interest and involvement in river health programs and on-ground works.

Organisations including Landcare and Friends groups work on revegetation, erosion and litter control, habitat conservation and other projects along the Yarra and its tributaries.

The community has a major role to play in protecting local waterways. There are a range of programs designed to educate and inform the public about the stormwater system and how a few simple actions, such as disposing of litter correctly and cleaning up after pets, can help to reduce pollution entering the rivers and creeks.

What we have done

Melbourne Water provides funding to community and Friends groups to assist them to protect and improve their local waterways. Since 1999, Melbourne Water has distributed more than \$400,000 in **grants to assist community groups**.

Melbourne Water's **Stream Frontage Management Program** aims to rehabilitate degraded rural river banks by offering participating landowners funding assistance, technical advice and education opportunities. The most common works required are weed and vermin control, fencing to exclude stock, and revegetation with indigenous plants. Around 1900 grants totalling almost \$5 million have been provided to landholders since the program started in 1996, with the funding used to erect almost 500 kilometres of fencing and plant 746,000 trees and shrubs.

Under the annual \$200,000 **Corridors of Green** program, Melbourne Water funds local councils to help revegetate rivers and creeks in their municipalities. Councils match this through funding or in-kind support, and Friends groups are involved in on-ground works. Since the program started in 1999, more than 350,000 native plants and shrubs have been planted.

Right: 16,000 people in the Yarra catchment are involved in the Melbourne Waterwatch education program.



OUR YARRA – SECURING A HEALTHY FUTURE



Above: The Eastern Bango Frog, pictured here, is a common and widespread burrowing frog, often found by Melbourne Water Frog Census volunteers. The presence of a variety of frog species indicates that a river, creek or wetland is healthy.

Melbourne Waterwatch is a free education program that aims to increase community understanding, participation and ownership of local river health issues by assisting schools and community groups to assess the water quality of their local rivers and creeks.

The program is hugely successful with around 16,000 people currently taking part throughout the Yarra catchment.

The **Melbourne Water Frog Census** is another popular education program, with around 900 volunteers taking part. It is run by the Amphibian Research Centre and Melbourne Water in partnership with Melbourne Waterwatch and it aims to increase community knowledge of the distribution of frogs, which are an indicator of healthy rivers.

Earlier this year, communities and schools along the Yarra and beyond took part in a community action project – **Our River Our Games**. The project was developed by the Office of Commonwealth Games and Melbourne Water to involve volunteers in caring for the Yarra and in preparations for the Commonwealth Games in March 2006.

What we are doing

PRIORITY PROJECT – We are continuing to support community groups by providing \$3.8 million over three years in funding for community groups and educational programs to improve rivers and creeks in the Yarra catchment.

This includes a doubling of funding for the community education and monitoring program **Melbourne Waterwatch**, and additional support for community groups.

PRIORITY PROJECT – The \$3.8 million community education project includes around \$140,000 over two years for a Yarra Riverkeeper boat that will monitor activity on the river and promote community care and appreciation of the river through river-based community awareness and education programs.

MANAGING YARRA WATER QUALITY – MELBOURNE WATER: THE CARETAKER OF RIVER HEALTH

What we have done

In the *Our Water Our Future* action plan, the Government outlined its vision for the management of all waterways within the Port Phillip and Westernport region. Melbourne Water was assigned as the caretaker of river health and was given responsibility for waterway management, regional drainage and floodplain management, the management of the environmental water reserve, and water quality monitoring throughout the region including the Yarra catchment.

What we are doing

PRIORITY PROJECT – The Government will establish an independently chaired Yarra Coordinating Committee to assist Melbourne Water to plan and coordinate the programs in the Yarra River Action Plan. The Committee will prepare a progress report on the implementation of the plan within 12 months.

The Committee will be chaired by Professor Barry Hart, and be comprised of the heads of organisations that play a significant role in managing Yarra water quality, including Melbourne Water, the Department of Sustainability and Environment, EPA Victoria, the Port Phillip and Westernport Catchment Management Authority, Yarra Valley Water, Parks Victoria and the Department of Human Services.

Who does what:

Agencies that play a significant role in managing Yarra water quality:

Organisation	Role and key responsibilities	Contact details
Melbourne Water	Caretaker of river health. Manages rivers and creeks, regional drainage network, drainage schemes and floodplains, monitoring programs, community education and support programs and manages litter upstream of Dights Falls. Manages Melbourne's major sewerage network.	Web: www.melbournewater.com.au Phone: 131 722
Department of Human Services	Provides health risk assessment and public health advice	Web: www.dhs.vic.gov.au Phone: 1300 55 44 79
Department of Primary Industries	Provides information and advice on improving agricultural practices to minimise impacts on river health and water quality	Web: www.dpi.vic.gov.au Phone: 136 186
Department of Sustainability and Environment	Develops and implements overarching policy framework for water resources in the State including strategic directions and investment in river health	Web: www.dse.vic.gov.au Phone: 136 186
EPA Victoria	Environment protection. Develops water quality objectives, regulates discharges, prevents pollution, operates a pollution 'hotline' service, enforces and provides information to the public	Web: www.epa.vic.gov.au Phone: 9695 2777
Local councils	Manage local drainage networks, infrastructure, stormwater, community education	Web: www.mav.asn.au (Municipal Association of Victoria) Phone: 9667 5555
Parks Victoria	Manages recreational and commercial boating along the Yarra as well as litter downstream of Dights Falls	Web: www.parkweb.vic.gov.au Phone: 13 19 63
Port of Melbourne Corporation	State-owned enterprise that manages land and water in the Yarra around Port	Web: www.portofmelbourne.com Phone: 9728 7555
Port Phillip and Westernport Catchment Management Authority	Co-ordinates natural resources and catchment management	Web: www.pppwca.vic.gov.au Phone: 9785 0183
Retail Water Companies (Yarra Valley Water, South East Water, City West Water)	Manage reticulated sewerage infrastructure in the Yarra catchment. Deliver backlog sewer program to replace septic tanks and manage small sewage treatment plants	Web: www.yvw.com.au Phone: 131 721
Sustainability Victoria	Develops litter campaigns, programs and grants, responsible for waste management and recycling, plastic bags reduction program and grants	Web: www.sustainability.vic.gov.au Phone: 1800 353 233

MANAGING YARRA WATER QUALITY – MELBOURNE WATER: THE CARETAKER OF RIVER HEALTH



Community and advocacy organisations

Friends, Landcare and community groups make a highly valuable contribution to protecting local rivers and creeks.

Greening Australia's national **River Recovery** project, in which the Yarra is a flagship river, aims to deliver environmental improvements through community and corporate support (see www.greeningaustralia.org.au).

The **Yarra Riverkeepers** is an independent community-based organisation that adopts a whole-of-river view in its planning and strategic work to protect and restore the Yarra (see www.waterkeepers.org.au/yarra).

Another broad-based community group, **Environment Victoria**, has identified preserving rivers and creeks as one of its three key campaigns. It has a Healthy Rivers website that includes people's personal stories of the Yarra and other Victorian rivers (see www.environmentvictoria.org.au).

Environment Victoria and Melbourne Water are supporting the inclusion of the Yarra River in Oz GREEN's **MYRiveR Yarra** Program (see www.myriver.org.au).

Where do I get further information?

For anything relating to the health of the Yarra, contact Melbourne Water as the caretaker of river health (131 722).

To obtain water quality monitoring results:

- > Major monitoring program:
www.melbournewater.com.au/river_data
- > Yarra Watch data: www.epa.vic.gov.au/YarraWatch

The Yarra River has its own website. The site has information about what is being done to improve the Yarra and how the community can help. It allows people to find out the condition of their local rivers, details of Friends groups and community activities, as well as where to find platypus and frogs (see www.melbournewater.com.au/ouryarra).

In 2004 Melbourne Water produced *Melbourne's Rivers and Creeks*. This report, which can be found on the Melbourne Water website, provides an overview of the condition of rivers and creeks and a summary of priorities and improvement works. This report will be updated in 2007.

How can I help?

- > Join a Friends, Landcare or other community group contact the Port Phillip and Westernport Catchment Management Authority for details (www.ppwcm.vic.gov.au, 9785 0183)
- > Contact your local council (www.mav.asn.au) or Melbourne Water (www.melbournewater.com.au)
- > Go to the Our Yarra website (www.melbournewater.com.au/ouryarra)

People can help reduce litter and pollution running into the Yarra River by:

- > Washing their car on the lawn
- > Putting dog droppings into bins
- > Rinsing painting equipment in the garden, not the gutter
- > Securing bin litter so it can't blow away

Also, you can report activities that adversely impact upon the health of the Yarra:

- > To report a pollution incident, contact EPA Victoria (1800 444 004)
- > To report illegal connections (stormwater/sewerage) contact your local council

This Action Plan is supported by a Background Report. The Action Plan and the Background Report can be downloaded from www.melbournewater.com.au.

GLOSSARY

Catchment An area of land drained by a river or creek system, or the land that rain water flows from into our reservoirs. Catchments provide the source of water for the reservoirs that collect our drinking water

Coliforms Bacteria that are used to indicate the presence of pathogens from faecal contamination of water

Contaminant Any physical, chemical, biological, or radiological substance or matter that has an adverse effect on air, water, or soil

E. coli (Escherichia coli) Bacteria/bacterium found in the stomachs of warm blooded animals (for example, humans) and used as an indicator of faecal contamination in freshwater

Ecosystem A term used to describe a specific environment, including all the biological, chemical and physical resources and the inter-relationships between those resources

Effluent Water discharged by a process, treated or untreated

Enterococci An indicator of faecal pollution that is suitable for marine and freshwater

Environmental flow The flow regime required to maintain a river's ecological health

Environmental water reserve The share of water that is set aside for the environment to maintain the health of rivers and creeks

Heavy metals Specific types of metals, such as cadmium, chromium, copper, iron, mercury, nickel, manganese, lead, zinc and arsenic

Leptospirosis An illness caused by a micro-organism found in the urine or tissues of some animals, or in moist soil or vegetation that has been contaminated with urine from infected animals. Most commonly in Victoria, the infection is contracted by dairy farmers, abattoir workers and others exposed to cattle

Macroinvertebrate Animals without a backbone that can be seen by the naked eye, for example insects, worms and crustaceans

Micro-organism A living organism too small to be seen with the naked eye including bacteria, some fungi, protozoa and viruses

Microbial contamination Contamination of the water source by micro-organisms. This generally refers to pathogens for example viruses, bacteria and protozoa

Nitrogen A chemical element essential for growth. Excessive nitrogen may contribute to algal blooms in rivers and creeks

Nutrients Substances such as nitrogen and phosphorus in various forms required for the growth of plants (like fertiliser)

Pathogen A disease-producing micro-organism

PCB – polychlorinated biphenyls. Originally synthesised as flame retardants and electrical insulators in equipment, the importation and manufacture of PCBs in Australia have been banned since the 1970s. While phase-out of equipment containing PCBs has been ongoing since this time, PCBs are very stable, toxic chemical substances that can build up in the food chain, accumulating in animal tissue.

Phosphorus A chemical element essential for growth. Excessive phosphorus may contribute to algal blooms in rivers and creeks

Pollution The results of activity that is detrimental to beneficial use by plants, animals or humans of water, air or land

Run-off Water that flows over the surface from a catchment

Sediment Sand, clay, silt, pebbles and organic material deposited in water

Sewage and sewerage Sewage is the waste carried in sewers. Sewerage is the system of pipes, pumps and treatment plants to manage sewage

Stormwater Rainfall that runs off roofs and roads and other surfaces and flows into gutters and drains, rivers and creeks and eventually bays. This water can carry untreated pollution such as plastic bags, hydrocarbons, heavy metals and animal droppings directly into rivers and creeks

Suspended solids Particles suspended in and carried by water. The term includes sand, mud, and clay particles as well as solids in wastewater

Toxicants Harmful substances that can be lethal in certain quantities including heavy metals and other chemical compounds

Turbidity The presence of fine suspended matter such as clay or silt in water causing the water to appear cloudy or muddy

Water quality The physical, chemical and biological measures of water

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for the publication: Yarra River action plan: securing water quality for a healthy future

For more information the health of the Yarra or Maribyrnong rivers contact
Melbourne Water as the caretaker of river health (131 722).

For more information about Department of Sustainability and Environment contact
the DSE Customer service Centre (136 185).

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