



# River and lake health 2005–06

## Key points:

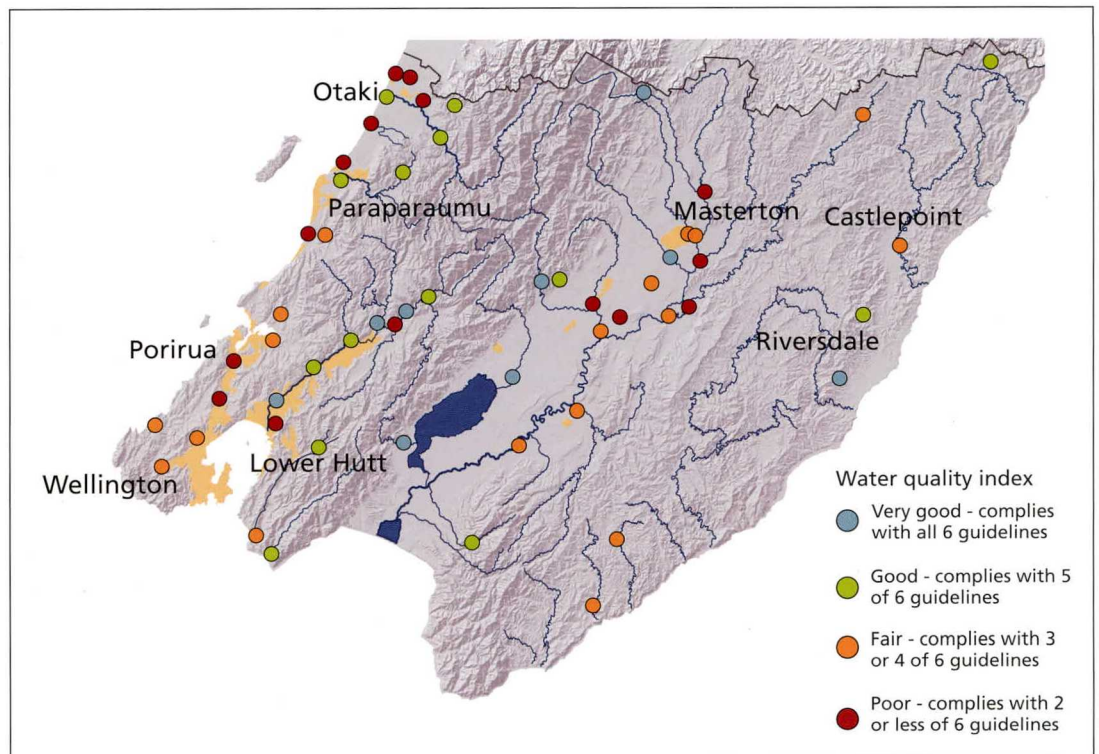
- The best water quality was in streams and rivers that flow almost entirely in bush and have little human influence.
- Water quality is poorest in urban streams and in streams at the bottom of agricultural catchments.
- The sediments in many streams are contaminated with DDT, reflecting its persistence in the environment.

## What happened in 2005-06?

### River and stream health

Last year's monitoring showed that nine of the 56 river and stream sites we monitor had very good water quality and complied with guidelines for all six water quality indicators we use to measure overall stream health. A further 14 sites exceeded the guideline value for just one indicator. As with previous years, the sites with good water quality generally flow through areas with little or no human influence in catchments where at least half the land is covered in indigenous vegetation. These are sites on rivers flowing out of the Aorangi, Tararua and Rimutaka ranges and include the Hutt, Tauanui, Waiorongomai, and Tauherenikau rivers, and the upper reaches of the Otaki, Waikanae, Wainuiomata, Waiohine and Ruamahanga rivers.

Once out of the bush cover of the ranges, the influence of the agricultural and urban land uses takes over and the water quality declines. The indicator that failed the guideline most often was dissolved reactive phosphorus (39 sites failed), followed by water clarity (33 sites failed) and then *Escherichia coli* bacteria (26 sites failed). The sites with the poorest water quality are on the Mangapouri and Waiwhetu streams, and the Mangatarere and Tauweru rivers. These rivers have catchments influenced mostly by agricultural or urban land use, or a combination of the two.



We can get a rough picture of how good the water quality is by checking the level of compliance with guidelines for six water quality indicators (water clarity, dissolved oxygen, dissolved reactive phosphorus, nitrite-nitrate nitrogen, ammoniacal nitrogen and *Escherichia coli*). The water quality index ratings here are based on two years' data from July 2004 to June 2006.

## Lake Wairarapa

Lake Wairarapa is the only large lake in the region, and the only lake where we monitor water quality. Since the Ruamahanga River was diverted from the lake in the 1970s, its catchment is now largely in indigenous forest. Results from last year's monitoring are similar to previous years with the lake water quality remaining in a poor state indicated by high levels of phosphorus, nitrogen, chlorophyll a, and poor water clarity.

Last year we investigated the usefulness of using zooplankton composition as a way of checking water quality. Zooplankton is an important part of a lake ecosystem and provides a measure of whether changes in water quality are affecting a lake's ecosystem. Early results agreed with the physical and chemical measures that indicated poor water quality.

## Contamination of stream sediments

Over the last two years we have investigated stream sediment contaminant concentrations in about 25 urban streams. The surveyed streams are all affected by stormwater discharges from industrial or residential areas or a combination of these. We checked the sediments for heavy metals, polyaromatic hydrocarbons, and organochlorine pesticides (such as DDT). The 2005 sample results showed that nearly a third of the streams sampled exceeded one or more of the 'high' trigger values of the national interim sediment quality guidelines. In most cases, the trigger value exceeded was for the now banned pesticide DDT. Elevated zinc concentrations were also common in streams flowing through Wellington city and Masterton.

High concentrations of heavy metals (notably copper and zinc) are generally found in the fine sediments in stormwater. Our urban streams didn't have many fine sediments so it is likely that they – and the contaminants attached to them – are flushed from the streams to the coastal marine area (see Harbours, estuaries and beaches report card).

Most of the contaminants we found are commonly found in stormwater runoff from industrial yards, roads, carparks and roofs. The widespread detection of DDT reflects its persistence in the environment (see Soil health report card).

## What is Greater Wellington doing?

Monitoring stream and river health at 56 sites around the region, and monitoring changes in stream health and bank stability above and below three riparian planting projects.

Providing advice to landowners about streamside management. In 12 high quality catchments we provide plants to landowners who have fenced off streams. Email [riparian@gw.govt.nz](mailto:riparian@gw.govt.nz) or visit [www.gw.govt.nz/streams](http://www.gw.govt.nz/streams) if you'd like to know more.

Working with city and district councils on an action plan to improve stormwater management.

Supporting 24 care groups working on improving streamside and wetland environments around the region.

## What can you do?

Keep animals, especially cattle and deer, out of rivers and streams.

Don't put chemicals or any other waste in stormwater drains, rivers or streams.

Join Greater Wellington's "Be the Difference" programme and learn some easy steps to help the environment for generations to come, with cleaner streams and less waste. Sign up on-line at [www.bethedifference.gw.govt.nz](http://www.bethedifference.gw.govt.nz), phone 0800 496 734, or write to Be the Difference, PO Box 11646, Wellington.

## Freshwater fish surveys

Fish are an important ecological part of rivers and streams and can be useful indicators of the life supporting capacity of waterways. Over the last year staff surveyed fish presence in some streams where we had little information about fish numbers and diversity.

The Awhea River begins in low elevation hills in the south east of Wairarapa and flows to the coast near Tora. Its catchment is mainly in pasture and its geology is mostly soft-sedimentary. When it was surveyed for fish for the first time last November we found redfin and Crans bullies, longfin and shortfin eels, as well as inanga and koaro – both migratory whitebait species when in their juvenile form. There were good numbers of all fish.

The Parkvale Stream is a lowland stream east of Carterton. It is one of the many small Ruamahanga tributary streams in the Wairarapa valley. It flows almost entirely through pasture and has a catchment geology that is mostly alluvium. As well as brown mudfish, a native fish classed as being in gradual decline nationally - and the only species previously recorded from this location - this stream had abundant populations of shortfin eels, upland bullies and koura (freshwater crayfish). Unfortunately we also found rudd, an introduced noxious species that damages stream habitat and competes with native fish for food.



The banded kokopu (pictured) wasn't seen in the Awhea River or Parkvale Stream when we surveyed there last year, but is reasonably common in other streams around the Wellington region. We use a model (point, click, fish) to predict what sort of streams various fish species are likely to be in. Every year we gather more information about the distribution of fish and check the results against the model.

## More information

If you would like any more information about river and stream health, visit our website at [www.gw.govt.nz](http://www.gw.govt.nz) or contact:

Alton Perrie (freshwater scientist). Phone 06 378 2484, email: [alton.perrie@gw.govt.nz](mailto:alton.perrie@gw.govt.nz)



# Rainfall and river flows 2005–06

## Key points:

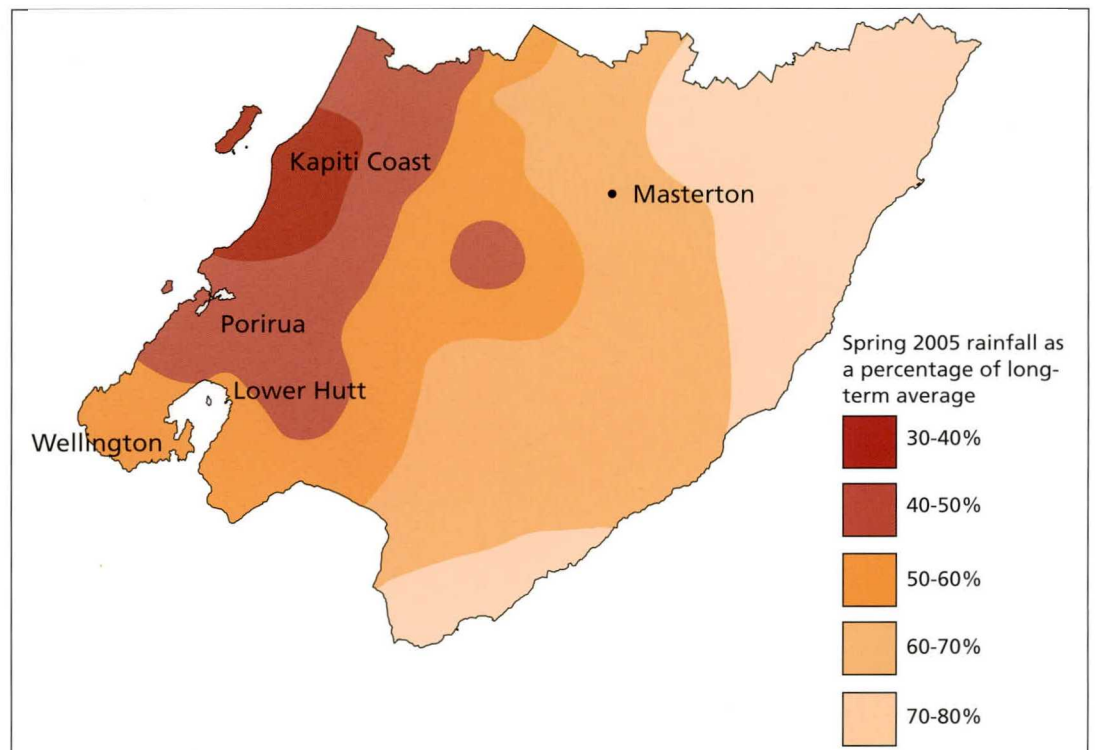
- Spring 2005 was unusually dry, particularly in the west of the region.
- River flows were lower than normal throughout spring and also into summer, triggering restrictions on water permits.
- Low rainfall and warm temperatures in spring contributed to blue-green algal blooms in some rivers.

## What happened during the year?

### Low rainfall in spring

The 2005-06 year was notable for its very dry spring. Rainfall was particularly low during August, September and November 2005, and the rainfall total for spring (September to November) was below average throughout the Wellington region. As shown by the map, the driest areas were in the west of the region. In parts of the Kapiti coast spring rainfall was only about 30% of that usually expected at the time of the year.

The dry weather was caused by more frequent anticyclones than normal producing stable conditions over the region. Spring is usually a time of weather extremes, but last spring had significantly fewer storms than usual for the time of the year.



Rainfall received during Spring 2005 (September-November) as a percentage of the long-term average spring rainfall. The map shows that in the west of the Wellington region rainfall was less than half the amount expected for the time of the year, and in some places it was as low as 30% of normal.

The dry spring resulted in very low river flows for the time of the year, and less recharge to rainfall-fed aquifers (see Groundwater report card). The low river baseflows going into summer meant that, although summertime rainfall was about normal, the river flows generally remained below average through until autumn 2006. In many of the region's rivers, flows dropped to levels that triggered restrictions on permits to take water. The restrictions are set at flow levels that are needed to protect the life in the rivers.

## River flows and blue-green algal blooms

During late spring and early summer 2005, blue-green algal (cyanobacteria) blooms were found in the Hutt, Otaki, Waikanae, and Waipoua rivers (see Recreational water quality report card). The causes of algal blooms in rivers are complex, but it is likely that low rainfall and river flows during the period combined with warmer than average temperatures to produce necessary conditions for algal growth.

During spring 2005 the weather was unusually stable, and so the rivers experienced fewer 'freshes' than normal. The graph (right) shows that river flows in the Hutt River were well below average and more stable than normal, particularly during August, September and November. The lack of high river flows to 'flush' the river meant that thick mats of algae were able to develop in many rivers.

## What is Greater Wellington doing?

Monitoring rainfall, river flows and lake levels at over 70 automatic recording stations across the region.

Checking compliance with resource consents to take water from rivers and streams, and issuing water restrictions when appropriate.

Developing an automated warning system that detects when river flow conditions may be conducive to proliferations of blue-green algae.

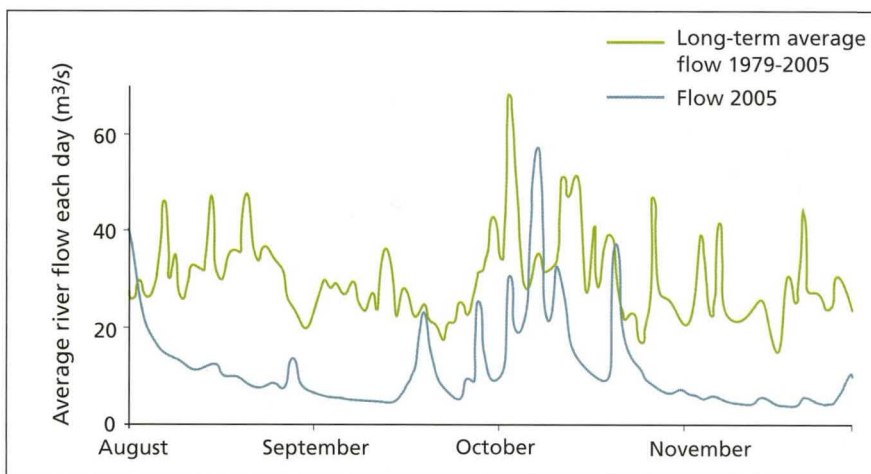
Operating a flood warning system, which involves monitoring river levels, forecasting flood peaks, and issuing warnings to people who may be affected.

Undertaking scientific investigations, such as fish habitat surveys, to make sure that minimum flows in the Regional Freshwater Plan are set at appropriate levels.

## What can you do?

Conserve water by watering your garden deeply once or twice a week during dry spells, rather than watering lightly every day. This encourages deeper-growing roots, making the plant more able to survive drought.

If you see water leaking from a water toby on the footpath or the road, report it to your local city or district council.



River flows in the Hutt River at Taita Gorge during August to November 2005. The blue line indicates the actual flow measured during winter and spring 2005; the green line shows the long-term mean flow for each day.



Greater Wellington staff measuring flows in the Waikanae River. We did this at about ten places along the river upstream from Waikanae to find out how much water was leaking between the river and groundwater. Both the river and the aquifer are used for water supply and we need to know the relationship between them so we can work out how much water it is safe to take.

## More information

Current river flows and rainfall data are posted on our website: [www.gw.govt.nz](http://www.gw.govt.nz). This information is updated every three to six hours. Current river flow and rainfall information can also be obtained by phone. Calls cost 12 cents per minute.

The numbers to call are:

08 322 0170 for Hutt Valley

08 322 0150 for Kapiti Coast

08 322 0190 for Wellington and Porirua

08 322 0650 for Wainuiomata and Orongorongo

08 322 0669 for Wairarapa rivers

08 322 9069 for Wairarapa rainfall and Lake Wairarapa levels.

For any other information, please contact:

Laura Watts (Wellington office)

Phone: 04 802 0339

e-mail: [laura.watts@gw.govt.nz](mailto:laura.watts@gw.govt.nz)

Mike Gordon (Wairarapa office)

Phone 06 370 5650

e-mail: [mike.gordon@gw.govt.nz](mailto:mike.gordon@gw.govt.nz)

Freephone Greater Wellington:  
0800 496 734



# Groundwater 2005–06

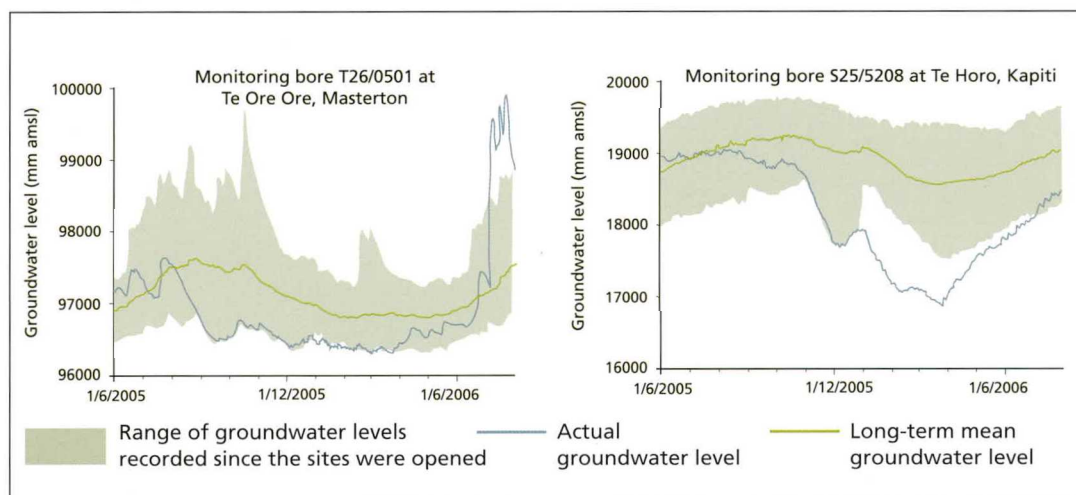
## Key points:

- Record low groundwater levels in confined Kapiti groundwater systems during spring and summer.
- Record high groundwater levels in unconfined Wairarapa groundwater systems during winter.
- Demand for groundwater continues to increase, especially in the Wairarapa where allocation has more than doubled over the last 10 years.

## What happened in 2005–06?

A dry spring in 2005, especially on the Kapiti coast, resulted in lower than average recharge to rainfall-fed aquifers. This led to record low groundwater levels occurring in these aquifers over much of the Kapiti coast throughout summer and well into winter.

In 2006, an exceptionally wet winter in the Wairarapa led to shallow groundwater levels reaching record highs. In many areas the water table reached the ground surface and springs were seen in areas where they had never been noticed before.



Groundwater levels around Masterton, which had been at record lows since winter 2005, stayed low throughout summer before reaching record highs in July 2006 after the prolonged rain in the Wairarapa. In Kapiti, record low levels at the beginning of summer 2006 fell even lower in spring and stayed low into winter.

## Groundwater use

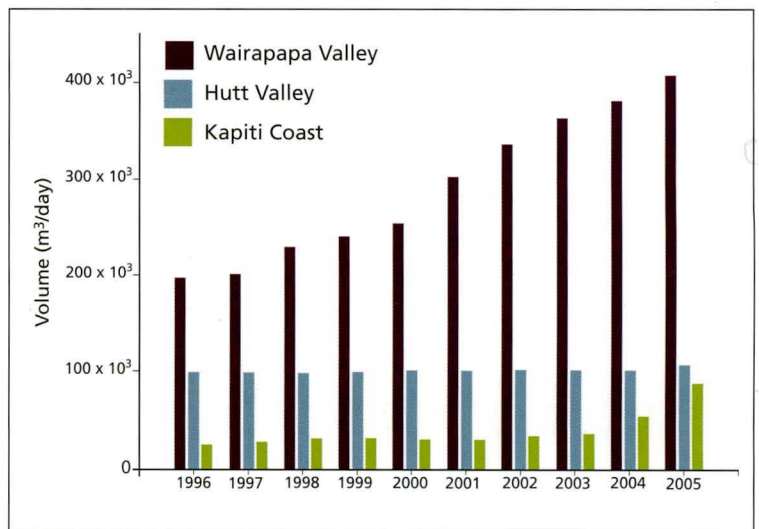
Groundwater under the Hutt Valley supplies about a third of the water to reticulated areas in Wellington, Porirua, Upper Hutt and Hutt cities. The rest of the water supplied to those cities comes from the Hutt, Wainuiomata and Orongorongo rivers. Otaki, Waikanae, Carterton, Greytown, Featherston and Martinborough also rely on groundwater for public supply. In the rural areas of the Kapiti coast and in the Wairarapa groundwater is used for domestic supply, stock water and irrigation.

As well as providing water for the region's people and industries, groundwater supports numerous streams and rivers, springs and many of the region's wetlands. Changes in groundwater levels can affect the flow of springs and streams and water levels in wetlands. If groundwater levels drop too far, these water bodies can dry up. If continued abstractions keep the groundwater level low, the dependent ecosystems can be permanently affected.

The highest diversity of wetland plants occurs in wetlands with seasonal changes in water levels. We need to manage the amount of water taken from groundwater so that the wetlands support as much life as possible.



Greater Wellington has authorised a substantial increase in groundwater use in the region over the last 10 years. Most of this increase has been in the Wairarapa, where a high demand for irrigation water has seen the allocated volume more than double from 200,000 cubic metres per day in 1996 to over 400,000 cubic metres per day today. Allocation in the Hutt aquifers has stayed at around 100,000 cubic metres per day over this time because the main aquifer system, the Lower Hutt groundwater zone, has been fully allocated (87% for public water supply) for a number of years. Increasing abstraction on the Kapiti coast – now approaching 100,000 cubic metres per day – is mainly to supplement Kapiti Coast District Council’s surface water abstraction for public water supply and is only used when water levels in the Waikanae River are too low to allow water to be taken.



Irrigation demand in the Wairarapa has led to more and more water being taken from Wairarapa groundwater resources.

## Groundwater quality

Greater Wellington monitors groundwater quality at 80 sites around the region. We test the water every three months for a wide range of physical and chemical parameters including bacteria, nutrients and metals. We also undertake more localised surveys to assess the impacts of land use activities such as farming and on-site wastewater disposal.

Our monitoring has shown that 44% of sites in unconfined or semi-confined aquifer systems (these are the most vulnerable groundwater systems) show elevated levels of nitrate nitrogen – an indication that land uses such as dairying and dry-stock farming, and septic tanks, are affecting the quality of our groundwater.

Untreated groundwater is the main potable water source for a lot of residents outside main urban areas and towns. Protecting the shallow groundwater through balancing nutrient application to the pasture requirements, careful effluent management and effective on-site wastewater disposal is important to help protect this valuable resource.

## More information

If you would like to know more about groundwater, visit our website at [www.gw.govt.nz](http://www.gw.govt.nz) or contact:

Tim Baker (Groundwater scientist, Masterton office).

Phone 06 378 2484, email [Tim.Baker@gw.govt.nz](mailto:Tim.Baker@gw.govt.nz).

Andrew Jones (Groundwater scientist, Wellington office).

Phone 04 384 5708, email [Andrew.Jones@gw.govt.nz](mailto:Andrew.Jones@gw.govt.nz).

## Wairarapa groundwater model

The increase in demand for groundwater in the Wairarapa Valley has prompted Greater Wellington to undertake a regional-scale study to improve our understanding of the Wairarapa groundwater system. We need to know where it comes from, how much there is, and where it goes because our current information suggests that no more water can be taken from these aquifers without long term effects. We need to confirm if allocation limits for aquifers have been set correctly to protect groundwater supplies and to help prevent streams, springs and wetlands from drying up.

Phase one of this project involved the development of a steady state model for groundwater in the Wairarapa Valley. The steady state model gives us a regional representation of the groundwater system and defines recharge areas, groundwater flow directions and groundwater discharge areas.

The next phase is to refine the model so that it accounts for what happens over time. The basic role of this model is to simulate groundwater flows under current and projected abstraction demands. This step will help us to identify areas vulnerable to abstraction and to re-assess abstraction limits so that the groundwater resource can be sustainably managed.

## What is Greater Wellington doing?

Monitoring groundwater quality at 80 sites across the region to check long-term changes in aquifer chemistry.

Monitoring groundwater levels at 138 sites across the region.

Targeted monitoring of nitrate levels in the areas of the region most vulnerable to contamination.

Developing a groundwater model of the Wairarapa Valley to improve our understanding and management of this large groundwater resource.

## What can you do?

If you have your own bore for a domestic water supply, get the water tested regularly, we suggest annually. Greater Wellington staff can advise on how to get the water tested.

Read the technical report of groundwater quantity and quality prepared for our five-yearly state of the environment report last year. This report is available on our website at: [www.gw.govt.nz/ser](http://www.gw.govt.nz/ser) under "Freshwater".

# Harbours, estuaries and beaches 2005–06

## Key points:

- Heavy metal and organic contaminants have accumulated in the sediments of Porirua Harbour but have not reached concentrations that would adversely affect animals that live on or in the sea bed.
- Shellfish in coastal waters near urban areas have been exposed to some heavy metal contaminants but concentrations in their flesh are within guidelines for human consumption.
- The sandy beaches and river estuaries along the west coast of the region are generally healthy.
- Diuron, used to boost the toxicity of some antifoulants used on boat hulls, has been detected in some coastal areas near marinas.

## What happened in 2005–06?

### Porirua Harbour sediment quality investigation

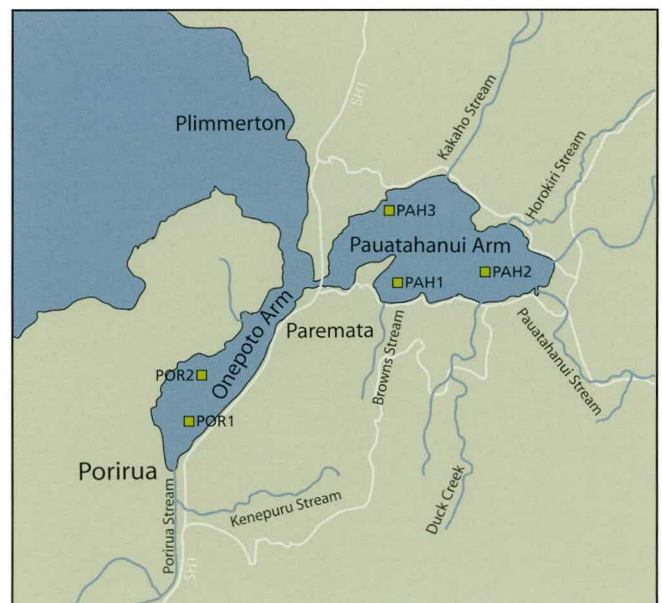
Over the last two years we have been investigating the quality of marine sediments in Porirua Harbour to establish the level of contamination from urban areas and determine any trends in their concentrations. Five sub-tidal sites (that is, always covered by water) have been assessed - two in the Onepoto Arm and three in the Pauatahanui Arm. We are focussing our monitoring in places like Porirua and Wellington harbours because these areas – unlike the south coast on Cook Strait for example – are low energy environments and contamination can build up in the sediments.

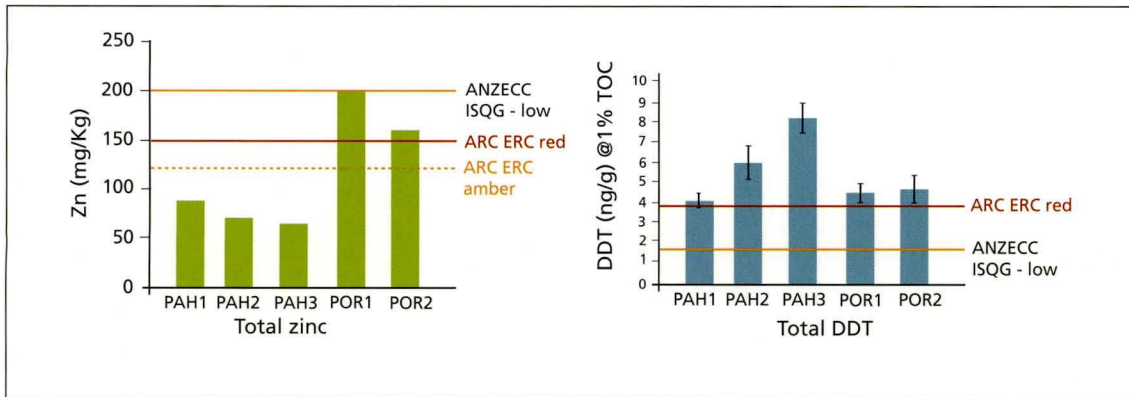
The results from sediment samples taken in May 2004 and October 2005 revealed copper, lead, and zinc concentrations were above national sediment quality guidelines in the Onepoto Arm sediments, but not in the Pauatahanui Arm sediments. Concentrations of other heavy metals, organochlorine pesticides, polycyclic aromatic hydrocarbons, and organotins in the surface sediments of both arms of the harbour were below guidelines with the exception of the now banned pesticides DDT and dieldrin. DDT concentrations are particularly elevated in the Pauatahanui Arm, reflecting historical and ongoing loads of rural sediment deposited in the harbour from the surrounding farmland. Recent studies of stormwater and stream bed sediments in the catchment confirm that metals and DDT are continuing to get to the harbour (see Rivers and lake health report card).

In 2004 and 2005 we also collected samples of benthic fauna (small animals that live on or in the sea bed) from both arms of the harbour. A total of 62 species were found, mainly worms and bivalve molluscs such as the nutshell *Nucula hartvigiana*. In the 2004 study, 48 of the 51 species observed were present in the Pauatahanui Arm whereas the Onepoto Arm only had 34 species.

The lower number in the Onepoto Arm is more likely to be related to the different physical habitat (this arm is muddier than the Pauatahanui Arm) rather than sediment contaminant concentrations. Analysis of the results suggests that contaminant concentrations are not adversely affecting the benthic fauna at the moment.

Scuba divers took samples of marine sediments at these five sites in Porirua Harbour so we could test them for heavy metals and other contaminants that persist in the environment for a long time. At each site the divers collected 25 sediment cores 50 mm diameter x 120 mm deep. The Pauatahanui Arm of the harbour, often called the Pauatahanui Estuary or Pauatahanui Inlet, is a regionally and nationally significant natural resource. It is classified as an area of significant conservation value in our Regional Coastal Plan, and as a site of special wildlife interest (SSWI) by the Department of Conservation.





Total zinc and average total DDT concentrations recorded in sub-tidal sediments from the Porirua Harbour in October 2004. Guidelines indicating possible and probable adverse effects are shown in orange and red. Although DDT-based pesticides are no longer in use, recent studies of stream bed sediments and urban stormwater confirm that DDT contaminated soil is still getting washed into streams.



Collecting blue mussels at Point Jerningham, Wellington Harbour.

## Shellfish quality

During February and March 2006, flesh samples of tuatua (Kapiti Coast), cockle (Porirua Harbour) and blue mussel (Wellington Harbour) were analysed for bacteria and trace metals. The sample results showed that:

- Faecal coliform indicator bacteria were detected in only a few samples of the three species of shellfish examined. No samples had bacteria present at a concentration that exceeded the NZ Food Safety Authority guidelines for edible tissue.
- Cadmium, chromium, copper, lead, mercury, nickel and zinc were present in the three species of shellfish examined. None of these metals were present at a concentration that exceeded the NZ Food Safety Authority guidelines for edible tissue. On average, the highest metal concentrations were found in blue mussels collected beside Frank Kitts Park and the Thorndon container terminal in Wellington Harbour.

## Antifouling agents investigation

In February 2006, seawater samples were collected from seven coastal sites and analysed for the antifouling co-biocides Irgarol 1051 and diuron. No Irgarol was detected in any sample, however, diuron was found in six of the seven samples. The highest concentrations were recorded at Seaview and Mana marinas. Lower concentrations were found at Evans Bay marina, Port Nicholson Yacht Club and Chaffers marina. At this stage it does not appear that the use of diuron is having an adverse effect on coastal water.

## What is Greater Wellington doing?

**Monitoring** sediment quality and ecological health in sensitive receiving environments such as the Porirua Harbour.

Preparing a coastal **monitoring strategy** that addresses monitoring requirements relating to such things as coastal water and sediment quality, ecological health and contaminants in shellfish flesh.

Supporting ten **care groups** working on improving beach, estuary and other coastal environments around the region.

Preparing a coastal and marine biodiversity action plan to set up projects to look after coastal ecosystems.

## Coastal beach habitat surveys

Last summer Greater Wellington mapped the sand, shingle and vegetation habitat of beaches and river estuaries along the Kapiti coast south to Titahi Bay and Makara Estuary. We found that generally the inter-tidal habitats were in a healthy condition, with no obvious signs of nutrient enrichment or heavy metal contamination. The fauna in the sandy beaches were dominated by amphipods, isopods, oligochaete worms and polychaete worms, while the muddier estuarine habitats supported a range of amphipods, gastropod snails and polychaetes.

There were localised impacts in some areas, mostly associated with residential development along the coast and the subsequent loss of coastal margin habitat and increases in erosion protection works.



Paraparaumu Beach on the Kapiti Coast was one of the sandy beaches surveyed last summer.

## What can you do?

Save the drain for rain. Stormwater drains go from the roadside directly to streams or the coast. Never put paint, oil or any other waste into stormwater drains. Paints (oil and water-based) and thinners are toxic to aquatic life, and discolour streams and coastal water.

## More information

If you would like more information about coastal water quality, visit our website at [www.gw.govt.nz](http://www.gw.govt.nz) or contact Juliet Milne, Surface Water Quality Scientist

Phone: 04 384 5708

E-mail: [juliet.milne@gw.govt.nz](mailto:juliet.milne@gw.govt.nz)





# Recreational water quality 2005–06

## Key points:

- Coastal water quality was suitable for swimming on all occasions monitored at 47 of the 76 beaches monitored during the 2005-06 bathing season.
- River water quality was suitable for swimming on all occasions monitored at nine of the 23 swimming spots during the 2005-06 bathing season.
- Water quality, especially in rivers, was most likely to be unsuitable for swimming during and shortly after rain.
- Some rivers were affected by blue-green algae over the summer.

## What happened in 2005–06?

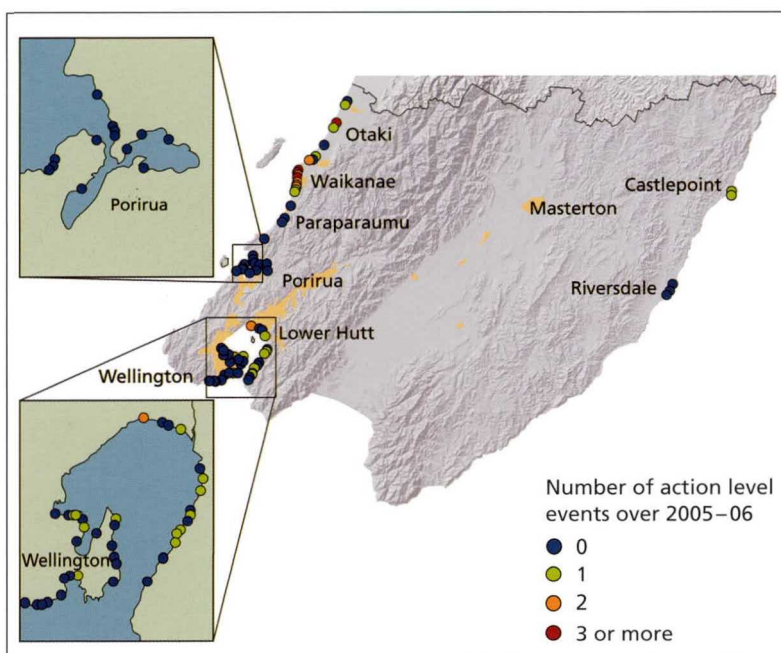
### Coastal waters

Recreational water quality was good at most of the region’s coastal beaches throughout the 2005–06 bathing season. Although 29 of the 76 sites monitored exceeded the “action” level (280 enterococci/100mL) of the national marine bathing microbiological water quality guidelines during the bathing season, 19 of these sites exceeded the guideline only once. Almost all of the high results were on the Kapiti coast where four sites exceeded the “action” guideline on three or more occasions. On one occasion in early February, a health warning sign was erected at Paraparaumu Beach after follow-up sampling showed the “action” guideline was still being exceeded.

In contrast to 2004-05, none of the 14 sites in the Porirua district exceeded the “action” guideline last summer. This was most probably because Porirua had below average rainfall over this period and so there was less urban and agricultural runoff into tributary streams and drains.

Over a third of the 46 cases where sites exceeded the “action” guideline coincided with more than 10 mm of rainfall in the 72 hours prior to sampling. At some bathing sites elevated enterococci counts were attributed to poor water quality in rivers and streams flowing into the coastal water. This was the case along Te Horo Beach and Paraparaumu Beach on the Kapiti coast, where strong north-west winds at the time would have kept the contaminated stream water inshore. Sediment re-suspension from high wave energies and/or strong winds also influenced water quality at some sites.

Several coastal areas were affected by sewer overflows, spills and wastewater discharges for a short time over the summer. These were Porirua Harbour near Titahi Bay, some of the eastern bays of Wellington Harbour, and Aotea Lagoon on Wellington City’s waterfront. Health warning signs were placed at affected areas and additional water quality sampling was conducted at nearby beaches directly after these pollution events until results came up clear.



Summary of compliance with the recreational water quality guidelines for 76 marine bathing sites monitored over the 2005-06 summer. For up-to-date results about water quality over the summer bathing period, check our website at <http://www.gw.govt.nz/on-the-beaches>.

## Fresh waters

Fourteen of the 23 freshwater sites monitored over the 2005-06 summer exceeded the "action" level (550 *E. coli*/100 mL) of the national freshwater bathing microbiological water quality guidelines. Twelve of these 14 sites exceeded the guideline on two or more occasions. Two sites – the Hutt River at Silverstream and Riversdale Lagoon – exceeded the "action" guideline on six occasions.

Seventy per cent of the cases where freshwater sites exceeded the "action" guideline coincided with significant ( $\geq 10$  mm) rainfall in the 72 hours prior to sampling. High bacteria levels in fresh waters are typically related to urban and agricultural runoff, and re-suspension of stream sediment during rainfall events.

Early last summer we found mats of cyanobacteria (blue-green algae) in some reaches of the Otaki, Waikanae, Hutt and Waipoua rivers. Cyanobacteria can produce cytotoxins that can make people sick and fatally poison some animals - dogs can die within hours of eating even small amounts. Regional Public Health and the city and district councils put up health warning signs advising people to keep away from affected rivers in the region.

## What is Greater Wellington doing?

Together with city and district councils Greater Wellington monitors and reports on recreational water quality at 76 coastal sites and 23 freshwater sites around the region. Water is sampled weekly from 1 November to 31 March and the results are assessed against the national recreational water quality guidelines so that we can advise people whether or not, from a public health perspective, the water is suitable for swimming and other forms of contact recreation.

Determining the suitability of our bathing sites for contact recreation, based on microbiological risk factors (e.g., stormwater outfalls, stock access) and the results of recent water quality monitoring.

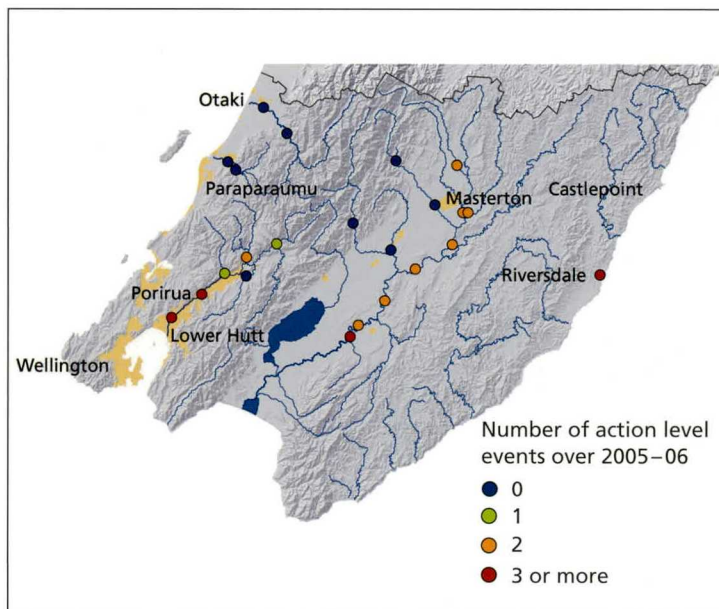
Monitoring coastal water quality at six locations to determine whether it is safe to gather shellfish for human consumption.

## What can you do?

Keep animals, especially cattle and deer, out of rivers and streams.

Don't pour paints, oils or other chemicals or waste into stormwater drains, streams or rivers.

Join Greater Wellington's "Be the Difference" programme and learn some easy steps to help the environment for generations to come, with cleaner waterways and less waste. Sign up on-line at [www.bethedifference@gw.govt.nz](mailto:www.bethedifference@gw.govt.nz), phone 0800 496 734, or write to Be the Difference, PO Box 11-646, Wellington.



Summary of compliance with the recreational water quality guidelines for 23 freshwater bathing sites monitored over the 2005-06 summer.



Cyanobacteria mats in the Hutt River at Melling Bridge, 18 November 2005. The presence of extensive cyanobacteria mats is linked with low river flows and warm weather (see Rainfall and river flows report card). These mats can grow even in clean or unpolluted rivers.

## How do we tell you if it is safe to swim?

Greater Wellington uses the national microbiological water quality guidelines "traffic light" system to let people know whether water at the beaches and in the rivers is suitable for swimming, surfing, and other recreational activities.

**Green** (surveillance) for go – sampling indicates a low health risk.

**Amber** (alert) for caution – sampling indicates the health risk has increased, but is still within an acceptable range.

**Red** (action) for stop – sampling indicates the water poses an unacceptable health risk.

## More information

If you would like more information about recreational water quality, visit our website at [www.gw.govt.nz/on-the-beaches](http://www.gw.govt.nz/on-the-beaches) or contact Juliet Milne, Surface Water Quality Scientist

Phone: 04 384 5708

E-mail: [juliet.milne@gw.govt.nz](mailto:juliet.milne@gw.govt.nz)



## Soil health 2005–06

### Key points:

- Most of the soil sites (22 out of 25) tested last year have good soil quality but soils used for market gardening showed a decrease in organic matter from the low levels recorded five years ago.
- Soils under dairy farms continue to show high phosphorus levels and high compaction.

### What happened in 2005–06?

#### Soil quality

In 2001 Greater Wellington began sampling soils at 118 sites representing a range of land uses – arable cropping, horticulture, market gardens, pasture and indigenous vegetation – on different soil types. The first round of sampling was completed in 2004-05, and last year we began the repeat sampling at 25 of the sites. Soil samples were analysed to find out the physical and chemical qualities of the soil (things like soil structure, and carbon and nutrient content). As well as checking soil quality, the samples were analysed for arsenic, cadmium, chromium, copper, nickel, lead and zinc.

The results of our latest sampling show that soil quality indicators were met at nine sites, with 13 sites failing on one indicator only – usually soil compaction. Only three of the 25 sites failed on more than one indicator.

It seems that the quality of soils under intensive agricultural use has deteriorated over the three to five years since those sites were first sampled. On market garden and arable cropping sites there has been a decrease in soil organic matter while soils on dairy farms confirmed previous findings – soil compaction and high levels of phosphorus (measured as Olsen P).

The heavy metal testing showed that there was a marked increase in zinc on most dairy farms, possibly because it is used to treat facial eczema. Apart from elevated levels of zinc and copper in some sites, and a high cadmium concentration at one dairy farm site, all other samples showed heavy metals at no more than 'background' concentrations.

#### Soil conservation

Greater Wellington works with landowners to help control erosion, particularly in the east Wairarapa hill country. Last year we helped 161 landowners plant 23,400 poplars and willows on 328 hectares of erosion-prone land. A further 93 hectares were established in conservation woodlots, and 1.3 kilometres of shelterbelts were established to decrease the effects of wind erosion on alluvial soils.



Our second round of soil monitoring showed that some soils under pasture are compacted. Soil compaction is a problem because the soil has less air spaces and so water and nutrients can't get through to the lower soil layers and pasture can't grow very well.



Poplars are used by many hill country farmers in the Wairarapa to stabilise erosion prone land. Without them, more soil would have washed off this farm in Pakaraka, near Masterton during the winter 2006 storms that hit on the property. Eroded hill sides can take more than 30 or 40 years to heal.



Forestry is probably the best use of land in some of the eastern Wairarapa hill country though there is a risk of soil loss for two or three years after harvesting.

## What is Greater Wellington doing?

Sampling and testing soils to understand the quality of soils across the region.

With city and district councils, and using guidelines produced by the Ministry for the Environment, we provide advice to landowners about contaminated sites.

Regulating large-scale vegetation removal and soil disturbance on erosion-prone land. District and city councils control vegetation removal and soil disturbance on all other land. In 2006-07 Greater Wellington will review the effectiveness and efficiency of the provisions in the Regional Soil Plan and take appropriate action where this is shown to be necessary.

Providing advice to landowners, and subsidising tree planting, so they can reduce erosion on their land.

## Soil contamination

In 2003 we reported on the results of soils tested for persistent pollutants in 40 locations around the region. The investigation was undertaken to find out what would be a 'normal' or 'background' level of contamination for soils in and around areas where people live and work.

When a landowner suspects that soil on their property is contaminated, we can use the results of this investigation to see if this is, in fact, the case or whether the levels are 'normal' or 'background' for that soil type in that location. If the soils are contaminated, we can use the results to provide guidance on clean-up requirements and establish what needs to be monitored to assess the level of harm from the soils.

In 2005-06 we sampled soil at 14 new locations, this time in the Wairarapa.

The main findings of this study were:

- Concentrations of heavy metals in coastal and terrace soils were within the range found in the 2003 study and are consistent with expectations for uncontaminated soils.
- Concentrations of polyaromatic hydrocarbons (PAHs) were similar to those seen in previous studies and were consistent with concentrations expected in uncontaminated soils.
- Low concentrations of the now banned pesticide DDT and its breakdown products (DDE and DDD) were found in 11 of the 14 samples tested. Though levels were less than international risk-based intervention limits, the presence of these substances demonstrates how long they remain in soils without breaking down. This can become a problem if the soils are eroded and end up in stream beds and coastal sediments (see Harbours, estuaries and beaches report card).

## What can you do?

Compost your kitchen scraps and garden waste and add it to your soil.

Test your soil fertility before adding fertilisers so you only add what's needed for the crops.

Plant trees on erosion-prone land to promote soil conservation and provide shelter and shade for stock.

Take hazardous waste like old paint and used oil to the hazardous waste collection facility at the landfill or to the household hazardous waste collection run by your city or district council.

## More information

If you would like to know more about land management or soil monitoring, visit our website at [www.gw.govt.nz](http://www.gw.govt.nz) or contact:

Bruce Croucher (contamination and land scientist).

Phone 04 384 5708, email [bruce.croucher@gw.govt.nz](mailto:bruce.croucher@gw.govt.nz).

Dave Cameron (Manager, land management).

Phone 06 378 2484, email [dave.cameron@gw.govt.nz](mailto:dave.cameron@gw.govt.nz).

# Air quality 2005–06

## Key points:

- The region had low pollution levels last year, with only three high pollution nights recorded in one airshed (Masterton).
- Fine particulate matter is the only pollutant that approaches limits set in the National Environmental Standard.
- Domestic fires continue to be the main contributors to air pollution in winter.

## Focus on fine particle pollution

Fine particulate matter, also known as PM<sub>10</sub>, is made up of particles smaller than 10 microns (smaller than the width of a human hair). These fine particles are small enough to be breathed into people's lungs where they can harm that person's health. When levels of fine particles in the air increase, more people with heart and lung disease are admitted to hospitals.

Smoke from wood or other fuel burnt in wood burners or open fires contains fine particles. Fine particles are also present in car exhaust fumes and some industrial discharges, and are in natural sources such as wind-blown dust and sea spray.

On winter nights when people are burning wood or coal to heat their homes, fine particles discharged from their chimneys can build up in the surrounding air. On still, cold and clear evenings this polluted air is not dispersed until the morning when the air starts to move again.

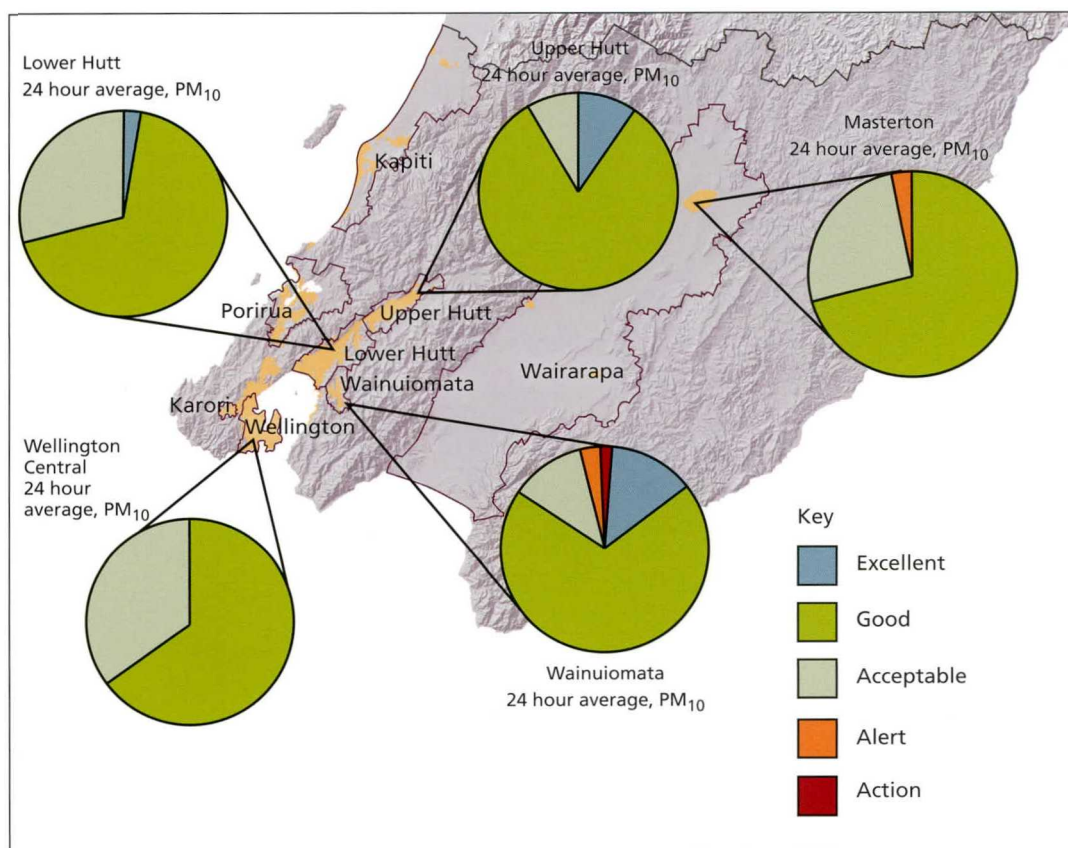


Figure 1: Levels of particulate matter (PM<sub>10</sub>) in five of the region's airsheds as measured at our monitoring stations in central Wellington, Upper Hutt, Lower Hutt, Wainuiomata and Masterton over the last year to 30 June 2006.

## What was our air quality like in 2005-06?

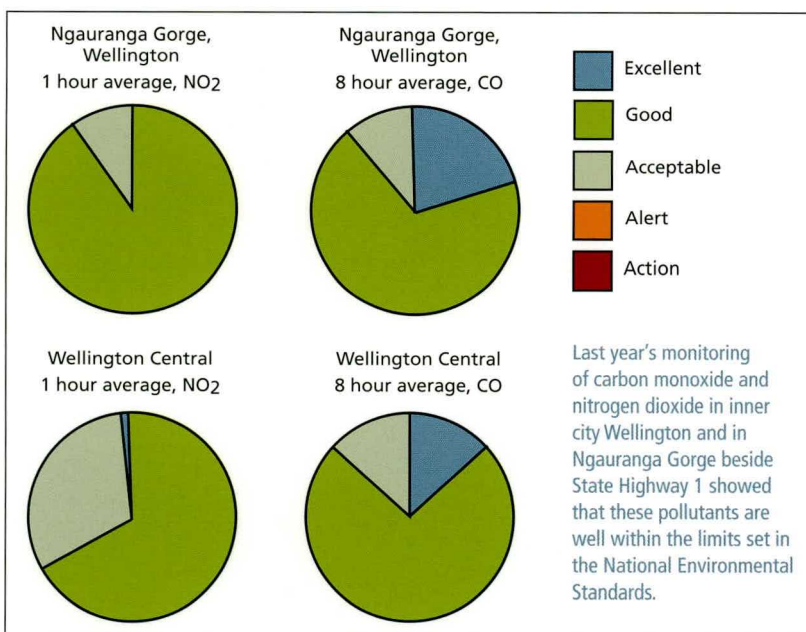
The quality of the region's air is shown in the pie graphs in Figure 1 on the other side of this card. The five colour categories in the pie graphs grade air pollution levels according to their relative health risk to people. The lowest level of risk is "excellent" (blue) where the contaminant concentrations are less than 10 per cent of the limit set by the National Environmental Standard. Greater Wellington's long-term goal is to achieve air quality that is "acceptable" or better (contaminant concentrations less than 66 per cent of the Standard). For PM<sub>10</sub>, this is a tougher target to meet than the Standard which requires only that fine particle pollution levels do not reach the 'action' level more than once per year.

During the 2006 winter there were three nights in Masterton where the level of particulate matter was just over the limit set by the Standard. The Standard allows one day per year where the limit can be exceeded. We are required to notify all other exceedences in a public newspaper. The limit in the Standard was not breached in any other airshed last winter.

The number of high pollution nights in any year is related to the weather and the monitoring method used. Studies of pollution in Masterton show that smoke from home fires is mainly responsible for the high levels of particulate matter in air during the winter months.

## Air quality beside busy roads

Fumes from motor vehicles can degrade air quality and make it unsafe to breathe. Greater Wellington maintains a permanent monitoring station for carbon monoxide and nitrogen dioxide at the corner of Vivian and Victoria streets in inner city Wellington, and has set up temporary stations beside State Highway 1 in Ngauranga Gorge and at Melling Bridge in Lower Hutt. Although the levels of pollutants recorded at these sites are higher than at the residential sites we monitor, the air quality measured last year is not a concern for people's health.



## More information

If you would like more information about air quality and air quality monitoring, visit our website at [www.gw.govt.nz/ser](http://www.gw.govt.nz/ser) or contact Tamsin Mitchell (Air quality scientist). Phone 04 384 5708 or email [tamsin.mitchell@gw.govt.nz](mailto:tamsin.mitchell@gw.govt.nz).

## National Environmental Standards for air quality

In 2004 the Ministry for the Environment introduced their National Environmental Standards for outdoor air quality. Limits have been set on some air pollutants to protect human health.

The Standard for fine particulate matter, which has applied since September 2005, is that in any 'airshed' the daily average concentration of particulate matter must not exceed 50 mcg per cubic metre of air (the airsheds in the Wellington region are shown in Figure 1 on the other side of this card). If this daily limit is breached after 2013, regional councils cannot grant any new resource consents to discharge fine particulate matter in that airshed.

## What is Greater Wellington doing?

**Monitoring.** We have a network of air quality monitoring stations around the region to track air pollution levels. We have permanent air quality monitoring stations in central Wellington City, Lower Hutt, Upper Hutt, Wainuiomata and Masterton, and two mobile monitoring stations that we set up in places suspected of having air pollution problems.

**Education.** We are working with school children through the Take Action programme to educate them about the effects of their activities on air quality and what they can do to reduce air pollution.

**Airsheds.** We have identified eight airsheds in the region: Wellington City, Lower Hutt Valley, Upper Hutt Valley, Wairarapa Valley, Porirua, Kapiti Coast, Karori and Wainuiomata. Airsheds are areas where contaminants can accumulate, such as valleys between steep hills.

## What can you do?

Walk, cycle or use public transport rather than a private vehicle when you can.

Insulate your house effectively and burn only clean dry wood in your fireplace. If you have a wood burner, follow the manufacturer's instructions.

Don't burn rubbish - in the fireplace or outside. Send paper and plastic for recycling and compost green waste.

Install only wood burners that meet the design and thermal efficiency standards set in the National Environmental Standard for air quality. These wood burners are clean burning with low levels of fine particle emissions. Contact the Ministry for the Environment ([www.mfe.govt.nz](http://www.mfe.govt.nz)) for more information about approved burners.

# Pollution control 2005–2006

## Key points:

- The number of incidents increased 9% from 2004-05.
- Incident numbers are increasing for most types of incident, with the exception of odour.
- Incidents of pollution by silt and liquid waste show the most significant increases.

## Incident response

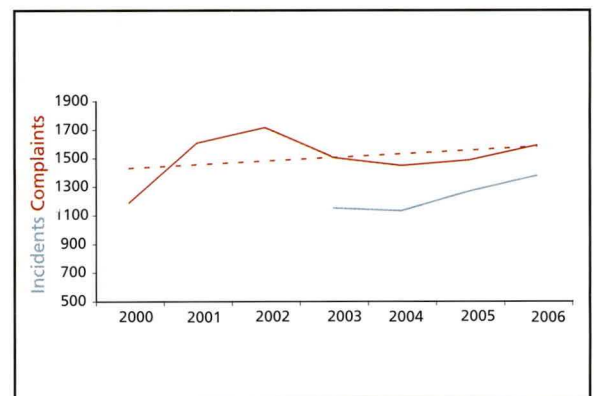
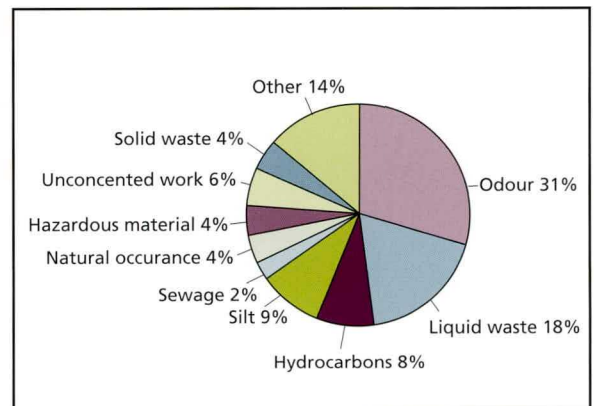
During 2005-06, the pollution control team responded to 1,368 environmental incidents, which gave rise to 1,579 individual complaints (some incidents, like odour, prompt more than one complaint). This was a small increase in both incident and complaint numbers compared to last year, and is consistent with the general trend since 1998.

The number of complaints for most incident types has been trending upward over recent years, with marked increases for incidents involving silt and liquid waste. Odour showed a marked decrease. The decrease is attributed to continued odour control improvements at the key source sites around the region.

## Significant incidents

These are some of the more significant pollution incidents that we responded to during 2005-06 (and the action we took):

- Pollution control officers attended 127 incidents where sediment was discharged into stormwater from subdivision developments with inadequate erosion and sediment control measures. The most significant discharges were from:
  - Ohiro Road (Brooklyn Holdings Limited)
  - Sweetacres Drive, Belmont (Barry Hayes property)
  - Staithe Drive, Whitby (Staithe Drive Developments Limited) see picture
  - Cortina Avenue, Johnsonville (McDonnell Homes)
  - Amesbury Drive, Glenside (Best Farms Limited)



Environmental incidents in the Wellington region

At all sites, Greater Wellington issued advisory notices, or abatement and infringement notices to the people responsible for the sediment discharge.

- A section of stream in Johnsonville was illegally piped during a subdivision development. Greater Wellington issued infringement fines of \$1,000 to the property owner, the engineering consultant and the contractor who undertook the works.

- Sewage was discovered leaking into the Karori Stream from a defective septic tank at Terawhiti Station farm. We took water samples to assess the level of contamination and asked the property owner to upgrade and repair the system to eliminate future discharges. The owner has replaced the septic tank and re-laid the field drains.
- Operational problems at the treatment plant for Taylor Preston's meatworks wastewater resulted in a discharge of stock effluent to the Ngauranga Stream on two separate occasions. Greater Wellington issued an infringement fine of \$1,000 for both these incidents.
- Developers of a lifestyle block in Wainuiomata dumped fill material in a wetland and illegally reclaimed a streambed. Greater Wellington issued an abatement notice requiring the fill material to be removed and issued an infringement fine of \$500.
- A large quantity of gravel was removed from the Waipoua riverbed without a resource consent causing discoloration of the stream and alteration of the channel. Greater Wellington issued an infringement fine of \$500.
- Stormwater runoff from Horokiwi quarry led to a significant sediment plume in Wellington Harbour on Anzac Day. A site management plan, with works to be completed by the end of 2006, was prepared by staff at Greater Wellington and the quarry.
- A construction company in Pauatahanui illegally piped and reclaimed a stream by filling it with construction and roading materials. Greater Wellington issued an abatement notice requiring the company to remove the material and to remove the pipe work or obtain the necessary consents. An infringement fine of \$750 was also issued.
- Failure of a lock bolt on a truck's tailgate caused 17 tonnes of meatworks waste sludge to spill onto State Highway 1 at Ngauranga Gorge. Pollution Control officers supervised a prompt clean-up ensuring that environmental effects were negligible.

## What can you do?

If you notice a pollution incident or an activity that you suspect does not comply with the Resource Management Act, call Greater Wellington's pollution hotline on 0800 496 734. This is a 24-hour service and our duty officer aims to respond within the hour on most occasions.

## What is Greater Wellington doing?

Our Take Charge pollution prevention team continued with their assessments of industrial and commercial sites in Paraparaumu. This was part of a programme to identify site practices that could be contributing to pollution of the Wharemauku Stream.

We have continued our Muddy Waters programme with the city and district councils to reduce the effects of earthworks on water quality. Last year we produced Small earthworks: Erosion and sediment control for small sites, a pocket sized best practice guide for contractors, regulatory agencies and consultants outlining a range of erosion and sediment controls.

## More information

If you want more information about how to avoid, reduce or respond to pollution, ring a member of our pollution control team on 04 384 5708 in Wellington, 06 378 2484 in Masterton, or ring 0800 496 734.

## Enforcement action summary

We took formal enforcement action where non-compliance with resource consents or regional rules resulted in adverse environmental effects that were more than minor (see table). Issuing advisory notices and requiring unconsented works to seek the necessary resource consents continue to be a cost-effective way to address most matters of non-compliance.

We are continuing to recover investigation costs - rather than issuing infringement fines - from people whose activities are non-compliant but where the environmental effects are only minor. Last year \$6,000 was recovered.

Last year we reported that the enforcement orders for illegal works in a tributary of the Owhiro Stream at Ohiro Road were appealed to the High Court by Ohiro Properties Limited. This appeal has been abandoned, leaving the original orders but the work has still not been completed. The stream has naturally cut back through these works and has formed a new channel.

Type of action	2005-06 (2004-05)
Advisory notices	58 (61)
Infringement notices	44 (21)
Abatement notices	24 (26)
Enforcement orders	0 (2)
Water shortage directions	0 (0)
Prosecutions	0 (0)



Sediment discharges from Staithe Drive, Whitby caused repeated discoloration at Browns Bay, Pauatahanui. After investigation of an earthworks site on Staithe Drive, we issued an abatement notice requiring them to cease further sediment discharges, improve erosion sediment control and reinstate the watercourse. We issued three infringement notices totalling \$1,750.