The State of our Environment

Annual Summary

Quality for Life

greater WELLINGTON
THE REGIONAL COUNCIL | Environment

What is the current state of the environment in the greater Wellington Region?

Can we swim in our sea and rivers?

How clean is our air?

The answers to such questions are inside this folder.

The cards in this folder summarise Greater Wellington - The Regional Council's environmental monitoring information for 2001/2002. Find out more about the Region's resources, how Greater Wellington is managing these resources, and what you can do to help.

Greater Wellington works hard to manage the Region's water, land, air and coast, and to reduce pollution. We want to ensure a sustainable future for all life in our Region - our success can be measured by looking at the results of our monitoring programmes.

greater WELLINGTON
THE REGIONAL COUNCIL

File No: X/27/03/01

21 January 2003

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Greater Wellington is the promotional name of the Wellington Regional Council

Dear Sir or Madam

The State of our Environment - Annual Summary

I am pleased to send you a copy of Greater Wellington's State of the Environment – Annual Summary.

The annual summary is made up of a series of 'report cards'. The report cards provide a summary of our monitoring results and explain some background to each resource being monitored. They also give tips about what you can do to help manage the resource.

Greater Wellington will be preparing report cards every year. We also produce a comprehensive State of the Environment Report every six years. State of the Environment Reports map our progress towards sustainable development within the Region. Our last State of the Environment Report was produced in 1999 and can be viewed on our website at www.gw.govt.nz.

As this is the first set of report cards we have produced, a feedback form has been included in the package. We would like our reporting on the state of the environment to be as informative and useful as possible, and would appreciate any suggestions you may have.

Yours sincerely

Margaret Shields

Chairperson

Encl: State of our Environment Report Cards
Feedback Form

Quality for Life

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Feedback Form

How interesting did you find this publication?

☐ Very interesting ☐ Interesting ☐ Not very interesting

What will you use this material for?

☐ Study ☐ Teaching/Presentation ☐ Planning/Decision making

☐ Learning more about the environment ☐ Consultancy work

☐ Other: _____

Which topics would you like to have read more about?

_____

_____

Was the material…

☐ Too technical ☐ Too simple ☐ Just about right

What aspects of the environment are you most concerned about?

☐ Air Quality ☐ Stream and River Quality ☐ Water Quantity and Flows

☐ Groundwater ☐ Lakes ☐ Coastal Water Quality

☐ Land and Soils ☐ Natural Hazards ☐ Biodiversity

☐ Contaminated sites ☐ Solid Waste ☐ All of it

☐ Other: _____

What user group do you belong to?

☐ Private person ☐ Education ☐ Business/Industry

☐ Media ☐ Political Organisation ☐ Environmental Organisation

☐ Local Government ☐ Government

☐ Other:_____

What age group are you in?

☐ 0-15 ☐ 16-25 ☐ 26-45 ☐ 46-60 ☐ 61+

Do you use the internet?

☐ Yes ☐ No

Any other comments?

_____

_____

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Please complete this form, fold so the address is showing, secure and post back to us. Thankyou.

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State of the Environment - Annual Summary
Greater Wellington - The Regional Council
PO Box 11646
Wellington

Air Quality 2001/02

Key points:

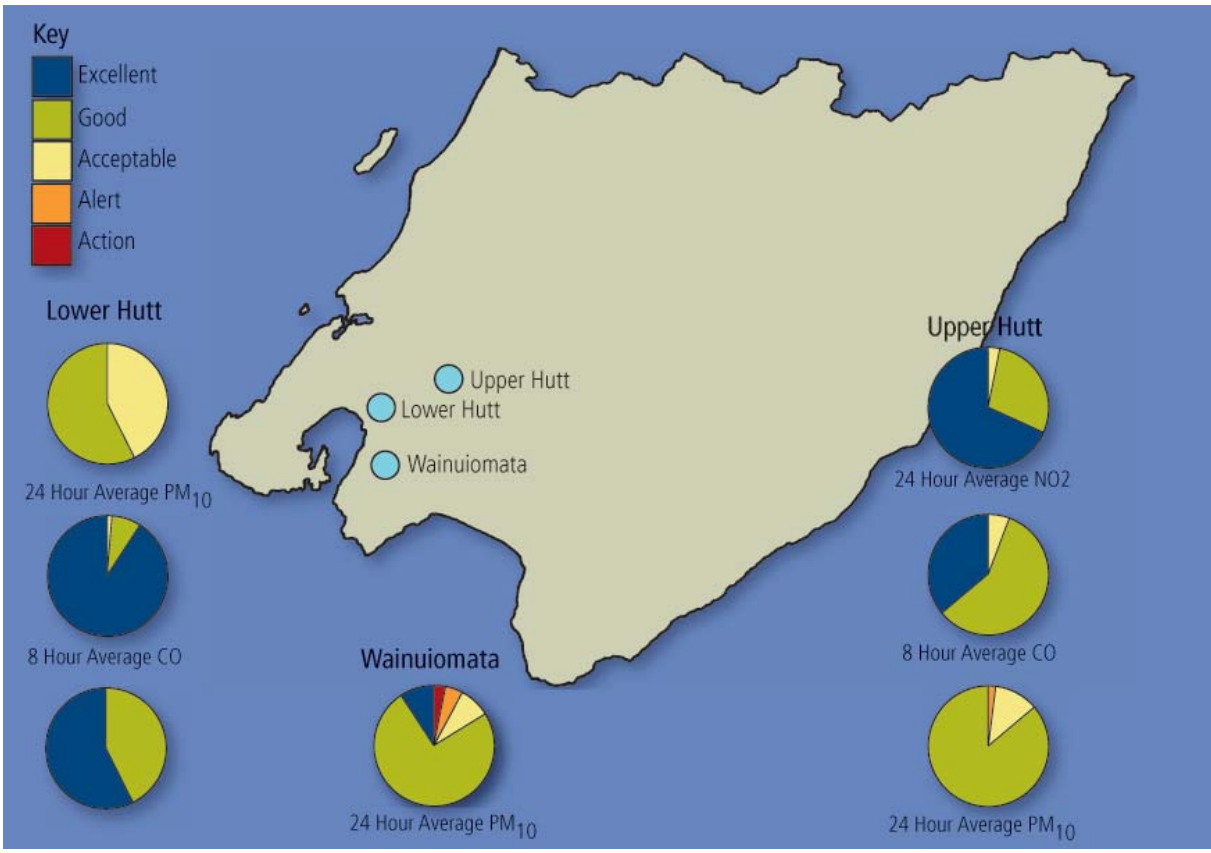
- At times, air quality in parts of the Region was a health threat.
- Motor vehicles were the Region's biggest air polluters overall.
- Air pollution in the Region was worse in winter. This was because of domestic fires.

How clean is our air?

Air quality is affected by a wide range of pollutants. Pollutants get into the atmosphere from both human activities (such as motor vehicles, domestic fires and industry) and from natural sources (such as the sea, soil and vegetation).

Our air pollution monitoring within the Region shows that the air quality is generally okay. However, in winter pollutants can build up to levels that affect human health.

The map below summarises the results of our air quality monitoring during 2001/02.



Map showing air quality monitoring results from October 2001 - September 2002

Air quality monitoring

During 2001/02, Greater Wellington – the Regional Council monitored air quality in Lower Hutt, Upper Hutt and Wainuiomata. We were looking for fine dust (which we call PM_{10} because it means Particulate Matter that is less than 10 microns in size), carbon monoxide (CO) and nitrogen dioxide (NO_2). These pollutants are known to be bad for human health and the environment.

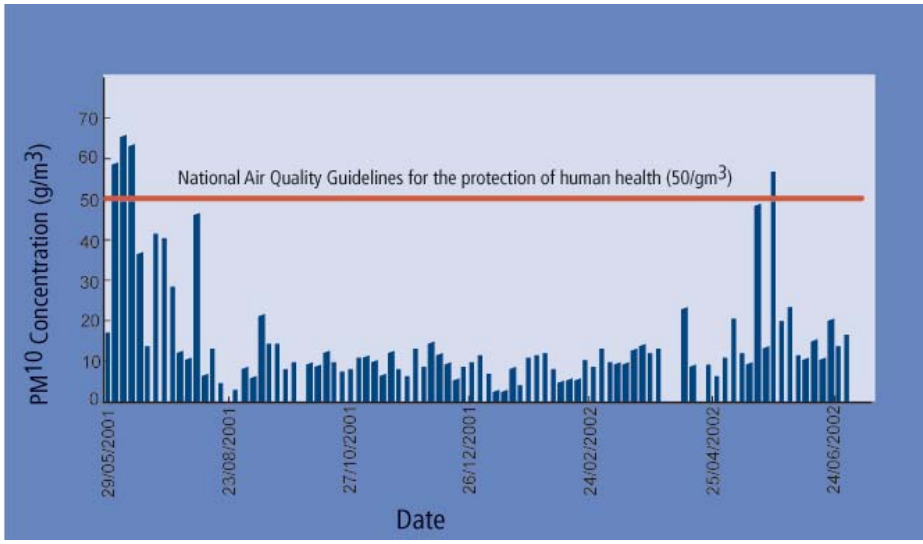
Air pollution causes respiratory illness and cardio-vascular disease, particularly in the young and old. Studies show that about 80 people in the greater Wellington Region die each year from air pollution related illnesses.

What have we discovered?

Upper Hutt: Smoke from household fires was the main pollutant in the atmosphere in Upper Hutt. Fortunately, last year was very mild and the level of dust particles in the air only exceeded the human health guideline on one occasion. Air pollution had been much worse the previous winter.

Lower Hutt: The air in Lower Hutt was polluted by smoke from household fires, emissions from industry and motor vehicle exhausts. On two occasions in August 2002, nitrogen dioxide concentrations in the air rose to levels that are harmful to the environment. The nitrogen dioxide comes from motor vehicle exhausts.

Wainuiomata: Smoke from household fires was the main pollutant in the atmosphere in Wainuiomata. Fine dust levels exceeded the human health guideline only once last year, but got very close on a number of other occasions. Pollutants tend to build up in Wainuiomata's cold, calm weather conditions over winter. The graph opposite shows fine dust levels in Wainuiomata since May last year. You can see when pollution levels exceeded the national guideline, and that the pollution increases during the winter months.



Air quality monitoring in Wainuiomata- 24-hour average of dust particles less than 10 microns (PM_{10})

What can you do?

Motor vehicles: carpool or use alternative means of transport if possible. Can you walk, cycle, or take a bus or train?

Domestic fires: insulate your house effectively and, if possible, use alternative heating sources, such as electricity or gas.

Recycle: avoid backyard burning. Recycle plastics and paper. Compost and re-use green waste instead of burning it.

What is Greater Wellington – The Regional Council doing?

Monitoring: setting up a network of air quality monitoring stations around the Region to keep an eye on air pollution levels. We have one mobile and two permanent monitoring stations.

One of the permanent monitoring stations is in Lower Hutt, and the other has just been set up in Masterton. This year, our mobile monitoring station will move from Upper Hutt to Porirua.

Education: developing a community education programme to tell people where and why air pollution is occurring and what can be done about it.

Investigation: investigating specific air pollution sources as necessary. We have compiled an air emissions inventory to identify the biggest contributors to air pollution in the Region.

Regulation: controlling discharges to air through the Regional Air Quality Management Plan.

Smoke haze in Wainuiomata - Winter 2002

More information

If you would like any more information about air quality and air quality monitoring, visit our website at www.wrc.govt.nz or contact:

Perry Davy (Air Quality Scientist)

phone: 04 384 5708

e-mail: perry.davy@wrc.govt.nz

Biodiversity 2001/02

Key points:

- Introduced pest plants and animals, especially possums, continue to impact our indigenous flora and fauna.
- Over time, there has been a decline in the area and quality of our natural ecosystems, reducing the 'services' that nature provides us.

Biodiversity is important

Biodiversity simply means the variety of all life – plants and animals. Since people arrived in New Zealand, our biodiversity has changed. Many plants and animals have become extinct and many are threatened – along with the places where they live.

Ecosystems give us the raw materials of life: plants and animals for food and shelter; fibre for clothing; rock materials for construction; and so on. Healthy ecosystems clean the air, provide the best quality water, stabilise the climate and detoxify our wastes.

Unfortunately, Greater Wellington – The Regional Council does not yet have a comprehensive biodiversity monitoring programme – although one is being developed. Nevertheless, we are working to improve the ecological health of some of the most severely damaged ecosystems in our Region – lowland bush, wetlands, rivers and their margins, estuaries, coastal escarpments, dunes and marine ecosystems. Each of these discussed below.

Lowland bush

The lowlands of the Region have been stripped of their natural cover to provide for farms, forests and places to live. What remains is under attack from possums and weeds. The good news is that possum control has helped increase foliage cover (or leafiness) in some tree species, including tawa, hinau and mahoe. The bad news is that possums are still badly damaging their favourite species, including kaikomako and fivefinger.

Last year, intensive possum control was carried out in several remnant areas of native bush in Wellington, Porirua, the Hutt Valley and Kapiti. A broader area of around 300,000 hectares was also treated as part of a bovine TB eradication programme.

Bush ecosystems on Greater Wellington land

Greater Wellington's regional parks and forests include huge areas of native bush. We are working to maintain forest health and enhance biodiversity in these areas.

Extensive surveys are conducted before we carry out intensive pest control programmes. This year's pest control programmes included a possum operation in the Akatarawa West area (8,800 hectares) and goat control in the Wainuiomata/ Orongorongo catchments, Pakuratahi Forest, Belmont Regional Park, and at Battle Hill.

Greater Wellington supports the Queen Elizabeth II National Trust covenant programme to protect remnant habitats on private land. Support was given to 15 covenants in 2001/02. Most were lowland bush areas.

The spreading old man's beard plant causes serious problems around the Region. During the year, over 700 problem sites were identified in Wairarapa's urban areas and the plant was removed from the banks of several Wairarapa rivers. Other plant pests were removed from the Kaiwharawhara Stream, East Harbour reserve and the Otaki River.

Wetlands

This year, Greater Wellington has been collecting information about wetlands in the Region and building up a database. We have found that there are around 11,000 hectares of wetland in the Region – only 12 percent of the Region's original wetland area. Our biggest wetland is the Lake Wairarapa complex which covers 8,500 hectares. But the majority of our wetlands are under one hectare.

A draft wetlands' action plan was completed during the year. The draft plan proposed investing in some outstanding wetlands on Greater Wellington land, and providing advice and incentives to encourage private owners to restore wetlands on their own land.

River ecosystems

Greater Wellington has completed a riparian management strategy which promotes streamside retirement and planting to improve biodiversity and stream health. Trial riparian zones on the Kakariki (Kapiti), Karori (Wellington) and Enaki (Carterton) streams are being fenced, planted and monitored.

Last summer we surveyed 90 sites in rivers around the Region for freshwater fish. Fish are a good indicator of river health and show us the type of habitats we need to create to restore the ecological health of rivers. The fish are captured in a large net after being temporarily stunned by an electro-fishing machine. Once they are identified and counted, they are returned unharmed to the river.

A total of 1595 fish, belonging to 17 species of freshwater fish were recorded. These findings are consistent with work carried out in other North Island streams. The two main differences were:

- Koaro is much more abundant in the greater Wellington Region than elsewhere in the North Island.
- Fish densities in tributaries of the Ruamahanga River were significantly lower than elsewhere. The reasons for this are unclear, but we suspect it could be because the fish are unable to migrate between the sea and freshwater. An inventory of river and stream structures that might restrict the movement of fish has since been completed.

Marine biodiversity

Greater Wellington and the Ministry for the Environment launched the Wellington Harbour marine biodiversity project "Our Harbour – Our Strait" in June 2002.

The project is taking a close up look at the coastal and marine life in the Wellington Harbour and Cook Strait area.

More Information

For further information about Greater Wellington's biodiversity programmes, please contact:

Tim Porteous (Biodiversity Coordinator)

Phone: 04 384 5708

E-mail tim.porteous@wrc.govt.nz

Estuaries, dunes, and escarpments

More species are threatened in coastal areas than in any other habitat in the Region. Greater Wellington has worked to protect coastal habitats, with the most visible project being at the Pauatahanui Inlet estuary. A community trust was set up and restoration is proceeding on the estuaries of the Kakaho and Horokiri streams, which flow into the Pauatahanui Inlet. Over 15,000 plants were planted at the Horokiri site in 2001/02.

The triennial Pauatahanui Inlet cockle count took place during the year, and comparisons with past surveys indicate the cockle population has stabilised. This is a good sign of habitat health.

We also continued to support a number of coast and dune care groups, including the Waitohu, Te Horo, Pukerua Bay, Riversdale and Castlepoint groups. At Evans Bay, another group has made progress in creating habitat for little blue penguins.

The last relatively unmodified dunes on the Kapiti Coast are at Queen Elizabeth Park. They are a valuable regional asset. These dunes have been severely damaged and so we held several public meetings to develop ways of restoring them. Our weed control programmes have continued and pingao and spinifex planting is being trialed as a technique for dune restoration.

Coastal Water Quality 2001/02

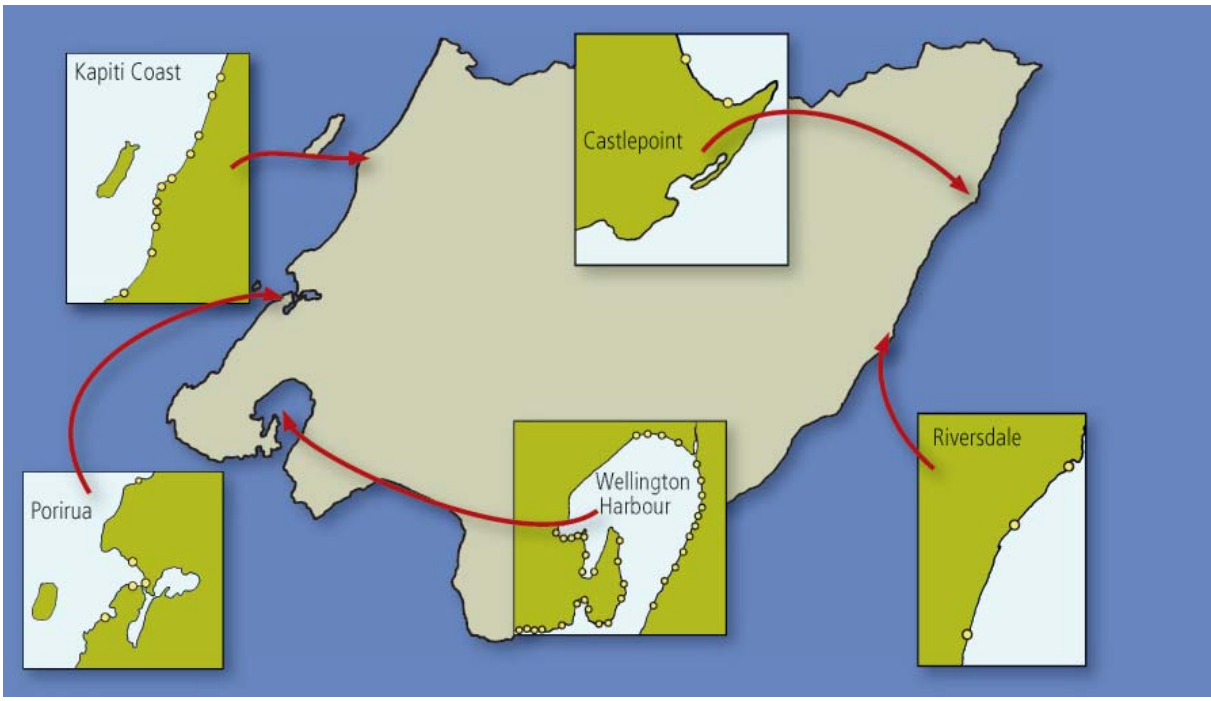
Key points:

- Water quality was good at most of the Region's beaches last year.
- Beaches were unsuitable for swimming during and immediately after heavy rain.
- Shellfish should not be taken from water near urban areas.
- Shellfish should not be taken within four days of heavy rain.

What do we monitor?

Greater Wellington - The Regional Council is working alongside the city and district councils to monitor coastal water quality at 75 sites within the Region. Water samples are taken weekly throughout the summer bathing season, which runs from 1 November to 31 March. This monitoring tells us whether or not the water is suitable for swimming – using national guidelines for recreational water quality.

During the past year, we have also been monitoring shellfish quality to find out where it's safe to gather shellfish within the Region.



Map showing the location of recreational water quality monitoring sites.

How clean is the water?

Monitoring during 2001/02 showed us that:

- Water quality was good at most of the Region's beaches throughout last summer's bathing season. Of the 75 sites monitored, 41 were okay for swimming at all times, 18 were unsuitable for swimming on only one occasion, and 16 were unsuitable for bathing on more than one occasion.
- Porirua Harbour at Te Hiko Street and Titahi Bay were the worst performers, and were unsuitable for swimming on numerous occasions.
- On most occasions when the beaches were unsuitable for swimming, there had been heavy rain in the preceding days. When it rains, polluted water is carried through our stormwater drains and enters the sea.

When is swimming most risky?

There's a greater risk of getting sick from swimming:

- During heavy rain and for up to two days after the rain;
- When you're at a beach or an area of sea that may be contaminated with sewage or runoff;
- When playing in calm shallow water where fine sediments are deposited. Bacteria can live for longer periods in fine sediments; or
- If you have reduced immunity. The elderly, babies and children may also be at greater risk.

How do I know if it's safe to swim?

We are using a 'traffic light' system to let you know whether beaches in the Region are suitable for swimming, surfing and other activities.

- **Green** is for go - sampling indicates low health risk for swimmers.
- **Amber** is for caution - sampling indicates health risk to swimmers is increasing.
- **Red** is for stop - sampling indicates poor quality water which is unsafe for swimming.

The traffic light system and more detailed results of our water quality monitoring is available:

- On our website at www.wrc.govt.nz/on-the-beaches (but note that the traffic light system will only be displayed during the summer bathing season).
- In local papers during the summer bathing season.
- On signs at monitoring sites. The signs will let you know if the water is unsuitable for swimming, and tell you where you can get more information.

Gathering shellfish

As well as identifying areas that are safe for swimming, Greater Wellington also monitors where it is safe to gather shellfish. We do this by looking at the water where shellfish are gathered, and by taking some shellfish and analysing their flesh. This year, samples of tuatua, blue mussel and cockle flesh were taken for analysis.

The quality of the Region's water for shellfish gathering was generally good, except in Porirua Harbour. We recommend that people do not eat shellfish collected in this Harbour, inland of Mana. Elsewhere, shellfish should not be collected near urban areas or during and up to four days after rain. By this time, filter feeding shellfish such as mussels will have cleaned themselves of bacteria. The number of bacteria and other organisms in the water increases during and after rain as a result of stormwater discharges.

What is Greater Wellington - The Regional Council doing?

Investigation: investigating the types of pollutants entering the sea from stormwater drains. When we know what the pollutants are and where they are coming from, we can work with territorial authorities to reduce or stop them.

Regulation: controlling the discharge of pollutants into coastal water through the Regional Coastal Plan.

What can you do?

Waste disposal: don't put chemicals or any other waste into stormwater drains or directly into the sea.

More information

If you would like any more information about coastal water quality, visit our website at www.wrc.govt.nz or contact:

Gary Stephenson (Coastal Scientist)
Phone: 04 384 5708
e-mail: gary.stephenson@wrc.govt.nz

Groundwater 2001/02

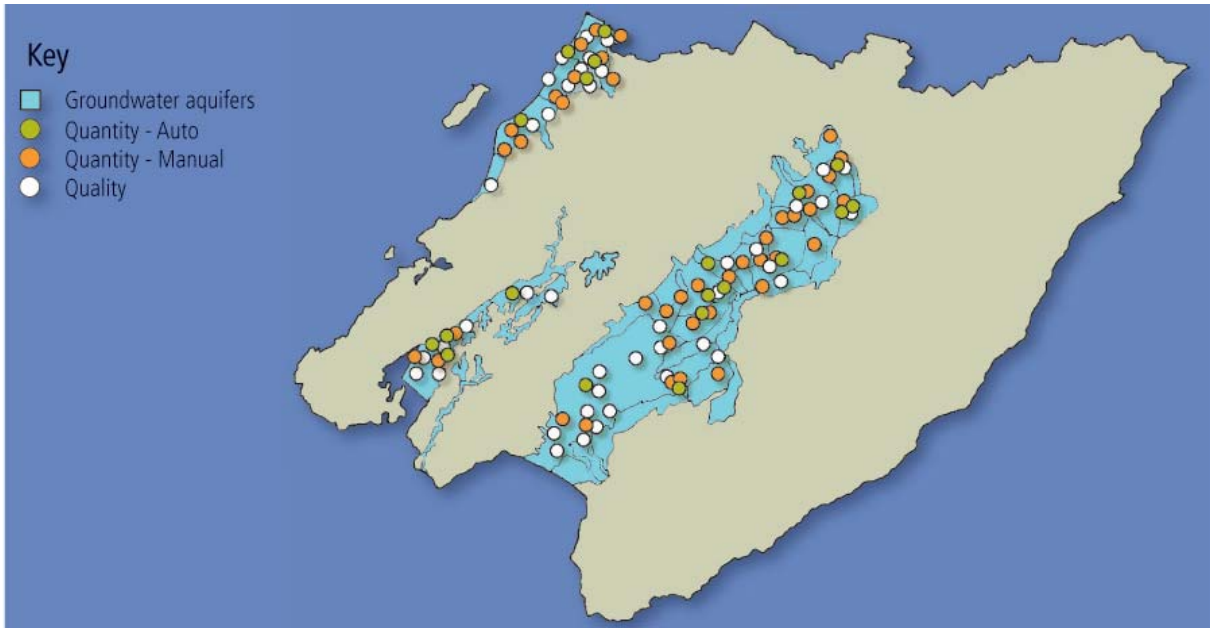
Key points:

- Groundwater levels were low early in the year, but good summer rainfalls replenished the aquifers.
- Groundwater quality was generally good although some areas showed localised pollution.
- In the Wairarapa, two aquifers are under stress.

Groundwater – a vital resource

Although its out of sight, groundwater is an important resource in the greater Wellington Region. About a third of the water for public supply in Wellington, the Hutt Valley and Porirua is taken from the Hutt Valley aquifers. Otaki, Martinborough and Carterton also rely on groundwater for their public water supplies and Greytown is currently installing a groundwater system.

Greater Wellington - The Regional Council is responsible for ensuring that our groundwater resource in the Region remains healthy. Consequently, we monitor both groundwater levels and groundwater quality at a number of sites across the Region (see map below). It is important that we use our groundwater systems wisely and give them a chance to be recharged; otherwise we may lose a supply of water on which we depend.



Groundwater sites monitored regularly by Greater Wellington

What happened in 2001/02?

Dry winter – low groundwater levels: As 2001 was a dry winter, most groundwater systems were not adequately recharged. Consequently, most groundwater levels were low early in the 2001/02 year. This trend continued until November when we received more rainfall than normal. This rain helped recharge the aquifers and, at the same time, reduced the demand on groundwater for irrigation.

Wet summer – groundwater levels recover: The wet summer meant that our groundwater systems were recharged and returned to healthy levels.

Good groundwater quality: Throughout the year, our monitoring showed that the quality of water in our aquifers was generally good. Unfortunately, we found some contamination in a few shallow aquifers, such as the Hautere (Otaki) and Te Ore Ore (Masterton). Contamination is caused by ineffective septic tanks that leak into groundwater. Greater Wellington is trying to educate people about the need to have effective on-site sewage systems. Excessive use of fertiliser and poor dairy shed effluent disposal can also contaminate shallow groundwater systems.

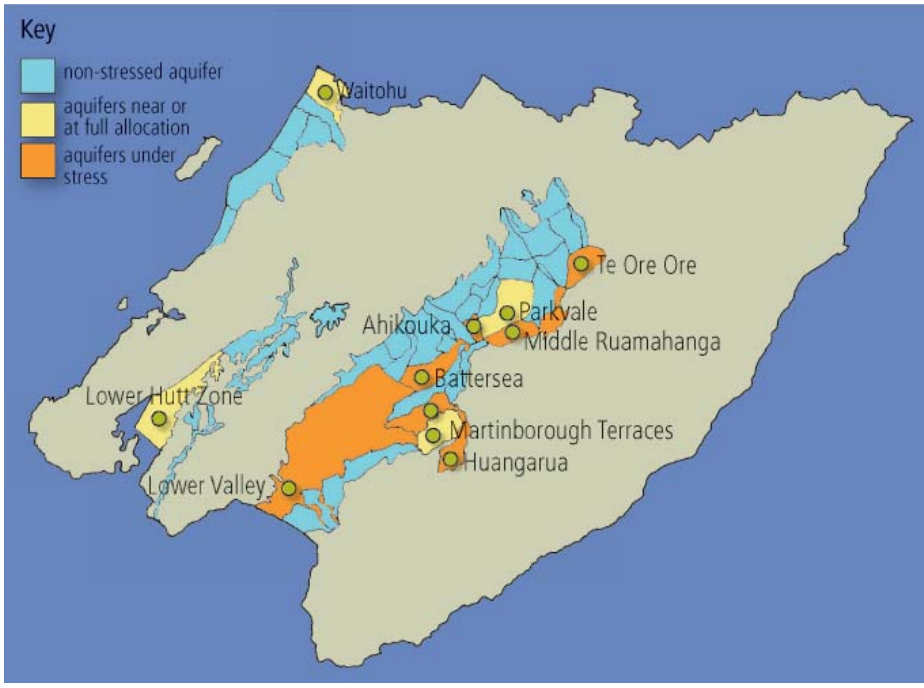
What is Greater Wellington – The Regional Council doing?

Monitoring: monitoring groundwater level and groundwater quality.

Targeted Investigations: undertaking specific investigations when our monitoring shows a possible problem. For example, last year we began investigating the depth of shallow groundwater on the Kapiti Coast. As this area suffers from a water shortage in summer, many people use their shallow bores to water their gardens. Greater Wellington has been worried whether the use of these bores is sustainable. Our investigations will determine how much water can be taken from the aquifer so that its health is preserved.

Again on the Kapiti Coast, we investigated the Hautere groundwater system to determine the cause of the nitrate contamination. As this groundwater is used for domestic supply, it was important to find out whether the contamination was due to present or past practices. Indications are that the contamination resulted from animal manure that entered the groundwater system about 25 years ago.

Regulation: controlling the construction of bores and the taking of groundwater through the Regional Freshwater Plan. The discharge of contaminants to land, which can affect groundwater quality, is controlled through the Regional Plan for Discharges to Land.



Areas Greater Wellington has identified as being near or at full allocation.

Groundwater systems stressed

Recent monitoring has told us that, in some areas, we have given people consents to take more water than the groundwater system can withstand long-term. The map above shows those areas where groundwater is already under stress and where it is coming under increasing pressure.

Therefore, in December 2001, Greater Wellington placed an informal moratorium on new resource consent applications to take groundwater from the Parkvale and Eastern Martinborough aquifers.

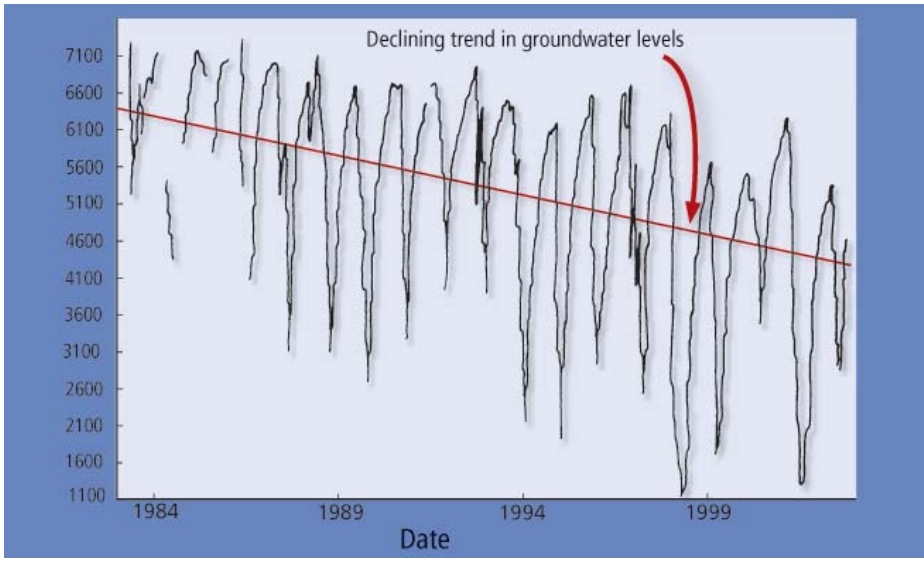
The moratorium will need to stay in place until further research can confirm that allocating more water will not threaten supplies to existing users. The graph below shows the decline in groundwater level in the Parkvale aquifer.

What can you do?

Conserve water: be water wise and use only what you need.

Avoid contamination: if you have a septic tank, or another kind of on-site sewage system, please check that effluent from the tank is evenly spread throughout the soakage treatment area. For more information about on-site sewage systems, check our Sewage Help Series - available in brochures from the Greater Wellington offices or on our website.

If you are a dairy farmer, take care about how you dispose of dairy shed effluent to land.



Groundwater levels recorded at Parkvale, Carterton

More information

If you would like any more information about groundwater, visit our website at www.wrc.govt.nz or contact:

Lindsay Annear (Wairarapa Office)

phone: 06 378 2484

e-mail: lindsay.annear@wrc.govt.nz

Andrew Jones (Wellington Office)

phone: 04 384 5708

e-mail: andrew.jones@wrc.govt.nz

Pollution Complaints 2001/02

Key points:

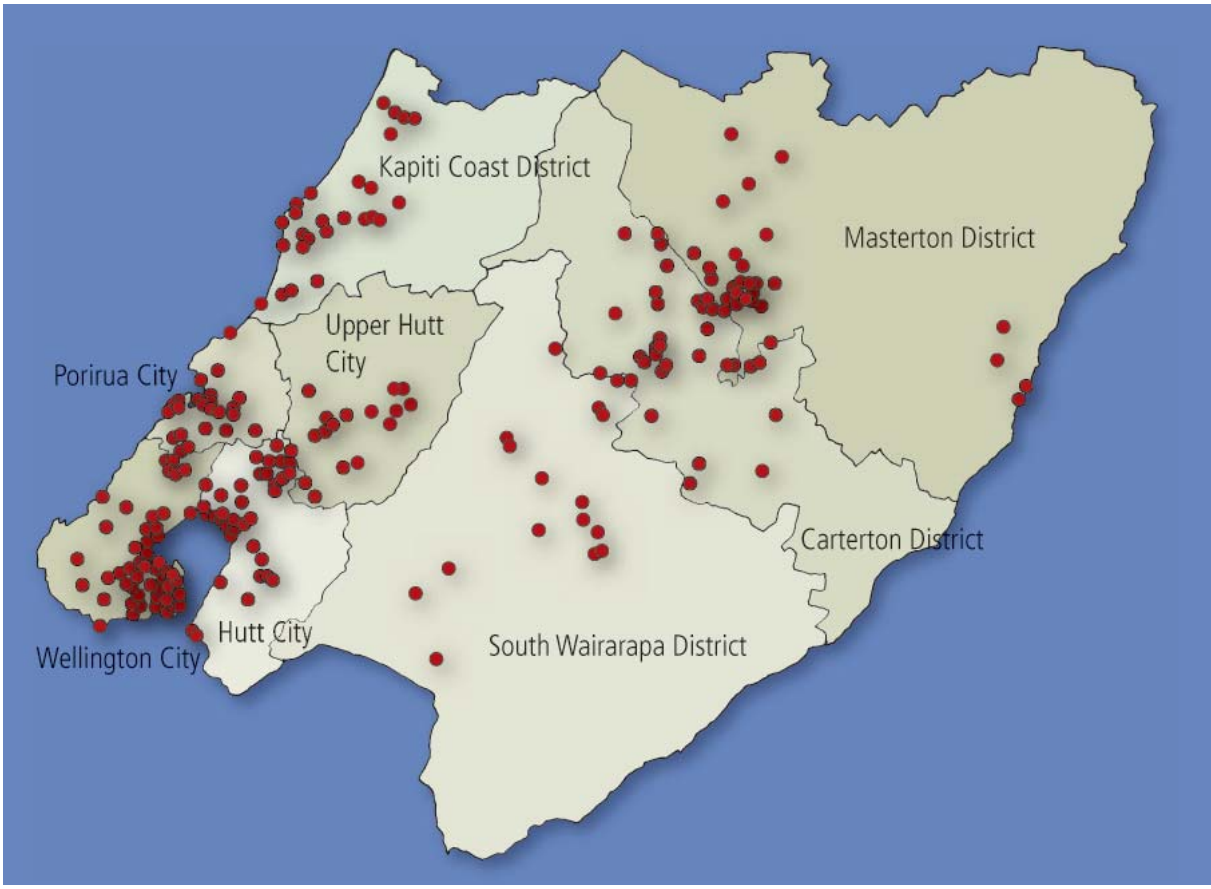
- The number of complaints received by Greater Wellington's 24-hour pollution hotline is still increasing – there was a 7 percent increase in complaints in 2001/02.
- Most of the complaints received were about odour (69 percent of all complaints).
- Ninety percent of the odour complaints received related to three industrial sites.
- Many seemingly minor pollution incidents can have a cumulative impact on our environment.

Pollution complaints continue to increase

Greater Wellington - The Regional Council provides a 24-hour pollution response service which responds to complaints about environmental pollution. The bad news is that the number of complaints is increasing; the good news is that this may mean that people are becoming more environmentally aware.

A total of 1702 complaints about pollution incidents were received by Greater Wellington during 2001/02 compared 1594 in the previous year. This is a 7 percent increase.

The map below shows that, not surprisingly, most complaints came from the heavily populated areas of the Region. Over 68 percent originated in Wellington City with only 10 percent coming from the Wairarapa. For the remainder of the Region, 10.3 percent came from Lower Hutt, 5.1 percent from Porirua, 3.1 percent from Upper Hutt and 2.8 percent from Kapiti.



Distribution of pollution complaints in the greater Wellington Region, 2001/02

Odour complaints

The pie graph below gives a breakdown of types of pollution incidents. Sixty nine percent of complaints received were about odour.

Ninety percent of odour complaints received in the past year were about three industrial sites (see below). The sites all hold resource consents for discharges to air. They are:

Asphalt Surfaces New Zealand Limited (formerly MKL Asphalt Surfaces Limited): this site has been a source of odour nuisance to residents in north western Tawa for a number of years. Greater Wellington has issued three infringement notices and one enforcement order, and arranged an independent review of odour sources from the plant. The company has now installed a carbon filter on the main stack and this has resulted in a significant reduction in the number of complaints received. Greater Wellington officers are monitoring the site.

Carey's Gully Complex: this site includes Wellington City Council's Southern Landfill, Anglian Water International Ltd sewage dewatering plant, Living Earth Ltd composting plant and Novagas methane flare facility. Odour complaints about the Carey's Gully Complex have been received from a wide area, including Happy Valley, Island Bay, Owhiro Bay, Kingston, Mornington, Vogeltown, Kowhai Park and Brooklyn. Odour control works at the complex include the installation of deodorisers and modified work practices. Despite these initiatives, complaints increased by 49 percent compared with last year. This suggests local residents are becoming less tolerant of the problem. Greater Wellington is planning to monitor odour around the Carey's Gully Complex, and is working with Living Earth Limited with respect to its consent for compost piles.

Taylor Preston: this a meat processing plant in the Ngauranga Gorge in Wellington. Odour complaints about this site are generally received from residents of Rangoon Heights, Broadmeadows, Khandallah and Johnsonville. Greater Wellington served this company with an infringement notice in September 2001 and commissioned an independent review of odour sources and controls. Taylor Preston is now implementing a number of recommendations and the site will be monitored.

Significant incidents investigated

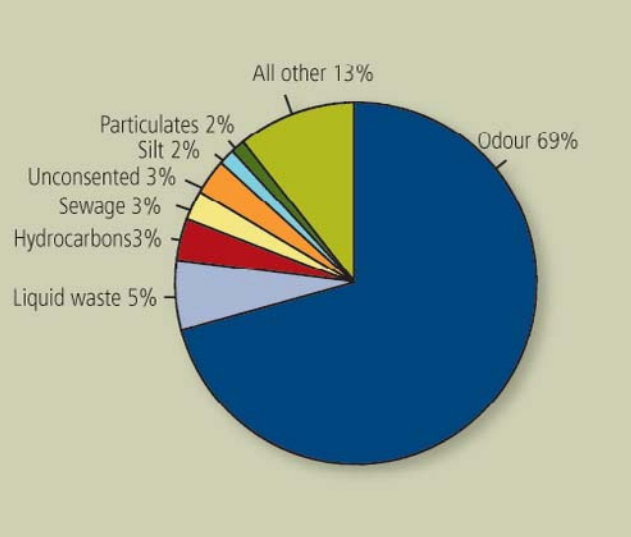
The following significant incidents occurred during 2001/02:

Allied Concrete, a concrete batching plant, discharged alkaline wastewater to the Carey's Gully Stream on 19 February 2002, raising pH and sediment levels. Greater Wellington is prosecuting Allied Concrete.

Non-cleanfill material was illegally dumped on **Graham Alexander's** property in the Mangaroa Valley between 1994 and 2001, despite an enforcement order for its removal being issued in August 1998. By early in 2002, the material had been removed.

A sewer overflow at Porirua Hospital contaminated an adjacent playing field and stream. Capital Coast District Health Board commissioned a consultant to advise on a clean-up. The area was cordoned off until it was made safe for public use.

Watercourses throughout the Region have been repeatedly contaminated by sewer overflows, silt-laden run-off, oil spills and solid waste dumping. The most affected watercourses were Waiwhetu Stream, Taupo Stream, Karori Stream, Kaiwharawhara Stream, Owhiro Stream, Koromiko Stream, Pauatahanui Stream and the Hutt River.



Types of pollution complaints received 2001/02

Enforcement action

During the 2001/02 year, Greater Wellington took the following enforcement action:

- Abatement notices: 9
- Infringement notices: 7
- Enforcement orders: 0
- Prosecutions: 2

To report a pollution incident, phone our pollution hotline: 0800 496 734

Soil Health 2001/02

Key points:

- Some of the Region's soils have been damaged by compaction, loss of organic matter and erosion.
- Most of these problems could be reversed through good land management practices.

Looking after our soils

It takes thousands of years for rocks to weather into soils, and hundreds of years for rich organic matter to build up. Our Region's welfare depends, to a large extent, on our soil and climate. This means that making the best use of our land and soils is very important for our well being and survival. To use our land wisely we have to understand soil.

Soil quality

Greater Wellington – The Regional Council's 1999 State of the Environment Report showed that we had little information about soil quality in the Region. Since 2000, we have been involved in a national soil monitoring project called '500 Soils'. Selected sites have been examined to identify their chemical, physical and biological properties. These properties tell us what the soil type is, and allow us to assess soil quality. Around 50 sites have now been monitored.

Overall, the results of the survey showed that most soils were of suitable quality for their current land use. The main findings were:

- Half the dry stock and dairy pastures sampled in the study had compacted soils. This can happen when soil comes under pressure from machinery or livestock. There is less movement of air and water in compacted soils, resulting in reduced root activity and pasture growth.
- There was a loss of organic matter from soils under arable crops, compared with the same soils in other land uses. In the soils sampled, this loss of organic matter was accompanied by a decline in soil structure. These two factors are often linked, and the combination can make crops less productive.
- Most of the problems identified are reversible and can be fixed by changes in land management. However, some damage will take many years to repair.
- Very high fertiliser levels were found in some soils in areas of dairy farming and arable cropping. While this is not a direct risk to the soil, it does increase the risk of soluble nutrients reaching surface and groundwater and causing contamination.

What is the Greater Wellington – The Regional Council doing?

Soil conservation: working with landowners to help control soil erosion in both hill-country and on alluvial plains, particularly in the Wairarapa. Soil conservation programmes have targeted 200 hectares of conservation woodlots and 300 hectares of poplar and willow planting on eroding hill country land.

A **wind erosion** control programme has established eight kilometres of shelter belts on land with severe wind erosion potential.

Riparian management: managing riparian areas to bring about a steady improvement in water quality. We promote streamside retirement and planting where it can provide benefit to stream health, including by stabilising stream banks and reducing runoff. Riparian management trials are underway on the Karori, Kakariki and Enaki streams.

Guidelines have been developed for erosion and sediment control. They provide information and advice about how to reduce the amount of silt getting into streams, rivers and the coast.

Regulation: preventing soil erosion and fostering sustainable land management practices through the Regional Soil Plan. The rules in the Plan control large-scale vegetation and soil disturbance activities on erosion-prone land.

What can you do?

Ways to reduce erosion include:

- Planting trees or shrubs on hills and stream banks.
- Minimising the use of earthworks where possible.
- Retiring eroded land from pastoral use to allow vegetation to recover. The effect of retiring severly eroded land is shown in the photos opposite taken in Little Kaiwhata in 1963 and 1986.

More information

If you would like any more information about land management or soil monitoring, visit our website at www.wrc.govt.nz or contact:

Dave Cameron (Regional Soil Conservator)
phone: 06 378 2484
e-mail: dave.cameron@wrc.govt.nz

Trial soil intactness monitoring programme

Soil intactness is a measure of how well soil is being kept in place, and how much is being lost through erosion.

Nearly two-thirds of our Region's soils are susceptible to erosion of one form or another. Severe erosion damages farmland and forests. It also increases sedimentation in rivers, reducing water quality and increasing flood risk.

Soil erosion can take place by:

- wind removal of soil;
- overland flow of runoff;
- stream banks being scoured and collapsing; or
- mass movement (landslides, earthflows, slumps and debris avalanches).

Measuring soil intactness tells us whether soils are staying in place. Less intact soils mean that land will be less productive. Less intact soils can also affect the environment, especially if soil enters waterways.

Soil intactness can improve through *soil accumulation*. This 'new' soil can come from decaying plants and plant matter, soils eroded from up-slope, sediments deposited by rivers, wind-blown dust and deposited volcanic ash.

During 2002, Greater Wellington designed and trialed a soil intactness monitoring programme. The trial looked at soils in an area east of Masterton.

We found that measuring soil intactness in this way can give accurate and useful information on a range of land management issues. We hope to implement the soil intactness monitoring programme region-wide in the coming year.

How will this information be used?

As the soil monitoring programmes develop, Greater Wellington will disseminate information to landowners so that they can adopt land use practices that sustain their soils so they remain productive for future generations.

Little Kaiwhata 1963

Little Kaiwhata 1986

River and Stream Quality 2001/02

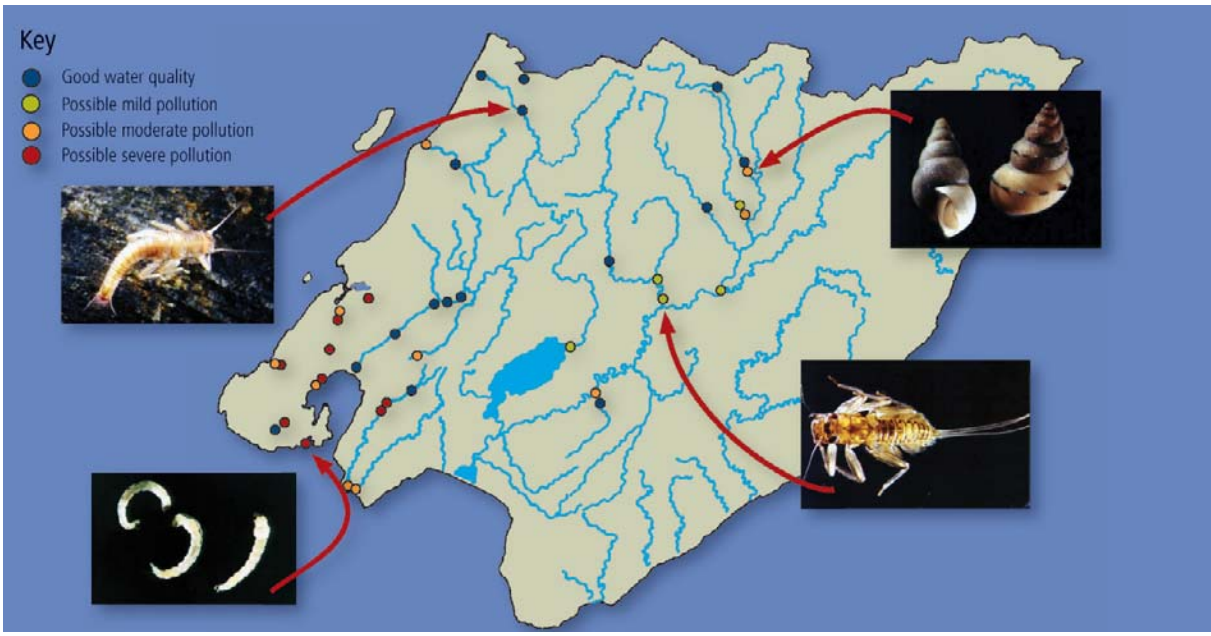
Key points:

- The water quality in the upper reaches of our streams and rivers was good.
- Water flowing through agricultural areas was being polluted by runoff from the land.
- Water flowing through urban areas was being polluted by runoff and stormwater.
- Major improvements in water quality have occurred in the Ngarara Stream and Wainuiomata River.
- Discharges from municipal sewage treatment ponds are still polluting rivers in parts of the Region.

Monitoring water quality

Greater Wellington – The Regional Council monitors water quality at 51 sites in streams and rivers throughout the Region. We want to know if the water is okay for swimming and whether or not the aquatic ecosystem is healthy.

By improving our understanding of changes in water quality, and the reasons for these changes, we can become better at managing our rivers and streams.



Map showing stream health in the greater Wellington Region as indicated by macroinvertebrate communities. (Photos courtesy of Stephen Moore, Landcare Research and Otago Regional Council.)

Biological monitoring

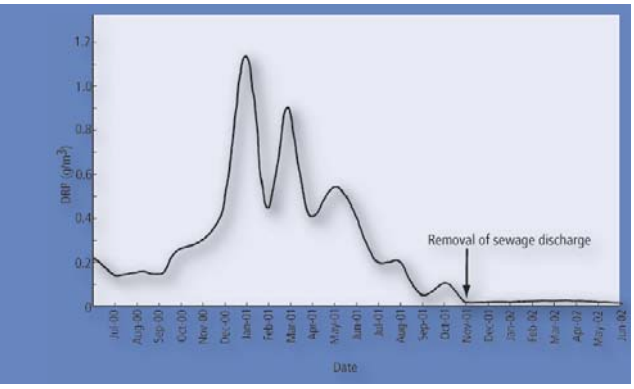
We examine populations of macroinvertebrates at our water quality monitoring sites. Macroinvertebrates are animals without backbones that are large enough to be seen without magnification, like insects. The types of macroinvertebrates present, and their abundance, tell us if the stream is healthy. The map above shows the results of the biological data collected over the summer of 2001/02. You can see which rivers had the healthiest aquatic ecosystems and best water quality.

Physical and chemical monitoring

Physical and chemical monitoring of water quality is carried out monthly throughout the year. We measure things like temperature, dissolved oxygen, pH and the levels of nutrients in the water.

Water quality at most sites was similar to previous years, but there was a big improvement in the Ngarara Stream and the Wainuiomata River. These water bodies have had some of the poorest water quality in the Region because treated sewage was being discharged into them. The sewage discharges to both rivers ended in December 2001.

The graph overleaf shows phosphorous levels in the Wainuiomata River between July 2000 and June 2002. Phosphorous is essential for plant growth, but if concentrations are too high, excessive growth may choke waterways.



Graph showing phosphorus levels in the Wainuiomata River, below the municipal sewage discharge.

How are we doing?

- **The best water quality and stream health** was in streams and rivers in the Tararua and Rimutaka Ranges, including the upper reaches of the Otaki, Hutt, Waiohine, Waikanae, Wainuiomata and upper Ruamahanga rivers.
- **Mild to moderate pollution** was found in streams and rivers flowing through agricultural land, including the Mangaroa, Tauherenikau, Waipoua, Mangatarere and lower Waiohine and Ruamahanga rivers. Runoff from farms, and stock walking and grazing in the rivers and streams, causes this pollution.
- **The poorest water quality and stream health** was found in streams and rivers flowing through urban areas, including the Karori, Porirua, Ngauranga, Owhiro and Waiwhetu streams, and the middle reaches of the Wainuiomata River. This was caused by polluted water entering streams and rivers from stormwater drains, especially after rain.

What can you do?

- Keep animals, especially cattle, out of rivers and streams.
- Don't put chemicals or any other waste in stormwater drains, rivers or streams.
- Find out about stream care groups in your area and get involved in planting trees and shrubs along waterways. Streamside planting helps stop pollution reaching the water, protects the stream banks from erosion and provides shade so that the water stays cool in the summer.

More information

If you would like any more information about river and stream quality, visit our website at www.wrc.govt.nz or contact:

Summer Warr (Masterton Office)

phone: 06 378 2484

e-mail: summer.warr@wrc.govt.nz

Gary Stephenson (Wellington Office)

phone: 04 384 5708

e-mail: gary.stephenson@wrc.govt.nz

Suitability for swimming

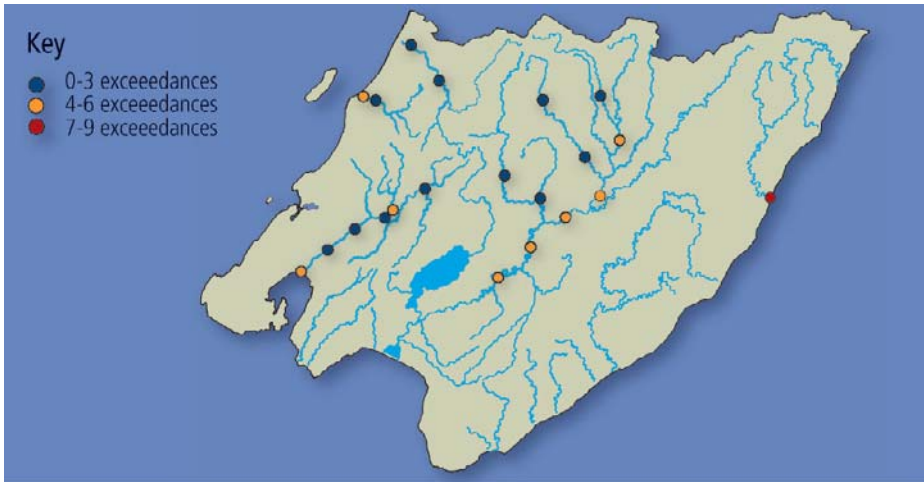
Water quality at popular swimming sites is monitored weekly between November and March and assessed using national water quality guidelines for swimming.

Water quality in the Region's western rivers was generally good. The Birchville and Boulcott sites on the Hutt River, and the Greenaway Road site on the Waikanae River, were the worst performers. Each was unsuitable for swimming on four occasions.

In the Wairarapa, water quality in the Waiohine, Waingawa and upper Ruamahanga rivers was good. All sites on the lower Ruamahanga River (downstream from Te Ore Ore) were unsuitable for swimming on numerous occasions. This was most common during November, December and January when the effects of pollution would have been made worse by low river flows combined with warmer summer temperatures.

Water quality in Riversdale Lagoon was unsuitable for swimming for much of the season and we recommend that it be avoided at all times.

See www.wrc.govt.nz/on-the-beaches to find out more about where water quality is suitable for swimming.



Map showing the location of recreational monitoring sites and the number of times each exceeded the guideline during the 2001/02 season.

What is Greater Wellington – The Regional Council doing?

Investigation: investigating types of pollution entering streams and rivers from stormwater drains. When we know what the pollutants are and where they are coming from, we can work with the territorial authorities to reduce or stop them.

Education: running a **Take Action for Water** programme in primary schools. The programme aims to educate young people about the nature of rivers and streams and how to look after them.

Greater Wellington is developing **Take Charge** - a pollution prevention programme to improve industrial discharge practices. We also support and work with stream care groups throughout the Region, promoting the restoration of streams and riparian areas.

Riparian management: managing riparian areas to bring about a steady improvement in water quality. We promote streamside retirement and planting where it can provide benefit to stream health. Riparian management trials are underway on the Karori, Kakariki and Enaki streams.

Regulation: controlling the discharge of pollutants into water through the Regional Freshwater Plan.

Water Quantity 2001/02

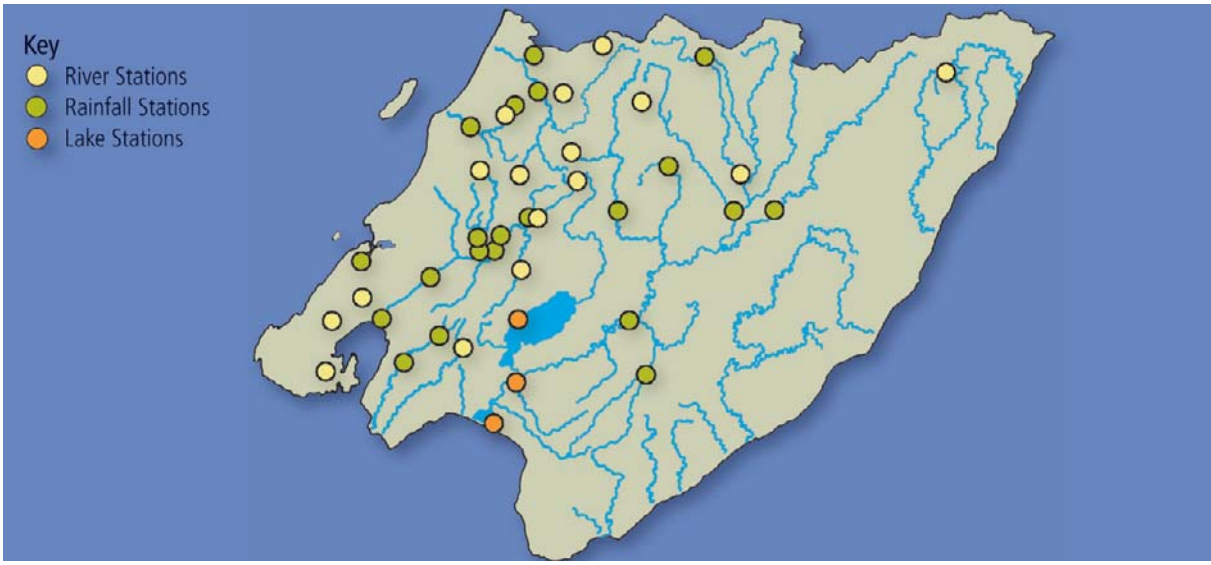
Key points:

- Rainfall and river flows across the Region were average to above average during 2001/02.
- There were no major floods during the year.

Monitoring water quantity

Greater Wellington – The Regional Council monitors rainfall, river flows and lake and tide levels at over 70 sites across the Region. Rain gauges high in the Tararua Ranges and water level recorders on our major rivers allow us to give advance warning of possible flooding so that early action can be taken to protect people and their property. The map below shows the location of rainfall and river level recording stations in the Region.

Information from the recording stations also helps us to plan ahead for drought management and water supply purposes, and is used when we assess proposals to take water from our rivers and streams. The Regional Freshwater Plan sets minimum flow levels for some rivers in the Region. This is so people can take and use the water for drinking, agricultural use and industry while making sure that there is still enough water flowing to keep the rivers healthy. We also need enough water in our rivers for swimming and other recreational activities.



Map showing the location of rainfall, river and lake level recording stations.

Events of note in 2001/02

Rainfall during 2001/02 was average to above average across most of the Region, and there were no major flood events.

It doesn't rain but it pours: on 10 January 2002, a torrential and very localised rainburst hit Wellington City, lasting for an hour. In that hour, a staggering 94 millimetres of rain fell at our Karori Reservoir rain gauge, with two-thirds of it falling in just 30 minutes. The rain overwhelmed the stormwater system and caused severe flooding in central Wellington City. Rainfall of that intensity is very rarely seen in New Zealand.

Drought situation avoided: the Wairarapa's eastern hill country had a dry start to 2001. Summer, autumn and winter of 2001 saw rainfall totals of only 55, 30 and 75 percent of average respectively. Another dry summer would have been devastating, but fortunately things came right, with 95 and 150 percent of normal rainfall during spring 2001 and summer 2002.

What happens during a flood?

Greater Wellington operates a flood warning system. Our rainfall and river level recording stations are linked by radio telemetry to the Greater Wellington offices. This allows staff to monitor the amount of rainfall and rising river levels as they happen.

The rainfall stations are concentrated where the heaviest rain often falls and where the major rivers start. When a large dump of rainfall is recorded at any station, an alarm is triggered back at the Greater Wellington flood-base.

The river level recording stations in the Region also have alarms. When a river rises above its trigger level, an alarm is activated and transmitted back to our offices. Information on the amount of rainfall, how quickly the rivers are rising and the forecast river heights is passed on to Greater Wellington flood protection staff, city and district councils, emergency management teams, and other people (such as landowners) who may be affected.

Where can you get information about water levels?

Information on river flows around the Region can be found on our website at: www.wrc.govt.nz/edc/mon/rivers/showriver.cfm. River level information is routinely updated every three to six hours – and more frequently during a flood.

Infoline provides easy access to rainfall, river flow and lake level information throughout the Region.

For Kapiti Coast rainfall and rivers call 08 322 0150.

For Wellington and Porirua rainfall and rivers, call 08 322 0190.

For Hutt Valley rainfall and rivers, call 08 322 0170.

For Wainuiomata/Orongorongo rainfall and rivers, call 08 322 0650.

For Wairarapa rivers, call 08 322 0669.

For Wairarapa rainfall and lake levels, call 08 322 9069.

Calls cost 12 cents per minute.

For any other information, contact:

Mike Gordon (Masterton Office)

phone: 06 378 2484

e-mail: mike.gordon@wrc.govt.nz

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phone: 04 384 5708

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The flood of 28 October 1998 in the Hutt River. The green tower on the right of the picture is a river recording station – part of our flood warning network. Information on the height of the river is used by Greater Wellington staff to determine how big the flood will be further downstream in Upper Hutt and Lower Hutt.

Wetlands are important

Wetlands play an important role in buffering the effects of flood waters. They do this by slowing the flow of water off the land and soaking up excess flood water like a sponge. Wetlands can also recharge groundwater and act as storage areas for streams and rivers by releasing water slowly to maintain summer flows. Their many plants and animals have adapted to living in wet conditions.

There are lakes and wetlands throughout our Region. The largest, Lake Wairarapa, is also the largest wetland complex in the lower North Island and has animal and plant communities of national importance. We manage the lake's water level, to maintain a healthy habitat for these communities.

Greater Wellington operates barrage gates at the lake outlet to control flow from Lake Wairarapa into the Ruamahanga River and vice versa. During winter months the gates are usually closed, to prevent the river flowing back into the Lake. They are often closed during summer as well, to prevent water flowing out of the Lake.

What is Greater Wellington – The Regional Council doing?

Monitoring: collecting rainfall and river flow information at automatic recording stations across the Region. These are installed for specific purposes such as flood management, flood warning and resource consent monitoring.

In addition to the automatic stations, staff measure river flow at a number of other sites in the Region. This is done every two to six weeks, depending on the season and volume of data collected.

Greater Wellington is also monitoring the El Nino/La Nina climate pattern and issuing seasonal rainfall and river flow forecasts where appropriate.

Investigation: undertaking fish habitat surveys to determine whether waterways in the Region have enough water in them to provide suitable habitat for native fish and trout. Fish need a combination of pools to hide and rest in, and riffles to find food in.

Water, air, earth and energy: elements in Greater Wellington's logo combine to create and sustain life. Greater Wellington promotes **Quality for Life** by ensuring our environment is protected while meeting the economic, cultural and social needs of the community.

CONTACTS AND INFORMATION

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