

Executive summary

This report reviews the Taranaki Regional Council's ('the Council') performance and achievements on its state of the environment monitoring, resource investigations and waste minimisation functions for the 2008/2009 year.

State of the environment monitoring provides long-term information on the state of Taranaki's environment and of its physical and natural resources. Resource investigations focus on exploring particular issues that need investigating for developing and implementing defensible and robust policy.

The implementation and the promotion of waste minimisation and cleaner production initiatives for industries continued to be the core focus for waste minimisation activities.

Set out below is a summary of the main activities carried out by the Council in 2008/2009:

- Implemented 17 state of the environment monitoring programmes.
- Undertook 30 inspections and 176 surveys at 254 monitoring sites, collecting 915 samples, in association with state of the environment monitoring programmes.
- Prepared 8 annual reports that summarised monitoring results from the state of environment monitoring programmes.
- Published and launched the five yearly comprehensive State of the Environment Report for Taranaki entitled '*Taranaki: Where We Stand. State of the Environment Report 2009*'.
- Reviewed and updated individual state of the environment monitoring programmes.
- Maintained quality assurance programmes and information databases for hydrometric, air quality, physicochemical freshwater, freshwater biological and marine biological data.
- Maintained public access to on-line live regional data on rainfall and bathing beach water quality, and included access to river flow and level data, wind speed and direction data and soil moisture and temperature data.
- Undertook or supported 12 research investigations and applied research projects.
- Continued a work programme focusing on the promotion and implementation of waste minimisation activities within the region.
- Carried out key waste minimisation projects including waste minimisation studies in selected priority sectors in consultation with the three Taranaki district councils.

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1. Introduction

1.1. Purpose

This report reviews the Taranaki Regional Council's performance and achievements on its state of the environment monitoring, resource investigations and waste minimisation functions for the 2008/2009 year.

1.2. Background

The Taranaki Regional Council ('the Council') has responsibility for the management of coastal, air, water and land resources in the Taranaki region, a responsibility derived from the Resource Management Act 1991. These responsibilities include monitoring and reporting on the state of the environment and gathering such information, and undertaking or commissioning such research, as is necessary for the Council to carry out its functions under the Resource Management Act. In particular, under section 35(2) of the Resource Management Act, the Council is required to monitor:

- the state of the whole or any part of the environment of the region; and
- the suitability and effectiveness of its policies and decisions including the Regional Policy Statement for Taranaki and regional plans.

This activity encompasses two component parts:

- state of the environment monitoring; and
- resource investigations and projects.

State of the environment monitoring involves on-going programmes that regularly monitor different parts of the environment and enable the Council and the community to ascertain how successful we have been in promoting the purpose of the Resource Management Act – namely, the sustainable management of our natural and physical resources.

It involves the sampling of air, land, fresh water (including groundwater) and coastal water and may include chemical, physical, bacterial or viral analysis, soil analyses, flow gauges, electric fishing, biological surveys of freshwater or marine ecosystems, and the sampling and analysis of ambient air. It may also involve the review of operational monitoring data provided by other sections of the Council, consent holders and other organisations.



Monitoring periphyton (algae that live on the beds of streams)

State of the environment monitoring puts in place systems and programmes that enable the Council to look back on environmental trends and change over time. With this information, the Council can continuously assess its own performance in resource management as well as that of resource users.

Resource investigations and projects refer to special 'one-off' investigations and applied research projects that are undertaken to collect additional information on particular parts of the environment for which additional information is required. They are usually undertaken in partnership with science providers, other councils, or resource users.

In addition, in 2008/2009 the Council continued a work programme initiated in the 2004/2005 year, focusing on the promotion and implementation of waste minimisation activities within the regional community. This work is in response to the *Regional Waste Strategy for Taranaki, 2004*. The Strategy was prepared by the Regional Waste Management Forum, comprising representatives from the Regional Council and from each of the three district councils within the region, and is based on the goals and objectives of the *New Zealand Waste Strategy, 2002*. A key outcome of the *Regional Waste Strategy, 2004* was the appointment of a Regional Waste Minimisation Officer, based at the Regional Council, to assist the four councils implement the Strategy.



Recycling via kerbside collection services

The long-term goals of the Council's waste minimisation programme are to:

- promote the adoption of producer responsibility, primarily within the dairy and petrochemical industries;
- deliver national initiatives and strategies such as the national waste strategy and cleanfill guidelines at the regional level; and
- work with small to medium size enterprises and businesses to encourage waste minimisation and cleaner production as everyday philosophies with economic and environmental benefits for the enterprises and for the wider community.

1.2.1 Objectives

The objective for state of the environment monitoring programmes set out in the Taranaki Regional Council 2008/2009 *Annual Plan* is to:

"Monitor the state of the environment in Taranaki to enable periodic evaluation of trends in the state of the environment and the effects of the implementation of the Council's policies and plans".

The objective for resource investigations and projects set out in the Taranaki Regional Council 2008/2009 Annual Plan is to:

“Provide relevant and quality information for resource management purposes.”

The objective for waste minimisation set out in the Taranaki Regional Council 2008/2009 Annual Plan is to:

“Encourage and implement waste management and cleaner production initiatives in Taranaki consistent with the Regional Waste Strategy for Taranaki and the waste management plans of the districts.”



One of the Council's rainfall monitoring sites

1.2.2 Community outcomes

Community outcomes are described as *‘the things that the community thinks are important for its wellbeing’*. State of the environment monitoring informs the Council if environmental wellbeing is being achieved. Environmental wellbeing encompasses factors that relate ultimately to the capacity of the natural environment to support, in a sustainable way, the activities that constitute community life.

The Council can use information gathered through state of the environment monitoring to assess if desired outcomes are being achieved, and in many respects, allow for some predictions of the future environmental wellbeing of the community.

1.2.3 Performance measures

In response to the objective for state of the environment monitoring, the Council adopted the following programmes in the 2008/2009 Annual Plan:

- Implement 100% of the Council's state of the environment monitoring programmes comprising monitoring of surface fresh water quantity, levels and flows, fresh water quality, groundwater quantity and quality and land use sustainability using recognised and reputable methods of data collection, analysis and reporting in accordance with the Council's State of the Environment Monitoring Procedures document and State of Environment Monitoring Programme.
- Monitor, review and where appropriate, further develop the programme for the 2009/2010 year with a specific emphasis on programmes for monitoring biodiversity within the region.
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- Maintain all quality assurance programmes and information databases for hydrometric, air quality, physicochemical freshwater, freshwater biological and marine biological data.

- Complete the five-yearly comprehensive report to the Taranaki community in 2008/2009 on the state of the Taranaki environment focusing on all resource management issues of significance in the region. The report provides information on the current state of the environment including trends and the effectiveness of the Council's policies and programmes.
- Conclude the review and report on biological data in Taranaki's freshwater ecosystems in conjunction with the Cawthron Institute.
- Maintain 100% public access to on-line live regional data on hydrology, meteorology, soil moisture and bathing beach water quality.

In response to the objective for resource investigations and projects, the Council adopted the following programme in the *2008/2009 Annual Plan*:

- Undertake a range of resource investigations and applied research projects, normally in partnership with science providers, other councils or resource users. Specifically for 2008/2009 the Council intends to:
 - investigate point source and diffuse discharge from pastoral activities and their effects on surface water quality (including nutrient accumulation and attenuation, copper and zinc sources and effects);
 - conclude an investigation at the former Patea freezing works;
 - support studies into effects upon soil structure and quality from on-farm fodder cropping;
 - support littoral sand drift study on north Taranaki coast;
 - investigate ecological significance of first order streams, and consequences of stream modification;
 - consider study into water use optimisation on dairy farms;
 - report on biodiversity value of riparian margin planting study;
 - support studies on the performance, effects and consequences of nitrification inhibitors in association with Dexcel and others;
 - support the dairying catchment water quality study being conducted by AgResearch and NIWA in the Waiokura Stream catchment;
 - consider supporting studies calibrating nutrient management models for the Taranaki catchment; and
 - identify and review projects for the next year.

In response to the objective for waste minimisation, the Council adopted the following programmes in the *2008/2009 Annual Plan*:

- Assist sector leaders in six activity areas in exploring and implementing waste minimisation, including enhancing recycling in schools;
- Maintain an in-house waste minimisation programme;
- Work with the dairy industry to identify and implement waste minimisation opportunities;
- Explore promotion of glass recovery and re-use;
- Explore alternatives to landfill disposal for organic wastes;
- Promote AgRecovery programme;
- Monitor the quantity of recyclables collected from schools in the South Taranaki and New Plymouth districts;
- Participate in regional waste management fora.



Student involvement in recycling at St Joseph's Primary, Hawera

2. Report on progress

The Council's progress in relation to the above objectives and programmes is set out in the following sections of this report.

2.1. State of the environment monitoring

2.1.1 State of the Environment Monitoring Programmes

In 2008/2009, the Council implemented all 19 individual state of the environment monitoring programmes scheduled for the year. Set out below is an overview of activities undertaken in 2008/2009 relating to the various components of the programme.

Freshwater

Regular monitoring of general surface and groundwater quality occurs throughout the region. The monitoring involves up to 16 individual programmes that monitor physical and chemical water quality, freshwater biology, freshwater bathing quality and groundwater. These individual programmes are described in the Council's document *State of the Environment Monitoring Programmes 2008/2009*. The parameters measured in freshwater related programmes are listed in Table 1.

In relation to surface water quality, the Council monitored physical and chemical water quality at eleven sites on a monthly basis.

In 2008/2009, the Council surveyed macroinvertebrate populations in spring and summer at each of the 52 freshwater biological sites representative of different land uses and catchment characteristics.

Analysis of the Council's biological data¹ has found that over the eleven years of the surveys, MCI values have improved at 39 (80%) of the 51 sites surveyed in 2006-2007, with declines at 11 sites. These changes are 'indicative' i.e. they are not necessarily statistically robust as an 'indisputable' trend.

When statistical tests are applied to the survey, 16 sites definitely show (statistically significant) improvement, and no sites show a decline. A further 11 sites show a 'likely' improvement, with only 3 showing a 'likely' decline. 15 of the 51 sites show



Sampling macroinvertebrates from the Patea River.

¹ Taranaki Regional Council. 2008. *Fresh Water Macroinvertebrate Fauna Biological Monitoring Programme Annual State of the Environment Monitoring Report 2007-2008*

such an improvement in quality, that there has been a step shift in the ecological condition of the sites (for the better).

Periphyton (the algae and slimes on rocks in streams) can be used as another indicator of stream ecological health as well as an indicator of amenity value. In 2008/2009 the nuisance periphyton growth programme involved undertaking three surveys (spring, mid summer and late summer) at 21 sites on ten streams.



Monthly physico-chemical water quality monitoring

Monitoring for the presence of *Didymosphenia geminata* (Didymo) was carried out at ten popular freshwater angling sites on three occasions. Results showed that there was no Didymo present at the representative sites monitored. Monitoring work will continue on this matter into 2009/2010 at a similar level.

Monitoring of freshwater contact recreation water quality was carried out at 15 popular freshwater bathing spots. Each site was monitored a minimum of 13 times over the summer bathing season – mid November to mid April. Taranaki sites continued to have overall good quality and only irregular samples in ‘alert’ or ‘action’ levels, which is characteristic of freshwater systems (less dilution in dry periods or flushing after localised showers).

The presence of toxic cyanobacteria (blue-green algae) was also monitored at five popular recreational sites in conjunction with the contact recreation surveys to ascertain whether growing concerns regarding algae blooms in other regions could be an issue in Taranaki. This programme has been expanded over the years to now include 5 sites and a total of approximately 60 samples. A cyanobacteria bloom was recorded at Lake Rotokare and the lake was closed by the local council for boating and recreation for the season. Signage was also necessary at Lake Rotomanu late in the season.

The Council has been regularly monitoring groundwater levels and quality since 1995. Parameters measured in groundwater are listed in Table 1.

In recent years the Council has gathered data on water quality changes in relation to riparian management. This long term monitoring project is carried out in the Kaupokonui, Katikara, Kapoiaia and Tawhiti catchments. Parameters



Groundwater monitoring site and sampling equipment

measured are listed in Table 1.

Other freshwater monitoring undertaken in 2008/2009 included regional lake water quality monitoring of four sites at Lake Rotorangi, the maintenance, update and review of data on low flows and water use data, and volumes of consented water abstraction, and the maintenance of a regional register of dams, weirs and fish passages.

In 2008/2009, Council officers implemented all 13 freshwater monitoring programmes, monitored 254 sites (note that a single location may contain two or more sites to monitor different programmes), and undertook 30 inspections and 176 surveys, collecting a total of 915 samples.

Table 1 below, summarises parameters measured, the number of sites monitored and the frequency of sampling undertaken per site in 2008/2009 in relation to each freshwater monitoring programme.

Table 1 Freshwater state of the environment monitoring programmes 2008/2009

Programme	Parameters monitored	Number of sites	Frequency of sampling per site	Comments
Physicochemical	Temperature, flow, DO, BOD5, pH, conductivity, black disc clarity, turbidity, absorbance, ammonia-N, nitrate-N, total-N, DRP, total P, alkalinity, suspended solids, faecal coliform and enterococci bacteria, % algal cover	11	12	Sites sampled are representative of different land uses. QC procedures also continued.
Biological	Macroinvertebrates (snails, molluscs, crustacea and insects)	52	2	3 additional sites in hill country streams included in 2007-2008
Nuisance periphyton	Periphyton communities	21	3	
Freshwater contact recreation water quality	MTEC faecal coliforms and E. coli, MF enterococci, conductivity, turbidity, temperature	14	13	Sampling is undertaken over the summer months; Cyanobacteria also sampled at 5 sites
Groundwater quality	Conductivity, alkalinity, pH, chloride, sulphate, silica, nitrate, nitrite, ammonia, dissolved reactive phosphorus, sodium, potassium, calcium, magnesium, iron, manganese, bromide, fluoride	5	4	
Groundwater levels	Water level	7	12	
Freshwater use & availability (surface and groundwater)	Low flow & water use	N/A	N/A	
	Total volume of consented surface water abstractions by use type & industry category	149*		Review of consents data base
	Total volume of consented groundwater abstractions by use type & industry category	76*		Review of consents data base
Regional hydrology	Flow/Water Level	18	12	Telemetered hydrological monitored systems
	Rainfall	25	12	
	Soil temperature/moisture	8	12	
	Wind direction/speed	5	12	Non-telemetered systems – temperature measures only
	Water temperature	11	12	
		4	12	Monthly flow gauges
Fish barriers	Barriers restricting fish passage	N/A	N/A	Maintenance of a register identifying existing & new barriers
Regional lake water quality	Lake Rotorangi physicochemical and biological water quality	13	4	Part of a compliance monitoring programme
Riparian management	Water temperature	10	12	Kaupokonui, Kaitikara, Kapoiaia, Tawhiti catchments
	Biological	10	2	
	Bacteriological	1	Part of SEM bathing	
	Periphyton	5	12	
	Clarity	3	12	
Total		264		

* not included in totals at bottom of table

The primary source of hydrological information is obtained through the Council's telemetry system. The Council operates 35 telemetered hydrological stations (two are shared with NIWA) recording water level and flows, water temperature, rainfall, wind direction, speed and maximum wind gusts, and soil moisture and temperature. This information is automatically transmitted to the Council. A further 24 non-telemetered water temperature sites are also maintained and monitored.

In 2008/2009 the region was close to normal rainfall conditions for all sites, except Cape Egmont, Mangaehu, and Pouakai at Carrington Rd, which recorded between 84 and 97% of normal. February 2009 was a very wet month, with rainfall totals ranging between 139 and 223% of normal. North Egmont recorded 721.5mm (173% of normal), while Patea recorded 140.0mm and Tawhiti at Duffy's Farm (Whareroa) recorded 136.0mm, which is 222% and 223% of their normal February rainfall respectively.

The region started off the 2008/09 season with rainfall totals ranging between 148% and 209% of normal, which resulted in the river flows having mean July 2008 flows almost double their monthly norm. This higher than normal rainfall carried on through to August, so flows did not drop below their mean monthly flows until September 2008.



Soil moisture is important for grass growth

With the high rainfall in February 2009, the region did not experience its normal 'dry' period in the summer. The 'dry' period did not happen until April, where rainfall did not occur for most of the month. This meant the rivers got to near critically low levels. It may not have appeared to have been that dry to people, as the grass was still green throughout April, but this was caused by the heavy dews the region experienced and not to do with any rain that may have occurred.

Air

The Council monitors key indicators of ambient air quality on an 'as required' basis. The monitoring involves up to six individual programmes that monitor various indicators of air quality. These individual programmes are detailed in the Council's document *State of the Environment Monitoring Programmes 2008/2009*.

Air monitoring programme data has been gathered and maintained for the past 17 years at up to 20 representative sites, including urban, rural, coastal and pristine areas. The indicators monitored reflect parameters of particular interest in those areas. These include sulphur oxides, nitrogen oxides, benzene, carbon monoxide, formaldehyde, suspended particulates, deposition, visibility, emission inventories, and inhalable particulates. Results obtained from the various monitoring programmes are compared with Ministry for the Environment national guidelines where appropriate, and National

Environmental Standards.

Regional monitoring to date has shown that Taranaki has very clean air, and on a regional basis there are no significant pressures upon the quality of the air resource. The frequency and complexity of programmes has therefore been reduced and no state of environment air quality monitoring was undertaken this year.

Coastal

The Regional Coastal Water Quality Monitoring Programme has been implemented by the Council since 1995. The programme comprises individual programmes that monitor marine bathing water quality and subtidal area.

In 2008/2009, 10 sites at recreational beaches were monitored for water quality over the bathing season (approximately November to March). Faecal coliform *E.coli* and enterococci bacteria numbers were measured and conductivity determinations were performed. The results showed that marine bathing water quality in Taranaki is generally safe for contact recreation (typically more than 95% of all samples comply fully with guidelines).

In the 2008-2009 year, Council officers continued to implement the Hard Shore Marine Ecological Monitoring Programme. Six reefs around the Taranaki coastline were surveyed in both spring and summer each year. At each reef, 25 randomly placed quadrats are used to measure percentage cover of algae and encrusting animal species, and the species diversity and abundance. The reefs are in effect control sites (unaffected by any significant discharge to the coasts) and marine ecological diversity is used as an indicator of coastal water quality. From the monitoring results to date it appears that each site has maintained a reasonably consistent level of ecological diversity over the duration of the programme (although variation does occur within sites, due almost invariably to natural factors such as sand drift). This suggests that coastal water quality and other environmental conditions have also remained relatively constant at these sites.

Council officers also continued the Soft Shore Marine Ecological Monitoring Programme. This monitoring is undertaken within the Tongaporutu and Waitotara estuaries, which are two of the region's four coastal areas of outstanding value. Twelve core samples are taken randomly at each site and the different types and numbers of species were recorded.



Tongaporutu Estuary

The soft shore monitoring results to date confirm that ecological diversity is low on soft shore

environments compared to hard shore systems. However, this is typical of this type of substrate. Monitoring also notes healthy populations of certain species, and a variety of other benthic animals were identified within the sediment.

Both estuaries appear to experience large fluctuations in the abundance of species over time. However, the fluctuations are not believed to indicate significant change to coastal and freshwater quality in the two estuaries. Recovery can be quite rapid after disturbance events such as floods.

Biodiversity

The biodiversity state of environment monitoring programme continued to be developed over this year. Monitoring of ecological health before and after pest animal control has been undertaken:

- At Whitecliffs with DOC and Ngati Tama
- At Lake Rotokare (providing technical support and assistance to the Lake Rotokare Scenic Reserve Trust)
- In East Taranaki (assisting the East Taranaki Environment Trust with monitoring of goat impacts).
- At three key native ecosystems using quick plot monitoring of vegetative health
- At Umutekai, five minute bird count surveys are being conducted to measure the consequences of animal pest control

Forest condition assessments, in which many indicators of forest condition are scored have been carried out/trialed at seven Key Native Ecosystem sites. For example, Umutekai Bush, one of 'jewels in Taranaki's crown' was scored 78/100, a score that whilst high, may improve with further biodiversity management.

Quantitative monitoring of wetland condition has been conducted at 10 wetlands (five by Landcare Research).

In a number of cases species richness and abundance monitoring is being carried out voluntarily by members of the public. Building community capacity to undertake monitoring will be a component of the Councils upcoming biodiversity monitoring strategy.



Monitoring the ecological health of a Key Native Ecosystem.

2.1.2 Preparation of annual summary reports

Annual reports are building blocks that evaluate and update state of the environment monitoring data gathered by the Council in the preceding year in relation to various component parts of the environment.

As at 30 June 2009, the Council had prepared eight annual summary reports as follows:

- *Freshwater Contact Recreational Water Quality at Selected Taranaki Sites – State of the Environment Monitoring Annual Report 2007-2008.*
- *Bathing Beach Water Quality State of the Environment Monitoring Report Summer 2008-2009. Technical Report 2009-11.*
- *State of the Environment Groundwater chemical quality 1994 – 2007. Technical Report 2008-58.*
- *State of the Environment Monitoring 2002-2007 Nitrates in shallow groundwater in Taranaki Technical Report 2008-78.*
- *State of the Environment Monitoring Groundwater Levels 2005-2008. Technical Report 2009-10.*
- *State of the Environment Monitoring Surface Water Availability in Taranaki 2008 Technical Report 2008-74.*
- *State of the Environment Monitoring Report Summary of Consented Water Takes 30 June 2008*
- *TrustPower Ltd – Lake Rotorangi Monitoring Programme Water quality and biological programmes Annual Report 2007-2008 Technical Report 2008-45²*



2.1.3 Taranaki. Where We Stand. State of the Environment Report, 2009

Every five years the Council prepares a comprehensive summary report on the State of the Environment for Taranaki. Three reports have now been prepared.

The first in 1996 was a 'baseline' report which summarised the region's progress in improving environment quality in Taranaki over the previous two decades and provided a 'snapshot' of the state of the environment at that time.

The second report was published in 2003 and reported on the first five years of a comprehensive suite of state of the



Hon. Nick Smith, Minister of the Environment, launched the report

² This compliance programme includes state of environment monitoring elements.

environment monitoring programmes covering land, air, freshwater, the coast and a number of other general areas.

In early 2009 the third state of the environment report was published: *Taranaki. Where We Stand. State of Environment Report 2009*. This report assessed and evaluated the state of the environment monitoring undertaken over the past 12 years and provided information on the current state of the environment, trends in the resources being monitored, pressures on those resources, reasons for the trends observed and the responses made by the Council and the local community.

The report was launched through a formal function at the Plymouth Hotel in New Plymouth. The Minister of the Environment, Dr. Nick Smith attended and formally launched the report before an audience of community leaders and key stakeholders. The launch provided a platform for a community celebration of the progress that the Taranaki community has made towards sustainable management of the environment.

The launch was well attended by over 80 people, and was a successful event.

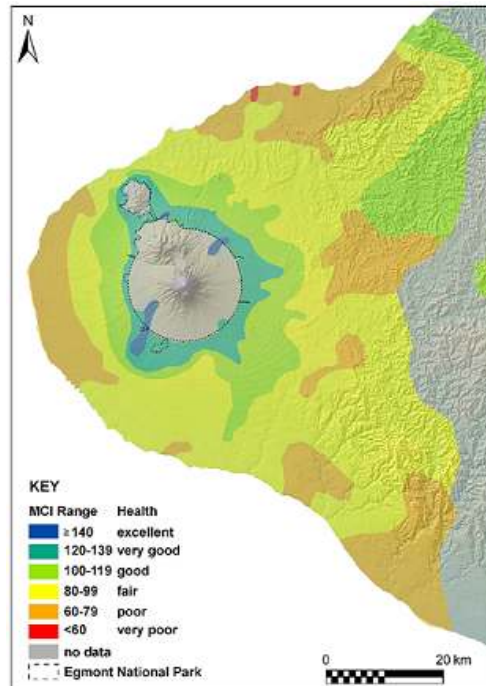
2.1.4 Review and report on biological trends

The report *Relationships between MCI, site altitude, and distance from source for Taranaki ring plain streams* (Stark Environmental report 2009-01, January 2009) was produced by an independent consultant analysing trends and relationships in the Council's biological data.

The work has successfully derived means of calculating realistically expected MCI values, a measure of stream health, for any stream on the ring plain, thus showing regional stream health and also allowing identification of stretches of streams where stream health is degraded.

The study establishes that streams on 47% of the ring plain are in 'fair' condition, and 38% of the ring plain has streams that are in 'good', 'very good', or 'excellent' condition, with streams on less than 15% of the ring plain being 'poor' and none 'very poor'.

The results of the study feed into techniques for evaluating the health of streams throughout the ring plain, and into determination of the state of the region's ring plain streams, and into the development of policies and objectives around water resource management.

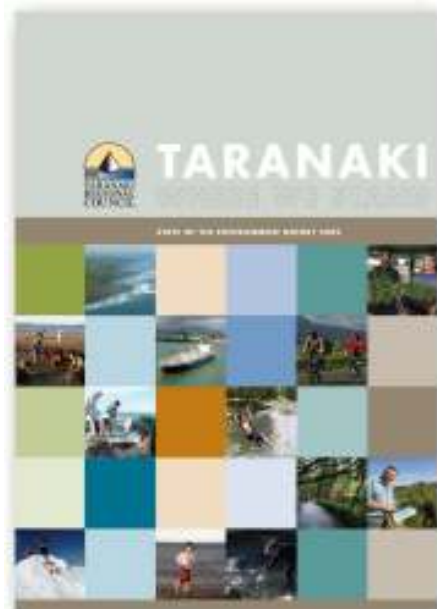


Stream ecological health decreases down catchments.

2.1.5 Review the monitoring programmes for 2009/2010

The Council annually reviews its state of the environment programmes. This is undertaken not only to ensure its on-going cost effectiveness and relevance but also to take into account any development of national environmental indicators and guidelines.

Following the release of the Council's report *Taranaki. Where We Stand. State of the Environment Report 2009*, the Council took the opportunity to further review the state of environment programmes, to ensure they meet the Council's policy and plan development requirements. Recommendations for reviews included deleting some programmes that had not been used for the preparation of the 6 yearly report (primarily information gathering ones), including new programmes to cover energy and waste, and reviewing a number of existing programmes to address matters such as freshwater biodiversity, wetland extent and condition, weed distribution, cultural assessment of state of environment change and greater incorporation of community gathered data in future programmes.



2.1.6 Maintain quality assurance programmes and information databases

Each year the Council undertakes quality assurance programmes, which review monitoring and sampling methodologies – both in the field and at the laboratory. This involves the use of independent external consultants that review:

- internal quality control, which assesses the precision in measurements; and
- external quality control, which assesses the programme's measures and the accuracy of the Council's data.

In 2008/2009, the quality assurance programmes verified the Council's field and laboratory monitoring and sampling methodologies. In particular, during the 2008/2009 year, Council staff were involved in the following activities:

- on-site reassessment of the Council's chemistry laboratory to confirm continuing accreditation of the laboratory by International Accreditation New Zealand;
- participation by the laboratory in five rounds of the 'Water Test' national inter-laboratory analytical programme (a proficiency testing programme);
- a number of inter-laboratory comparisons between the Council's laboratories and laboratories of consent holders or their consultants, involving split or duplicate sample analysis taken during compliance monitoring inspections;
- participation in the NIWA National Rivers Network programme, during which one duplicate of samples collated for analysis by NIWA is also analysed in the Council's laboratory;

- 'blind' state of the environment freshwater samples collected in duplicate in the field and processed independently in the chemical laboratory, on a three-monthly basis;
- continuation of an annual macroinvertebrate samples exchange with an independent expert following a national protocol (Protocol QCI, Stark *et al*, 2001), focused on sample processing, taxa recognition and identification;
- Council data from hydrology sites (rivers, flows, rainfall) was periodically compared by Council staff with data for the same site collected by NIWA;
- Confirmation of Council algae identification by external experts.

2.1.7 Maintain public access to on-line regional data

Interest in the Council's website (www.trc.govt.nz) continued to grow throughout the 2008/2009 year, and is an important point of information for the public. The site provides an overview of the Taranaki region and the Council's significant activities. The website provides people with access to on-line rainfall data (at 18 sites), river flows and levels (at 21 sites), soil moisture (at 8 sites), wind speed and direction (at 5 sites) and water temperatures (at 9 sites) all year round and bathing water quality data during the summer months.

With 80,132 views for the 2008/2009 year, the website's wind data portal page was the second most visited behind the home page (107,723 views). Also among the most visited pages were the rainfall data portal page (22,858 views) and the river data portal page (16,570 views).



Bathing water quality results on the Council's website.

2.2. Resource investigations and applied research projects

Central government, through the administration of its substantial public good science fund, has the principal role in ensuring that competent, relevant and useable environmental science and research is provided to underpin resource management in New Zealand. For its part, the Council believes it has a responsibility to assist the government in prioritising and defining environmental research agendas and to resource supplementary, investigative projects of an applied nature, which are focused on the needs of Taranaki and the functions of the Council.

In 2008/2009, the Council undertook or provided funding for resource investigations and applied research projects that were identified in the *2008/2009 Annual Plan*. The status and outcomes achieved to date are discussed below.

Investigate point source and diffuse discharge from pastoral activities and their effects on surface water quality.

A report has concluded into rate of assimilation and dilution of the contaminants discharged into a stream from a dairy effluent treatment pond³. The study demonstrated that riparian planting provides significant additional benefit for water quality, even when pre-existing quality is already high. The study found that rainfall events contribute mass loadings of several contaminants that can be much higher than the mass loadings from individual point sources (dairy effluent treatment ponds).

The study concluded that the more reactive of contaminants (ammonia, dissolved reactive phosphate) are stabilised within 120 metres of their point of discharge, biochemical oxygen demand and bacteriological contaminants within 450 metres, and the more persistent contaminants such as nitrate and total phosphate within 1.5 kilometres. This indicates that consideration should be given to cumulative effects where there are multiple discharges within a distance of up to 120-450 metres.

Investigation at the former Patea freezing works

The Council completed an assessment of levels of contamination in the former Patea freezing works site in the previous financial year⁴. This year the Council has carried on air quality monitoring and inspecting the integrity of the polymer protecting the site. It also assisted the South Taranaki District Council (STDC) in developing a site remediation plan.

In November 2008, a paper entitled ' Patea freezing works ' was presented by Council staff to the annual conference of the Waste Management Institute of New Zealand in Blenheim .

The Government has confirmed a major contribution to STDC's for use in remediating the site.

Support studies into effects upon soil structure and quality from on-farm fodder cropping

The Council has continued to provide financial support for studies undertaken on trial farms into the effects on soil structure and quality from on-farm fodder cropping. Intensification of dairy farm productivity by producing arable crops has the potential to impact on the environment through tillage operations releasing nitrogen bound in soil organic matter and causing changes in the soil organic carbon pool. The objective of this project is to follow changes occurring in soil properties when land is converted to crops after a long period in pasture. Short term cropping can be an effective method in the process of renewing old pasture with new more productive cultivars with improved insect resistance. Whilst at any one time, only 10% of the farm area is expected to be in

³ Taranaki Regional Council. 2008. *The assimilation and dilution of dairy shed effluent pond discharges in Taranaki: a study and discussion of in-stream environmental effects below a pond discharge.*

⁴ Taranaki Regional Council. May 2008. *Patea Freezing Works Detailed Site Investigation Report.*

supplementary feed crops, the duration of cropping phase may be critical to the longer term sustainability of the proposed feed system for dairy production in Taranaki.

This project will monitor changes in the key indicators of sustainability of the cropping practice in a long term pastoral situation with intervening cropping cycles. Soil indicators such as soil biomass carbon, potentially mineralisable carbon, nitrate and ammonium concentrations in soil extracts will provide useful information on the likely effects of cropping practices for Taranaki soils.

Support littoral sand drift study on north Taranaki coast;

The Council supported a student research project on the movement of sand along the Taranaki coast from the massive erosion event in the headwaters of the Hangatahua (Stony) River catchment. Since the initial collapse in 1998, the adjacent coastal shoreline has experienced a continuous influx of dense 'black' titanomagnetite-rich volcanic sands from the Stony River. These sediments are being rapidly transported to the north-east by the energetic wave climate, creating upper-shore sandy beaches on what is normally a rocky boulder coast devoid of sand.



Hangatahua (Stony) River coastline, November 2008

This study focuses on onshore geomorphology and sediment characteristics of this coast in June, September and November 2008. Results indicate that there has been a decrease in the beach sediment volume and mean grain size with distance north-east of the Stony River. This "sand lens" is predominantly transported only when high tides coincide with energetic wave conditions.

The research was presented to the International Coastal Symposium in Portugal.

Investigate ecological significance of first order streams, and consequences of stream modification

Small streams (first or second order streams) make up 75% of all streams in Taranaki, criss-crossing the Taranaki landscape. Intact small streams provide habitat for rare and diverse stream-life and perform hydrologic functions such as the provision of natural flood control, the buffering of summer low-flows and recharging of groundwater.



Recontoured paddock after the realignment of a tributary of the Mangawhero stream.

Aerial photos taken in 2001 and 2007 were examined and the extent of stream modification was calculated by comparing the two sets of photographs. The results indicated a much higher rate of small stream modification than that indicated by records of consent applications, an estimated 96 km of small stream modifications were mapped during this six year period.

In terms of the proportion of their total small stream-length lost, the most affected catchments include many of the small unnamed coastal catchments in southern ring plain dairying areas, as well as the Mangatoromiro, the Rawa, the Ouwe, the Mangati, the Opuhe and the Taikatu.

In terms of the highest total stream length lost, the Kaupokonui, Waingongoro and Patea river catchments lost the most stream length through modification in the 2001-2007 period.

A draft report was completed by the end of the financial year.

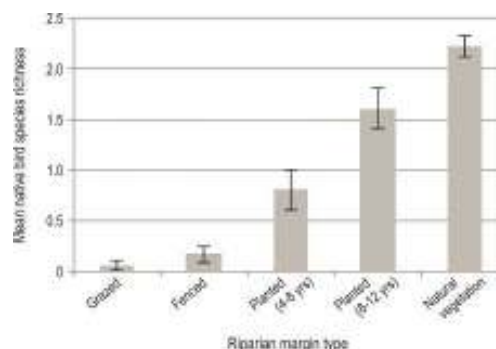
Consider study into water use optimisation on dairy farms

This project was not progressed due to other commitments.

Biodiversity value of riparian margin planting

The Council initiated an examination of the biodiversity value of planted riparian margins and supported a student research project on the subject. The thesis report was completed this year, and is entitled "*Riparian Management in Taranaki. A success for native biodiversity*".

The results indicate the continuing ecological enhancement for both flora and fauna, as riparian plantings are undertaken and subsequently approach maturity. Fantails, waxeyes and grey warblers were amongst bird species noted to profit from riparian management. Native plant species diversity increased with the age of riparian plantings.



Graph illustrating the increase in bird diversity with age of riparian planting

However, weed control was identified as a key management need.

Performance, effects and consequences of nitrification inhibitors

The Council continued to support studies on the performance, effects and consequences of nitrification inhibitors in association with Dairy NZ (formerly Dexcel) and others. Research is being carried out into the opportunity for nitrification inhibitors to increase the profitability and environmental sustainability in Taranaki soils, particularly in coastal Taranaki. Nitrification inhibitors are chemicals that impair the activity of nitrifying soil bacteria thereby slowing the formation of nitrate from ammonium in the soil. This provides more opportunity for plants to use the nitrogen before it is leached from the root zone, particularly during times of slow plant growth such as winter.

Two farmlets have been established to undergo this research, which will run for a period of two years. Preliminary results suggest that there is no difference between the treatments in terms of pasture growth or milk solids produced.

Supporting studies calibrating nutrient management models for Taranaki conditions

The Council is supporting research undertaken on a demonstration farm to evaluate and compare greenhouse gas emissions, energy efficiency nutrient losses and whole-system environmental implications from the many different dairy farm systems that operate in Taranaki. The OVERSEER nutrient budget model will be used to evaluate the environmental effects of a wide range of different farm systems on Taranaki research and demonstration farms, as well as some commercial farms. While evaluations have previously been carried out on the physical production and economic results, little evaluation has been carried out in terms of nutrient budgets or environmental efficiency.

Dairying catchment water quality study

The Council has continued to support research undertaken in the Waiokura catchment being conducted by Agresearch and NIWA. The Waiokura catchment was chosen by Council staff, upon request to nominate a catchment for a national 'best practices in dairying catchments' study, as a 'worst-case' stream- arising within the ring plain and with high-intensity dairying and a high density of waterways running through it. It is not typical of ring plain streams.

The catchment has been closely studied for 8 years. The fencing of stream banks was identified as a key measure that would promote stream health.

There has been an increase in the length of stream bank protected by riparian works. There has also been a reduction in phosphate fertiliser application and conversion of shed pond discharges from the stream to land. Yields of dissolved and total phosphate and of suspended solids to the stream have reduced 25-40%, as have concentrations of bacteriological indicators.



Steve Poole, farmer in the Waiokura catchment, and his riparian planting.

Productivity within the catchment has increased by almost 25% during the same period. Nitrogen fertiliser usage, supplementary feeding, and nitrogen losses into the stream have increased during the same period.

The MCI values in the stream indicate a good to excellent ecological community, notwithstanding that nutrients guideline values are exceeded. There is an increased level

of farm dairy discharge consent compliance within the catchment, from more than 1 UIR per year (97% compliance) to 1 incident since 2004 (99.5% compliance).

An update of the research being carried out in this catchment was presented by NIWA at the Freshwater Sciences Conference, held in New Plymouth in November 2008.

Additional research projects supported

In addition to the research projects described above, the Council also provided financial support to the development of environmental indices for wetland health (along similar lines to the use of the MCI index for stream health). This research is being undertaken through a FRST contract by NIWA covering wetlands from the whole of the country in order to establish a set of indicators that will be representative of the diversity of wetlands across New Zealand.

The Council also provided support for research into developing a river sediment monitoring tool. This work will aim to quantify the impact of land management strategies for the stabilisation of fragile catchments, it will benchmark catchment stability and evaluate sources and fluxes of gravel supplies. Given the increase in erosion in the headwaters of many Taranaki rivers, this is timely research.

Finally, the Council supported a student project that will determine the properties, distribution and potential usefulness of the aquifers in the Stratford and South Taranaki Districts. The study will produce an updated hydrogeological model for TRC to use as a basis for effective water resource management.

Identify and review projects for the next year.

The final performance measure identified in the 2008/09 Annual Plan was to identify and review projects for next year. The following section discusses these projects.

Marfell Park

The background to the project is that Marfell park is located on a former municipal landfill. The landfill was closed in 1976 and subsequently was developed into the park which includes a children's playground.

Recent laying of stormwater pipes in the northern part of the park, in the vicinity of the playground, encountered some crushed drums with a small amount of chemical residue about 2 m below the surface. Laboratory testing of the waste and surrounding soil by the Council revealed the agrichemicals trichlorophenol (TCP), tetrachlorobenzene (TCB) and dioxin contamination (2,3,7,8-TCDD) within the waste. Small concentrations of



Laying of stormwater pipes excavated crushed drums

some other organic pesticide compounds (including the organophosphate insecticide dichlofenthion) were also detected. A risk assessment showed there was no reason to avoid using the park.

However, the discovery of the chemical residues has raised concerns within the community that there could be general dioxin and other contamination within the landfill and that this contamination could also be affecting the surface of the park. Park users are concerned that they or their children might be exposed to such contamination in their day-to-day use of the park.

An independent consultant, Graeme Proffitt, from Prattle Delamore Partners Limited, has developed an investigation programme with the community. It is proposed to sample soil in various locations in the park to determine whether the soil contains concentrations in excess of soil concentration guidelines. If contaminant levels are excessive, then a subsidiary aim is to determine ways of managing the risk.

Other resource investigations proposed for future years are listed in the Council's Long Term Council Community Plan (2009-2019).

Envirolink

The Council engages in 'Envirolink' and other science research project development opportunities and strategies to enhance the knowledge base for policy development and implementation. Envirolink is a regional council driven funding scheme, with funds administered by the Foundation for Research, Science & Technology (FRST). Projects with clear relevance and benefit to Taranaki are proposed for 'Envirolink' and other funding opportunities. In addition, senior Council staff led both the Envirolink environmental management tools selection process and the development of the *Future Needs Research Strategy* on behalf of regional councils.

2.3. Waste minimisation

The following activities have been carried out in relation to the Council's waste minimisation programme in the 2008/2009 year:

Exploring and implementing waste minimisation including enhancing recycling in schools

Waste minimisation assistance was provided in the following six sectors: restaurants/cafes, service clubs, hotels, public events (input into the Rugby World Cup games bid), education and agriculture. The majority of the work with businesses in 2008/2009 involved assisting them in implementing suggestions made as a result of their initial waste minimisation assessment.

The Taranaki Regional Council continued to work with the South Taranaki District Council, Stratford District Council and New Plymouth District Council on furthering recycling in schools. The Paper4Trees scheme is now established in the region. After consideration by waste officers from the four councils financial support was provided by the three district councils towards the set up costs, and the scheme was adopted by all schools. As part of this programme schools monitor the amount of paper collected. Council staff have also worked on waste minimisation issues with a group of preschool teachers.

The quantity of other recyclables collected from schools in South Taranaki and New Plymouth District is not able to be monitored because it is collected with recycling from other sources.

Maintain an in-house waste minimisation programme

The Council has continued its own in-house waste reduction and recycling activities, including recycling paper printed on only one side and recovery of all recyclable and compostable canteen wastes. As part of this programme, a waste audit was also conducted on Council's own wastes. Two thirds of the total was recyclable or compostable. The waste audited highlighted the large number of disposal cups used. Since the audit, the Council no longer uses disposable cups.



The mountain of used paper cups !

Working with the agricultural industry and farm plastics

The Council continued to assist the Agrecovery Foundation with the development of a national farm agrichemical containers recovery programme. Two locations are now established for the disposal of agrichemical containers, one in Waitara (the site was established in 2006/2007) and one in Hawera (the site was established in 2007/2008). A third site is to be established in Stratford in the near future. Farmers can leave their empty agrichemical containers at these locations for further processing. The Council would like to see the remaining significant producers of dairy chemicals join the programme.

In 2008/2009 the Council continued to promote recycling of silage wrap plastic from farms in the region. This issue was identified in the Council report, *Investigation into Taranaki's Rural Waste Stream*, as material farmers would like to see recycled.



Recycling of silage wrap plastic

Agpac continued to use agricultural contractors as agents for its silage wrap recycling scheme in Taranaki in 2008/2009.

A local recycling company also continues to accept the wrap independently. In addition, Agrecovery has recently started a silage wrap recycling service. All of these services are promoted by the Council.

A national programme for the collection of agricultural chemicals is about to be launched by Agrecovery. This will require some input from the four councils and a meeting is to be held shortly with the programme manager to facilitate this.

Explore promotion of glass recovery and re-use

The Council has continued to investigate options for recovery and recycling of glass within the region. Although New Zealand's only glass manufacturer has increased capacity during the year, glass recycling continues to be problematic. Alternative end uses within the region are therefore still being investigated to forestall landfilling of glass collected through recycling programmes. These potential uses include roading aggregate, sandblasting and plastering sand. Interest has been expressed by various players, and is being pursued.

Explore alternatives to landfill disposal for organic wastes

Composting operations were contacted as part of the inventory of solid wastes management and disposal in Taranaki, and all are experiencing good demand. Comments made by these businesses in response to a question about how composting businesses might be able to further assist waste minimisation in the region included: better green waste collection systems, improving the awareness of the composting facilities available, and banning green waste in kerbside municipal rubbish collections.

Participation in regional waste management fora

The Council is a participant in the Regional Solid Waste Working Party. The Working Party is currently made up of representatives from: the Taranaki Regional Council, New Plymouth District Council, Stratford District Council, and South Taranaki District Council, and Waste Management Ltd (current provider of municipal refuse collection and recycling services). It is a forum of councillors and senior staff considering all aspects of waste management.

The Working Party was established in 2004 for the purpose of developing a detailed proposal for funding and managing the shared landfills, assisting, where appropriate, with obtaining consents and co-ordinating any matter relating to solid waste management in Taranaki.

With the enactment of the Waste Minimisation Act, the role of the Working Party is likely to change. It is currently chaired by Councillor Walker of this Council, and administered by the NPDC. Consideration is currently being given to re-forming the Working Party as a joint inter-council committee with decision making roles. The establishment of a joint committee could address waste minimisation issues (not just solid waste); empower a joint forum for regional and district councils to cooperate and decide on waste management projects and initiatives with intra regional benefits, and enable decision making associated with waste management to be decided on a regional rather than district basis.

The Council's waste minimisation officer convened and reported to the Taranaki Regional Waste Officers' forum. Suggestions arising from the forum were acted upon where possible.

In addition to the actions identified in the 2008/09 annual plan, the Council has undertaken the following waste minimisation or recycling initiatives:



Okurukuru Restaurant, winner of an environmental award, 2009.

Environmental awards

One of the six environmental awards presented by the Council in May 2009 was awarded to a restaurant which had implemented effective waste minimisation and energy efficiency measures with the assistance of the Council's waste minimisation officer.

Other matters

Council officers continued to promote waste minimisation to members of the public and assisted

with enquiries regarding hazardous wastes management and disposal, recycling, the proper disposal of chemicals, paper, computers, tyres, glass and plastic and waste exchanges. The Council also continued to promote Freecycle, a web based resources exchange, and successfully used this website to dispose of Council's unwanted (but still working) IT equipment.

Information on waste in the region was collected and analysed for the State of the Environment Report.

The Waste Minimisation Officer co-authored and presented a paper at the 2008 WasteMINZ conference, *Waste Minimisation and Resource Recovery at Events*, using WOMAD 2008 as a case study.

eDay – collection of electronic equipment

eDay was held in over 30 centres across New Zealand on Saturday 4 October 2008. In Taranaki, there were collection points in New Plymouth, Hawera and Stratford which were organised by the three district councils with assistance from the Taranaki Regional Council. A number of industries (eg computer/office supplies and transportation) provided sponsorship or support. The collection was a great success with New Plymouth collecting 28 tonnes of unwanted computers (4.5 container loads) from 618 vehicles, Stratford 4 tonnes from 84 vehicles and Hawera 7 tonnes from 154 vehicles. The community response was above predicted levels.

All equipment was sorted at the drop-off sites on eDay before being transported to recycling plants within New Zealand and overseas. All equipment dropped off at a collection point will be recycled by accredited recyclers using accepted international practices to ensure the safety of workers and maximise the recovery of materials.



Packing up electronic equipment collected during e-day.

Inventory of solid wastes management and disposal in Taranaki

A draft report has been prepared on the management and disposal of wastes that do not pass through the avenues of municipal collection and disposal services in order to facilitate waste management in the region. This information is not readily available from the three district councils unlike the municipal collection information. This report looks at the range of wastes and recycled materials produced within the industrial sector, the nature of the industries producing such wastes, the volume and characteristics of the wastes, their present disposal fate, and the issues and opportunities facing this sector.

3. Conclusion

In conclusion, the Council has addressed its performance measures for resource investigations, monitoring, and waste minimisation activities set out in the *2008/2009 Annual Plan*, and has undertaken some additional works and projects.

The Council continues to implement and develop its state of the environment monitoring programmes to enable it to assess progress towards the sustainable management of the region's natural and physical resources and the effectiveness of its resource management policies and plans. Other resource investigations and applied research has been undertaken where the Council, through its monitoring, has identified a particular environmental issue for which further information is needed.

Programmes and performance measures

- Implemented 17 state of the environment monitoring programmes.
- Undertook 30 inspections and 176 surveys at 254 monitoring sites, collecting 915 samples, in association with state of the environment monitoring programmes.
- Prepared 8 annual reports that summarised monitoring results from the state of environment monitoring programmes.
- Published and launched the five yearly comprehensive State of the Environment Report for Taranaki entitled '*Taranaki: Where We Stand. State of the Environment Report 2009*'.
- Reviewed and updated individual state of the environment monitoring programmes.
- Maintained quality assurance programmes and information databases for hydrometric, air quality, physicochemical freshwater, freshwater biological and marine biological data.
- Maintained public access to on-line live regional data on rainfall and bathing beach water quality, and included access to river flow and level data, wind speed and direction data and soil moisture and temperature data.
- Undertook or supported 12 research investigations and applied research projects.
- Continued a work programme focusing on the promotion and implementation of waste minimisation activities within the region.
- Carried out key waste minimisation projects including waste minimisation studies in selected priority sectors in consultation with the three Taranaki district councils.

The work carried out contributed to the desired community outcomes of a sustainable and prosperous region.

The report will be forwarded to key interested stakeholders for resource investigations and monitoring.

Appendix I

An example of a individual state of the environment monitoring programme

SEM job sheet
Freshwater physicochemical monitoring programme

Project Manager	Scientific Officer (Water Resources), Chris Fowles	
Job number	720100 001	
File	SEM2/1 (formerly RPS5/10/5)	
Doc No	302346	
Policy Links	Issue 3.1 Method 9 ER 2,3,4,5 and Method 5.	
Monitoring period	1 July 2008 – 30 June 2009	
Sampling	<p>Sampling will be undertaken monthly at 11 sites, representative of different land uses, for: temperature, flow, DO, BOD₅, pH, conductivity, black disc clarity, turbidity, absorbances (3 wavelengths), ammonia-N, nitrate-N, total-N, DRP, total P, alkalinity, suspended solids, faecal coliform & E.coli bacteria (mTech), enterococci bacteria. Sites are (as listed in the "SITES" database): MKW000300, MRK000420, WKH000500, STY000300, PNH000200, PNH000900, WGG000500, WGG000900, PAT000200, PAT000360, MGH000950.</p> <p>Technical Officer: 12 sampling runs x 7.5 hours/run x 2 persons 180 hours Laboratory (analytical): \$345/sample x 11 sites x 12 sampling runs = \$45540</p> <p>Gaugings will be undertaken monthly at 4 sites by Hydrology staff (at MKW000300, STY000300, PNH000200, & PAT000200) for rating purposes.</p>	
Reporting	<p>Preparation of annual summary report to the Taranaki Regional Council, providing statistical summaries of each parameter at each site and comments on changes from the previous year.</p> <p>Scientific Officer: 90 hours 90 hours</p>	
Resource summary	<p>Technical Officer 180 hours Scientific Officer 90 hours Laboratory \$45,540</p>	
Note	<p>Sampling techniques are summarised in a sampling procedures document 'State of the Environment Regional Water Quality Monitoring Network for Taranaki - Physicochemical Sampling Techniques for Freshwater Rivers and Streams' (May 1996). It is essential that the procedures outlined in this document (including appropriate quality control) are followed to ensure consistency and integrity in the data.</p>	

Appropriate quality control internal and external (eg, with NIWA) exercises will be performed at regular intervals.

Data has been analysed for trends after 10 years and will continue to be trended at yearly intervals (subject to review). The report should include data for the 3 sites within the network that are monitored by NIWA (a trend report was prepared by NIWA for these sites in 1996).

