

## 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 2005/2006 year.

State of the environment monitoring continues to be a major focus of the Council's investigations and monitoring activities. The monitoring provides long-term information on the state of Taranaki's environment and of its physical and natural resources; assisting the Council to develop and review policy and methods of implementation, and to promote sustainable resource management.

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

Set out below is a summary of the main activities carried out by the Council in 2005/2006:

- Implemented 25 state of the environment monitoring programmes.
- Undertook 1,519 inspections, sampling runs and surveys at 325 monitoring sites in association with state of the environment monitoring programmes.
- Prepared five annual reports that summarised monitoring results relating to freshwater resources for the preceding year (2004/2005) in the Taranaki region. Completed one annual report relating to the monitoring of groundwater levels and abstraction volumes for the 2004/2005 year. Completed one annual report relating to marine ecology monitoring for the 2002/2005 period.
- Completed three reports relating to temporal trending of State of the Environment water quality data for the 10 year period, 1995-2005.
- Reviewed and updated individual state of the environment monitoring programmes.
- Prepared and adopted new state of the environment monitoring programmes for 2005/06.
- Maintained quality assurance programmes and information databases for hydrometric, air quality, physicochemical freshwater, freshwater biological and marine biological data.
- Prepared a publication on best practices on farm for installing stream crossings.
- 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 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 pilot studies in selected priority sectors in consultation with the three Taranaki district councils.
- Initiated a water optimisation investigation for dairy shed cleaning, conducted on behalf of the Taranaki Rural Sustainability Community Group.
- Continued to work with schools on waste minimisation matters and the implementation of the National Environmental Standards Air Quality (2004) as it applies to schools.

## Table of contents

<b>1. Introduction</b>	<b>4</b>
1.1. Purpose	4
1.2. Background	4
1.2.1 Objectives	5
1.2.2 Community outcomes	5
1.2.3 Performance measures	6
<b>2. Report on progress</b>	<b>8</b>
2.1. State of the environment monitoring	8
2.1.1 State of the Environment Monitoring Programmes	8
2.1.2 Preparation of annual summary reports	12
2.1.3 Review the 2006/2007 monitoring programmes	13
2.1.4 Maintain quality assurance programmes and information databases	13
2.1.5 Maintain public access to on-line regional data	14
2.2. Resource investigations and applied research projects	14
2.3. Waste minimisation	19
<b>3. Conclusion</b>	<b>22</b>
<b>Appendix I Example of an individual state of the environment monitoring programme</b>	<b>24</b>

## List of tables

Table 1	Freshwater state of the environment monitoring programmes 2005/2006	10
Table 2	Investigations and research projects identified in the Annual Plan 2005/2006	15

# 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 2005/2006 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:

- (a) The state of the whole or any part of the environment of the region; and
- (b) 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.

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 2005/2006 the Council continued a work programme implemented in the previous 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*, which was released in February 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*. A key consequence of the *Regional Waste Strategy* was the appointment of a Regional Waste Minimisation Officer, based at the Regional Council, to assist the four councils in the implementation of the Strategy.

The long-term goal of the Council's waste minimisation programme is to promote the adoption of extended producer responsibility, primarily within the dairy and petrochemical industries, the delivery at a regional level of national initiatives and strategies such as the national waste strategy and cleanfill guidelines, and to work with small to medium size enterprises and businesses in the region to encourage waste minimisation and cleaner production as everyday philosophies with economic and environmental benefits for the enterprises and for the wider community.

Summaries reporting on the environmental quality of some of the various component parts of the state of the environment monitoring programme are prepared annually by Council staff. These reports act as 'building blocks' towards the preparation of the Regional State of the Environment Report, which is prepared on a five year basis. To date the Council has prepared two Regional State of the Environment Reports – the first in 1996 and the second in 2003.

### **1.2.1 Objectives**

The objective for state of the environment monitoring programmes set out in the 2005/2006 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 2005/2006 Annual Plan is to:

*"Provide relevant and quality information for resource management purposes."*

The objective for waste minimisation set out in the 2005/2006 Annual Plan is to:

*"To encourage and implement waste management and cleaner production initiatives in Taranaki consistent with the Regional Waste Strategy for Taranaki."*

### **1.2.2 Community outcomes**

Community outcomes are described as *"the things that the community thinks are important for its well-being"*<sup>1</sup>. State of the environment monitoring informs the Council if one of the seven key aspects of well-being, Environmental<sup>1</sup>, is being achieved. Environmental well-being 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 well-being of the community. The recent assessment of the Council's freshwater physicochemical and biological state of the environment monitoring data bases, clearly indicate that, in respect to these areas, environmental well-being is not only being maintained, but in many instances improving by significant quantities.

### 1.2.3 Performance measures

In response to the objective for state of the environment monitoring, the Council adopted the following programmes in the 2005/2006 Annual Plan:

- Implement the Council's *State of the Environment Monitoring Programme* comprising monitoring of surface fresh water quantity, levels and flows, fresh water quality, groundwater quantity and quality, coastal waters, air quality and land use sustainability according to the documented individual programmes.
- Monitor, review and where appropriate, further develop the programme for the 2006/07 year before 30 June 2006.
- Maintain quality assurance programmes and information databases for hydrometric, air quality, physicochemical freshwater, freshwater biological and marine biological data.
- Maintain public access to on-line live regional data on rainfall, 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 2005/2006 Annual Plan:

- Undertake a range of resource investigations and applied research projects, normally in partnership with science providers, other councils or resource users, including:
  - investigating the performance characteristics of farm dairy oxidation ponds and their effects on surface water quality;
  - supporting studies on the effects and consequences of high density stocking rates in association with Dexcel and others; and
  - supporting the dairying catchment water quality study being conducted by AgResearch and NIWA in the Waiokura Stream catchment.

In addition to those programmes identified in the Annual Plan, the Council initiated the following programmes:

- trend analysis of surface water physicochemical data for the 1995 to 2005 period;
- trend analysis of surface water macroinvertebrate (biology) data for the 1995 to 2005 period;
- analysis of reasons for trends in macroinvertebrate (biological) data;
- investigation into the best practice for installing stream crossings (bridges and culverts) on farms;
- evaluation of the Council's regional state of the environment macroinvertebrate database;

- investigation into improving fish passage for “orphan” dams and weirs;
- prepared an inventory of Regionally Significant and Protected Wetlands;
- prepared an inventory of key Native Ecosystems in Taranaki; and
- implemented a monitoring regime to assess the effectiveness of riparian planting programmes.

In response to the objective for waste minimisation, the Council adopted the following programme in the 2005/2006 Annual Plan:

- In conjunction with the region’s district councils, implement a programme promoting waste minimisation, including:
  - employing a waste minimisation officer to assist sector leaders in six activity areas in exploring and implementing waste minimisation;
  - maintaining an in-house waste minimisation programme;
  - working with the petrochemical and dairy industries to investigate waste minimisation opportunities; and
  - devising and implementing measurements of construction and demolition wastes going to cleanfill.

In addition to those programmes identified in the Annual Plan, the Council initiated the following programmes:

- assist schools with waste education, reduction, and recycling initiatives;
- worked with the Ministry of Education and schools towards the practical implementation of the National Environmental Standard (Air Quality) 2004;
- investigated options for the recycling of silage wrap plastic, and agrichemical containers;
- initiated a report into regional renewable energy assessment for Taranaki;
- initiated investigation into optimisation of cleaning water use on dairy farms in Taranaki; and
- continued waste assessments of small and medium sized organisations in the region.

## 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 2005/2006, the Council implemented all 25 individual state of the environment monitoring programmes scheduled for the year. Set out below is an overview of activities undertaken in 2005/2006 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 12 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 2005-2006*.

In relation to surface water quality, the Council monitored physical and chemical water quality at eleven sites on a monthly basis. This monitoring involved a range of measures including temperature, flow, DO, BOD<sub>5</sub>, pH, conductivity, black disc clarity, turbidity, absorbance, ammonia-N, nitrate-N, total-N, DRP, total P, alkalinity, suspended solids, faecal coliform bacteria, enterococci, bacteria and percentage algal cover. Generally water quality deteriorates downstream due to various factors. Wet weather in late summer reduced bacterial concentrations and peak temperatures, but increased turbidity, nitrates, and suspended solids.



*Fresh water monitoring in Huatoki Stream*

In 2005/2006, the Council surveyed macroinvertebrate populations in spring and summer at each of the 51 freshwater biological sites representative of different land uses and catchment characteristics.

Prior to June 2002, periphyton assessment was done in conjunction with macroinvertebrate sampling for state of the environment monitoring. However, a separate periphyton programme (the nuisance periphyton growth programme) was developed in 2002-2003 to utilise data collected more appropriately. In 2005-2006, this programme involved three nuisance periphyton surveys (spring, mid summer and late summer) at 21 sites on ten streams. It also includes a taxonomic analysis of periphyton communities at 12 sites on five rivers.

Monitoring for the presence of *Didymosphenia geminata* (Didymo) was carried out at eight to 12 popular freshwater angling sites on three occasions during the 2005/2006 period. The surveys were carried out in conjunction with Biosecurity New Zealand. Results showed that there was no Didymo present at the representative sites monitored. Monitoring work will continue on this matter into the 2006/2007 period.

Monitoring of freshwater contact recreation water quality was carried out at 11 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 Council has been regularly monitoring groundwater levels and quality since 1995. Groundwater monitoring involves a range of measures including nitrate levels, conductivity, alkalinity, pH, chloride, sulphate, silica, nitrate, ammonia, dissolved reactive phosphorus, sodium, potassium, calcium, magnesium, iron, manganese, bromide and fluoride. In 2005/2006, the Council quarterly monitored groundwater quality at six sites and measured groundwater levels at four sites on a monthly basis. Two other sites monitored groundwater levels (one was monitored on a quarterly basis and the other on an annual basis).

In recent years the Council has also been undertaking a study of water quality in relation to riparian management in the Kaupokonui, Katikara, Kapoiaia and Tawhiti catchments. In the Kaupokonui catchment the Council undertook two surveys of macroinvertebrate communities in spring and summer at five sites.

Council officers also undertook continuous measurements of water temperature at three sites in the Kaupokonui River and two in the Mangawhero Stream. In relation to the Katikara Stream, macro-invertebrate surveys were carried out at two sites in spring and summer. In the Kapoiaia Stream, spring and summer macroinvertebrate surveys and continuous measurements of water temperatures were undertaken at three sites. For the Tawhiti catchment, Council officers undertook continuous measurements of stream water temperatures at three sites in the Tawhiti Stream and undertook monthly measurements of aesthetic appearance (black disc clarity and turbidity) and conductivity at the three water temperature sites. Trend analysis will be undertaken for the sites in this programme in due course, once a baseline of data is established.

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, rainfall, wind direction, speed and temperature, 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 general the 2005/2006 was drier than normal except for the Waitotara Valley and Hawera areas which recorded approximately 10% more rainfall than normal. All other rainfall sites recorded approximately 80% of their normal yearly levels and November, February and March recorded the least rainfall throughout the region. Due to low rainfall, all river levels were also generally below mean water levels for the year. In November 2005, many rivers

recorded their lowest mean flow on record and some recorded their lowest flows for November since recording began.

Other freshwater monitoring undertaken in 2005/2006 included regional lake water quality monitoring of three 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 2005/2006, Council officers implemented all 12 freshwater monitoring programmes, monitored 325 sites (note that a single location may contain two or more sites to monitor different programmes) and undertook 1,519 sampling runs, inspections and surveys.

Table 1 below, summarises parameters measured, the number of sites monitored and the frequency of sampling undertaken per site in 2005/2006 in relation to each freshwater monitoring programme.

**Table 1** Freshwater state of the environment monitoring programmes 2005/2006

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	Macroinvertebrate	51	2	
Nuisance periphyton	Periphyton communities	21	3	Taxonomic analysis at 12 sites 2 x yr
Freshwater contact recreation water quality	MTEC faecal coliforms and E. coli, MF enterococci, conductivity, turbidity, temperature	11	13	Sampling is undertaken over the summer months
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 nitrates	Not carried out in the 2005-2006 monitoring period	0	0	1 in 5 year programme now implemented.
Groundwater levels	Water level	7	12	
Freshwater use & availability	Low flow & water use	N/A	N/A	
	Total volume of consented surface water abstractions by use type & industry category	126	1	Review of consents data base
Regional hydrology	Flow	18	12	Telemetered hydrological monitored systems
	Rainfall	25	12	
	Wind direction/speed	5	12	Non-telemetered systems – temperature measures only
	Water temperature	9		
		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	Various- biological, water temperature, bacteriological, periphyton, clarity	8	12	Kaupokonui, Kaitikara, Kapoaiiaia, Tawhiti catchments
		10	2	
		1	Part of SEM bathing	
<b>Total</b>		<b>325</b>		

## **Air**

The Council regularly monitors key indicators of ambient air quality throughout the region. The monitoring involves up to nine 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 2005-2006*.

Air monitoring programme data has been gathered and maintained for the past 15 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 adjusted to an appropriate level of resourcing.

## **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. These individual programmes are contained in the Council's report *State of the Environment Monitoring Programmes 2005-2006*.

In 2005/2006, 13 samples at recreational beaches were monitored for water quality over the bathing season (approximately November to March). Faecal coliforms, *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 and compares well with other regions.

In the 2005/2006 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) where 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). This suggests that coastal water quality and other environmental conditions have also remained relatively constant at these sites.



*Kaimoana survey being carried out by Council officers and a local iwi representative*

Council officers also continued the Soft Shore Marine Ecological Monitoring Programme. This monitoring is undertaken at 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. Core samples (25cm diameter x 12cm height) were sieved, and the different types and numbers of species were recorded.

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. After the February 2004 floods in the Waitotara catchment the softshore monitoring found the substrate had changed and the marine life had disappeared. The monitoring undertaken to date in 2006 has shown that this site has recovered in terms of species abundance and diversity since the floods.

#### **Other**

In 2005/2006, the Council implemented four other state of the environment monitoring programmes. These programmes related to the preparation of annual reports summarising information on land management, pest management, civil defence hazard file and awareness of natural hazards.

### **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 2006, the Council had prepared seven annual summary reports in relation to preceding years (2004/2005 or earlier) and one annual and one biannual report for the current year as follows:



*Annual monitoring reports*

#### **2004/2005 period or earlier**

- *Freshwater Physicochemical Programme – State of the Environment Monitoring Annual Report 2004-2005.*
- *Freshwater Macroinvertebrate Fauna Biological Monitoring Programme – State of the Environment Monitoring Annual Report 2004-2005.*
- *Freshwater Contact Recreational Water Quality at Selected Taranaki Sites – State of the Environment Monitoring Annual Report 2004-2005*
- *Bacteriological water quality of the Waimoku catchment Annual Report 2003-2005.*

- *Hard Shore and Soft Shore Marine Ecological Programmes Report 2002-2005*
- *Groundwater level and Abstraction Volumes Annual Report 2004-2005.*
- *Freshwater Contact Recreational Water Quality at Selected Taranaki Sites – State of the Environment Monitoring Annual Report 2004-2005*

### **2005/2006 period**

Two further reports were also in an advanced state of preparation at the end of the period. These were:

- *Freshwater Nuisance Periphyton Biennial Report 2002-2005.*
- *Freshwater Contact Recreational Water Quality at Selected Taranaki Sites – State of the Environment Monitoring Annual Report 2005-2006*

### **2.1.3 Review the 2006/2007 monitoring programmes**

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-our place, our future - Report on the state of the environment of the Taranaki region 2003*, the Council took the opportunity to begin a more in-depth review of the Council's individual programmes, to ensure they meet the Council's policy and plan development requirements. By the end of the 2003/2004 year, this work had been completed for air, coastal/ marine, and soil/ land use programmes. In 2005/2006 period, work was undertaken on the remaining SEM programmes (freshwater biological, physicochemical, and hydrological), and background work was being done on biodiversity programme development. Work done at national level has informed this review work. These programmes continue to be developed and implemented.

### **2.1.4 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 2005/2006, the quality assurance programmes verified the Council's field and laboratory monitoring and sampling methodologies. In particular, during the 2005/2006 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; and
- Council data from hydrology sites (rivers, flows, rainfall) was periodically compared by Council staff with data for the same site collected by NIWA.

### **2.1.5 Maintain public access to on-line regional data**

Interest in the Council's website ([www.trc.govt.nz](http://www.trc.govt.nz)) continued to grow throughout the 2005/2006 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 also provides people with access to on-line rainfall all year round and bathing beach water quality data during the summer months.

Visits to the site are continuing to grow with the weather pages in particular being very popular. In 2005/2006, the weather page was the second most frequently visited page on the Council's website, after the 'Explorer' page, which is consistent with the 2004-2005 period.

New information has also been added to the pages. In addition to rainfall (17 sites) and bathing beach data, the site also now provides live information on river flows, levels, soil moisture (6 sites), and water temperature (8 sites), and on wind speed and direction (4 sites).

## **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 2005/2006, the Council undertook or provided funding for resource investigations and applied research projects that were identified in the Annual Plan 2005/2006. Set out in Table 2 below is a summary of the research projects identified in the Annual Plan and the outcomes achieved to date.

**Table 2** Investigations and research projects identified in the Annual Plan 2005/2006

Description	Status	Results to date
Investigating the performance characteristics of farm dairy oxidation ponds & their effects on surface water quality	Draft reports received & reviewed internally. Consultant engaged to revise and prepare final version, identifying key findings. Staff are now preparing the report for publication.	Undertaken a series of investigations relating to the performance characteristics & environmental effects of farm oxidation ponds, including diurnal & seasonal variations in discharge rates & quality & the ecological in-stream effects, relative to pond construction and operation parameters.
Implementation of a monitoring regime to assess the effectiveness of riparian planting programmes	Programme underway- now an on-going SEM programme	This programme is described further in the SEM section of this report
Participation in studies on the effects & consequences of high density stocking rates in association with Dexcel & others	Final report had been received	Studies underway at Whareroa Research Farm into the effects on soil structure of intensive farming practices, including supplementary feed systems. Results in 2005-06 confirm earlier results of no evidence of sudden decline in soil structure with higher stocking rates, and more efficient cycling of nutrients as stocking rates increase
Supported the dairying catchment water quality study being conducted by AgResearch and NIWA in the Waiokura Stream catchment	NIWA paper on the first four years of the study reviewed by Council (February 2005). Study on-going.	Financial support & ongoing fieldwork (primarily regular sampling at 3 sites, & farmer land management advice & assistance) provided to the study. The project aims to establish baseline water quality under present farming conditions & land use intensity, & detect changes in water quality as better management practices are adopted by farmers. Most farms in the catchment have property plans in place. There are 125,300 metres of streambank in the catchment. Of this, 57,640 metres are adequately protected [43%] with fencing and or planting that meets the requirements of the Dairying and Clean Streams Accord and there are proposals to fence and or plant 67,660 metres of streambank [54%]. P,K,S application reducing, N increasing. Report shows that elevated suspended solids, total phosphorus, & faecal bacteria concentrations primarily occur during significant rainfall events in winter. While average nitrate levels increase about 20% downstream, ammonia & phosphate levels fall. Almost all relevant guidelines (stock watering, aquatic ecosystem protection) are satisfied. It is anticipated that riparian planting & restriction of stock access to the stream will significantly improve water quality.

In addition to the above projects that were specified within the Annual Plan, additional projects were undertaken.

### **Stream health methodology**

In 2003/2004, the Council supported a project to establish and publicise a modified MCI (a methodology for assessing in numeric terms the health of a stream community) capable of application to soft-bedded streams, to support consent and state of the environment

monitoring. The Council continued its involvement in the project in the 2004/2005 year, providing input into a technical review on establishing the methodology. In 2005/2006, the Council provided additional data for the purpose of verification of the index scores.

### **Lake water reporting**

During the 2005/2006 year the Council supplied the Ministry for the Environment's consultants with all historical water quality data for Lake Rotorangi for the purpose of national reporting of trends in lake water quality.

### **Freshwater physicochemical trends**

During the year, the Council collated and analysed state of the environment physicochemical data for the 10 year period 1995 to 2005, *Trends in the quality of the surface water of Taranaki*. This report examines trends in the physicochemical quality of the region's surface freshwater. With the accumulation of ten years' data, and the development and implementation of appropriate statistical analysis tools, the Council is now in a position to quantitatively assess trends in water quality, taking into account variations in flow conditions. While the SEM data is the primary record used in this review, use has also been made of data gathered 25 years ago in a survey of the Taranaki ring plain conducted by the Taranaki Catchment Commission.

The state of Taranaki's surface freshwater was reviewed in general terms, and was also compared to various national guidelines and to comparable rivers and streams elsewhere in New Zealand.

The findings of the report show that generally Taranaki has good to excellent freshwater quality, and water quality is generally not compromised for appropriate water uses. Levels of organic parameters are low and water is clear. While nutrient levels (particularly nitrate) are higher than desirable to avoid nuisance growths, this of itself does not mean such growths will occur. Ammonia levels are low, and bacteriological quality meets some stock and recreational water guidelines for most of the year.

### **Macroinvertebrate trending method**

In 2005/2006, the Council commissioned the Cawthron Institute to analyse and provide a methodology to determine what temporal trends there were in the Council's state of the environment macroinvertebrate data for the 10 year period, 1995 to 2005. The analysis and subsequent report, *An approach to the evaluation of temporal trends in Taranaki state of the environment macroinvertebrate data*, developed a methodology, agreeable within the scientific community, for determining temporal trends for macroinvertebrate data.

### **Macroinvertebrate trend analysis**

A follow-on report, *A discussion of trend analysis of State of the Environment freshwater biological data of Taranaki*, used the methodology developed to determine macroinvertebrate trends at specific sites, which indicate water quality for specific sites over time. The results of this first trending of Taranaki's SEM macroinvertebrate show very good news for the region.

At a standard significance test criterion of  $p < 0.05$ , the results show a considerable number of sites (21) with statistically significant improvement in water quality as indicated by macroinvertebrate community index (MCI) analysis. This test also shows that a lot of other sites are maintaining existing water quality, with no significant trends. This is despite

increasing pressures on water quality in the region e.g. a doubling in the region's dairy herd. What is equally encouraging is at this significance level there is only one significantly deteriorating site of the 60 trended.

With a more conservative approach, at a significance level of  $p < 0.05$  with False Discovery Rate (FDR) adjustment, the results remain encouraging. It shows 11 sites with significant improvement with regard to MCI and no sites with significant deterioration.

### **Macroinvertebrate – reasons for trends**

In 2005/2006, the Council was in the final stages of preparing a report, *An interpretation of the reasons for statistically significant temporal trends in macroinvertebrate (MCI) SEM data in the Taranaki region*. The ecological significance of trends at specific sites and discussion of the reasons for the statistical trends are presented in this report along with assessments of stream/river 'health' for each site over the ten year period, based on a modified MCI grading system.

In some cases specific events or actions (eg, improvements to point source discharges) accounted for the trends evaluated for individual sites, whereas other trends were either coincident with maintenance of, or improvement in, aspects of physicochemical water quality, variability in catchment hydrology, or postulated to be consistent with increased surveillance monitoring and/or improved consents' compliance in catchments for some distance upstream of monitored sites. Overall, there was a general improvement in stream/river 'health' as determined by MCI bands, at the start and end of the ten year period. This occurred mainly at sites in the middle and lower reaches of catchments where the cumulative effects of upstream activities would be expected to have had the greatest influence on macroinvertebrate communities as indicators of surface water quality.

### **Coastal information**

In 2003/2004 the Council compiled an inventory of information on the Taranaki coast, in partnership with the Department of Conservation, and a preliminary gap analysis was undertaken to identify in what areas the most research has been conducted, and where there is a lack of information for the marine environment, to help identify future research needs. In the year under review, this information was collated and compiled, and a report distributed to stakeholders. In 2005/2006 the Council's on-line GIS application was updated, the information became available publicly via this electronic medium.

Arising from this work, one of the 'gaps' in critical information identified was addressed during the year. The Council has supported financially and participated in a project to explore and investigate the region's sub-tidal benthic ecology along the North Taranaki Bight. The project involved a large number [approximately 1200] of transects from the shore out to target depths of around 30m, involving diving inspections, underwater video work, and water quality measurements. Staff participated in project design and field work. The information gathered will assist the Council in its management of resource consent issues, biodiversity, regional coastal plan review, and sustainable management of the marine environment, as well as providing a baseline for spatial and temporal changes and trend detection and analysis.

A gap in the knowledge of the South Taranaki coastline was also identified. This led to a project team being developed (led by the Department of Conservation) in which Council

staff are involved, to find out more about the state and qualities of this section of coast, in order to gather all available information, both scientific and anecdotal. The inventory has been used extensively for collating information and Council staff have been involved in presentations at public meetings.

### **Wetlands**

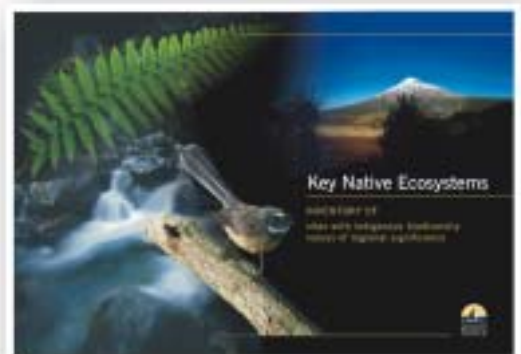
In 2005/2006, the Council compiled an inventory of regional significant wetlands in the report, *Regionally Significant Wetlands of Taranaki, An Inventory 2005*. The inventory was created through pooling the work of the Department of Conservation [DOC] Protected Natural Areas Programme, the Council's *Wetlands Resource Inventory 2001*, and surveying the Taranaki region through database searches and field work. Since the 2001 publication, field information has been collected by the DOC, the Queen Elizabeth the Second National Trust [QEII] and the Council.

The inventory provides information on wetlands of regional significance. These are wetlands identified in Appendix IIA, IIB and III of the Taranaki Regional Council Regional Fresh Water Plan [the "RFPW"], or are protected by rules in the Plan. 48 wetland sites are identified in Appendix IIA, IIB and III of the RFPW and a further 28 sites are protected by rules 80 – 87 in the RFPW.

For each wetland recognised as regionally significant, an inventory sheet has been prepared which identifies the: ecological district; wetland type and number; land tenure; location; ecological features; ecological values; natural and amenity values; threats; formal protection status and other protection. The inventory sheets also include a digital picture of the wetland and an aerial map of the shape and location of the wetland.

### **Key Native Ecosystems**

In 2005/2006, the Council produced the *Key Native Ecosystems – Inventory of Sites with Indigenous Biodiversity Values of Regional Significance*. The Inventory is a culmination of a comprehensive 'desktop' exercise involving the review and analysis of site-specific information on all sites of interest. In the first instance it has been a collation exercise noting that many people and organisations including the Council have been involved in a range of site specific biodiversity activities. The Council's wetland programme is an example. The information gathered has come from a wide variety of sources and has involved input and assistance from the QEII National Trust, South Taranaki District Council, New Plymouth District Council, Stratford District Council, Department of Conservation, Royal Forest and Bird Protection Society, Fish and Game New Zealand and the Taranaki Kiwi Trust. Further input and a final peer review was provided by Mrs Maggie Bayfield (consultant).



The Inventory provides a comprehensive reader's guide and site-specific information on 155 terrestrial Key Native Ecosystems. Sites were individually assessed having regard to the following matters:

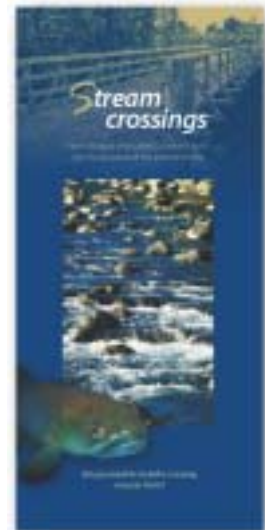
- **Rarity and distinctiveness:** Site contains indigenous flora and fauna species that are listed as 'Acutely Threatened' in accordance with the New Zealand Threat Classification, or which are particularly unique to Taranaki or uncommon in the region; or
- **Representativeness:** Site is representative of an indigenous vegetation type that is now much reduced (e.g., less than 10 or 20%) from its former extent in the ecological district; or
- **Ecological context:** Site enhances connectivity between fragmented indigenous habitats, enhances the values or provides buffering for other sites of value, or provides seasonal or core habitat for specific indigenous species; and
- **Sustainability:** The site is sustainable i.e., of a size or shape and has the ability, through appropriate management, to sustain those other values referenced above.

### **Dairy shed cleaning – managing water usage**

In 2005/2006, the Council applied for and was granted support from the Ministry of Agriculture and Forestry (MAF) Sustainable Farming Fund, on behalf of the Taranaki Rural Sustainability Community Group, to develop and publicise guidelines for farmers on the conservative use of water for dairy shed and pad wash downs. Information has been collated and assessed for application to the Taranaki region. This project will continue into the 2006-2007 year.

### **Stream crossings**

In 2004/2005, the Council applied for and was granted support from the MAF Sustainable Farming Fund, on behalf of the Taranaki Rural Sustainability Community Group, to develop and publicise guidelines for farmers on the design, installation and maintenance of culverts so as to minimise impacts upon fish passage, bank erosion, and stream bed degradation, and achieve the goal of the Dairying and Clean Streams Accord in the region ('water suitable for fish'). By the end of the 2004/2005 year information was being collated and assessed for application to the Taranaki region. This project was completed during the 2005-2006 year.



### **'Envirolink' project proposals**

In 2005/2006, Council staff led a delegated workgroup on behalf of the regional councils of New Zealand, to identify, scope, and prioritise applied research projects that were deemed to have widespread value for consideration by the Foundation for Research, Science and Technology (FRST) for funding under the 'Envirolink' scheme. Those projects selected for advocacy include the collation of a river flood hazard engineering handbook, the development of stream habitat assessment methods, stream restoration and rehabilitation assessment, integration of nutrient management modeling tools and the modeling and classification of threatened environments.

## **2.3. Waste minimisation**

The following activities that have been carried out in relation to the Council's waste minimisation programme in the 2005/2006 year:

### **Waste minimisation pilot studies**

Waste minimisation pilot studies were conducted in four selected priority sectors: the publishing, public service, outdoor pursuits, and educational (primary and tertiary) sectors; at selected sites in each of the three districts. Sites were selected in consultation with the three district councils.

One of the eleven annual environmental awards presented by the Council in June 2006 was awarded to one of the selected sites on the basis of its waste minimisation and energy conservation activities.

### **Waste incineration and recycling at schools**

The Taranaki Regional Council continued to assist in a review, by the Ministry for Education, on current waste disposal practices carried out by schools in the region. The review also identified all possible waste disposal options for schools including incineration, landfilling, and recycling. The review was initiated in light of the National Environment Standards for Air Quality 2004 that constrains the use of incinerators in schools. The Taranaki Regional Council is currently working with the South Taranaki District Council and New Plymouth District Council to explore recycling options for schools in the South Taranaki and New Plymouth districts. In addition, the preparation of waste minimisation workshops for primary and secondary schools on this matter was underway at the end of the 2005/2006 period.

### **Recycling facilities**

The Council continued to work with the New Plymouth District Council and Budget Waste Ltd to establish and promote computer recycling at the Colson Road transfer station.

### **Links with national organisations**

Links with national organisations such as BusinessCare, the Ministry for the Environment, WasteMINZ, Recycling Operators of New Zealand (RONZ) were and continue to be developed, with particular regard to identifying the potential regional and district benefits that may accrue. The benefit of this will be seen through the dissemination of current national practice through to local level with emphasis on the selected priority sectors targeted for waste minimisation action in the Taranaki region.



*The Council's waste minimisation officer demonstrating recycling techniques with pupils of a local primary school*

### **Taranaki Regional Waste Officers' forum**

The Council's Waste Minimisation Officer co-ordinated and reported to the Taranaki Regional Waste Officers' forum. Suggestions arising from the forum were acted upon where possible.

### **Other matters**

The Council undertook to support in principle and assist in the development of a national farm plastics (silage wrap, agrichemical containers) recovery programme that had been

proposed during the preceding year. Staff were involved in reviewing the proposal and have undertaken to provide assistance in site location and preparation, staff time, and some financial assistance, as the project develops. In 2005/2006 the Council made a contribution to this national agrichemical container collection system, which should see the set-up of drop-off points in the region. Farmers can leave their empty agrichemical containers at these points for further processing. It is anticipated that the collection system will be established in the region by April 2007.

The Council also undertook to support a consortium of regional councils investigating the economic, environmental, and community benefits of waste diversion and resource recovery versus waste disposal. The project was going through a final scoping phase at the end of the 2004/2005 year. In 2005/2006 this report was received by the Council and is currently under review.

In 2005/2006 the Council investigated options for the recycling of silage wrap plastic, and continued to deal with potential collectors and plastic recyclers. The Council will continue its investigations on this issue as it was identified in the report, *Investigation into Taranaki's Rural Waste Stream*, as material farmers would like to see recycled.

The Council contributed financially to the 'keep Taranaki beautiful' campaign led by the New Plymouth District Council. The campaign included the 'clean-up' of streams and the coastal foreshore in Taranaki.

Council staff continued to promote waste minimisation to members of the public and assisted with enquiries regarding recycling, the proper disposal of chemicals, paper, computers, tyres, glass and plastic and waste exchanges. The Council has continued its own in-house waste reduction and recycling activities, including continuing trials of 100% recycled photocopying paper.

### 3. Conclusion

In conclusion, the Council has met its performance measures for resource investigations and monitoring, and waste minimisation activities set out in the 2005/2006 Annual Plan.

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 25 state of the environment monitoring programmes.
- Undertook 1,519 inspections, sampling runs and surveys at 325 monitoring sites in association with state of the environment monitoring programmes.
- Prepared five annual reports that summarised monitoring results relating to freshwater resources for the preceding year (2004/2005) in the Taranaki region. Completed one annual report relating to the monitoring of groundwater levels and abstraction volumes for the 2004/2005 year. Completed one annual report relating to marine ecology monitoring for the 2002/2005 period.
- Completed three reports relating to temporal trending of State of the Environment water quality data for the 1995-2005 period.
- Reviewed and updated individual state of the environment monitoring programmes.
- Prepared and adopted new state of the environment monitoring programmes for 2006/07.
- 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 and wind speed and direction data.
- Undertook 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 pilot studies in selected priority sectors in consultation with the three Taranaki district

councils, initiated a water optimisation investigation for dairy shed cleaning, conducted on behalf of the Taranaki Rural Sustainability Community Group.

- Continued to work with schools on waste minimisation matters and the practical implementation of the National Environmental Standards Air Quality (2004) as it applies to schools.

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

## **Appendix I**

### **Example of an individual state of the environment monitoring programme**

**SEM job sheet**  
**Freshwater physicochemical monitoring programme (PROVISIONAL)**

<b>Project Manager</b>	Scientific Officer (Water Resources), Chris Fowles	
<b>Job number</b>	7201	
<b>File</b>	SEM2/1 (formerly RPS5/10/5)	
<b>Policy Links</b>	Issue 3.1 Method 9 ER 2,3,4,5 and Method 5.	
<b>Monitoring period</b>	1 July 2006 – 30 June 2007	
<b>Sampling</b>	<p>Sampling will be undertaken monthly at 11 sites, representative of different land uses, for:</p> <p>temperature, flow, DO, BOD<sub>5</sub>, pH, conductivity, black disc clarity, turbidity, absorbances (3 wavelengths), ammonia-N, nitrate-N, total-N, DRP, total P, alkalinity, suspended solids, faecal coliform bacteria (mTech), enterococci bacteria.</p> <p>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</p> <p>Laboratory (analytical): \$313/sample x 11 sites x 12 sampling runs = \$41316</p> <p>Gaugings will be undertaken monthly for 4 sites by Hydrology staff (at MKW000300, STY000300, PNH000200, &amp; PAT000200) for rating purposes.</p>	
<b>Reporting</b>	<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: 80 hours <span style="float: right;">80 hours</span></p>	
<b>Resource summary</b>	<p>Technical Officer <span style="float: right;">180 hours</span></p> <p>Scientific Officer <span style="float: right;">80 hours</span></p> <p>Laboratory <span style="float: right;">\$41,316</span></p>	
<b>Note</b>	<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 should be analysed for trends after 10 years and then at five yearly intervals. 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). It may be appropriate to employ a consultant for this task.