

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 2006/2007 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. Resource investigations tend to be shorter in duration and to focus on exploring particular issues, so that the Council strategically acquires the knowledge base and understanding it needs for defensible and robust policy development and implementation.

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 2006/2007:

- Implemented 19 state of the environment monitoring programmes.
- Undertook 1156 inspections, sampling runs and surveys at 303 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 (2005/2006) in the Taranaki region. Completed one annual report relating to freshwater contact water quality monitoring for the 2006/2007 period.
- Completed one report relating to temporal trends in State of the Environment groundwater quality data for the year period, 1992-2005.
- Began preparations for the five yearly comprehensive State of the Environment Report for Taranaki due to be published in 2008.
- Reviewed and updated individual state of the environment monitoring programmes.
- Prepared and adopted new state of the environment monitoring programmes for 2007/2008.

- 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 12 research investigations and applied research projects. Projects undertaken during the year or designed during the year for implementation in 2007/2008 included further exploration of the effects of dairy effluent discharges on streams, on-going studies in the Waiokura Stream catchment of opportunities for good farming practices to improve stream quality, further data and reports establishing the robustness of Taranaki soils under stocking rate intensification, beginning to examine the biodiversity of our pastures and riparian margins, analysing the effects of flow patterns and seasonal variations on in-stream ecology, and examination of trends in the state of our soils and lakes.
- 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.
- Continued to implement 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.

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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 2006/2007 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.

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 2006/2007 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*, 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. A third is planned for 2008 release.

1.2.1 Objectives

The objective for state of the environment monitoring programmes set out in the 2006/2016 Long Term Council Community 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 2006/2016 Long Term Council Community Plan is to:

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

The objective for waste minimisation set out in the 2006/2016 Long-Term Council Community 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'*. State of the environment monitoring informs the Council if one of the seven key aspects of well-being, Environmental, 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 2006/2016 Long Term Council Community 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 2007/2008 year before 30 June 2007.
- Maintain quality assurance programmes and information databases for hydrometric, air quality, physicochemical freshwater, freshwater biological and marine biological data.
- Prepare the five-yearly comprehensive report to the Taranaki community in 2007/2008 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.
- Review and report on biological data trends in Taranaki's freshwater ecosystems in conjunction with the Cawthron Institute.
- 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 2006/2016 Long Term Council Community 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;
 - supporting the dairying catchment water quality study being conducted by AgResearch and NIWA in the Waiokura Stream catchment; and
 - identify and review projects for the next year.

- In addition to those programmes identified in the LTCCP, the Council initiated or completed the following programmes:
 - analysis of reasons for trends in macroinvertebrate (biological) data;
 - evaluation of the Council's regional state of the environment macroinvertebrate database;
 - investigation into improving fish passage for 'orphan' dams and weirs;
 - implemented a monitoring regime to assess the effectiveness of riparian planting programmes;
 - investigating the biodiversity on farmland at different stocking rates at the Whareroa Research Farm.

In response to the objective for waste minimisation, the Council adopted the following programme in the 2006/2016 Long Term Council Community 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 dairy industry to investigate waste minimisation opportunities; and
 - implementing measurements of commercial organic wastes going to the Colson Road transfer station and/or landfill.

In addition to those programmes identified in the Long Term Council Community 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, relating to use of incinerators;
- investigated options for the recycling of silage wrap plastic, and agricultural 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 2006/2007, 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 2006/2007 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 15 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 2006/2007*.

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, BOD₅, 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.



State of Environment Monitoring - Freshwater

In 2006/2007, the Council surveyed macroinvertebrate populations in spring and summer at each of the 49 freshwater biological sites representative of different land uses and catchment characteristics. The programme was reduced by 2 sites (in the Waiaua River catchment) to allow for additional sites in a representative hill country catchment to be included in the programme. These will be introduced in 2007/2008.

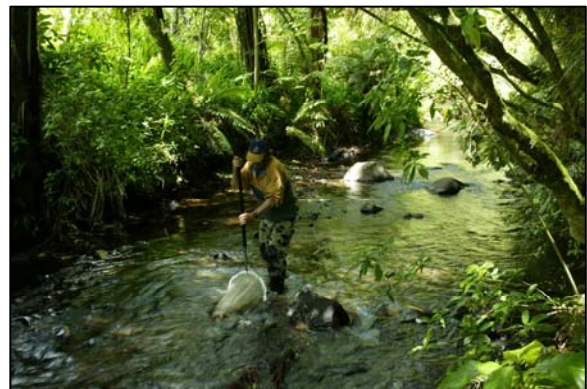
Prior to June 2002, periphyton assessment was done in conjunction with macroinvertebrate sampling for state of the environment monitoring. However, a separate periphyton programme (the nuisance periphyton growth programme) was developed in 2002/2003 to utilise data collected more appropriately. In 2006/2007, 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 four popular freshwater angling sites on three occasions during the 2006/2007 period, a reduction from 6-12 sites in the previous 2005/2006 monitoring year. 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 2007/2008 period with the programme being extended to include 2-3 additional sites.

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 presence of toxic cyanobacteria (blue-green algae) was also monitored at four popular recreational lakes in conjunction with the contact recreation surveys to ascertain whether growing concerns regarding algae blooms in other regions could be an issue in Taranaki. Very little blue-green algae was recorded, however a more systematic monitoring programme is proposed for the 2007/2008 year to confirm this.

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 2006/2007, the Council quarterly monitored groundwater quality at six sites and measured groundwater levels at eight sites on a monthly basis. Monitoring of nitrates in shallow groundwater was also undertaken during 2006/2007, a programme which is conducted every five years. Sixty-five sites were sampled four times during the year and analysed for nitrite/nitrate-nitrogen and ammoniacal nitrogen. A survey of the concentrations of herbicides and pesticides in shallow groundwater was also undertaken in 2006/2007. This programme is conducted every four years and monitored six sites for compounds belonging to the organo-nitrogen herbicide, acid herbicide and organochlorine pesticide groups.



Freshwater monitoring in the Huatoki Stream

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 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 2006/2007 was drier than normal by at least 8% for most sites, except for Waitotara Valley, Patea, Hawera and Dawson Falls (all South Taranaki sites), which recorded between 102 and 119% of normal. February was a very dry month, with the maximum rainfall recorded being 67.5mm at Waitotara Valley, while North Egmont Visitors Centre recorded only 37.0mm, 7.7% of its normal February rainfall. The months from January to May generally received below normal rainfall, which has resulted in low mean river flows. This is in complete contrast to November 2006, where rainfall totals for the month were between 116 and 243% of normal. This resulted in the highest November river flows since records began for the Manganui River at Everett Park and the Waingongoro River in Eltham.

Other freshwater monitoring undertaken in 2006/2007 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 2006/2007, Council officers implemented all 15 freshwater monitoring programmes, monitored 281 sites (note that a single location may contain two or more sites to monitor different programmes) and undertook 984 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 2006/2007 in relation to each freshwater monitoring programme.

Table 1 Freshwater state of the environment monitoring programmes 2006/2007

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	49	2	Decrease of two sites so additional sites in hill country streams could be included in 2007-2008
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	13	13	Sampling is undertaken over the summer months; Cyanobacteria also sampled at 4 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 nitrates	Carried out in the 2006-2007 monitoring period; temperature, pH, conductivity, nitrite/nitrate-nitrogen, ammoniacal nitrogen	67	4	1 in 5 year programme now implemented.
Groundwater herbicides & pesticides	Carried out in 2006-2007 monitoring period; organonitrogen herbicide, acid herbicide and organochlorine pesticide groups	6	1	1 in 4 year programme 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	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	18	12	Telemetered hydrological monitored systems
	Rainfall	25	12	
	Soil temperature/moisture	7	12	
	Wind direction/speed	5	12	Non-telemetered systems – temperature measures only
	Water temperature	9	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		281		

* not included in totals as bottom of table

Air

The Council regularly monitors key indicators of ambient air quality throughout the region. The monitoring involves up to seven 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 2006/2007*.

Air monitoring programme data has been gathered and maintained for the past 16 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.

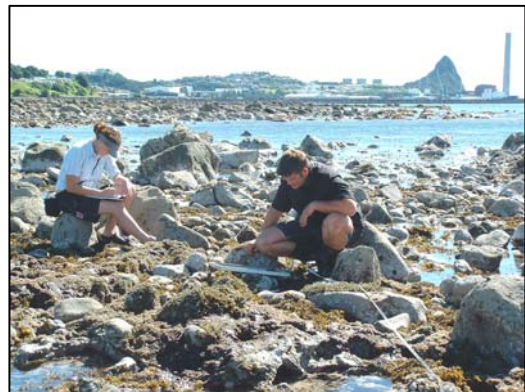


State of Environment Monitoring - Air

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. For example, during 2006/2007, no monitoring programmes were scheduled or implemented. Two programmes are to be implemented and reported on in the 2007/2008 monitoring year (carbon monoxide and nitrogen dioxide [3 yearly] monitoring programmes).

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 2006/2007*.



Intertidal monitoring in North Taranaki

In 2006/2007, 11 samples 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), and compares well with other regions.

In the 2006/2007 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, 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. 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 2006/2007, 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 2007, the Council had prepared six annual summary reports in relation to preceding years (2005/2006 or earlier) and one annual report for the current year as follows:

2005/2006 period or earlier

- *Freshwater Physicochemical Programme – State of the Environment Monitoring Annual Report 2005/2006.*



Annual monitoring reports

- *Freshwater Macroinvertebrate Fauna Biological Monitoring Programme – State of the Environment Monitoring Annual Report 2005-2006.*
- *Freshwater Contact Recreational Water Quality at Selected Taranaki Sites – State of the Environment Monitoring Annual Report 2005-2006*
- *Hard Shore and Soft Shore Marine Ecological Programmes Report 2005-2006*
- *Temporal Trends in Groundwater Quality – Nutrient Concentrations in Taranaki (1992-2005)*
- *Freshwater Contact Recreational Water Quality at Selected Taranaki Sites – State of the Environment Monitoring Annual Report 2005-2006*

2006/2007 period

- *Freshwater Contact Recreational Water Quality at Selected Taranaki Sites – State of the Environment Monitoring Annual Report 2006/2007*

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

- *Freshwater Nuisance Periphyton Biennial Report 2002-2006.*
- *Bathing Beach Water Quality State of the Environment Monitoring Report Summer 2002-2007 (5 reports)*

2.1.3 Five year State of the Environment Report

Every five years the Council prepares a comprehensive summary report on the State of the Environment for Taranaki. To date, two reports have 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. This report provided the basis from which State of the Environment monitoring programmes were established. The second report was published in 2003 and reported on the first five years of a comprehensive suite of state of the environment monitoring programmes covering land, air, freshwater, the coast and a number of other general areas.

In 2008 the third state of the environment report is due to be published. This report will assess and evaluate the state of the environment monitoring undertaken over the past 12 years and provide 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.

During the later part of the 2006/2007 monitoring year, preparations on reviewing and developing the report format and identifying gaps in existing monitoring information

was undertaken. The bulk of the work to complete this report will be undertaken in the 2007/2008 monitoring year, with publication scheduled at the end of October 2008.

2.1.4 Review the 2007/2008 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. Notable changes to the programmes for the 2007/2008 monitoring year are detailed as follows:

Biodiversity Programmes

Project briefs have been prepared for the following state of the environment programmes relating to biodiversity, which will be implemented (in part) in 2007/2008:

- Wetland monitoring programme - to determine the condition and biodiversity values of significant wetlands in the Taranaki region to test the effectiveness of the Council's management and intervention approaches and to determine the state of, and trends in the quality of wetlands in the Taranaki region.
- Key native ecosystem (KNE) biodiversity monitoring programme - to monitor and report on the biodiversity condition of selected Taranaki Regional Council Key Native Ecosystems in order to allow assessment of the effectiveness of Council management practices; detection of threats to and negative changes in KNEs so that remedial action can be taken if required; and determination of the state of, and trends in the quality of indigenous biodiversity at KNEs in Taranaki.



A regionally significant wetland in North Taranaki

Toxic Cyanobacteria (blue-green algae) Programmes

Recent concerns in other regions relating to toxic cyanobacteria in freshwaters has resulted in an investigation into the presence of toxic cyanobacteria (suspended) blooms in Taranaki lakes which have high recreational use. Sampling was conducted at four lakes during the 2006/2007 summer and results indicated that very little cyanobacteria was present. A programme has been developed as a result of this initial investigation and will be implemented at four lakes and one river site in the 2007/2008 summer.

The nuisance periphyton monitoring programme will also be including some monitoring of benthic mats of cyanobacteria (thick dark mats of algae attached to the streambed) in the 2007/2008 monitoring programme to establish whether there is any potential for toxic blooms of benthic cyanobacteria to occur in Taranaki rivers.

2.1.5 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 2006/2007, the quality assurance programmes verified the Council's field and laboratory monitoring and sampling methodologies. In particular, during the 2006/2007 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 TRC algae identification by NIWA.

2.1.6 Maintain public access to on-line regional data

Interest in the Council's website (www.trc.govt.nz) continued to grow throughout the 2006/2007 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 (18 sites), river flows and levels (20 sites), soil moisture (7 sites), wind speed and direction (5 sites), and water temperature (5 sites) all year round and bathing beach water quality data during the summer months.

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 2006/2007, the Council undertook or provided funding for resource investigations and applied research projects that were identified in the Long Term Council Community Plan 2006/2016. 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 Long Term Council Community Plan 2006/2016

Description	Status	Results to date
Investigating the performance characteristics of farm dairy oxidation ponds & their effects on surface water quality	Final Report published and presented to Council. Further investigations based on findings and recommendations are proposed over the next few years	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. The results validated the Council's guidelines for dairy oxidation ponds as set out in the Regional Freshwater Plan, as robust criteria that provide for a high level of environmental protection when adhered to. Further investigations now proposed include:

Description	Status	Results to date
		<ul style="list-style-type: none"> • Simultaneous sampling of nutrients down the length of a catchment to assess cumulative effects • fertilizer loadings in Taranaki streams • copper and zinc entering streams in relation to oxidation pond discharges • Review of what degree of treatment is being achieved in appropriately sized oxidation ponds
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 for original project has been received, together with further updates. Report from extended study awaited.	<p>Studies have been undertaken for five years 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. In the year under review, the Council provided for additional sampling, analysis, and reporting, following the continuation of the project beyond its original timeframe. The final report is awaited at the time of preparing this summary.</p> <p>The Council has also undertaken a study of the biodiversity (plants, nematodes, macroinvertebrates) developing in the various pasture management regimes, which include intensively grazed pasture, pasture with no animal grazing, and land left fallow for the period of the study. Field work has been completed, and analysis of samples and report writing is underway. The purpose of this work is to gain a clearer understanding of biodiversity within cultivated land in Taranaki, and how it might change under stocking intensification and reversion.</p>
Supported the dairying catchment water quality study being conducted by AgResearch and NIWA in the Waikura Stream catchment	NIWA paper on the first five years of the study presented to 'Water 2006' national conference (<i>Dairy farming and sustainability: a review of water quality monitoring in five contrasting regions of New Zealand</i>). Study on-going.	<p>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.</p> <p>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%]. It is noted that by comparison with other catchments in the national study, riparian fencing is well advanced.</p> <p>P,K,S application reducing, N increasing.</p> <p>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.</p>

In addition to the above projects that were specified within the Long Term Council Community 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 2006/2007, providing input into a technical review on establishing the methodology and providing additional data for the purpose of verification of the index scores. A scientific paper detailing this work was published in the Journal of Marine and Freshwater Research in March 2007 – *Stark & Maxted (2007) A biotic index for New Zealand soft bottomed streams. Vol 41(1):43.*

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.

In November 2006 the Ministry for the Environment released two reports - *Snapshot of Lake Water Quality in New Zealand*, (Opus Consultants) and *Snapshot-lake water quality* (NIWA)-summarising the data supplied by all councils. The Opus report in particular discussed the state of Lake Rotorangi by comparison with other lakes around New Zealand. The reports have been presented to the Council.

From the discussion in the reports, it appears that the Council's monitoring programme for lakes in the region is at an appropriate level (there were concerns over a lack of monitoring elsewhere). Lake Rotorangi is classified as mesotrophic, the third 'best' of the six trophic states (degrees of enrichment or degradation) used in the study. It was noted in the study that Lake Rotorangi is stable, and that 81% of all lakes nationwide studied are either stable or showing improvement.

Macroinvertebrate trends

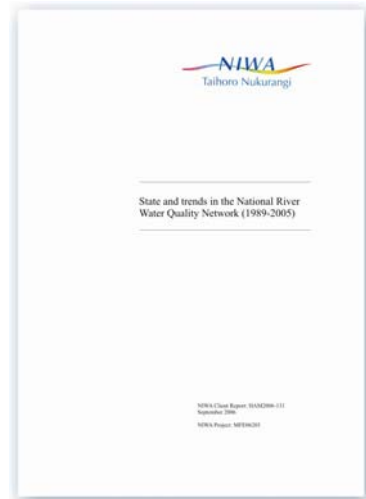
In 2005/2006, the Council commissioned the Cawthron Institute to analyse and provide a methodology to determine what temporal trends there were in the Council's state of the environment macroinvertebrate data for the 10 year period, 1995 to 2005. The analysis and subsequent report, *An approach to the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

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.

In 2006/2007, the Council finalised 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 the year under review, Cawthron drafted the report '*Influence of the season and flow regimes on the MCI biotic index*', for review by Council.

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.



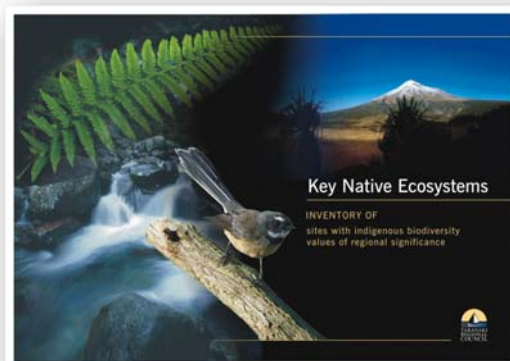
NIWA Trend Report

During 2006/2007 the Council obtained the soft-ware package (STATISTICA) which will enable future trending via the above method to be conducted in house. Reports prepared relating to the 2006/2007 monitoring year and subsequent years will be assessed using this method, with trends to be updated on an annual basis. This will provide a more rigorous assessment for detecting and determining any trends (or stability) in the state of the region's environment.

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 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:

As a result of this document, monitoring of KNEs is proposed to



Key Native Ecosystems Report

assess the effectiveness of Council management practices; detect threats to and negative changes in Key Native Ecosystems so remedial action can be taken if required; and determine the state of, and trends in the quality of indigenous biodiversity at KNEs in Taranaki. A project brief has been developed with further investigation into developing this monitoring programme planned for the 2007/2008 monitoring year.

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 has continued throughout the 2006/2007 year, with field studies. A report is to be prepared.

'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. Based on the priority list, a number of projects were approved in 2005/2006. This is now an ongoing working group which recommends projects for funding annually.

In 2006/2007 further projects have been approved through this scheme. Projects underway include a river engineering and control handbook, a land use capability handbook, stream habitat assessment methodology development, and a pest management prioritization methodology, and new projects commissioned include the extension of the SINDI project (constructing an electronic database of all soil quality data collected using the 500 Soils Project protocols, and upgrading Landcare Research's SINDI web tool to permit automatic data entry from the database), developing a coastal hazard assessment manual, defining groundwater protection zones and setback distances based on viral transport in aquifer and vadose zone media, and guidelines for assessing the effects of fine sediment bed-load on instream values. Staff will be involved in progressing several of these projects in 2007/2008 and beyond.

Trends in the levels of organic carbon and nitrogen in pastoral soils of Taranaki

There is a general growing awareness of the significance of the organic content of soil, and concern over the consequences of its potential depletion. The organic fraction of soil contributes significantly to its physical properties and to its ability to retain nutrients. There is also an appreciation of the amount of carbon contained in soil. If the carbon is lost, it is usually as carbon dioxide to the atmosphere, thereby contributing to greenhouse gas emissions and hence to climate change. Globally the amount of carbon sequestered in soil is significant, and soil depletion is a recognised factor in emission inventories. A New Zealand study has found significant losses from New Zealand soils.

During the year the Council funded a study of the levels of organic carbon and nitrogen in the soils of the region. The findings of that study are presented in the report at hand. It collates the results from 15 sites in Taranaki that have been sampled within the period 2005-2007, each of which were sampled originally between 1976 and 1984. Thus, for each site, trends in organic carbon, organic nitrogen, and phosphate levels over a period of decades can be determined.

The average change in organic carbon for all 15 sites was a loss of 0.2 tonnes carbon per hectare per year. With a standard deviation of 1.8 t C/ha/yr, this change is not significantly different from zero, and the conclusion is that the total soil carbon in the profiles of soils in Taranaki has not changed over the last 20-30 years. Similarly for organic nitrogen, the report concludes there has been no apparent change in the last two-three decades. However, while organic carbon and organic nitrogen have remained stable in Taranaki, levels of soil phosphate (Olsen P) have markedly increased over the interval. The average increase was 13 mg/kg, from 19 to 32 mg/kg, an increase of almost 70%. This indicates that farmers have applied or are applying phosphate fertiliser at rates that are unnecessarily high for pasture maintenance and productivity. The results of the study were to be presented to the Council just after the end of the period under review.

Site contamination investigation

The Council was approached by South Taranaki District Council (STDC) to guide and assist it in assessing the site of the abandoned Patea freezing works for possible contamination. The site includes fuel storage tanks, old electrical fittings, and large ash dumping areas from coal-fired boilers and a site incinerator. A site visit and discussions with STDC staff and former site employees helped in scoping an investigation plan. At the end of the period under review the plan had been submitted to the Ministry for the Environment to apply for assistance with funding a detailed site investigation. Further work is anticipated in 2007/2008.

Projects identified during 2006/2007 for future implementation

The effects of pasture renewal and on-farm fodder cropping, on soil

Arising in part from the findings of the study into the levels of and trends in organic carbon and nitrogen in pastoral soils of Taranaki reported above, the Council is partnering the Waimate West Research Farm in developing an investigation into the effects upon soil quality of pasture renewal and the growing of fodder crops on-farm, for implementation in the 2007/2008 year and beyond, recognising that these are practices that might become more widespread as pressure continues to increase stocking rate and pasture productivity, and that they might lead to a degradation of soil fertility and structure.

Performance of nitrification inhibitors on Taranaki farms

When nitrogen is applied to soil (e.g. as animal wastes, effluent, or fertiliser), it is available for uptake by plants and micro-organisms, and also begins to move through the soil column as it dissolves into groundwater. In the form of urea or ammonia,

nitrogen is relatively readily available for plant uptake, and is relatively immobile. Microbial action steadily converts these forms to nitrites and nitrates, which are much more mobile and leach readily away from the root zone into groundwater. As the negatively charged nitrate ion moves through soil, it also takes with it positively charged ions such as potassium, calcium and magnesium.

This represents a loss of nutrient for the pasture, an economic loss to the farmer, and an adverse environmental impact in terms of increased nitrate in groundwater used for drinking (higher nitrates in drinking water lead to adverse health effects) and degraded soil quality and water ways (higher nitrates encourage stream weed and algal growth). It also leads to emissions of nitrous oxide, a potent greenhouse gas. Nitrifying inhibitors are chemicals that reduce the rate of conversion of ammonia to other forms of nitrogen, thus prolonging its availability to plants (increasing productivity by up to 15%) and reducing its loss into the environment (by up to 50%). However, these results occur on soils and climates that are markedly different to conditions in Taranaki. During the 2006/2007 year, Council staff collaborated in designing a study of the performance of inhibitors in Taranaki. Approval for the study was confirmed late in the year, and it will proceed in the 2007/2008 and subsequent years at the Whareroa Research Farm.

Littoral sand drift

The rivers of Mt Taranaki, and particularly the Stony River, are a source of sand discharge into the near-shore coastal drift along the northern coast of Taranaki. Erosion events in recent years have released a 'slug' of sand into the littoral drift. This has significant implications for sand replenishment on northern beaches, siltation rates within Port Taranaki, the formation of drifts within eddies across river mouths, and the smothering of kaimoana beds. The Council is supporting research into drift monitoring and evaluation.

Biodiversity of riparian margins

A project brief has been prepared to investigate the effects of riparian margin restoration on indigenous biodiversity in the Taranaki region.

This project involves comparing species diversity and abundance among sites with greater or lesser degrees of riparian restoration. It is to be implemented in the 2007/2008 monitoring year.

2.3. Waste minimisation

The following activities that have been carried out in relation to the Council's waste minimisation programme in the 2006/2007 year:

Waste minimisation pilot studies

Waste minimisation and energy efficiency pilot studies were conducted in six selected priority sectors: restaurants/cafes (almost half the premises in the region were assessed during the year, with new measures for food waste recovery and put in place at many), public events (including securing Sustainable Management Fund funding from the

Ministry for the Environment to assist with diverting recyclables and food waste from landfill for a large 2007/2008 event), retail complex (45 retail outlets), hotels, service clubs, and educational sectors (particularly schools in Stratford and New Plymouth); at selected sites in each of the three districts. Sites were selected in consultation with the three district councils. There has also been consultation with Ministry for the Environment's EnviroSchools programme in Taranaki to review opportunities for co-operation, and with the Taranaki co-ordinator of the Royal Society of New Zealand's EMAP project



Colson Road Recycling Centre

One of the nine annual environmental awards presented by the Council in May 2007 was awarded to a company specialising in recycling washing machine parts into generators that use renewable energy sources (wind, hydro) for electricity generation, and another award went to a school that Council officers have worked with to implement a recycling and composting programme.



Local teachers on a profession development day with Council staff at a recycling centre in New Plymouth

Waste incineration and recycling at schools

The Taranaki Regional Council continued to work with the South Taranaki District Council and New Plymouth District Council to implement recycling for schools in the South Taranaki and New Plymouth districts. All schools in New Plymouth and South Taranaki districts have been provided with recycling bins, a free kerbside recycling collection for these bins, and the opportunity for further advice from the Council's waste minimisation officer. Schools in New Plymouth and South Taranaki districts were surveyed by telephone in December and March to assess use of incinerators and recycling bins, before and after the introduction of the recyclables collection service. Reported use at that stage was very low (only 4 of the 79 contacted were still using their incinerators, and 3 of these reported only minimal use).

Recycling facilities

The Council investigated options for recovery and recycling of fluorescent tubes and glass within the region. As a result of limited opportunities to recycle glass at New Zealand's only glass manufacturer, located in Auckland, alternative end uses within the region are 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.

Links with national organisations

Links with national organisations such as BusinessCare, the Ministry for the Environment, WasteMINZ, Recycling Operators of New Zealand (RONZ) were maintained, 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.

Taranaki Regional Waste Officers' forum

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.

AgRecovery collection programme for agrichemical containers

The Council continued to assist the development of a national farm agrichemical containers recovery programme that has been under development for some time. Staff have been 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. Three locations were confirmed for the region during the year under review, with the scheme established at one and the other two awaiting site development. Farmers can leave their empty agrichemical containers at these locations for further processing. It is anticipated that the collection system will be established at all three sites in the region by November 2007. The Council wishes to see the scheme expanded.

Other matters

In 2006/2007 the Council continued to deal with potential collectors and plastic recyclers over the feasibility of recycling 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.

Field investigations and information collation were undertaken for a study of water use efficiency in farm dairy sheds (see section above on research projects).

Measurements were made of commercial and urban waste types received at the Colson Road transfer Station, and a report drafted.

Pamphlets describing composting, a recycling directory, and recycling in schools were prepared and distributed.

Following the release by the Ministry for the Environment of the report '*Targets in the New Zealand Waste Strategy*' (April 2007), the Council prepared an analysis of the report for the Regional Solid Waste Working Group, and reviewed progress towards the national targets and the targets set out in the '*Regional Solid Waste Strategy*' by the four

councils of Taranaki. A report for the Council and the RSSWG was being prepared at the end of the period under review.

Council staff 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 has continued its own in-house waste reduction and recycling activities, including use of 100% recycled photocopying paper and recovery of all recyclable canteen wastes.

3. Conclusion

In conclusion, the Council has met its performance measures for resource investigations and monitoring, and waste minimisation activities set out in the 2006/2007 Long-Term Council Community 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 19 state of the environment monitoring programmes.
- Undertook 1156 inspections, sampling runs and surveys at 303 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 (2005/2006) in the Taranaki region. Completed one annual report relating to freshwater contact recreation water quality monitoring for the 2006/2007 period.
- Completed one report relating to temporal trends of State of the Environment groundwater quality data for the 1992-2005 period.
- Reviewed and updated individual state of the environment monitoring programmes.
- Prepared and adopted new state of the environment monitoring programmes for 2007/2008.
- Began preparations for the five yearly comprehensive State of the Environment Report for Taranaki due to be published in 2008.
- 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 or collaborated in 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, and 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 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

Example of an 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 2007 – 30 June 2008	
Sampling	<p>Sampling will be undertaken monthly at 11 sites, representative of different land uses, for:</p> <p>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.</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 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: 80 hours 80 hours</p>	
Resource summary	<p>Technical Officer 180 hours</p> <p>Scientific Officer 80 hours</p> <p>Laboratory \$41,316</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</p>	

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.

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 (subject to review as it may be possible to retrend annually). 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).