STAFF REPORT

TO: Resource Management Policy Committee

FROM: Trevor James, Resource Scientist

REFERENCE: R05007

SUBJECT: **THE STATE OF SURFACE WATER QUALITY IN TASMAN DISTRICT – REPORT EP05/06/08** Report prepared for the meeting of 1 June 2005

If Councillors wish to see a full copy of this report (63 pages) please contact Trevor James.

1. INTRODUCTION

As part of its obligations under the Resource Management Act, the Tasman District Council monitors the state of surface water quality and river health at selected sites throughout the Tasman Region. Data from this monitoring programme and selected information collected as part of scientific studies carried out by other agencies in the region are reviewed in this report.

A range of water quality parameters have been measured at most sites on a quarterly basis at base flows since 1999. Samples of aquatic macro-invertebrates have been collected annually since 1999 at most of the water quality sampling sites. Some types of macro-invertebrates are tolerant to pollution while others are not. Therefore, the presence or absence of particular macro-invertebrate species can indicate the ecological health of a site. The amount and types of periphyton (or algae) growing on the river bed is also indicative of river health and has been measured quarterly at most of the water quality sampling sites since 2001.

Below is the Executive Summary of a report that will be presented in full to Council's Environment & Planning Committee meeting on 1 June, 2005.

2. EXECUTIVE SUMMARY

A cluster analysis of the water quality results identified three groups of sites. One group consisting of eight small streams had poor water quality. These sites (subsequently labelled as the 'red' sites) have poor water clarity and high concentrations of nutrients and faecal indicator bacteria compared with other sites in the district and often exceed water quality guidelines. Dissolved oxygen concentrations were low at times at some of these sites. All of these sites are on small streams draining land that has been intensively developed for agriculture, horticulture, or urban usage. Sites in this group include: Motupipi, Watercress, Winter, Little Sydney, Waiwhero, Kikiwa and Reservoir.

A second group of 11 sites (subsequently labelled as the 'yellow' sites) have better water quality than the red sites, but tend to have lower water clarity and higher concentrations of nutrients and faecal bacteria than that in the high quality ("green") sites. The yellow sites include small streams and the downstream end of moderate sized rivers that drain intensively developed areas. Sites in this group include: lower Riwaka, lower Sherry, Mangles, lower Onekaka, lower Wai-iti, Motupiko, Black Valley, Kaituna.

The remaining "green" sites had the highest water quality and included forested headwaters and also the downstream reaches of the district's large rivers. Sites in this group include: Motueka, Takaka, Aorere, Buller, Matakitaki, Waimea, Wairoa, Wangapeka.

Sites draining low elevation land had higher concentrations of TN, NO_3-N, NH_4-N, DRP, TP, *E. coli*, and suspended sediments than sites draining hill country, mountains or flowing from a lake. Oxygen saturation was lowest in 1st order streams. Concentrations of nutrients also tended to be highest in the smaller streams. Concentrations of nutrients, *E. coli* and suspended sediment at sites classified as having pastoral land cover were higher than at sites with indigenous forest or exotic forest land cover. Similarly, water clarity was lower at pastoral sites than in forested sites. The effects of land use on water quality are widely recognised and the results of this analysis are consistent with earlier nationwide studies of water quality patterns.

Continuous water temperature records were available for 23 sites, mostly within the Motueka River catchment. Data from well-shaded headwater streams never exceeded the temperature criteria for protecting ecosystem health during the summer. However, the water temperature criteria was regularly exceeded during summer at sites on small unshaded streams draining developed land (e.g. Waiwhero, Little Sydney, Kikiwa). The temperature criteria was also regularly exceeded in the lower reaches of the Tadmor and Motueka rivers.

Trends in water quality were determined at the three National River Water Quality Network sites (Motueka at Gorge, Motueka at Woodstock, Buller at Longford) where sampling has been conducted monthly since 1989. Concentrations of ammonium nitrogen declined at all three sites over the course of the data record, whereas concentrations of total nitrogen increased at all three sites. Water clarity also tended to increase at all three sites, including the Gorge site, which is upstream of any human land use, over the course of the data record. The fact that these changes were consistent among all three sites suggests that this trend is related to climatic changes, rather than changes in land management. However, nitrate nitrogen concentrations and conductivity increased significantly at the Motueka at Woodstock site over the course of the data record, but not at the other sites, suggesting that these changes may be related to changes in land use within the Motueka Catchment over the last 16 years.

Macro-invertebrate communities indicated good ecosystem health at the majority of the sites that were sampled. However, ecosystem health appears to be poor in many of the small lowland streams that drain the intensively developed parts of the region (e.g. Motupipi River, Watercress Creek, lower Reservoir Creek, Waiwhero, Little Sydney). These sites were also identified as having poor water quality.

Periphyton communities were also indicative of good ecosystem health at the majority of sites. However, again the small lowland streams draining intensively developed land often had excessive accumulations of nuisance algae.

In terms of water quality, the Tasman Region is fortunate because all of the region's large rivers have a significant proportion of native forest in their catchments. Therefore, any inputs of pollutants from developed land in the middle and lower reaches are substantially diluted by the large volume of high quality water from upstream. The main threats to water quality and stream health in the Tasman Region relate to the intensification of agriculture in the region, and to a lesser extent the expansion of residential development in the region. The main problems with water quality in the Tasman Region are currently found in small streams which drain intensively developed land. Restoration efforts should focus on reducing nutrient and faecal bacteria inputs to these systems. Efforts should also be made to increase the amount of bank-side vegetation along these streams to provide shading and keep water temperatures below the critical levels required for protecting ecosystem health. If improvements can be made to the water quality of many small streams, this will also lead to cumulative improvements in the quality of water in the main rivers.

The Surface Water Quality Monitoring Programme is currently under review and wide feedback has been gathered from key present and former staff as well as key stakeholders. Already some new monitoring sites on small streams have been added and some sites on large rivers have been removed e.g Buller and Matakitaki Rivers (subject of an earlier recommendation to Council). The details of this review will be presented at the 1 June Environment & Planning Committee meeting.

3. RECOMMENDATIONS:

1. Council receive the report entitled 'State of Surface Water Quality in Tasman District'.

2. Council consider the following:

2.1 Changes to the monitoring programme

While recognising the value of a long-term data set that is based on consistent high quality data from the same sites using the same parameters and similar sampling intervals, there is little value in maintaining the status quo if there are good reasons to make changes to a monitoring programme.

2.2 Add more sites on small streams to the programme. Small (1st and 2nd order) streams are highly under-represented compared to the percentage of these streams in the district. Small streams are the most vulnerable to pollution. Any new sites chosen should cover both 'reference' sites draining areas that are largely undisturbed and 'impact' sites that are currently facing pressure or are likely to in the near future. Several sites on small streams were added in late 2004.

2.3 Rationalisation to enable adding sites as above

- **Remove some sites on larger waterways** in order to add sites on small streams. Sites that are candidates for being dropped or moved are: *Aorere at Devil's Boots, Wai-iti at Pigeon Valley, Wairoa at Irvines*. Sites dropped in the last year: *Buller at Lake, Glenroy at Bridge,* Matakitaki River at Nardoo, *Matakitaki at Horse Terrace, Motueka d/s Graham*. Reasons for dropping these sites is explained in a report on surface water quality for the upper Buller catchment (James, 2004).

- **Cease collecting data from NRWQN sites** other than faecal indicator bacteria.

- **Cease collecting samples for *Total nitrogen* and *total phosphorus*** analysis except at downstream sites of the large river catchments throughout the district. **Cease sampling for *Total, Fixed and Volatile suspended solids*** unless for targeted impact investigations to identify the likely causes of poor water clarity or high turbidity.

2.4 Collect macro-invertebrate samples biannually (once in spring and once in autumn) **for the next two years** and then move to autumn thereafter. This is due to unpredictable weather and flow conditions in Spring often upsetting sampling plans and worst-case stream health will generally occur in late summer as a result of low flows, algae accumulation and warm water temperatures. Sampling in both spring and late summer should be undertaken for at least two years to identify the likely seasonal changes in macro-invertebrate community composition at the sites.

2.5 Determine the behaviour of contaminant load semi-continuously over a few flood events upstream of sensitive receiving environments e.g faecal bacteria delivered from the Aorere River to the Golden Bay. In this case, the load delivered during large floods will probably be much greater than that delivered over a much longer time period at low flow. Therefore, automated flow-weighted samplers that would sample water throughout floods would be required to calculate an accurate load to the Bay. This kind of sampling is expensive and logistically difficult as staff have to be on standby ready for a flood event. This work is being undertaken in the Motueka River catchment as part of ICM research and has been undertaken in the Aorere River at Devil's boots.

2.6 Increase sampling interval. To be able to detect trends in water quality in the district in less than 10 years from now, more frequent sampling is required. This increased frequency could be carried out at a selection of sites to limit increased costs. This is a mdeium priority but will add significantly to the cost.

2.7 Undertake semi-continuous sampling for dissolved oxygen, pH and temperature at all sites on a rotational basis. These parameters can vary considerably on a 24-hour cycle meaning that discrete samples should be collected at the same time of day at all sites to be able to compare results with any real meaning. Obviously this is not possible unless deploying field meters that log data. TDC has two of these and can hire or loan one or two more enabling efficient and cost-effective coverage of sites. This is a high priority with little extra cost.

2.8 Install turbidity and conductivity probes for continuous sampling at key hydrometric stations. Once a correlation is established between these parameters and contaminants such as faecal bacteria and nutrients the total loading can be established at a range of flows at relatively low cost. These could be established at downstream sites of the large river catchments throughout the district (the last three site listed above). Low-medium priority.

2.9 Increase targeted impact investigations to be able to determine the effects of specific activities within a landuse. Part of the annual budget could be dedicated to this type of monitoring to be able to respond to new landuse pressures occurring in different areas. It is also a case of moving through the list of priorities ranked on environmental risk. Priorities for such investigations include:

- Determining what, and where are the activities within the dairy farming landuse in Tasman that generate the highest faecal bacteria loads. Such investigations have begun in coastal western Golden Bay.

- What are the causes of the high nutrient load to the Motupipi River. This could potentially involve groundwater monitoring given that this waterway is fed largely by groundwater.

- Determining the effects of sewage or septage on waterways from new cluster housing subdivisions such as those proposed in the Moutere. This has implications for planning rules for the Rural 3 zone.

2.10 Information management

- An inventory of environmental information should be set up using a web-based spatially referenced system. This could be integrated with nationally-based systems such as Terrestrial and Freshwater Biodiversity Information System (TFBIS).

- Implement a data management system. A comprehensive council-wide needs analysis has been undertaken and a software package has been chosen after a thorough decision process.

- Development of web-based reporting systems to ensure that up-to date information is delivered to the public thereby adding a lot more value to this monitoring programme. This should not replace the production of more detailed reports, such as this, or oral delivery of this information such as at planned seminars and road shows.

- Develop the NCS consents database so that consents can be sorted by landuse or activity type within a catchment or area and output plotted on a map. This is necessary for trying to determine cause and effect. However, this sorting is a very tedious manual process and tedious at present.

2.11 Internal communications strategy. As environmental issues emerge through complaints and monitoring, systems for efficient and effective feedback between consents, planning, resource science, parks and reserves and engineering should be developed.

2.12 Resource consent processing. Consent decisions should be better peer reviewed and discharges to water should include receiving water monitoring where appropriate. Ensuring resource consents for discharges to water, including stormwater, are processed in a timely fashion for higher risk industrial activities. A greater emphasis should be placed on receiving water sampling to determine loadings from individual activities.

2.13 Compliance Monitoring. Resources for **compliance monitoring activity** should be increased particularly in the short term with respect to the following:

- Dairy farming discharges to land and water, stock crossings, feed pads and standoff pads, stock access to waterways and management of wetlands. The frequency of monitoring of such activities should be increased to biennial at least and biannual for discharges of dairy farm effluent to water. Farmers should be assisted in defining priorities for improving environmental performance on their farm based on environmental risk. This should go hand in hand with education particularly around the Clean Streams Accord which is about to be signed by Fonterra and TDC. A road show on this topic is planned for mid June.

- Discharges including stormwater from higher risk industrial activities such as landfills, timber treatment facilities and workshops

More effective **recording of complaints** to be able to determine a more representative summary of public opinion. High priority and low cost.

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