

# the state of our environment



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Gisborne 2007 and 2008

## The Coast

### Principal findings

- Several rivers carrying high suspended-sediment loads discharge to the open sea along the East Coast
- Bacterial loads in both marine and freshwater samples are typically influenced by rainfall events that increase stormwater runoff, and with it silt and bacterial contamination that affect water quality.
- Rural run-off is considered the most likely and significant source of contamination
- Overall, the water quality at the majority of monitored marine sites has improved.
- Testing revealed low levels of sample exceedence compared with the total number of samples tested.
- By December 2010 a new BioTrickling Filter wastewater treatment plant (BTF) should be in operation in Gisborne City, utilising microorganisms to break down waste material, ultimately converting it to plant biomass.
- Biotransformation has been accepted through the resource consent process to be a method of treatment that may meet the wishes of the community and tangata whenua, who desire to have no human wastewater discharging into Poverty Bay.

### Keeping beach and coast-users safe and informed

Swimmers, surfers and people gathering shellfish expect their activities to be safe and healthy, despite the fact microorganisms exist in most surface waters. While many of these are harmless, others potentially pose a health risk, particularly if human or animal faecal matter enters water used for recreation or gathering shellfish.



The Environmental Health section of the Gisborne District Council therefore operates a surveillance programme to monitor 28 coastal sites. Sites are assessed against guidelines depending on the type of use that occurs there (whether contact recreation/bathing or shellfish gathering). Popular recreational sites undergo frequent surveillance throughout summer when use is greatest. A limited number of sites continue to be monitored throughout the remainder of the year.

### Recreational water quality

The 2007-2008 summer bathing season was dominated by fine weather with below-normal rainfall received throughout the November to March period, with the exception of December. Monitoring of one rain event was carried out during the period. We know that during rain events runoff from land carries silt, and with

it bacteria, via the rivers that discharge into Poverty Bay. High bacterial counts at city beaches can persist for several days following rain events. During the 2008-2009 bathing season, coastal areas received more regular and evenly distributed rainfall than during the previous summer.

Twenty-nine marine sites and three freshwater sites were monitored from April 2007 to March 2008, and twenty-eight<sup>1</sup> marine sites and three freshwater sites were monitored from April 2008 through to March 2009.

<sup>1</sup>Monitoring ceased at the southern end of Kaiti Beach in 2008. That site was originally put in place to monitor the outfall from the long-gone meat processing site, and is no longer required. Samples are still taken from the yacht club further along Kaiti Beach.



**Above: Turihaua Lagoon is a popular spot with families, but can have high bacteria counts.**

An additional six freshwater recreational sites were monitored for information- gathering purposes, although these sites are not subject to Ministry of Health Guidelines.

Twenty-four of the 29 marine sites monitored during the 2007/2008 bathing season (and 23 of 28 sites in 2008-2009) produced samples containing excessive numbers of bacteria. Most of these exceedences were directly linked to periods of significant rainfall at known rain-affected or offshore sites.

In 2007-2008 four results that were not explained by high rainfall came from Turihaua Beach, Wainui Beach opposite the Surf Club, Waikanae Beach opposite the Surf Club and Midway Beach opposite the Surf Club.

These sites subsequently underwent sanitary surveys, which revealed nothing out of order, and it was concluded the high bacterial counts had come from adjacent streams that were carrying high bacterial loads even in times of low-flow.

Nine exceedences during the summer of 2008/2009 were not explained by high rainfall. These sites were Turihaua Beach, Waikanae Beach opposite the Surf Club Makarori Beach opposite the settlement, Tolaga Bay Beach at the end of Wharf Road, Anaura Bay Beach opposite the south camp and Midway Beach opposite the Surf Club.

Sanitary surveys showed that in these instances, either significant rain in the 6 days prior to sampling, combined with debris in the water, had caused the high bacterial loads; or alternatively they were due to high loads of bacteria in adjacent streams during times of low flow, combined with onshore winds.

Thirteen of the 14 offshore marine sites also contained excessive bacterial loads at some time during the 2007-2008 monitoring period, and these were all linked to periods of high rainfall.

The three freshwater sites included in monitoring for research purposes were the Waimata River at Grant Road, the Turanganui River at "the Cut" and the Turanganui River at Gladstone Road Bridge. Unsurprisingly, these sites also revealed high levels of bacterial contamination linked to rainfall.

### Shellfish Sites

Two parameters are used to monitor the water quality of shellfish gathering sites: the seasonal median and a maximum limit of faecal coliform bacteria per 100ml for 10% of the samples. Faecal coliforms are indicator organisms; their presence may indicate harmful bacteria, viruses or protozoa may also be present.

These are the same guidelines used by the shellfish export sector and are internationally accepted. They do not cover marine biotoxins (algal blooms), which are monitored by the Public Health Unit of Tairāwhiti District Health Board.

A total of seven sites were monitored. Wherowhero Lagoon site fluctuated in and out of median compliance throughout the reporting period (this is typical). For sites that did not comply with the 10% compliance criteria, this was due to rainfall carrying surface runoff from land.

In the summer period 2007/2008:

- Only two sites complied with the seasonal median criterion.
- Five sites complied with the sample percentage exceedence criterion; they were Pouawa Sea, Sponge Bay, Sponge Bay offshore, Kaiti Beach at the Southern Outfall and Kaiti Beach opposite the Yacht Club. Historical results show Pouawa has consistently complied since the 1999/2000 season.
- The Tolaga Bay End of Wharf and Wherowhero Lagoon sites did not comply with either criterion and hence did not comply with the Guidelines.

In the summer period 2008/2009:

- Only the Tolaga Bay Wharf site complied with the seasonal median criterion.
- Two sites complied with the sample percentage exceedence criterion: Pouawa Sea and Sponge Bay sites.
- None of the sites complied with both criteria.

### Sampling Programme

Sites are monitored at a frequency consistent to their use. For example, most offshore sites are sampled fortnightly throughout the year, whereas designated swimming and surfing beaches are monitored weekly during the bathing season, and those that continue to be used throughout the remainder of the year are monitored fortnightly outside of the peak season.

Over the past few years no one has been observed gathering shellfish near the current Wherowhero Lagoon sampling site. It appears that the preferred site for shellfish collection is at the other end of the lagoon adjacent to Muriwai Township, and the sampling site may need to be changed.

Samples are sent to an IANZ-accredited laboratory for analysis. *Enterococci* results from a marine water sample and *E.coli* results from a fresh water sample are available within 24 hours.

### Informing the public

Permanent or seasonal signage is located at water-quality sampling sites, and on access routes to shellfish gathering areas, to inform the public that water quality in the area is monitored. In rain-affected areas a warning is included that water quality may present increased risks to health for up to five days following heavy rain.

Some sites where the potential for water contamination is often present have permanent display signs warning people that the shellfish collected from the area are not safe to eat, for instance at the Peel Street Bridge over the Taruheru River, and Kaiti Beach at the Yacht club.

Temporary signage would be placed at recreational sites to notify elevated risks if contamination not associated with rainfall is detected. No temporary signs were required during this reporting period.

Information pamphlets are distributed to all visitor outlets including the Information Centre, and camping grounds.

People should be aware that at times when the sea is discoloured by sediment following heavy rain, the potential health risk to bathers is elevated.

### Conclusions

2007 and 2008 were the fourth and fifth years the Recreational Water Monitoring Programme has been operating under the most recently reviewed National Guidelines.

Overall, the water quality at the majority of marine sites has improved. The trend of low levels of sample exceedence compared with the total number of samples tested has continued.

Exceedences were nearly always linked to rainfall events where land runoff has been the primary source of bacterial contamination. Since sampling continues according to the calendar, samples collected during or in the days following rain are very likely to show elevated levels of bacteria. However, in between rain events the water quality is likely to be very good.

### Sedimentation in the marine environment

Gisborne District's maritime climate, punctuated by storms and droughts, coupled with a tectonically active and unstable landscape,



induces widespread erosion of the mudstone- and sandstone-dominated hinterland. Removal of native forests by human settlers within the past one thousand years led to an unprecedented acceleration in erosion. By the early 20th century, most forest cover was gone and landslides proliferated in steep headwaters.

Several rivers carrying high suspended-sediment loads (extremely high during floods), discharge to the open sea along the East Coast. Suspended sediment plumes contain a mixture of particle sizes and with them transport bacteria, nutrients and possibly chemical contaminants into the ocean.

Significant sediment-yielding rivers include the Awatere, Waiapu, Uawa, Waiomoko, Pouawa, Turanganui and Waipaoa Rivers. The Waiapu River heads the list, yielding thirty-six million tonnes of sediment per year.

The Waipaoa River is region's second ranking river in terms of suspended sediment discharge, delivering fifteen million tonnes of mud, silt and sand per year to coastal Poverty Bay. That's the equivalent of about 4,100 truckloads per day.

It is estimated around ten percent of sand carried by the Waipaoa River is deposited on the beaches of Poverty Bay. This material replenishes the beaches and as a result the Poverty Bay shoreline is prograding or accreting (building out to sea). Meanwhile other sections of coastline are eroding due to a combination of sea level rise, geological subsidence and a paucity of sand for replenishment.

The remaining suspended sand is deposited close to river mouths where it forms the estuaries of the Karakatuwhero, Awatere, Waiapu, Uawa, Pakarae, Turanganui and Waipaoa Rivers.

### Influence of sediment on marine life

Very large pulses of sediments entering estuaries in flood events can bury estuarine organisms

Fine, silty sediments are generally rapidly flushed to sea, away from sensitive near-shore rocky reef habitats, though they can become



very widely dispersed by wave action and prevailing currents, potentially being carried many tens of kilometers offshore, and dispersing over many tens of square kilometers.

It is during large flood events that extensive turbidity causes catastrophic smothering of benthic organisms, and disruption of feeding and spawning areas for a variety of fish species, across large areas of the continental shelf. Recovery of biodiversity may take decades following events such as Cyclone Bola and the Labour weekend floods of 2005.

#### Update on Gisborne's wastewater treatment plans

By December 2010 it is intended that the new BioTrickling Filter treatment plant (BTF) will be operating at a new site in Banks Street, in the Awapuni industrial subdivision of Gisborne City. Resource consents have been granted by independent



Above: The Waipaoa River in flood discharges a plume of muddy water into Poverty Bay. (Photo: Dave Peacock, Gisborne District Council)



Above: Detail from a Seawifs satellite image from 11 May 1999 showing sediment plumes around the East Coast following rainfall centred on Mahia peninsula. (Image: Seawifs, NASA)

commissioners who heard all the evidence from the Council (as applicants), ten groups of submitters and the officers that made recommendations for conditions to be placed on the resource consents.

As soon as the BTF is operational, a pilot UV water treatment plant will commence operation. By 2012 all domestic effluent will be disinfected utilising UV light, significantly reducing the levels of enterococci and coliform bacteria. The end result of this two-stage treatment will be water that is reliably cleaner and of a consistent standard, even better than that required by law.

#### What's the idea behind the BTF?

The BTF process imitates the natural processes that would occur when human waste contacts land and soil: micro-organisms break down the material, ultimately converting it to plant biomass. Biotransformation has been accepted through the resource consent process<sup>2</sup> to meet the wishes of the community and tangata whenua, who desire to have no human wastewater discharging into Poverty Bay.

Council is initiating studies, with funding from central Government, to gain a better understanding of the biological processes that will occur within the new BTF plant, and ascertain whether the process will definitely satisfy the cultural, health and water quality standards that the community demands.

<sup>2</sup>The resource consent for the BTF plant stipulates fallback positions in the event of the biotransformation process not meeting desired performance levels. These include: Installation of an additional BTF tower so that the loading on the media is halved, or, installation of clarifiers to separate solids, which would then be required to be disposed of to a landfill, or other processes recommended by a technical advisory group and the Wastewater Management Committee after consideration of a range of studies that would be undertaken, as described in the resource consent conditions.