Investigation into the microbiological quality **of Bay of Plenty estuarine shellfish**

AIM To obtain better information on the pathogen levels in shellfish stocks, so the public could be better informed of the risks of collecting and eating shellfish from local beds

INTRODUCTION

It is known that human viruses can stay in shellfish gut tissue for weeks and cause shellfish to be unsafe to eat. Consumption of virus-contaminated shellfish can cause gastroenteritis and hepatitis A which when, transmitted person to person can spread through entire communities.

Shellfish beds in Tauranga Harbour and Waihi Estuary are easily accessible and shellfish are often collected from these areas rather than the open coast.

A jointly funded research project set out to assess the bacterial and viral quality of shellfish in Tauranga Harbour and Waihi Estuary. Project objectives included:

- Determining if viral contamination of shellfish is occurring and to what extent;
- How long shellfish remain contaminated after an adverse pollution event;
- Which adverse pollution events/ practices give rise to bacterial/viral shellfish contamination;
- Assess shellfish quality against recommended guideline values for human consumption;
- Assess whether potential for contamination could be predicted/assessed without costly ongoing shellfish/water sampling.
- Obtain new information on the pathogen levels in shellfish, so the public are better informed of the risks of eating shellfish from local beds.

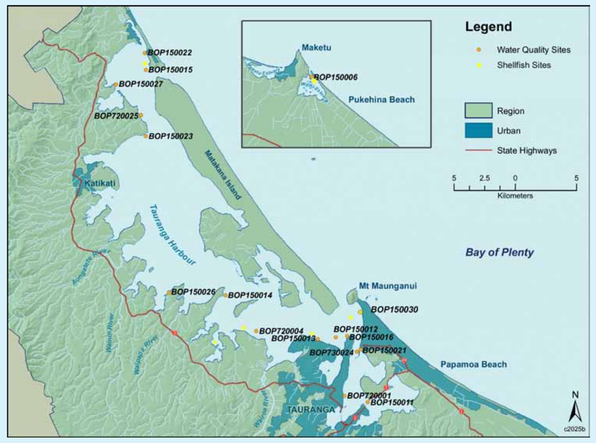
METHODOLOGY

Sampling and Analysis

Shellfish (cockles, oysters, pipi and horse mussels) were sampled from six sites (five in Tauranga Harbour and one in Waihī Estuary), and water samples taken from 13 sites monthly for a year. Shellfish were tested for E. coli, enterococci, norovirus and adenovirus (which can cause disease in humans), FRNA bacteriophage. Water samples were also tested for E.coli and enterococci.

Comprehensive sampling was also carried out after two suspected adverse pollution events. A suspected adverse pollution event was defined as a:

- sewage overflow from Council reticulated wastewater system >50 cubic metres in volume and;
- rain event which increases water flows in the rivers within the Tauranga Harbour or Waihi Estuary catchment to at least twice the median flow.



Microbiological Limits

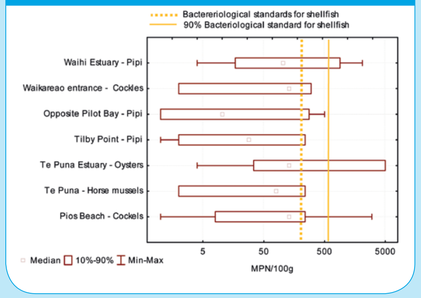
Recreational shellfish-gathering bacteriological guideline values for water are outlined in the Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas, Ministry for the Environment and Ministry of Health (2003):

- The median faecal coliform content of samples taken to meet the guideline standards should not exceed 14 per 100 ml, and not more than 10 percent of samples should exceed 43 per 100 ml.

No specific microbiological guideline criteria exist for shellfish flesh gathered for non-commercial purposes. NZFSA advised that the commercial shellfish limits could be used in a non-commercial setting. The microbiological limits outlined in the New Zealand Food Safety Authority Animal Products (Specifications for Bivalve Molluscan Shellfish) Notice 2006 for commercial shellfish quality were applied. No published norovirus standards exist, however as only a few Norovirus particles may be enough to infect a healthy person a nil tolerance of norovirus is applied.

- The E.coli median MPN of the shellfish samples must not exceed 230 E.coli per 100 g and not more than 10 percent of the samples must exceed an MPN of 700 per 100 g.

Concentration Of E.Coli In Shellfish



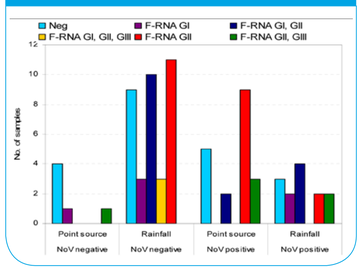
Comparison of indicator bacteria and virus results in shellfish and shellfish collecting waters based on monthly sampling over 12 months

	WATERS		SHELLFISH		
	FC content Waters		E.coli	FC	GII Norovirus
	Median cfu/100ml	% n > 43 FC cfu/100ml	Median MPN/100g	Median MPN/100g	% Positive
Pios Beach – Cockle	2	25%	130	185	25%
Te Puna – Horse Mussel	18.5	33%	80	170	29%
Te Puna Estuary – Oyster	18.5	33%	130	850	0%
Tilby Point – Pipi	10	17%	29	240	67%
Waikareao entrance – Cockle	10	17%	130	45	60%
Opposite Pilot Bay – Pipi	2	8%	11	27	50%
Waihi Estuary – Pipi	35.5	42%	105	235	8%

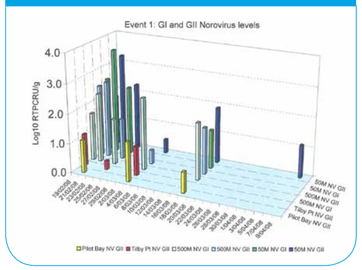
KEY RESULTS

- Viral contamination in shellfish occurs often.
- Viruses where mostly commonly found adjacent to urban areas (i.e. Tauranga city).
- Norovirus levels were generally low in shellfish except following the significant sewage spill.
- Norovirus remained detectable in shellfish 50 metres from sewage spill for up to three months.
- Shellfish may not be safe to eat even when the bacterial quality is within the accepted limits.
- Low levels of norovirus found in shellfish from three of the six sites in Tauranga Harbour after heavy rain.
- High levels of bacteria found after heavy rain.
- Bacterial levels decreased after seven days following rainfall.

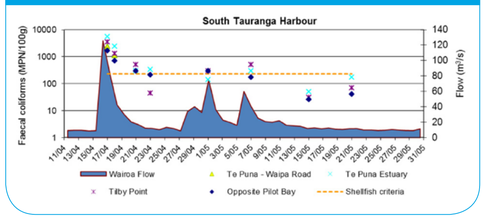
Comparison between F-RNA phage and norovirus (NoV) occurrence in point source and rainfall adverse event samples (N =74)



Norovirus GI and GII levels (log10 RTPCRU/g of shellfish gut tissue) in shellfish following sewage overflow event



Faecal coliform concentrations in shellfish, South Tauranga Harbour and Wairoa River daily total flow



Virus results in all shellfish sampled monthly over 12 months

	Norovirus GI	Norovirus GII	Adenovirus
Total No of Tests	72	72	72
No. of Positive	3	23	7
% Positive	4.2%	32%	9.7%

CONCLUSIONS

Viral contamination in Tauranga Harbour supports NZFSA's advice not to collect shellfish near urban areas.

- Shellfish may not be safe to eat even when the bacterial quality is within the accepted guideline limits.
- Significant risk associated with consuming shellfish from certain areas.
- Examination of catchment and estuarine conditions is useful in assessing shellfish contamination.

For further information see www.toiteorapublichealth.govt.nz/vdb/document/57

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