Marlborough's Coastal Recreational Water Quality 2008-09

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MARLBOROUGH DISTRICT COUNCIL

EXECUTIVE SUMMARY

A number of coastal locations in Marlborough are monitored on a weekly basis during the summer months and assessed against the Ministry for the Environments (MfE's) bathing water guidelines. Coastal water quality in Marlborough is generally very good and during the 2008-09 bathing water season, nearly 80% of sites were categorised as safe for recreational use for more than 95% of the time. Exceedances of MfE guidelines generally occurred during wet weather with notable exceptions being Portage, Momorangi and Marfells Beach. Marfells beach had the worst water quality ever recorded since monitoring of the site began in 1996. Whites Bay, which generally has excellent water quality, also reported some of its worst results.

Suitability for recreation grades (SFRG) have been derived based on the most recent five years of microbiological data. The Sanitary Inspection Categories have been recalculated due to the high number of irreconcilable follow-up grades in previous years. Only one site this year returned an irreconcilable follow-up grade, this one being Portage. Of the fifteen sites which were graded only ten had enough samples over five years from which a microbiological assessment grade (MAC grade) could be calculated. Regular monitoring of each site is recommended to allow for comparisons in coastal water quality each year and to allow for complete SFRG bathing grades to be determined.

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1. INTRODUCTION

District councils are required under the Health Act 1956 to monitor environmental factors affecting public health and to abate conditions likely to be offensive or injurious to health. Water quality in our rivers and coastal areas can have an impact on public health. Regional councils have responsibilities under the Resource Management Act 1991 for the planning and management of natural resources including fresh and coastal waters. The Marlborough District Council as a unitary authority has responsibility for both district and regional functions. Guidelines for the safe use of recreational waters are defined by the Ministry for the Environment in the Microbiological Water Quality Guidelines (2003). The recreational waters in Marlborough are sampled in accordance with these guidelines.

2. OBJECTIVES OF THE MARINE BATHING WATER PROGRAMME

The objectives of the bathing water programme are:

1. To provide the results of monitoring to the public as soon as they become available.
2. To assess the safety of each site in relation to the risk of contracting illness/infection at each site on a weekly basis and to inform the public as soon as possible.
3. To grade bathing water sites using MfE's 2003 guidelines for grading swimming beaches.
4. To assess the results of monitoring to allow for national comparisons between coastal bathing water sites and to enable long term trends in coastal bathing water quality to be determined.
5. To help identify sites which require additional investigation due to excessive faecal contamination.

3. SITES

During the summer of 2008-09 a total of 18 coastal bathing water sites were monitored on a weekly basis from November to March inclusive, the location of these sites are shown in Appendix 1. Sampling takes place independent of tidal levels. The bulk of the monitoring is carried out in the Queen Charlotte Sound due to its high recreational use and also due to its higher risk (enclosed nature, high population during the summertime etc.). Table 1 details the name, location and grid reference of each site. In general the coastal waters of Marlborough are suitable for contact recreational activities; however there are areas which are more susceptible to contamination, such as the Picton coastal waters and developed bays in the Marlborough Sounds such as Tirimoana and Moenui.

Table 1: Coastal Bathing Water Sites 2008-09

Site name	Site ID	Grid Reference (NZTM)	
Anakiwa	GRO-1	2587083	5993201
Bobs Bay	PCT-3	2595183	5991849
Hakahaka Bay	PTU-001	2603350	5989250
Marfells Beach	MB-1	2610215	5941787
Mistletoe Bay	OB-1	2591480	5997715
Moenui	MOE-1	2576696	5992100
Momorangi Bay	MOM-1	2588827	5992585
Ngakuta Bay	NGK-1	2590525	5992195
Oyster Bay	PTU-002	2603188	5988691
Picton Foreshore	PCT-5	2594309	5990521
Portage	POR-1	2596786	6000405
Shelly Beach North	PCT4A	2594598	5990639
Te Mahia	TEM-1	2591405	5998456
Tirimoana	TIR-5	2586243	5992655
Waikawa Bay	WKB-1	2597707	5992797
Wairau Bar	WRR-7	2598590	5966903
Wairau Diversion	WDV-2	2596069	5973626
Whites Bay	WB-1	2598438	5979497

4. SAMPLING

The water quality at each site is tested for the presence of enterococci bacteria. The results are reported in MPN/100mL (most probable number). All laboratory testing is carried out by the Cawthron Institute in Blenheim. Enterococci are chosen as the indicator bacteria for coastal waters due to its higher survival rates in saline waters and as such it is deemed to be a good indicator of recent sewage and/or faecal contamination. Samples are taken in water approximately 0.5m deep. The sample is taken from a depth of approximately 0.1m from the surface.

4.1 Indicator Organisms

An indicator organism can be defined as an organism which is used to indicate the **potential** presence of another organism. Enterococci are the indicator organisms used when monitoring coastal water recreational sites. When monitoring coastal waters used for recreational purposes, the primary concern is the presence of organisms which can cause illness and/or infection in people. It may not always be possible to identify specific disease causing organisms due to their low numbers, difficulty and expense of analysis among other reasons; therefore the waters are tested for indicator organisms, in this case enterococci. The advantages of using enterococci as the indicator organism are 1) it is easy to sample and inexpensive to measure and 2) it can survive for several weeks in saline waters and is therefore a definite indication of recent faecal contamination. Enterococci are present in the gut of all warm blooded animals (including humans, mammals and birds), all of which are potential carriers of disease causing organisms in humans.

The number of enterococci present in a water sample (100mL) denotes the **potential** health risk of the waters to humans, it is not a direct measurement of the actual health risks, and therefore an exceedance of the guideline value indicates that there is an *increased* risk to bathers in the area. Further details on how this risk is quantified are available in Appendix 2 of the Microbiological Water Quality Guidelines (MfE, 2003).

4.2 Guideline Values

The guideline values for safe coastal recreational sites have been determined by MfE and are as follows:

	For a ***single*** sample		Requirement	
Acceptable '*Green Mode*'	< 140 Enterococci / 100mL	Highly likely to be uncontaminated	Routine monitoring	Safe ☺
Alert '*Amber Mode*'	140 - 280 Enterococci / 100mL	Potentially contaminated	Investigate likely causes	OK 😐
Action '*Red Mode*'	> 280 Enterococci / 100mL[1]	Highly likely to be contaminated	Further investigation, inform relevant interested parties	Unsafe ☹

These levels are based on keeping illness risks associated with recreational water use to less than 2% (MfE, 2003). In addition, the Ministry of the Environment has developed Suitability for Recreation Grades (SFRG's) for swimming beaches. These are defined using the Microbiological Assessment Category (MAC) and the Sanitary Inspection Category (SIC) as defined by MfE.

4.2.1 Microbiological Assessment Category (MAC)

The Microbiological Assessment Category is assessed using data from the previous 5 years. A minimum of 20 samples over the bathing water season (November to March inclusive) for each year is required in order to establish a complete MAC, if there are less than 100 samples over this 5 year period then the MAC status is defined as being incomplete or interim. Marlborough District Council has been carrying out monitoring of coastal water bathing sites since 1996, however in order to obtain a completed MAC grade a minimum of 20 samples per site for each bathing water season is required. Only 15 of the sites sampled have data over the past 5 years. Of these the number of samples for each site ranges from 54 to over 100 for this 5 year period. Two thirds of the 15 sites assessed had more than 100 samples over a five year period. Table 2 below defines the MAC grades.

Table 2: Microbiological Assessment Category (MAC) definitions for marine waters (MfE, 2003).

Grade	95th Percentile (Hazen method)	
A	≤ 40	Enterococci / 100mL
B	41 - 200	Enterococci / 100mL
C	201 - 500	Enterococci / 100mL
D	> 500	Enterococci / 100mL

The MAC grade is assessed each year based on the previous 5 years of data. The MAC is used in conjunction with the SIC to obtain a Suitability for Recreation Grade (SFRG). There are between 20 and 22 weeks in the bathing water season so it is important to ensure each site is consistently monitored over the bathing water season to ensure accurate reporting of MAC grades and Suitability for Recreation Grades (SFRGs).

4.2.2 Sanitary Inspection Category (SIC)

The SIC assigns a category to the site based on the risk of contamination associated with faecal sources in the vicinity. Figure 1 details this risk. Marlborough District Council assigned SIC classes to the coastal water bathing sites in 2004; these classes have been re-assessed in 2009 due to the number of inconsistencies between the MAC grades and the SIC classes resulting in incomplete or follow-up grades being assigned to beaches in previous years. The results from investigations into faecal source contamination carried out in 2007-08 (MDC, 2008) were used in the reassessment of the SIC classes.

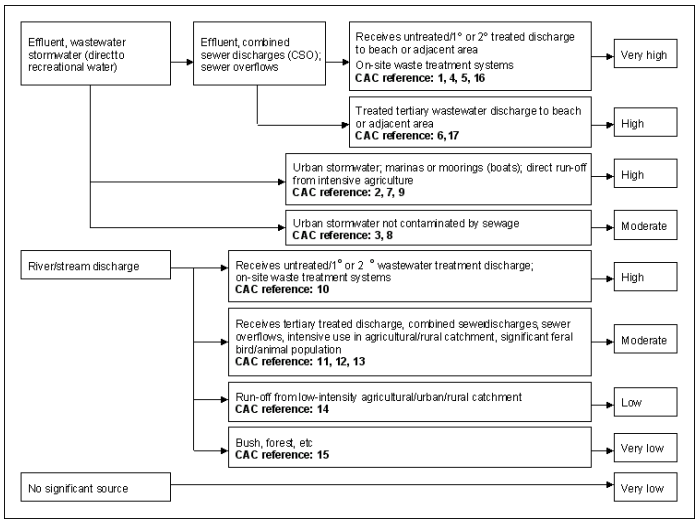

Figure 1: Sanitary Inspection Category for coastal water sites (MfE, 2003)

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[1] Applies to *two* consecutive single samples (resampled as soon as practicable after receiving first result) greater than 280/100mL

4.2.3 Suitability for Recreation Grade (SFRG)

Bathing water sites are graded according to the SFRGs, which are Very Good, Good, Fair, Poor and Very Poor. Suitability for Recreation Grades (SFRGs) are obtained using the MAC in conjunction with the SIC and are calculated using the MfE's Recreational Water Quality Assessment software called 'Bathewatch' (figure 2).

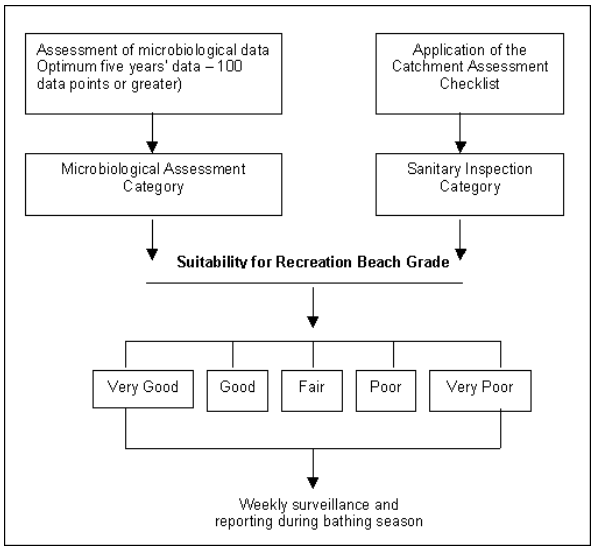


Figure 2: Requirements for grading swimming rivers (MfE, 2003)

5. BATHING WATER QUALITY RESULTS 2008-09

The results of the summer 2008-09 sampling are shown in Appendix 2. These results are graphed for each site and are shown in Appendix 3. The graphs show the enterococci numbers alongside rainfall (72 hour total) and plotted against both the alert and action level bathing water guideline standards.

Figure 3 shows the percentage of time the sites were deemed safe or otherwise for swimming and are ranked accordingly. All but one site was deemed safe for swimming for more than 90% of the time. Frequent wet weather exceedances at Moenui have resulted in the site being unsafe for recreational activity for 14% of the time. Portage had numerous exceedances of the alert and action level guidelines; these exceedances occurred during both wet and dry conditions. Momorangi has seen an improvement in water quality over recent years.

The best water quality has been from Shelly Beach, Bobs Bay and Anakiwa, where results showed that water was safe for swimming 100% of the time, this includes periods during and after heavy rainfall. However, even in pristine environments bacteria levels can be elevated during and after heavy rainfall.

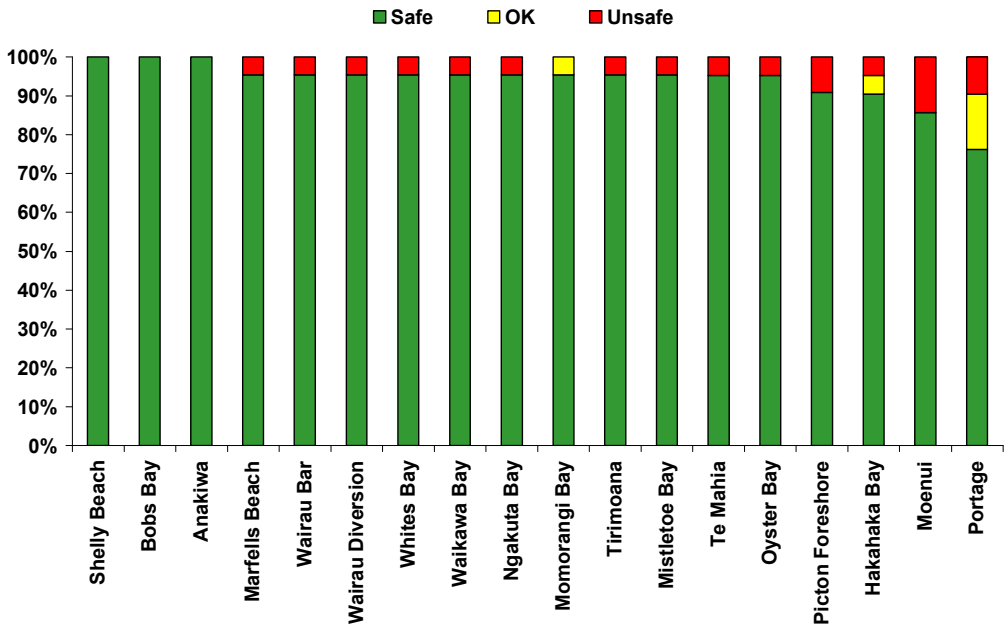


Figure 3: Coastal water bathing sites ranked according to the percentage of time they were suitable for contact recreation.

The 95 percentile counts for each site show a similar pattern (Figure 4), with Moenui and Portage having the highest and third highest (respectively) 95 percentile enterococci count. High enterococci counts at Moenui are all associated with high rainfall events. Four of the five exceedances at Portage occurred during dry weather.

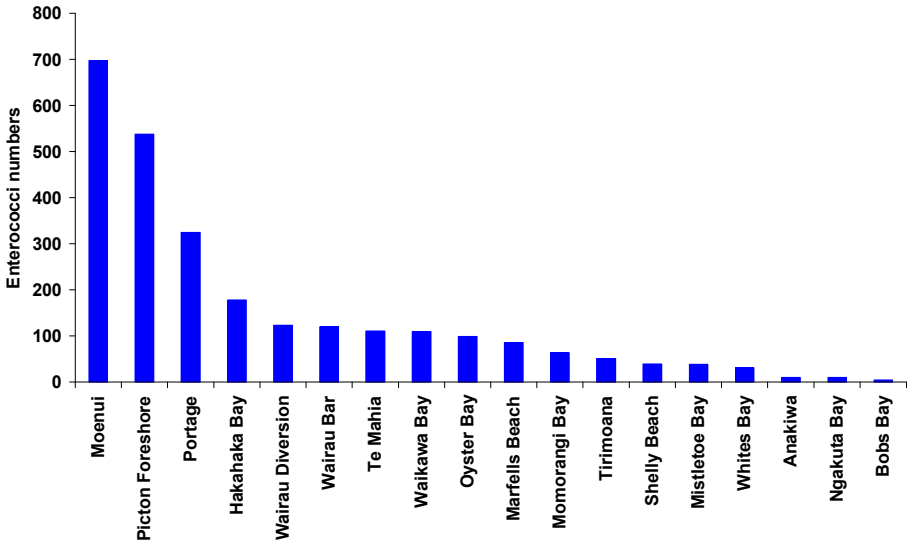


Figure 4: Coastal water bathing sites ranked in descending order according to the 95-%ile enterococci number estimated for the 2008-09 bathing water season.

The beaches in Picton are susceptible to urban runoff and stormwater overflows among other sources and are therefore at high risk of contamination particularly after high rainfall events. The two exceedances recorded at Picton Foreshore occurred after heavy rainfall. Recent efforts in the maintenance and upgrading of the stormwater network and efforts to ensure minimal pollution from industrial/commercial sites are proving successful as water quality in this area continues to improve. Continued monitoring of the Foreshore and Shelly Beach is important to ensure this upward trend in water quality continues to be observed.

5.1 Rainfall Effects

The bacteria loading of streams and coastal waters are generally expected to increase during and after heavy rainfall. This is due to contaminants (including bacteria) being washed from land surfaces into waterways. The problem is exacerbated in urban and in intensive agricultural areas. Whilst measures can be put in place to ensure minimum contamination from various land-use practices some degree of bacterial contamination of waters will still occur after heavy rainfall due to the presence of wildlife. For this reason it is advised that swimming does not occur during and for up to three days after heavy rainfall events. The corollary to this is that increased bacteria numbers in dry weather are a concern as they are often indicative of a localised source of pollution. High rainfall events do not always result in corresponding high bacteria counts due to factors such as the time of sampling in relation to the first flush event[2], change in tides etc.

[2] The concentration of contaminants is usually highest at the beginning of a rainfall event, particularly after a period of dry weather.

Of the 23 exceedances of MfE's bathing water guidelines (>140) in 2008-09, 18 of them occurred after heavy rain. Figures 5 and 6 show the number of exceedances of the guidelines in relation to rainfall for sites located in the Queen Charlotte Sound.

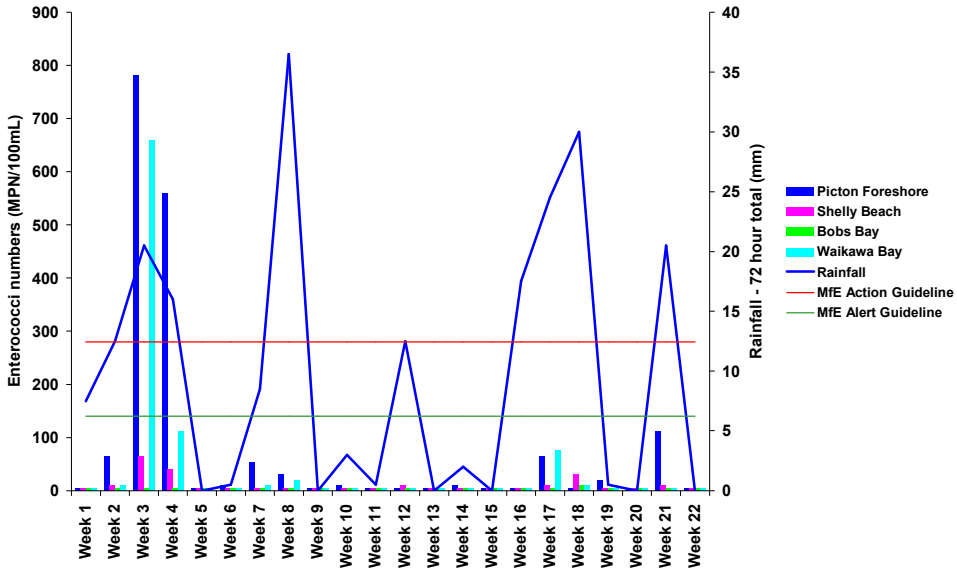


Figure 5: Enterococci numbers in relation to rainfall events for the sites located in the Picton area.

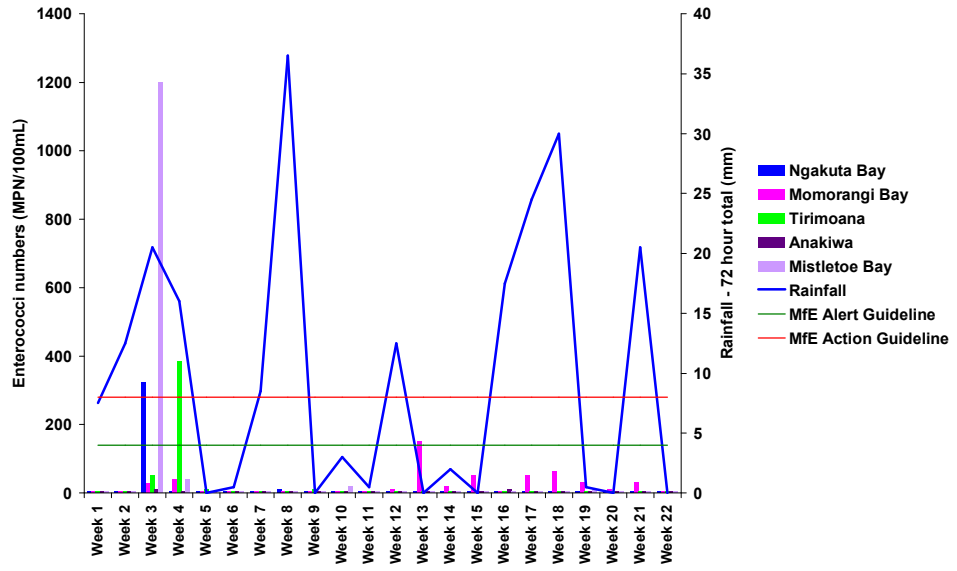


Figure 6: Enterococci numbers in relation to rainfall events for the sites located in the Queen Charlotte Sound.

Four of the five dry weather exceedances occurred at Portage, problems with the sewage disposal system at the resort are suspected to have contributed to these exceedances. The remaining dry weather exceedance occurred at Momorangi Bay. Investigations have been carried out at Momorangi Bay to

determine the source of faecal contamination in the bay and it is suspected that wildfowl have a major role to play (MDC, 2008).

An unusually high result (831 enterococci/100mL) was recorded for Marfells Beach on the 10th December 2008. Although there had been some rain (7.8mm over 72 hours recorded at Dashwood), it is unlikely that this was as a result of rainfall washing contaminants onto the beach. This is the highest result ever recorded for this site. In addition 2008-09 recorded the highest results for Marfells Beach since monitoring began in 1996 (99 samples).

5.2 Suitability for Recreation Grades (SFRGs) 2008-09

The Suitability for Recreation Grades have been calculated using the latest five years of microbiological data and the SIC classes which have been reassessed in 2009 (Appendix 4). Three of the eighteen sites sampled in this years programme have no long term data and consequently only fifteen sites have an SFRG calculated. Ten of these fifteen sites have complete datasets over the last five years for the calculation of the MAC grade. The results are shown in Table 3.

Table 3: Suitability for Recreation Grades for Marlborough's Coastal Bathing water sites

Site	MAC Grade* Summer season 2008-09	MAC Grade** long term (5 years)	Trend	SFRG	Status of SFRG grade
Anakiwa	A	D	↑	Poor	Complete
Bobs Bay	A	B	↑	Very Good	Complete
Hakahaka Bay	C	-	-	-	-
Marfells Beach	C	B	↓	Very Good	Complete
Moenui	D	D	↔	Very Poor	Complete
Momorangi Bay	B	D	↑	Poor	Complete
Ngakuta Bay	B	B	↔	Very Good	Complete
Oyster Bay	C	-	-	-	-
Picton Foreshore	D	D	↔	Very Poor	Complete
Portage	C	C	↔	Very Poor	Follow-up
Shelly Beach North	B	C	↑	Fair	Complete
Te Mahia	C	B	↓	Very Good	Complete
Tirimoana	B	C	↑	Fair	Complete
Waikawa Bay	C	B	↓	Good	Complete
Wairau Bar	C	D	↑	Poor	Complete
Wairau Diversion	C	B	↓	Good	Complete
Whites Bay	C	A	↓	Very Good	Complete

* Based on the 95th percentile (Hazen) for the 2008-09 Bathing Water season.

** Calculated using MfEs' Bathewatch programme, includes the latest 5 years of microbiological data

† 'Follow-up' grades, the Bathewatch software detected inconsistencies between the MAC and the SIC. A conservative default grade was subsequently calculated by Bathewatch. A complete sample set (>100 samples over the last 5 years) and/or a recalculation of the SIC is required to confirm the SFRG.

Where there are apparent inconsistencies in the recorded microbiological data and the SIC, Bathewatch calculates the most conservative grade for the site and flags the grade as an 'Irreconcilable Follow-up Grade'. Portage is the only site for which inconsistencies were detected between the recorded microbiological data and the SIC. The SIC rates the site as being at 'very high' risk however the microbiological data shows that the site has moderate to high faecal contamination. The sewage system at Portage is currently being upgraded. The SIC will be recalculated once the upgrade has been completed. This may resolve the inconsistencies in the calculation of the beach grade.

Figure 7 shows the percentage of sites that fall within each SFRG grade. Just under half of all sites are graded as poor or very poor. Table 3 compares this years results with results over the long term (the past 5 years) and shows that whilst some sites showed an improvement, notably Anakiwa and Momorangi, a large proportion showed a decline in water quality. Notable amongst these are Marfells Beach, Whites Bay and Te Mahia.

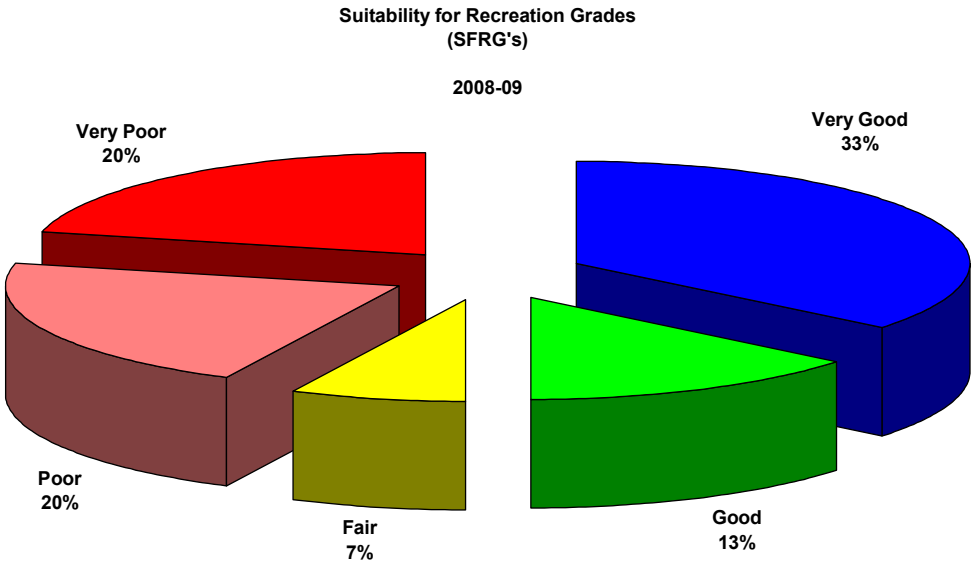


Figure 7: Pie-chart of SFRG's for the marine bathing water sites for the summer 2008-09.

6. RECOMMENDATIONS FOR SUMMER SAMPLING 2009-10

1. Ensure all sites are sampled on a weekly basis throughout the summer period. Regular sampling is required in order to obtain complete MAC grades. MAC grades and SFRG's are regularly reported to MfE for inclusion into nationwide reporting. Regular sampling also ensures that trends in water quality can be detected over time.

2. Microbial Source Tracking should be used where faecal contamination becomes an issue in bathing water areas.

3. A wet weather survey should be carried out for Moenui and surrounds to help determine the extent and the source of faecal contamination.

7. REFERENCES`

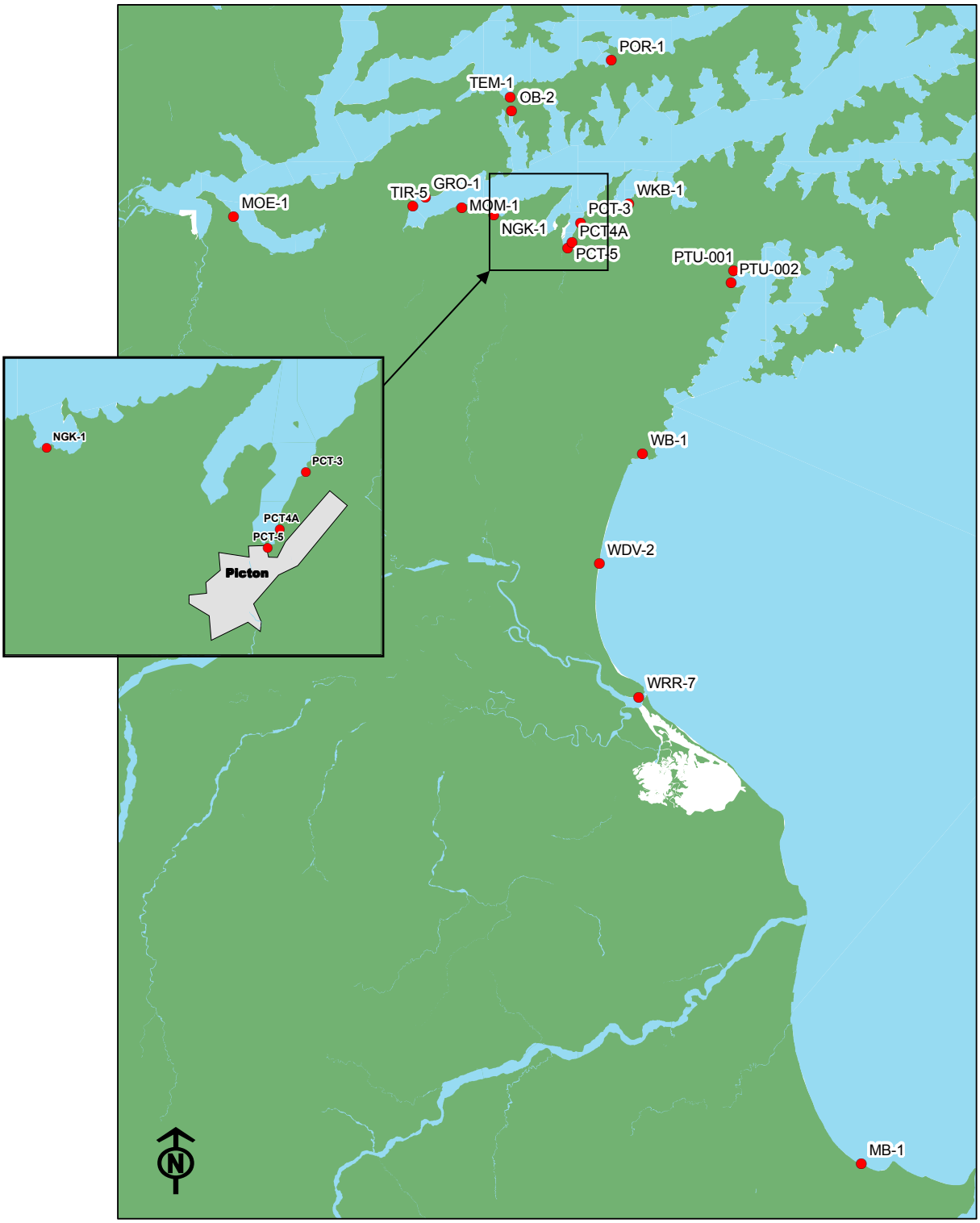
MfE (2003) *Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas.* Ministry of the Environment. http://www.mfe.govt.nz/publications/water/microbiological-quality-jun03/microbiological-quality-jun03.pdf

MDC (2004) *The Microbiological Quality of Marlborough Coastal Bathing Beaches 2003-2004*. November 2004. Marlborough District Council.

MDC (2008) *Marlborough's Coastal Bathing Water Quality, 2007-08*. May 2008. Marlborough District Council.

APPENDIX 1

Coastal Bathing Water Site Locations



APPENDIX 2

Results from the Bathing Water (Coastal Waters) sampling from November 2008 to March 2009 inclusive

	MB-1	WRR-7	WDV-2	WB-1	PCT-5	PCT4A	PCT-3	WKB-1	NGK-1	MOM-1	TIR-5	GRO-1	OB-2	TEM-1	POR-1	MOE-1	PTU-002	PTU-001		
DATE*	Marfells Beach	Wairau Bar	Wairau Diversion	Whites Bay	Picton Foreshore	Shelly Beach	Bobs Bay	Waikawa Bay	Ngakuta Bay	Momorangi Bay	Tirimoana	Anakiwa	Mistletoe Bay	Te Mahia	Portage	Moenui	Oyster Bay	Hakahaka Bay	Increased Risk	Significant Risk
Week 1	20	5	5	5	5	5	5	5	5	5	5	5	5	NS	NS	5	NS	NS	140	280
Week 2	5	5	20	5	64	10	5	10	5	5	5	5	5	10	5	124	30	5	140	280
Week 3	87	5	5	5	782	64	5	659	324	30	53	10	1200	5	5	10	99	178	140	280
Week 4	5	124	124	10	560	40	5	111	5	40	384	5	40	53	5	697	30	40	140	280
Week 5	20	5	10	5	5	5	5	5	5	5	10	5	5	5	5	10	5	5	140	280
Week 6	831	5	5	5	10	5	5	5	5	5	5	5	5	885	5	40	53	5	140	280
Week 7	20	738	364	30	53	5	5	10	5	5	5	5	5	111	254	1400	624	5	140	280
Week 8	5	10	10	20	30	5	5	20	10	5	5	5	5	5	20	10	5	20	140	280
Week 9	10	5	5	5	5	5	5	5	5	5	10	5	5	5	164	20	5	5	140	280
Week 10	5	5	30	5	10	5	5	5	5	5	5	5	20	40	5	10	10	10	140	280
Week 11	10	5	53	5	5	5	5	5	5	5	5	5	5	5	531	5	10	20	140	280
Week 12	5	5	5	31	5	10	5	5	5	10	5	5	5	5	5	5	5	5	140	280
Week 13	5	10	10	5	5	5	5	5	5	150	5	5	5	5	111	53	10	5	140	280
Week 14	53	10	20	5	10	5	5	5	5	20	5	5	5	5	5	5	5	10	140	280
Week 15	5	10	111	10	5	5	5	5	5	53	5	5	5	5	178	111	5	10	140	280
Week 16	5	20	20	945	5	5	5	5	5	5	5	10	5	5	10	5	10	288	140	280
Week 17	5	5	31	10	64	10	5	75	5	53	5	5	5	5	324	384	5	5	140	280
Week 18	10	20	10	5	5	31	10	10	5	64	5	5	5	5	5	10	75	10	140	280
Week 19	10	31	20	10	20	5	5	5	5	31	5	5	10	10	75	5	5	5	140	280
Week 20	5	10	5	5	5	5	5	5	5	10	5	5	5	5	5	5	31	5	140	280
Week 21	5	5	10	10	111	10	5	5	5	31	5	5	5	5	5	NS	10	31	140	280
Week 22	5	20	53	20	5	5	5	5	5	5	5	5	5	5	5	5	10	20	140	280

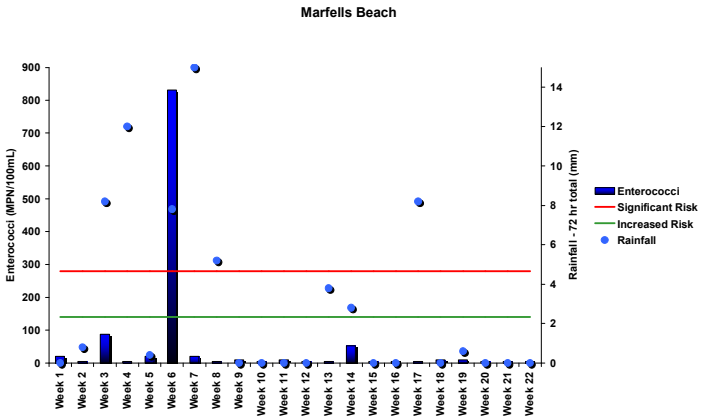
NS No sample taken due to time constraints

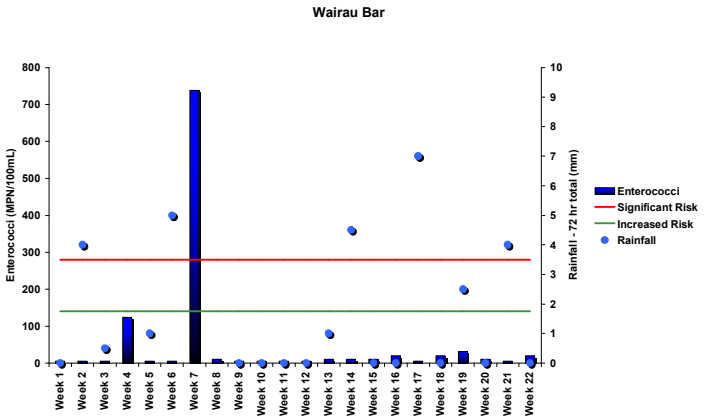
Less than values are halved i.e. <10 MPN/100mL becomes 5. No bacteria detected in the water sample

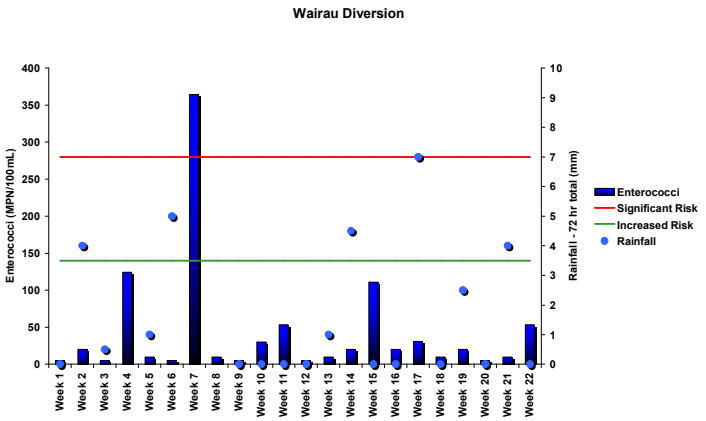
* Week 1 begins on the 3rd November, with samples taken throughout that week, week 2 begins on the 10th November etc.

APPENDIX 3

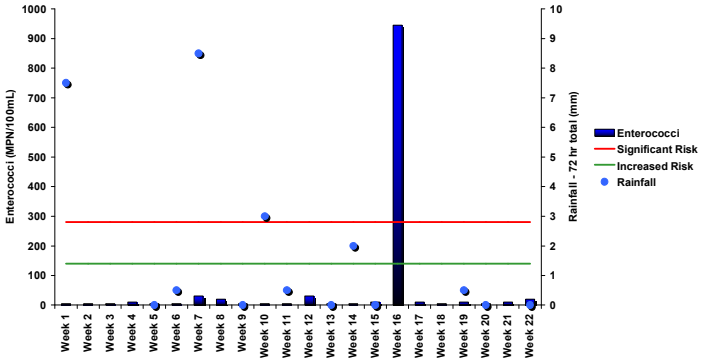
Graphed results for each Coastal Bathing Water site for the Summer 2008-09 period in relation to MfE's bathing water standards (action level denoted by significant risk and alert level denoted by increased risk). Follow-up samples are not graphed as the SFRG grade calculations, as defined by MfE, do not include follow-up samples. A follow-up sample is taken when a routine sample exceeds the MfE guideline of 280 Enterococci/100mL.



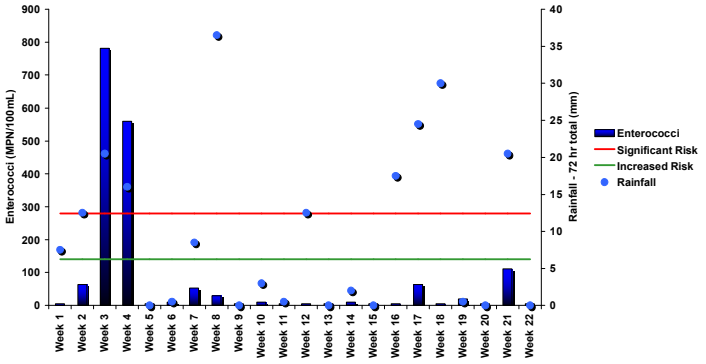




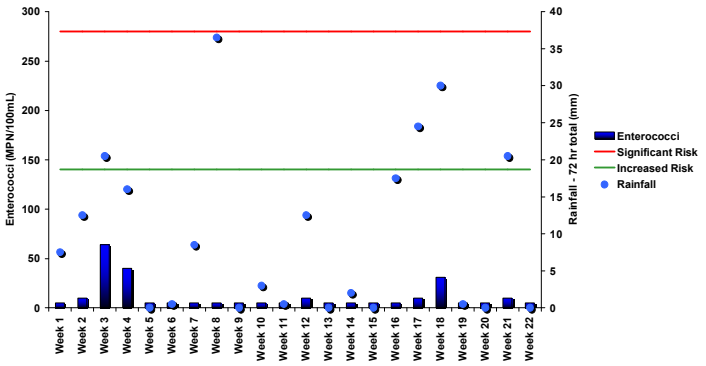
Whites Bay



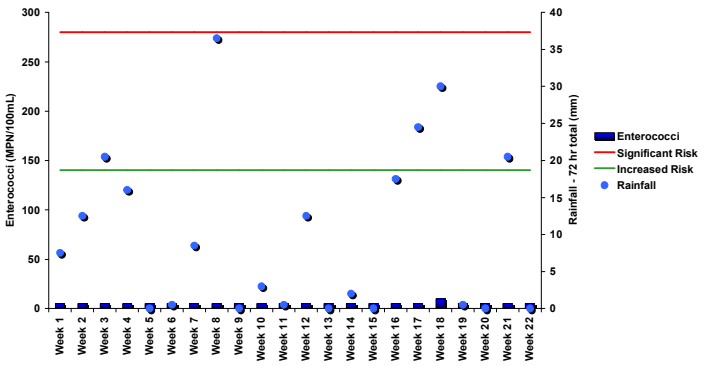
Picton Foreshore



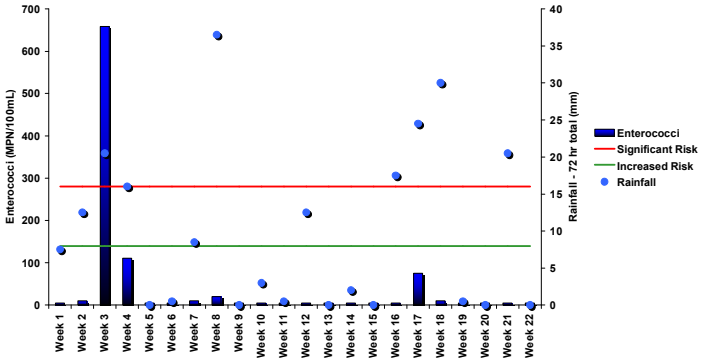
Shelly Beach



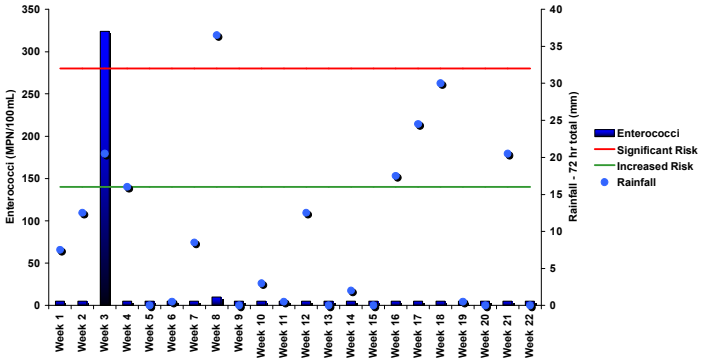
Bobs Bay



Waikawa Bay



Ngakuta Bay



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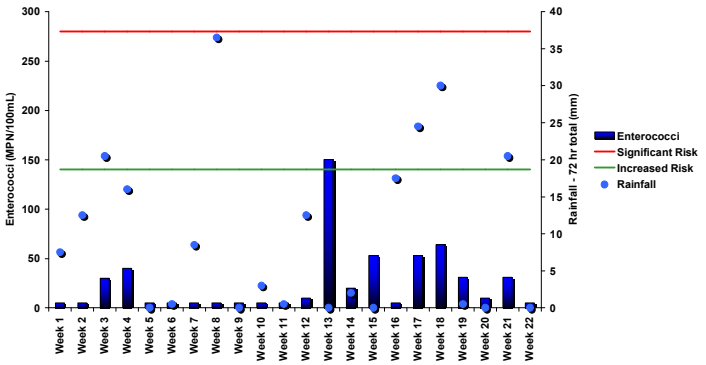

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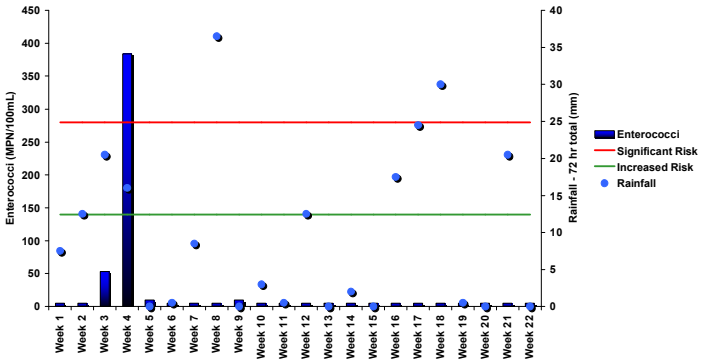

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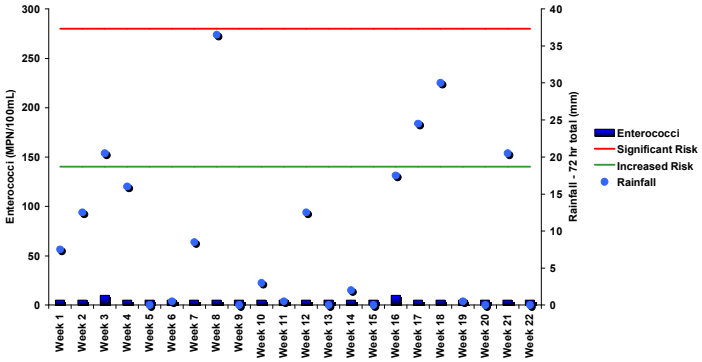
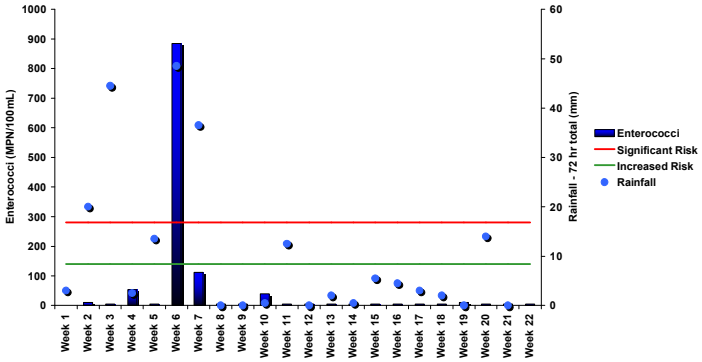


Te Mahia



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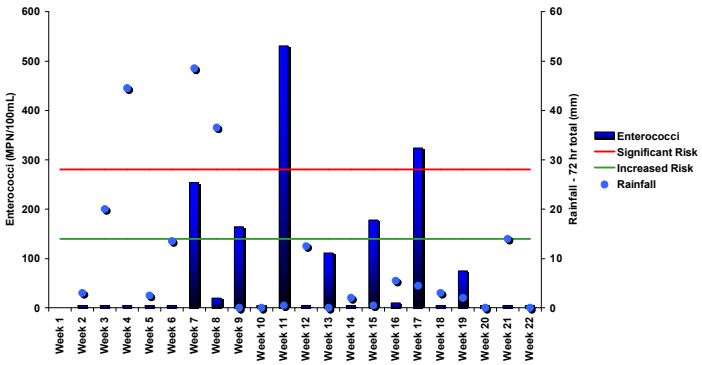
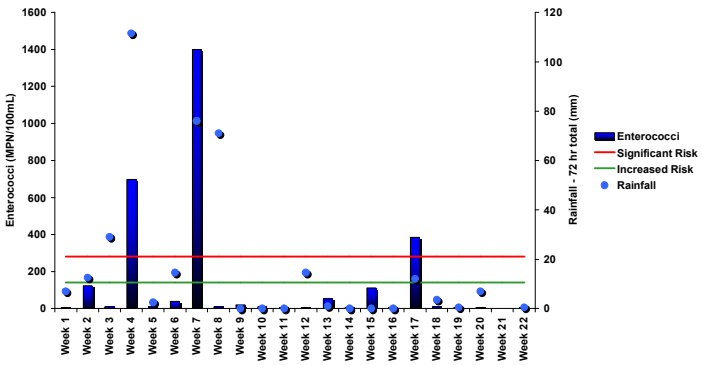
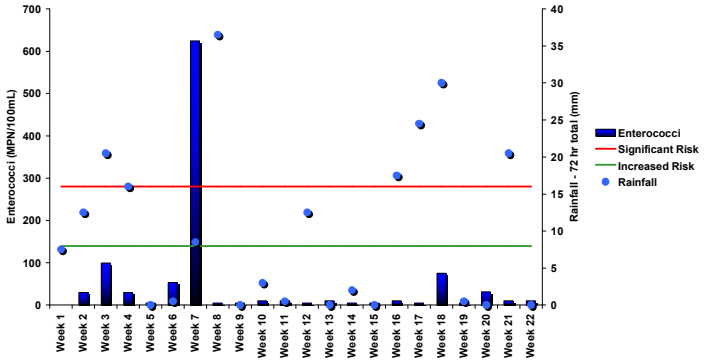


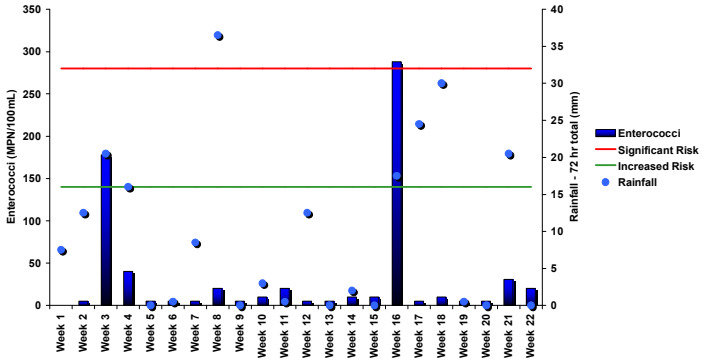
Moenui



Oyster Bay



Hakahaka Bay



APPENDIX 4

2008-09 Suitability for Recreation Grade (SFRG's) Results

ANAKIWA

******** Microbiological Assessment Category ********

Annual exceedance information (for water year 01 November to 31 October)

	sample season	sample size	median	exceed 140 to 280	exceed >280	%days <280
Year	2008	22	5	0	0	100
Year	2007	23	10	3	2	91
Year	2006	20	10	0	1	95
Year	2005	21	10	0	3	85
Year	2004	20	25	2	2	90
Total	0	106	10	5	8	92

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 996

Data Set Extent - Complete Data Set (5 years with at least 100 samples)

******** Suitability for Recreation Grade ********

Suitability Assessment Results

SFRG Assessment Grade - Poor

Primary Impact - ,13: River - agricultural activites/birds/feral animals

Complete

******** Sanitary Inspection Category ********

Catchment Assessment Checklist Results

SIC Assessment Grade - Moderate

Primary Impact:

13: River - agricultural activites/birds/feral animals

BOBS BAY

******** Microbiological Assessment Category ********

Annual exceedance information (for water year 01 November to 31 October)

	sample season	sample size	median	exceed 140 to 280	exceed >280	%days <280
Year	2008	22	5	0	0	100
Year	2007	20	10	1	1	95
Year	2006	16	10	0	0	100
Year	2005	14	10	0	0	100
Year	2004	18	10	0	0	100
Total	0	90	10	1	1	98

Assessment Results

Microbiological Assessment Grade - B

Hazen Percentile Result - 99

Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

******** Suitability for Recreation Grade ********

Suitability Assessment Results

SFRG Assessment Grade - Very Good

Primary Impact - ,0: No significant source indicated.

Complete

********** Sanitary Inspection Category **********

Catchment Assessment Checklist Results

SIC Assessment Grade - Very Low

Primary Impact:

0: No significant source indicated.

MARFELLS BEACH

********** Microbiological Assessment Category **********

Annual exceedance information (for water year 01 November to 31 October)

	sample season	sample size	median	exceed 140 to 280	exceed >280	%days <280
Year	2008	22	5	0	1	95
Year	2007	21	10	0	0	100
Year	2006	7	10	0	0	100
Year	2005	4	10	0	0	100
Year	2004	0	0	0	0	0
Total	0	54	10	0	1	98

Assessment Results

Microbiological Assessment Grade - B

Hazen Percentile Result - 61.8

Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

********** Suitability for Recreation Grade **********

Suitability Assessment Results

SFRG Assessment Grade - Very Good

Primary Impact - ,0: No significant source indicated.

Complete

********** Sanitary Inspection Category **********

Catchment Assessment Checklist Results

SIC Assessment Grade - Very Low

Primary Impact:

0: No significant source indicated.

MOENUI

********** Microbiological Assessment Category **********

Annual exceedance information (for water year 01 November to 31 October)

	sample season	sample size	median	exceed 140 to 280	exceed >280	%days <280
Year	2008	21	10	1	2	90
Year	2007	24	40	3	6	75
Year	2006	20	10	0	0	100
Year	2005	21	10	1	0	100
Year	2004	19	10	1	0	100
Total	0	105	10	6	8	92

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 718.25

Data Set Extent - Complete Data Set (5 years with at least 100 samples)

********** Suitability for Recreation Grade **********

Suitability Assessment Results

SFRG Assessment Grade - Very Poor

Primary Impact - ,4: Private sewage disposal systems

Complete

********** Sanitary Inspection Category **********

Catchment Assessment Checklist Results

SIC Assessment Grade - Very High

Primary Impact:

4: Private sewage disposal systems

MOMORANGI BAY

********** Microbiological Assessment Category **********

Annual exceedance information (for water year 01 November to 31 October)

	sample season	sample size	median	exceed 140 to 280	exceed >280	%days <280
Year	2008	22	7.5	1	0	100
Year	2007	36	20	4	6	83
Year	2006	26	40	1	5	80
Year	2005	21	20	0	2	90
Year	2004	20	46.5	2	2	90
Total	0	125	20	8	15	88

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 730.5

Data Set Extent - Complete Data Set (5 years with at least 100 samples)

********** Suitability for Recreation Grade **********

Suitability Assessment Results

SFRG Assessment Grade - Poor

Primary Impact - ,13: River - agricultural activites/birds/feral animals

Complete

********** Sanitary Inspection Category **********

Catchment Assessment Checklist Results

SIC Assessment Grade - Moderate

Primary Impact:

13: River - agricultural activites/birds/feral animals

NGAKUTA BAY

********** Microbiological Assessment Category **********

Annual exceedance information (for water year 01 November to 31 October)

	sample season	sample size	median	exceed 140 to 280	exceed >280	%days <280
Year	2008	22	5	0	1	95
Year	2007	21	10	0	0	100
Year	2006	20	10	0	1	95
Year	2005	21	10	1	0	100
Year	2004	20	10	0	0	100
Total	0	104	10	1	2	98

Assessment Results

Microbiological Assessment Grade - B

Hazen Percentile Result - 124

Data Set Extent - Complete Data Set (5 years with at least 100 samples)

******** **Suitability for Recreation Grade** ********

Suitability Assessment Results

SFRG Assessment Grade - Very Good

Primary Impact - ,0: No significant source indicated.

Complete

******** **Sanitary Inspection Category** ********

Catchment Assessment Checklist Results

SIC Assessment Grade - Very Low

Primary Impact:

0: No significant source indicated.

PICTON FORESHORE

******** **Microbiological Assessment Category** ********

Annual exceedance information (for water year 01 November to 31 October)

	sample season	sample size	median	exceed 140 to 280	exceed >280	%days <280
Year	2008	22	10	0	2	90
Year	2007	23	10	0	3	86
Year	2006	21	10	0	1	95
Year	2005	34	40	1	7	79
Year	2004	34	46.5	3	6	82
Total	0	134	20	4	19	85

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 1069

Data Set Extent - Complete Data Set (5 years with at least 100 samples)

******** **Suitability for Recreation Grade** ********

Suitability Assessment Results

SFRG Assessment Grade - Very Poor

Primary Impact - ,2: Stormwater outlets

Complete

******** **Sanitary Inspection Category** ********

Catchment Assessment Checklist Results

SIC Assessment Grade - High

Primary Impact:

2: Stormwater outlets

PORTAGE

******** **Microbiological Assessment Category** ********

Annual exceedance information (for water year 01 November to 31 October)

	sample season	sample size	median	exceed 140 to 280	exceed >280	%days <280
Year	2008	21	5	3	2	90
Year	2007	19	10	0	0	100
Year	2006	18	10	1	1	94
Year	2005	19	10	1	0	100
Year	2004	20	10	0	2	90
Total	0	97	10	5	5	94

Assessment Results

Microbiological Assessment Grade - C

Hazen Percentile Result - 299.5

Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

******** **Suitability for Recreation Grade** ********

Suitability Assessment Results

SFRG Assessment Grade - Very Poor

Primary Impact - ,5: Primary or secondary treatment facilities

Follow-up

******** **Sanitary Inspection Category** ********

Catchment Assessment Checklist Results

SIC Assessment Grade - Very High

Primary Impact:

5: Primary or secondary treatment facilities

SHELLY BEACH

******** **Microbiological Assessment Category** ********

Annual exceedance information (for water year 01 November to 31 October)

	sample season	sample size	median	exceed 140 to 280	exceed >280	%days <280
Year	2008	22	5	0	0	100
Year	2007	23	10	2	0	100
Year	2006	21	10	1	1	95
Year	2005	21	10	2	1	95
Year	2004	21	10	0	1	95
Total	0	108	10	5	3	97

Assessment Results

Microbiological Assessment Grade - C

Hazen Percentile Result - 226.9

Data Set Extent - Complete Data Set (5 years with at least 100 samples)

******** **Suitability for Recreation Grade** ********

Suitability Assessment Results

SFRG Assessment Grade - Fair

Primary Impact - ,3: Urban stormwater

Complete

******** **Sanitary Inspection Category** ********

Catchment Assessment Checklist Results

SIC Assessment Grade - Moderate

Primary Impact:

3: Urban stormwater

TE MAHIA

******** **Microbiological Assessment Category** ********

Annual exceedance information (for water year 01 November to 31 October)

	sample season	sample size	median	exceed 140 to 280	exceed >280	%days <280
Year	2008	21	5	0	1	95
Year	2007	18	10	0	0	100
Year	2006	17	10	0	0	100
Year	2005	21	10	0	2	90

Year	2004	19	10	0	1	94
Total	0	96	10	0	4	95

Assessment Results

Microbiological Assessment Grade - B

Hazen Percentile Result - 120.1

Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

******** **Suitability for Recreation Grade** ********

Suitability Assessment Results

SFRG Assessment Grade - Very Good

Primary Impact - ,0: No significant source indicated.

Complete

******** **Sanitary Inspection Category** ********

Catchment Assessment Checklist Results

SIC Assessment Grade - Very Low

Primary Impact:

0: No significant source indicated.

TIRIMOANA

******** **Microbiological Assessment Category** ********

Annual exceedance information (for water year 01 November to 31 October)

	sample season	sample size	median	exceed 140 to 280	exceed >280	%days <280
Year	2008	22	5	0	1	95
Year	2007	21	10	0	4	80
Year	2006	20	10	0	1	95
Year	2005	21	10	0	1	95
Year	2004	21	10	0	1	95
Total	0	105	10	0	8	92

Assessment Results

Microbiological Assessment Grade - C

Hazen Percentile Result - 389.5

Data Set Extent - Complete Data Set (5 years with at least 100 samples)

******** **Suitability for Recreation Grade** ********

Suitability Assessment Results

SFRG Assessment Grade - Fair

Primary Impact - ,13: River - agricultural activites/birds/feral animals

Complete

******** **Sanitary Inspection Category** ********

Catchment Assessment Checklist Results

SIC Assessment Grade - Moderate

Primary Impact:

13: River - agricultural activites/birds/feral animals

WAIKAWA BAY

******** **Microbiological Assessment Category** ********

Annual exceedance information (for water year 01 November to 31 October)

	sample season	sample size	median	exceed 140 to 280	exceed >280	%days <280
Year	2008	22	5	0	1	95

Year	2007	21	10	0	1	95
Year	2006	20	10	0	0	100
Year	2005	21	10	0	1	95
Year	2004	19	10	1	0	100
Total	0	103	10	1	3	97

Assessment Results

Microbiological Assessment Grade - B

Hazen Percentile Result - 124

Data Set Extent - Complete Data Set (5 years with at least 100 samples)

******** **Suitability for Recreation Grade** ********

Suitability Assessment Results

SFRG Assessment Grade - Good

Primary Impact - ,14: River - focal points of drainage

Complete

******** **Sanitary Inspection Category** ********

Catchment Assessment Checklist Results

SIC Assessment Grade - Low

Primary Impact:

14: River - focal points of drainage

WAIRAU BAY

******** **Microbiological Assessment Category** ********

Annual exceedance information (for water year 01 November to 31 October)

	sample season	sample size	median	exceed 140 to 280	exceed >280	%days <280
Year	2008	22	7.5	0	1	95
Year	2007	22	10	0	2	90
Year	2006	20	10	0	1	95
Year	2005	16	10	0	1	93
Year	2004	20	10	0	4	80
Total	0	100	10	0	9	91

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 530.5

Data Set Extent - Complete Data Set (5 years with at least 100 samples)

******** **Suitability for Recreation Grade** ********

Suitability Assessment Results

SFRG Assessment Grade - Poor

Primary Impact - ,13: River - agricultural activites/birds/feral animals

Complete

******** **Sanitary Inspection Category** ********

Catchment Assessment Checklist Results

SIC Assessment Grade - Moderate

Primary Impact:

13: River - agricultural activites/birds/feral animals

WAIRAU DIVERSION

******** **Microbiological Assessment Category** ********

Annual exceedance information (for water year 01 November to 31 October)

	sample season	sample size	median	exceed 140 to 280	exceed >280	%days <280
Year	2008	22	15	0	1	95
Year	2007	20	10	0	1	95
Year	2006	18	10	0	0	100
Year	2005	18	10	1	0	100
Year	2004	19	10	2	0	100
Total	0	97	10	3	2	97

Assessment Results

Microbiological Assessment Grade - B

Hazen Percentile Result - 172.75

Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

******** **Suitability for Recreation Grade** ********

Suitability Assessment Results

SFRG Assessment Grade - Good

Primary Impact - ,13: River - agricultural activites/birds/feral animals

Complete

******** **Sanitary Inspection Category** ********

Catchment Assessment Checklist Results

SIC Assessment Grade - Moderate

Primary Impact:

13: River - agricultural activites/birds/feral animals

WHITES BAY

******** **Microbiological Assessment Category** ********

Annual exceedance information (for water year 01 November to 31 October)

	sample season	sample size	median	exceed 140 to 280	exceed >280	%days <280
Year	2008	22	5	0	1	95
Year	2007	20	10	0	0	100
Year	2006	20	10	0	0	100
Year	2005	18	10	0	0	100
Year	2004	20	10	0	1	95
Total	0	100	10	0	2	98

Assessment Results

Microbiological Assessment Grade - A

Hazen Percentile Result - 40

Data Set Extent - Complete Data Set (5 years with at least 100 samples)

******** **Suitability for Recreation Grade** ********

Suitability Assessment Results

SFRG Assessment Grade - Very Good

Primary Impact - ,0: No significant source indicated.

Complete

******** **Sanitary Inspection Category** ********

Catchment Assessment Checklist Results

SIC Assessment Grade - Very Low

Primary Impact:

0: No significant source indicated.