Marlborough's Coastal Bathing Water Quality

2006-07

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Marlborough District Council

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 2006-07 bathing water season, over 73% of sites were categorised as safe for recreational use for more than 95% of the time. However there are some locations which fall short of this high standard e.g. Momorangi Bay. The source of contamination at Momorangi Bay is unknown and further investigations are recommended to help determine the source and thereby better manage the water quality in the bay. Suitability for recreation grade (SFRG) have been derived based on the most recent five years of microbiological data and sanitary inspections (carried out in 2004). Many sites do not have enough samples to determine a suitable beach grade and therefore regular monitoring of each site is recommended to allow for comparisons in coastal water quality each year.

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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 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 of the Environment in the Microbiological Water Quality Guidelines. The recreational waters in Marlborough are sampled in accordance with these guidelines.

2. SITES

During the summer of 2006-07 a total of 15 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 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 bays in Queen Charlotte Sound such as Momorangi Bay.

Table 1: Coastal Bathing Water Sites 2006-07

Site name	Site ID	Grid Reference (NZTM)	
Anakiwia	GRO-1	2587083	5993201
Bobs Bay	PCT-3	2595183	5991849
Marfells Beach	MB-1	2610215	5941787
Moenui	MOE-1	2576696	5992100
Momorangi Bay	MOM-1	2588827	5992585
Ngakuta Bay	NGK-1	2590525	5992195
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

3. 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 at a water depth of 0.5m approximately 0.2m from the water surface.

3.1 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).

3.2 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 Enterococci / 100mL	Potentially contaminated	Investigate likely causes	OK 😐
Action '*Red Mode*'	> 280 Enterococci / 100mL[1]	Highly likely to be contaminated	Further investigatation, inform relevant interested parties	Unsafe ☹

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

In addition, the Ministry of the Environment has developed Suitability for Recreation Grades (SFRG's). These are defined using the Microbiological Assessment Category (MAC) and the Sanitary Inspection Category (SIC).

3.2.1 Microbiological Assessment Category (MAC)

The Microbiological Assessment Category is assessed using data from the previous 5 years. A minimum of 100 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. 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 for each bathing water season is required. For the 15 sites sampled this year the number of samples per year (over the last 5 years) ranges from 25 to over 100. Only 25 samples have been taken at Marfells Beach as it is considered low risk, 64 samples have been taken at Whites Bay, again this site is also considered low risk. The remaining sites have in excess of 70 samples taken over the last 5 years. Table 2 below defines the MAC grades.

Table 2: Microbiological Assessment Category (MAC) definitions for marine waters

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

The MAC grade will be 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 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).

3.2.2 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.

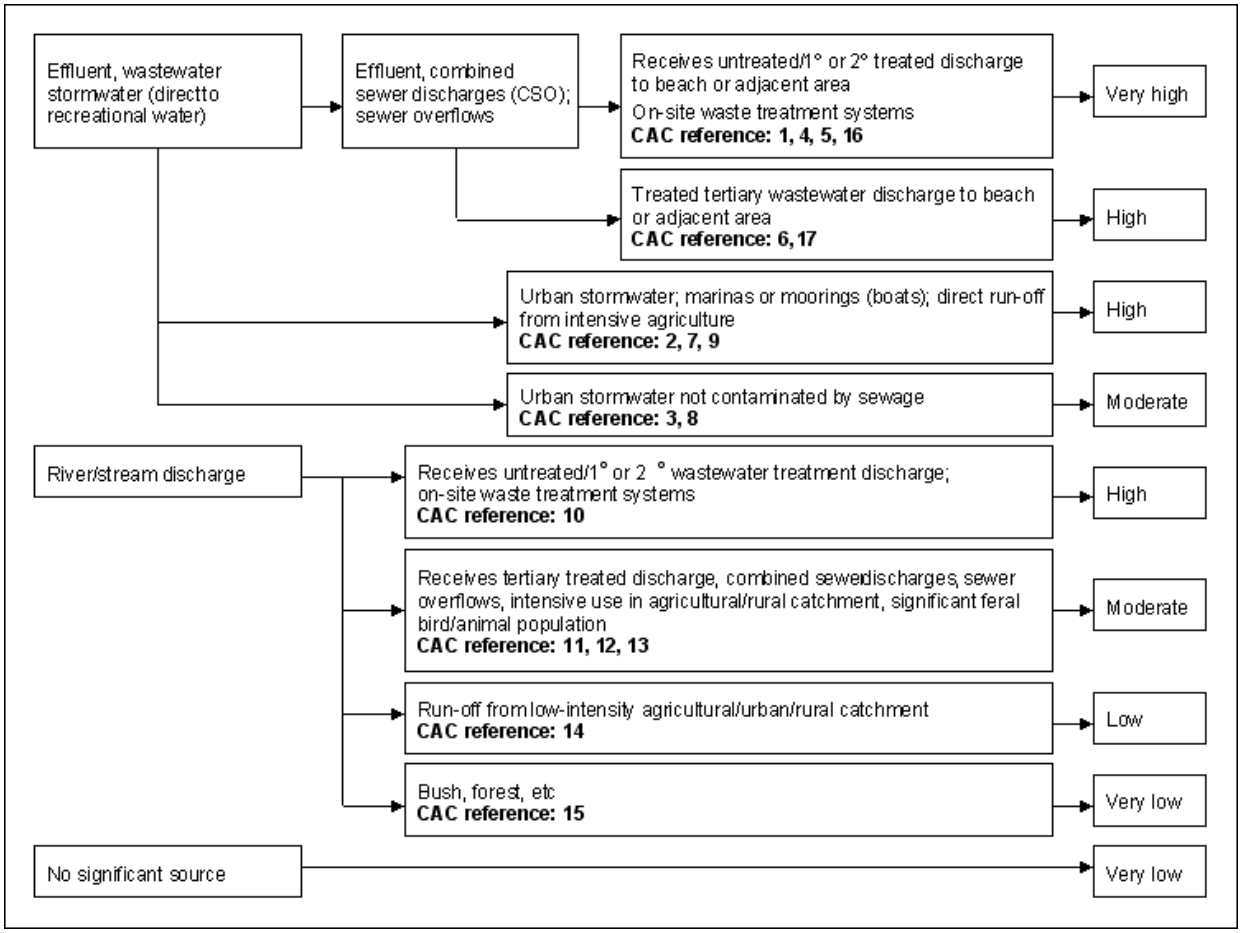


Figure 1: Sanitary Inspection Category for coastal water sites (MfE, 2003)

3.2.3 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 SICs.

4. BATHING WATER QUALITY RESULTS 2006-07

The results of the summer 2006-07 sampling are shown in Appendix 2. These results are graphed for each site and are shown in Appendix 3. The results are graphed on a log scale and plotted against both the alert and action level bathing water guideline standards.

Table 3 shows the percentage of time the sites were deemed safe or otherwise for swimming and are ranked accordingly. Momorangi was deemed unsuitable for recreational activity for 25% of the time. Many of the exceedances could not be attributed to heavy rainfall in the preceding days. The results from Momorangi are discussed further in section 5. Consistently the best water quality has been from Marfells Beach, Whites Bay and Bobs Bay. The median counts for each site show a similar result (Table 4), with Momorangi having the highest median count and Picton Foreshore having the next highest. The beaches in Picton are susceptible to urban runoff and stormwater overflows among other sources and are therefore at high risk of contamination, however 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 Shelley Beach is vital to ensure this upward trend in water quality continues.

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

SITE NAME	SITE ID	% of time Enterococci numbers < 140 MPN/100mL	% of time Enterococci numbers >140 <280 MPN/100mL	% of time Enterococci numbers > 280 MPN/100mL
		Suitable for recreational use ☺	OK for recreational use 😐	Unsuitable for recreational use ☹
Marfells Beach	MB-1	100	0	0
Whites Bay	WB-1	100	0	0
Bobs Bay	PCT-3	100	0	0
Waikawa Bay	WKB-1	100	0	0
Te Mahia	TEM-1	100	0	0
Moenui	MOE-1	100	0	0
Picton Foreshore	PCT-5	95	0	5
Ngakuta Bay	NGK-1	95	5	5
Tirimoana	TIR-5	95	0	5
Anakiwia	GRO-1	95	0	5
Wairau Diversion	WDV-2	95	0	0
Shelly Beach North	PCT4A	90	5	5
Wairau Bar	WRR-7	89	0	5
Portage	POR-1	88	6	6
Momorangi Bay	MOM-1	70	5	25

Table 4: Coastal water bathing sites ranked according to the median Enterococci count recorded during the 2006-07 bathing water season.

Site Name	Site ID	Median Enterococci count (MPN/100mL)
Marfells Beach	MB-1	5
Wairau Bar	WRR-7	5
Whites Bay	WB-1	5
Shelly Beach North	PCT4A	5
Bobs Bay	PCT-3	5
Waikawa Bay	WKB-1	5
Ngakuta Bay	NGK-1	5
Tirimoana	TIR-5	5
Anakiwia	GRO-1	5
Te Mahia	TEM-1	5
Portage	POR-1	5
Moenui	MOE-1	5
Wairau Diversion	WDV-2	10
Picton Foreshore	PCT-5	10
Momorangi Bay	MOM-1	46.5

4.1 Rainfall Effects

The bacteria loading of streams and coastal waters are 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 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 results in corresponding high bacteria counts due to factors such as time of sampling in relation to the first flush event[2], change in tides etc.

Exceedances of MfE's bathing water guidelines are shown below in table 5 in relation to the rainfall total from the preceding 72 hours. The results from Momorangi are discussed in more detail in section 5. The Wairau Bar exceedance on the 13 March 2007 can not be attributed to rainfall and is most likely due to a localised pollution source. The site was resampled as soon as possible after receipt of the result but no

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

further exceedances were recorded. The exceedances at Tirimoana and Anakiwa on the 27 December 2006 cannot be explained by high rainfall. It is likely poorly performing septic tanks during the busy holiday period contributed to the exceedances. It is also possible that illegal discharge of waste from boats may have contributed to the exceedances. The exceedance at Portage on the 21 March 2007 was due to a failure of the treatment system at the Portage resort. The system was repaired as soon as the failure was identified. The public at Portage were also informed of the failure and the corresponding exceedance of the bathing water standard as soon as the exceedance was reported. Subsequent bacteriological samples for the site were below the limit of detection. All other exceedances were associated with high rainfall events.

Table 5: Exceedance of MfE guidelines (action level in red, alert level in amber) in relation to rainfall.

Date	Site	Rainfall (mm/72 hours)	Enterococci (MPN/100mL)
13 March 2007	Wairau Bar	0	**364**
14 March 2007	Picton Foreshore	15.0	**1300**
14 March 2007	Shelly Beach North	15.0	**306**
27 December 2006	Ngakuta Bay	4.0	**137**
10 January 2007	Ngakuta Bay	26.0	**288**
27 December 2006	Momorangi Bay	4.0	**238**
23 January 2007	Momorangi Bay	0.0	**429**
20 February 2007	Momorangi Bay	0.0	**560**
7 March 2007	Momorangi Bay	0.0	**659**
14 March 2007	Momorangi Bay	15.0	**1000**
21 March 2007	Momorangi Bay	0.0	**1700**
27 December 2006	Tirimoana	4.0	**1700**
27 December 2006	Anakiwia	4.0	**624**
10 January 2007	Portage	26.0	**207**
21 March 2007	Portage	0.0	**1200**

4.2 Suitability For Recreation Grades (SFRGs) 2006-07

The Suitability for Recreation Grades have been calculated using the latest five years of microbiological data (Appendix 4) and the Sanitary Inspection Categories, which were calculated in 2004 (MDC, 2004). It was not deemed necessary to recalculate the SIC as there have been no major changes in land-use or point source discharges in any of the catchments. The results are shown in Table 6.

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 a 'Follow-up Grade'.

Table 6: Suitability for Recreation Grades for Marlboroughs Coastal Bathing water sites

Site	MAC Grade* Summer season 2006-07	MAC Grade** long term (5 years)	SFRG	Status of SFRG grade
Ngakuta	B	B	Very Poor †	Interim
Bobs Bay	A	B	Very Good	Interim
Marfells Beach	A	B	Very Good	Interim
Moenui	B	B	Good	Interim
Te Mahia	B	B	Poor †	Interim
Waikawa Bay	B	B	Poor †	Interim
Whites Bay	A	B	Poor †	Interim
Tirimoana	B	C	Poor	Interim
Shelly Beach North	C	C	Poor	Interim
Wairau Bar	B	C	Poor	Interim
Wairau Diversion	A	C	Poor	Interim
Anakiwa	B	D	Poor †	Interim
Momorangi	D	D	Very Poor	Interim
Picton Foreshore	B	D	Very Poor	Complete
Portage	C	D	Very Poor	Interim

* Based on the 95th percentile for the 2006-07 Bathing Water season.

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

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

5. MOMORANGI

All of the exceedances at Momorangi were recorded within 2 hours of high tide and were mostly recorded during February and March. Exceedances coincided with heavy rainfall on only one occasion (14 March 2007, 15mm rainfall in the preceding 72 hrs). Additional sampling was carried out in Momorangi Bay following the exceedances in order to try and determine the source of the contamination. In addition Momorangi Stream (MOM-011) was sampled during the peak summer season as part of the compliance with the Resource Consent for Momorangi Campground. Table 7 shows the results from this additional sampling, and also the results of follow-up samples taken in the bay.

Table 7: Results of sampling carried out in Momorangi Bay 2006-07. Amber indicates an exceedance of the Alert standard, red indi8cates an exceedance of the Action standard. Highlighted counts (blue) indicate elevated bacteria levels (above recognised background levels) ns = not sampled.

	MOM-001	MOM-011	MOS-003	MOS-002
Sampling Date	Momorangi Bay (Enterococci)	West Stream (*E.coli*)	West Stream (*E.coli*)	East Stream (*E.coli*)
13 December 2006	20	5	ns	ns
20 December 2006	75	480	ns	ns
27 December 2006	238	13000	ns	ns
4 January 2007	5	500	ns	ns
10 January 2007	111	2300	ns	ns
17 January 2007	5	460	ns	ns
23 January 2007	429	ns	ns	ns
25 January 2007	5	ns	ns	ns
30 January 2007	5	ns	ns	ns
8 February 2007	53	ns	ns	ns
14 February 2007	20	ns	ns	ns
20 February 2007	560	ns	ns	ns
22 February 2007	10	ns	ns	ns
23 February 2007	124	ns	ns	ns
28 February 2007	5	885	ns	ns
7 March 2007	659	238	ns	164
9 March 2007	30	164	222	429
14 March 2007	1000	2000	2000	2000
16 March 2007	10	560	406	945
21 March 2007	1700	207	1700	150
23 March 2007	40	99	945	222
27 March 2007	40	271	99	178
4 April 2007	124	271	1200	238

Figure 2 shows the location of these sites, in addition to the location of the sewage works at the campground (MOM-009). Results from consent monitoring of the sewage works show that the works have been compliant with their conditions throughout the summer period and there were no maintenance

issues with the works during the summer period. However there is no requirement to monitor for bacteria in the effluent and the effluent is only treated to a secondary standard.

Figure 2: Location of sampling sites at Momorangi

In order to more fully understand the catchment dynamics at Momorangi an intensive monitoring programme is proposed for the 2007-08 summer bathing water season. This is to include sampling for *E.coli* and Enterococci at the existing sites, at the outlet to the wastewater treatment works, and at selected sites which are directly downgradient of the drainage fields. An inspection of the drainage fields will also be carried out to determine the existence of any direct seeps to either of the streams. The operation of the existing pumping station located in the grassed area between the road and the beach will also be investigated.

There are a number of factors which may contribute to the localised contamination of the seawater in the bay:

- Two fresh water streams drain into the bay
- At high tide the water is shallow, such that input from the two streams (and any pollutants) will tend to 'pond' in the bay
- There are a number of potential sources of faecal pollution in the bay

1. The campground, including the wastewater treatment works and the pumping station.

2. Septic tanks

3. Feral animals within the catchment

4. A large bird population within the bay

In light of the above it is proposed that faecal source tracking be carried out on water samples from the bay to help determine the extent of the contribution from the varying sources.

6. RECOMMENDATIONS FOR SUMMER SAMPLING 2007-08

1. Increase the number of monitoring sites at Momorangi Bay.

2. Introduce an extensive stream water investigation of the two main streams entering Momorangi Bay. Enterococci, ammonium nitrogen, dissolved reactive phosphorus and nitrate nitrogen testing to be carried out on the stream samples, in addition to *E. coli* counts. This will help clarify the possibility of sewage seepage to the streams and the bay.

3. Carry out a faecal source identification investigation at Momorangi Bay to help determine the origin of the contamination in the bay.

4. Increase the monitoring network to include sites at Oyster Bay and Hakahaka Bay in Port Underwood. Development has recently increased in the Port Underwood area which necessitates the inclusion of additional bathing water quality monitoring sites.

5. Include Okiwi Bay in the routine monitoring programme. The coastal waters of Okiwi have been sampled in the past and have shown high bacteria numbers in the summertime when the population increase significantly. Poorly performing septic tanks are suspected.

6. Include monitoring sites at popular holiday destinations such as Tennyson Inlet and Elaine Bay.

7. 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.

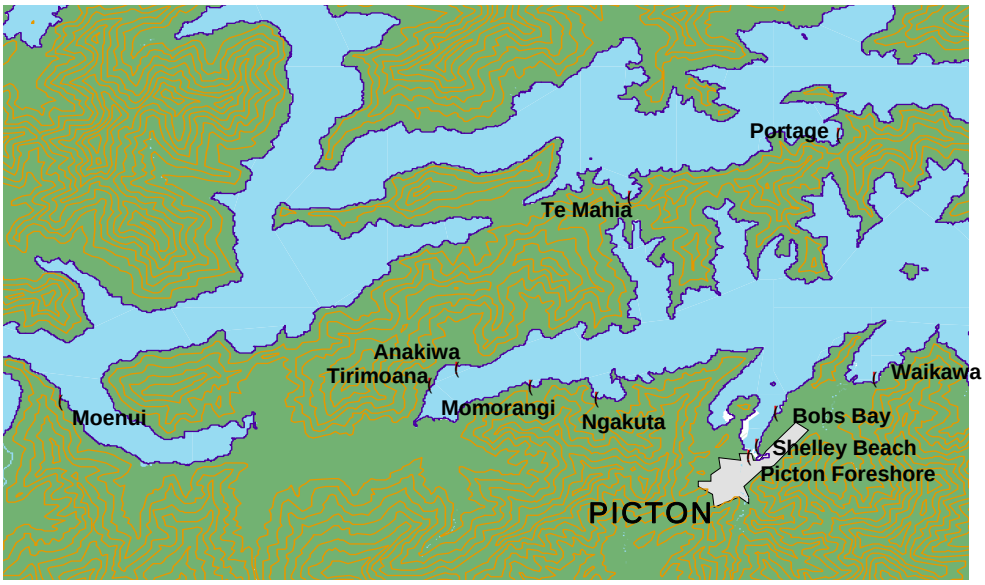
7. REFERENCES

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.

APPENDIX 1

Coastal Bathing Water Site Locations



APPENDIX 2

Results from the Bathing Water (Coastal Waters) sampling from November 2006 to March 2007 inclusive

Date*	Marfells Beach	Wairau Bar	Wairau Diversion	Whites Bay	Picton Foreshore	Shelly Beach North	Bobs Bay	Waikawa Bay	Ngakuta Bay	Momorangi Bay	Tirimoana	Anakiwia	Te Mahia	Portage	Moenui	alert	action
	MB-1	WRR-7	WDV-2	WB-1	PCT-5	PCT4A	PCT-3	WKB-1	NGK-1	MOM-1	TIR-5	GRO-1	TEM-1	POR-1	MOE-1		
16/11/2006	5			5	30	5		10	5	10	30	5			5	140	280
23/11/2006		30	40	10	40	271		10	87	111	5	20			75	140	280
29/11/2006	5	111	10	5	5	20		5	5	5	5	5			5	140	280
6/12/2006				10	10	5	5	5	5	30	5	10	10	5	5	140	280
12/12/2006		5	5	5	5	5	5	5	5	20	5	5	5	5	10	140	280
19/12/2006	5	5	5	5	10	5	5	30	5	75	10	40	5	5	10	140	280
27/12/2006		5	20	5	99	5		124	137	238	1700	624	10	5	10	140	280
4/01/2007	5	40	5	5	5	10	5	5	5	5	5	5	10	5	5	140	280
11/01/2007		5	5	5	5	5	5	124	288	111	10	30	99	207	10	140	280
18/01/2007		10	10	5	20	10	5	5	5	5	5	5	10	5	40	140	280
23/01/2007	5	5	10	5	53	10	20	5	5	429	5	5	10	5	5	140	280
31/01/2007		10	5	5	5	5	5	5	5	5	5	5	5	5	5	140	280
8/02/2007	10	5	10	10	5	5	10	5	5	53	5	5	5	5	5	140	280
15/02/2007		5	5	5	10	5	30	5	5	20	5	5	5	5	5	140	280
21/02/2007		5	5	5	20	137	5	5	5	560	5	20	5	20	5	140	280
28/02/2007	5	40	20	5	10	5	5	5	5	5	5	5	5	5	5	140	280
7/03/2007		5	5	20	5	10	5	10	5	659	5	5	75	5	5	140	280
15/03/2007		364	10	5	1300	306	5	5	5	1000	5	5	30	5	5	140	280
21/03/2007		5	10	5	5	10	5	5	5	1700	5	5	5	1200	5	140	280
27/03/2007		10	20	5	10	5	5	5	5	40	5	5	5	5	5	140	280

No sample taken due to time constraints

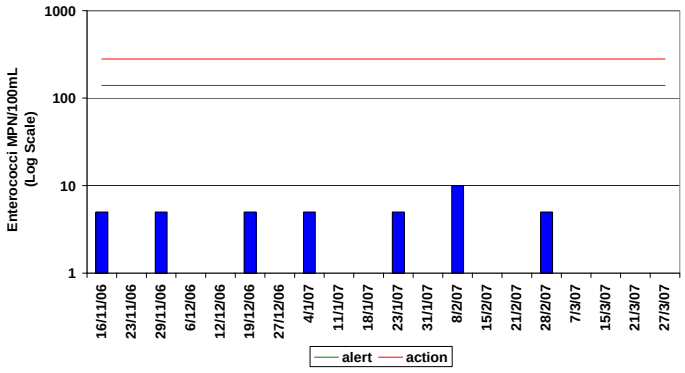
Less than values are halved i.e. <10 MPN/100mL becomes 5. No bacteria detected in the water sample

* Some sites may have been sampled up to 2 days before or after the date indicated due to time constraints, contact MDC for further clarification

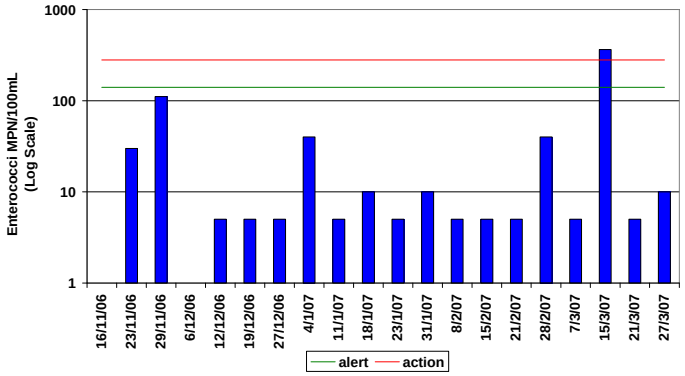
APPENDIX 3

Graphed results for each Coastal Bathing Water site for the Summer 2006-07 period in relation to MfE's bathing water standards (action level and alert levels)

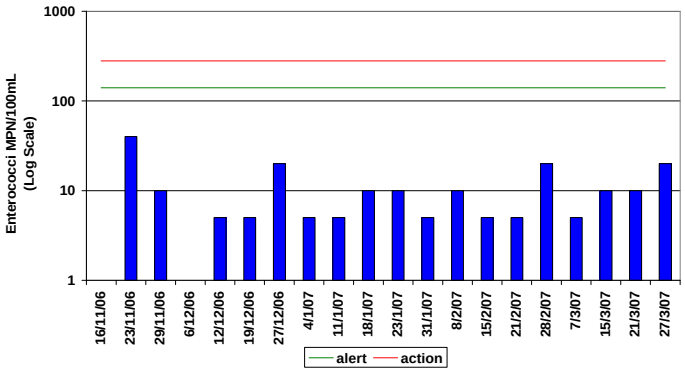
Marfells Beach



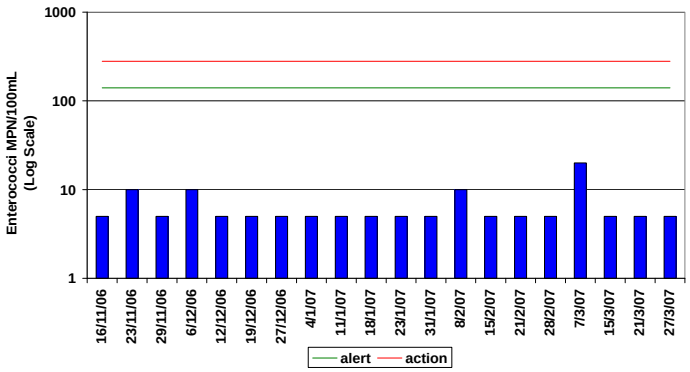
Wairau Bar



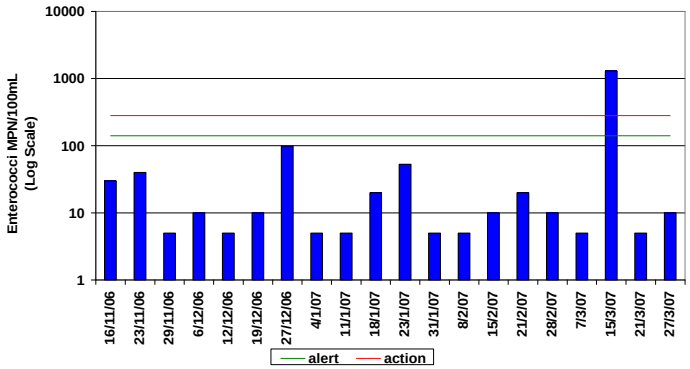
Wairau Diversion



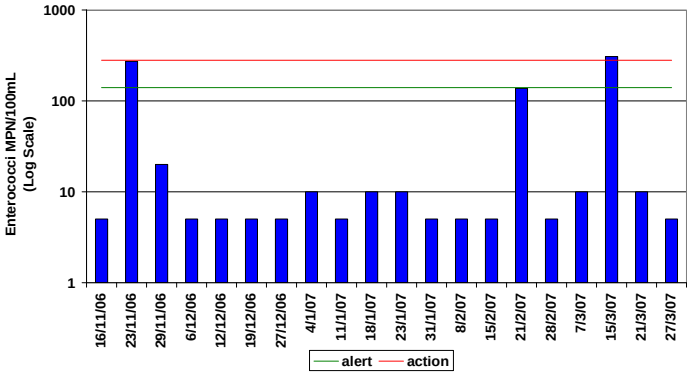
Whites Bay



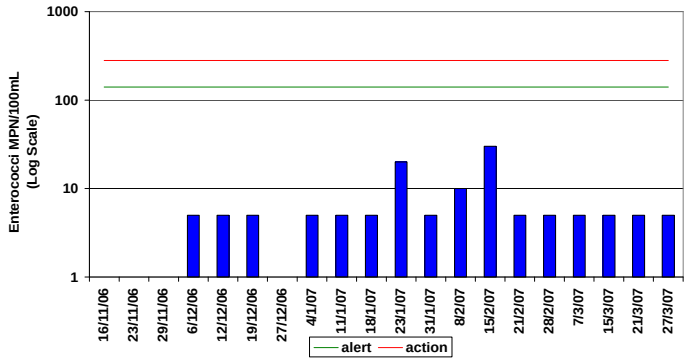
Picton Foreshore



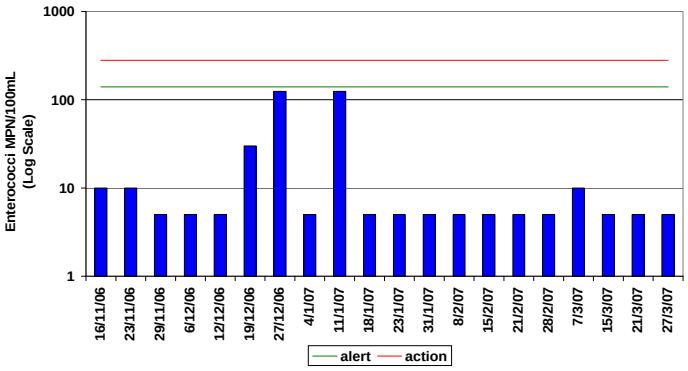
Shelly Beach



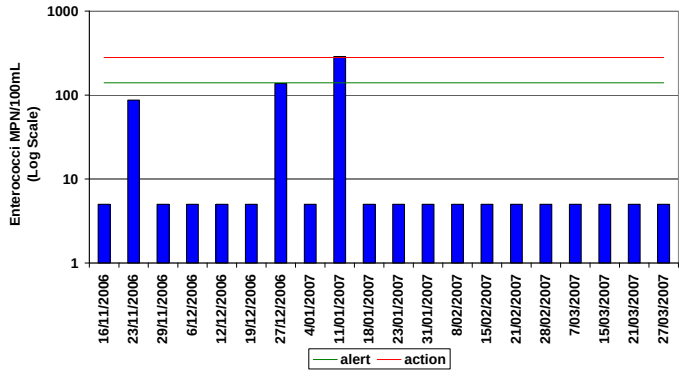
Bobs Bay



Waikawa Bay



Ngakuta Bay



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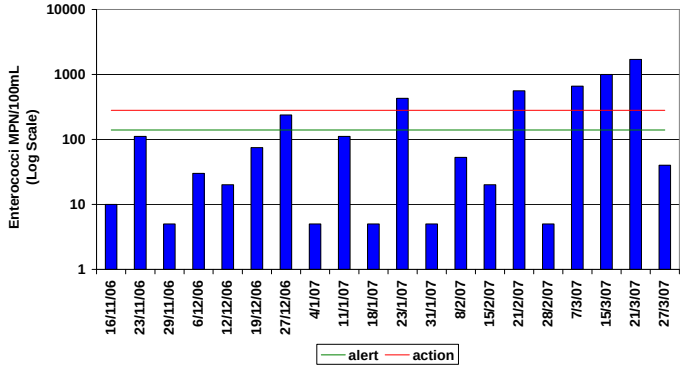

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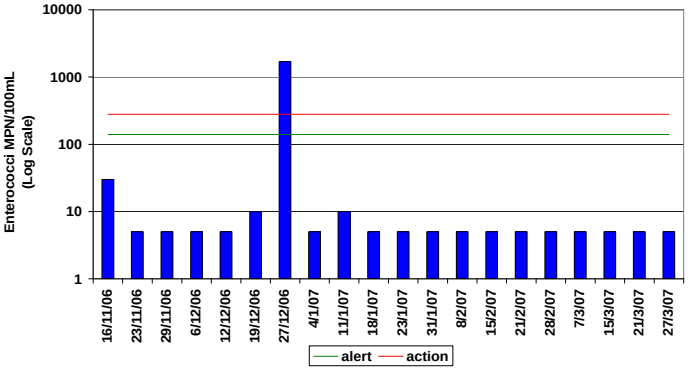

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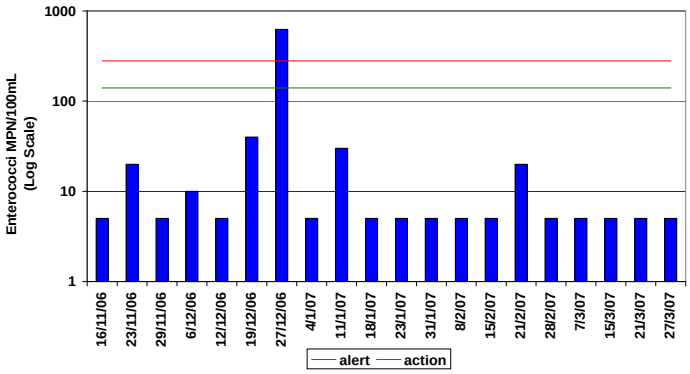
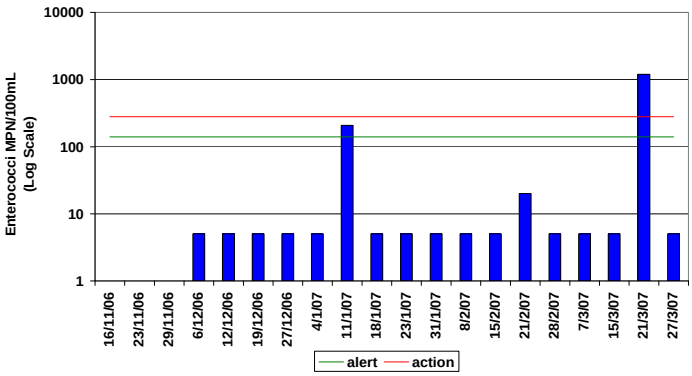
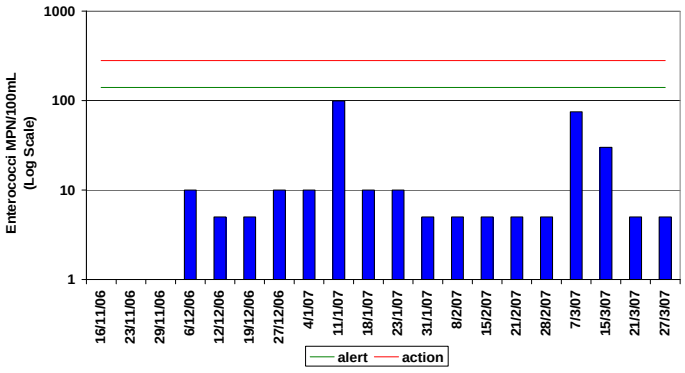


Portage



Te Mahia



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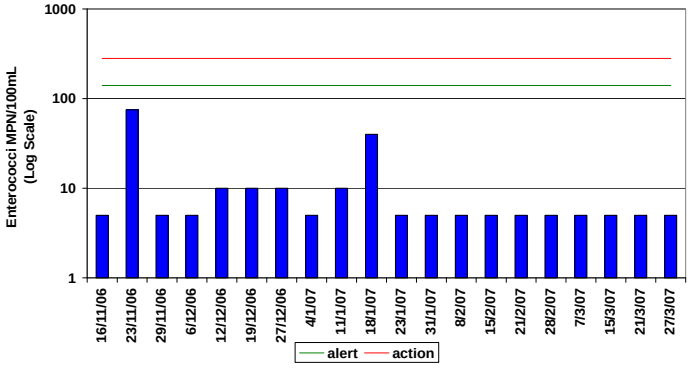

APPENDIX 4

2006-07 Microbiological Assessment Category Results

Ngakuta

******** 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	2006	20	10	0	1	95
Year	2005	21	10	1	0	100
Year	2004	20	10	0	0	100
Year	2003	21	10	0	1	95
Year	2002	11	10	0	0	100
Total	0	93	10	1	2	97

Assessment Results

Microbiological Assessment Grade - B

Hazen Percentile Result - 124
Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

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	2006	20	10	0	1	95
Year	2005	21	10	0	3	85
Year	2004	20	25	2	2	90
Year	2003	20	10	0	2	90
Year	2002	1	0	0	0	100
Total	0	82	10	2	8	90

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 1400
Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

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	2006	20	10	0	1	95
Year	2005	21	10	0	1	95
Year	2004	20	10	0	1	95
Year	2003	20	10	0	2	90
Year	2002	9	10	0	0	100
Total	0	90	10	0	5	94

Assessment Results

Microbiological Assessment Grade - C

Hazen Percentile Result - 384
Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

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	2006	16	10	0	0	100
Year	2005	14	10	0	0	100
Year	2004	18	10	0	0	100
Year	2003	15	10	0	1	93
Year	2002	11	10	0	0	100
Total	0	74	10	0	1	98

Assessment Results

Microbiological Assessment Grade - B

Hazen Percentile Result - 99
Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

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	2006	7	10	0	0	100
Year	2005	4	10	0	0	100
Year	2004	0	0	0	0	0
Year	2003	14	10	0	0	100
Year	2002	0	0	0	0	0
Total	0	25	10	0	0	100

Assessment Results

Microbiological Assessment Grade - B

Hazen Percentile Result - 47.75
Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

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	2006	20	10	0	0	100
Year	2005	21	10	1	0	100
Year	2004	19	10	1	0	100
Year	2003	19	10	1	0	100

Year	2002	11	10	1	1	90
Total	0	90	10	4	1	98

Assessment Results

Microbiological Assessment Grade - B

Hazen Percentile Result - 164
Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

Momorangi

******** 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	2006	22	40	1	4	81
Year	2005	21	20	0	2	90
Year	2004	20	46.5	2	2	90
Year	2003	19	40	1	3	84
Year	2002	11	10	0	1	90
Total	0	93	20	4	12	87

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 540.35
Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

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	2006	20	10	0	1	95
Year	2005	32	40	1	7	78
Year	2004	34	46.5	3	6	82
Year	2003	33	30	5	5	84
Year	2002	12	10	1	0	100
Total	0	131	30	10	19	85

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 1395
Data Set Extent - Complete Data Set (5 years with at least 100 samples)

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	2006	17	10	1	1	94
Year	2005	0	0	0	0	0

Year	2004	9	20	0	2	77
Year	2003	16	10	0	2	87
Year	2002	11	10	1	0	100
Total	0	53	10	2	5	90

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 1100
Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

Shelly Beach North

******** 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	2006	19	10	1	1	94
Year	2005	21	10	2	1	95
Year	2004	21	10	0	1	95
Year	2003	21	20	3	0	100
Year	2002	10	10	0	0	100
Total	0	92	10	6	3	96

Assessment Results

Microbiological Assessment Grade - C

Hazen Percentile Result - 250.8
Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

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	2006	17	10	0	0	100
Year	2005	21	10	0	2	90
Year	2004	19	10	0	1	94
Year	2003	12	10	0	0	100
Year	2002	6	10	0	0	100
Total	0	75	10	0	3	96

Assessment Results

Microbiological Assessment Grade - B

Hazen Percentile Result - 117.75
Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

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	2006	20	10	0	0	100
Year	2005	21	10	0	1	95
Year	2004	19	10	1	0	100
Year	2003	19	10	1	0	100
Year	2002	13	10	0	0	100
Total	0	92	10	2	1	98

Assessment Results

Microbiological Assessment Grade - B

Hazen Percentile Result - 122.7
Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

Wairau Bar

******** 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	2006	18	10	0	1	94
Year	2005	16	10	0	1	93
Year	2004	20	10	0	4	80
Year	2003	19	10	1	1	94
Year	2002	11	10	0	0	100
Total	0	84	10	1	7	91

Assessment Results

Microbiological Assessment Grade - C

Hazen Percentile Result - 442
Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

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	2006	18	10	0	0	100
Year	2005	18	10	1	0	100
Year	2004	19	10	2	0	100
Year	2003	19	64	3	4	78
Year	2002	0	0	0	0	0
Total	0	74	10	6	4	94

Assessment Results

Microbiological Assessment Grade - C

Hazen Percentile Result - 278
Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

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	2006	20	10	0	0	100
Year	2005	18	10	0	0	100
Year	2004	20	10	0	1	95
Year	2003	6	10	0	0	100
Year	2002	0	0	0	0	0
Total	0	64	10	0	1	98

Assessment Results

Microbiological Assessment Grade - B

Hazen Percentile Result - 90.6
Data Set Extent - Interim Data Set (< 5 years or < 100 samples used)

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