



Marlborough's Freshwater Recreational Water Quality

2007-08

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EXECUTIVE SUMMARY

A number of freshwater locations in Marlborough are monitored on a weekly basis during the summer months and assessed against the Ministry for the Environment's (MfE's) bathing water guidelines. Marlborough's rivers are generally of good quality and are safe for recreational activities. However rivers that drain urban and intensive agriculture areas are more prone to poor water quality and are often not safe for recreational activities, even during dry weather. Wet weather events frequently result in exceedances of MfE's guidelines and therefore swimming following rainfall is not recommended, particularly in urban and intensive agriculture areas.

During the 2007-08 bathing water season, just over a quarter of sites monitored were categorised as safe for recreational use for more than 90% of the time. The poorest performing site, the Rai at Brown River Reserve was safe for recreational use for less than 50% of the time. The second poorest site, the Taylor at Riverside was suitable for contact recreation for just over 60% of the time.

Suitability for recreation grades (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 grade and therefore regular monitoring of each site is recommended to allow for comparisons in freshwater quality each year and to assign complete Suitability for Recreation Grades to each site.

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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 water. 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 (MfE, 2003). The recreational waters in Marlborough are sampled in accordance with these guidelines.

2. SITES

During the summer of 2007-08 a total of 13 freshwater bathing sites were monitored on a weekly basis from November to March inclusive, the location of these sites are shown in Appendix 1. Table 1 details the name, location and grid reference of each site. In general the freshwaters of Marlborough are suitable for contact recreational activities, however there are areas which are more susceptible to contamination which can lead to an increased risk of illness and infection. The 13 sites that are chosen to be monitored each bathing water season are deemed high use and/or high risk sites. For example the Lower Wairau and the Rai River both have a high amenity value where kayaking, rowing and swimming are routinely undertaken during the summer months, these rivers are also deemed high risk due to land use practices which can lead to diffuse pollution within the catchments, which can impact of bathing water quality.

Table 1: Freshwater Sites 2007-08

Site name	Site ID	Grid Reference (NZTM)
Taylor @ Hutcheson Street Bridge	TYR-5	2589749, 5965963
Taylor @ Riverside	TYR-16	2590036, 5965687
Opawa @ Malthouse Reserve	OPR-40	2594039, 5964404
Opawa @ Elizabeth Street Footbridge	OPL-1	2590450, 5966000
Wairau @ Blenheim Rowing Club	WRR-1	2594332, 5968306
Wairau @ Wairau Rowing Club	WRR-9	2592398, 5969476
Wairau @ Ferry Bridge	WRR-8	2591253, 5971829
Wairau Diversion @ Neals Road	WDV-1	2594005, 5973346
Pelorus @ Totara Flat	PLR-3	2558264, 5989435
Rai @ Brown River Reserve	RAR-2	2559215, 5998566
Rai @ Rai Falls	RAR-1	2558020, 5990970
Pelorus @ Pelorus Bridge	PLR-2	2558079, 5989795
Waihopai @ Craiglochart Bridge # 2	WHR-3	2565059, 5952794

3. SAMPLING

The water quality at each site is tested for the presence of *Escherichia coli* (*E. coli*) and the results are reported in MPN/100mL (most probable number). All laboratory testing is carried out by the Cawthron Institute in Blenheim. *E. coli* is chosen as the indicator bacteria for freshwater as it is deemed to be a good indicator of recent sewage and/or faecal contamination.

3.1 Indicator Organisms

An indicator organism can be defined as an organism which is used to indicate the **potential** presence of another organism. *E. coli* is the indicator organism used when monitoring freshwater recreational sites. When monitoring freshwaters 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 *E. coli*. The advantages of using *E. coli* as the indicator organism are 1) it is easy to sample and inexpensive to measure and 2) it can survive for several weeks in freshwater and is therefore a definite indication of recent faecal contamination. *E. coli* is 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 *E. coli* 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 will indicate 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 freshwater recreational sites have been determined by MfE and are as follows:

	For a <i>single</i> sample		Requirement	
Acceptable <i>'Green Mode'</i>	< 260 <i>E.coli</i> / 100mL	Highly likely to be uncontaminated	Routine monitoring	Safe 😊
Alert <i>'Amber Mode'</i>	> 260 <i>E.coli</i> / 100mL	Potentially contaminated	Investigate likely causes	OK 😐
Action <i>'Red Mode'</i>	> 550 <i>E.coli</i> / 100mL	Highly likely to be contaminated	Further investigation, inform relevant interested parties	Unsafe 😞

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 five bathing water seasons (November to March inclusive) 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 freshwater bathing sites since 1996, however in order to obtain a completed MAC grade a minimum of 20 samples for each bathing water season for a period of 5 years is required. For the 13 sites sampled this year the number of samples per year (over the last 5 years) ranges from 90 to over 100. Table 2 below defines the MAC grades.

Table 2: Microbiological Assessment Category (MAC) definitions

Grade	95 th Percentile
A	≤ 130 <i>E.coli</i> / 100mL
B	131 - 260 <i>E.coli</i> / 100mL
C	≥ 261 - 550 <i>E.coli</i> / 100mL
D	> 550 <i>E.coli</i> / 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 between 21 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).

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 freshwater bathing sites in 2004 (MDC, 2004).

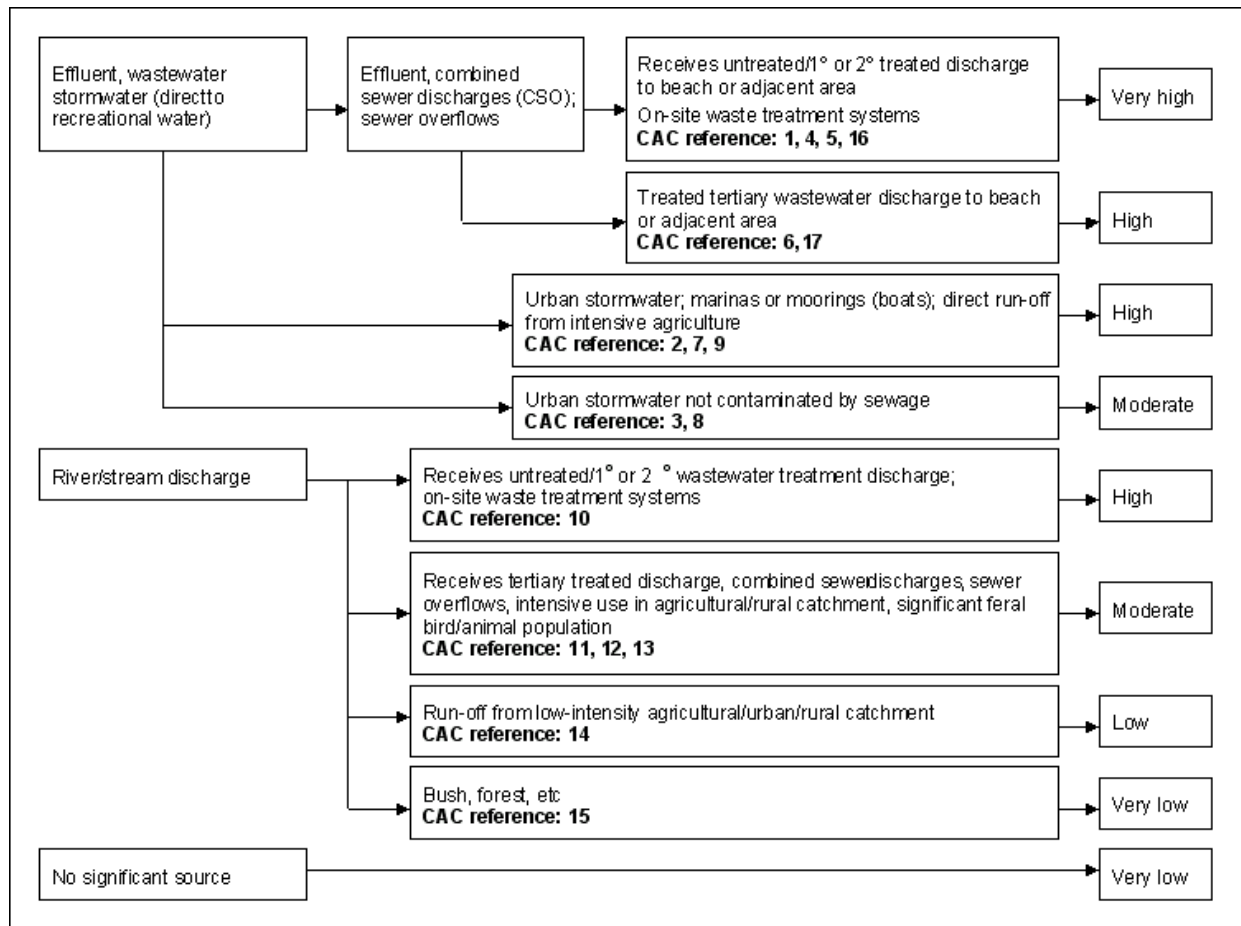


Figure 1: Sanitary Inspection Category for freshwater sites (MfE, 2003)

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 and are calculated using MfE’s Recreational Water Quality Assessment software called ‘Bathewatch’.

4. BATHING WATER QUALITY RESULTS 2007-08

The results of the summer 2007-08 sampling are shown in Appendix 2. These results are graphed for each site and are at shown in Appendix 3. The results show the *E. coli* numbers alongside rainfall (72 hour total) and are 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. The Rai at Rai Falls and at Brown River Reserve and the Taylor River at Riverside had the poorest water quality during the summer 2007-08 season and the Opawa River at Elizabeth Street footbridge, the Wairau River at Blenheim Rowing Club, the Wairau Diversion at Neals Road Bridge and the Pelorus River at SH6 Bridge had the best.

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




SITE NAME	SITE ID	% of time <i>E.coli</i> numbers < 260 MPN/100mL	% of time <i>E.coli</i> numbers >260 <550 MPN/100mL	% of time <i>E.coli</i> numbers > 550 MPN/100mL
		Suitable for recreational use 	OK for recreational use 	Unsuitable for recreational use 
Opawa @ Elizabeth Street Footbridge	OPL-1	90	10	0
Wairau @ Blenheim Rowing Club	WRR-1	90	5	5
Wairau Diversion @ Neals Road	WDV-1	90	5	5
Pelorus @ Pelorus Bridge	PLR-2	90	5	5
Taylor @ Hutcheson Street Bridge	TYR-5	86	9	5
Opawa @ Malthouse Reserve	OPR-40	86	9	5
Wairau @ Wairau Rowing Club	WRR-9	86	14	0
Wairau @ Ferry Bridge	WRR-8	86	9	5
Waihopai @ Craiglochart Bridge #2	WHR-3	81	0	19
Pelorus @ Totara Flat	PLR-3	76	14	10
Rai @ Rai Falls	RAR-1	72	14	14
Taylor @ Riverside	TYR-16	62	29	9
Rai @ Brown River Reserve	RAR-2	48	38	14

Table 4 shows the median *E. coli* count for each of the sites. The sites are ranked from lowest to highest. Again the Pelorus River at the state highway bridge, the Wairau at Blenheim Rowing Club and the Wairau Diversion at Neals Road have the best water quality. The poorest water quality is at the Brown River Reserve, where the median count is higher than MfE's alert bathing water guideline. The Opawa River at Elizabeth Street footbridge has one of the highest median *E. coli* numbers but is also ranked the highest in terms of compliance with the guidelines (Table 3), showing that whilst numbers may have remained just below the guidelines for the summer the high background bacteria numbers imply that the risk of infection/illness from this site is still reasonably high. The high median numbers for the urban and intensive agriculture areas reflect the impact these have on our recreational water quality.

Table 4: Freshwater bathing sites ranked according to the Median *E. coli* count recorded during the 2007-08 bathing water season.

Site Name	Site ID	Median <i>E.coli</i> count (MPN/100mL)
Pelorus @ Pelorus Bridge	PLR-2	20
Wairau @ Blenheim Rowing Club	WRR-1	30
Wairau Diversion @ Neals Road	WDV-1	40
Wairau @ Wairau Rowing Club	WRR-9	40
Wairau @ Ferry Bridge	WRR-8	75
Waihopai @ Craiglochart Bridge #2	WHR-3	75
Pelorus @ Totara Flat	PLR-3	75
Opawa @ Malthouse Reserve	OPR-40	87
Rai @ Rai Falls	RAR-1	99
Taylor @ Hutcheson Street Bridge	TYR-5	137
Taylor @ Riverside	TYR-16	164
Opawa @ Elizabeth Street Footbridge	OPL-1	178
Rai @ Brown River Reserve	RAR-2	271

4.1 Rainfall Effects

E. coli numbers have been shown to be highly correlated with turbidity (Davies-Colley *et al.*, 2004) and in many instances turbidity can be used as a surrogate for *E. coli* numbers, both in large and small agricultural catchments (Collins 2002, Nagels *et al.*, 2002, Muirhead *et al.*, 2004). High turbidity results in poor water clarity, thus swimming in areas which appear dirty or murky should be avoided.

Heavy rainfall was responsible for many of the exceedances recorded at the bathing water sites. With the exception of the Brown River Reserve site, all exceedances recorded in the Rai Valley (Rai Falls and Pelorus sites) were as a result of heavy rainfall (figure 2). The Rai at Brown River Reserve recorded four additional exceedances which were not associated with rainfall.

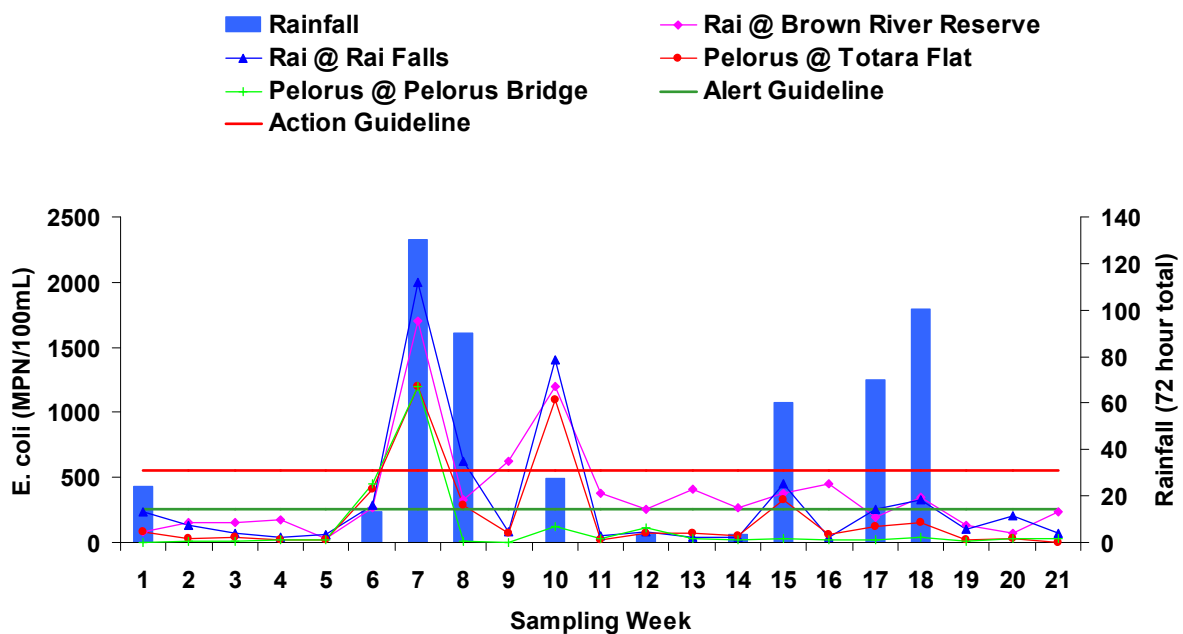


Figure 2: Relationship between rainfall and *E. coli* numbers for the Rai Valley sites.

The Wairau swimming sites (Ferry Bridge, Wairau Rowing Club, Blenheim Rowing Club and the Wairau Diversion at Neals Road) can be adversely affected by heavy rainfall much further up the catchment. This is evidenced when the river is highly turbid and a brown colour eventhough there has been no local rainfall.

4.2 Non-rainfall exceedances

The Waihopai at Craiglochart, the Lower Wairau sites and the Brown River reserve site all recorded exceedances of the guideline values when there had been no rainfall in the preceding 3 days. It is likely that dairying in the Rai catchment is responsible for these exceedances at the Brown River Reserve but it is not known what the cause might be at the other sites.

4.3 Suitability for Recreation Grades (SFRGs) 2007-08

The Suitability for Recreation Grades were calculated using the latest five years of microbiological data (Appendix 4) and the Sanitary Inspection Categories, which were calculated in 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.

Table 6: Suitability for Recreation Grades for Marlboroughs Freshwater Bathing sites

Site	MAC Grade* Summer season 2007-08	MAC Grade** long term (5 years)	Trend	SFRG	Status of SFRG grade
Opawa at Elizabeth St Footbridge	C	C	↔	Poor	Complete
Opawa at Malthouse Reserve	C	D	↑	Very Poor	Complete
Pelorus Bridge	C	D	↑	Poor	Follow-up
Pelorus at Totara Flat	D	D	↔	Poor	Complete
Rai at Brown River Reserve	D	D	↔	Poor	Complete
Rai at Rai Falls	D	D	↔	Poor	Complete
Taylor at Hutcheson	C	D	↑	Poor	Complete
Taylor at Riverside	D	D	↔	Poor	Complete
Waihopai at Craiglochart	D	D	↔	Poor	Follow-up
Wairau at Blenheim Rowing Club	C	C	↔	Poor	Complete
Wairau at Ferry Bridge	C	C	↔	Fair	Complete
Wairau at Wairau Rowing Club	C	C	↔	Very Poor	Follow-up
Wairau Diversion at Neals Road	C	C	↔	Fair	Complete

* Based on the 95th percentile for the 2007-08 Bathing Water season, calculated using Microsoft excel

** 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.

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'. For example the Pelorus Bridge site has enough data over five years to give a complete MAC grade. The monitoring data shows that water quality is poor (grade D). As described in section 4.1 this site is very susceptible to exceedances of the guideline values during rainfall, however the Sanitary Inspection Category (SIC) grades the site as 'very low', meaning that there are few sources of bacterial contamination and therefore the risk of bacteria input to the site is 'very low'. Therefore the SIC classification is in complete opposition to the monitoring data and therefore the SFRG has been flagged as a 'Follow-up' grade. Therefore either or both the MAC and SIC need to be reassessed.

Based on the above grades the best freshwater bathing sites are only classed as Fair with most being classed as Poor or Very Poor (figure 3). Only seven of the 13 sites have enough data over five years to determine complete MAC grades. Three of the sites have inconsistencies between the monitoring data and the sanitary inspection categories. Some sites showed an improvement in water quality when compared with long term monitoring of the site.

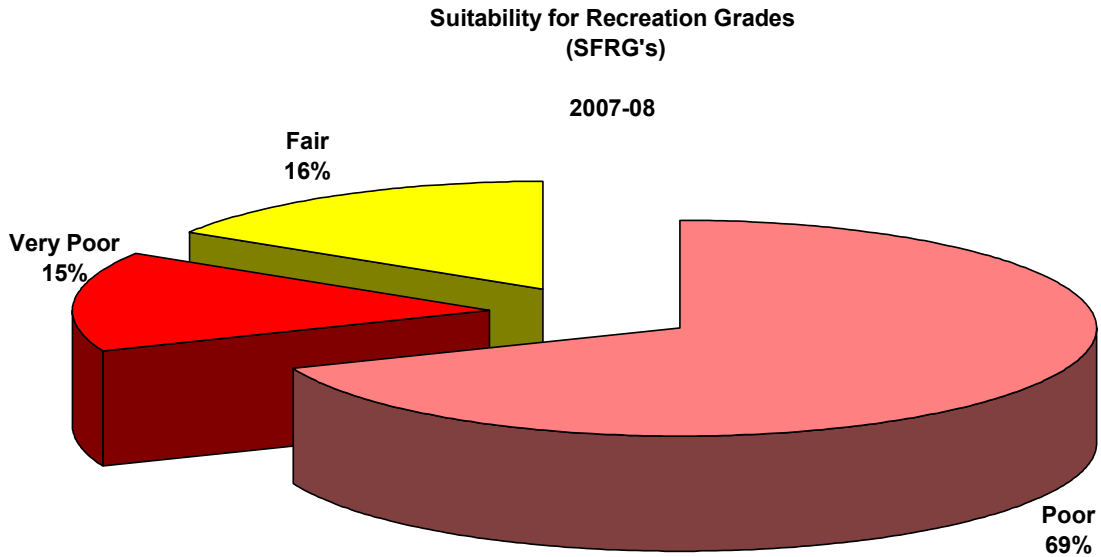


Figure 3: Pie-chart of SFRG's for the freshwater bathing sites for the 2007-08 summer.

5. CONCLUSIONS AND RECOMMENDATIONS

River and stream systems are highly valued in the Marlborough region and there is a perception/demand that the water quality is of a high enough standard that water-based recreational activities are safe, especially during the warmer summer months. Water quality monitoring during the 2007-08 period showed that just over a quarter of the sites monitored were safe for swimming for 90% or more of the time. In addition over 80% of sites were classed as poor or very poor according to MfE's recreational water quality grading system.

There are few point source discharges to rivers and streams in the Marlborough region, with the exception of stormwater discharges in urban areas. The high correlation between *E. coli* numbers and rainfall demonstrates the impact land-use has on water quality with urban areas and areas of intensive pastoral farming having the poorest water quality. This is not inconsistent with what has been reported on a national level (Larned *et al.*, 2004). Therefore in order to improve water quality for recreational use management strategies need to focus on diffuse sources of pollution. There are initiatives already in place e.g. Marlborough District Councils 'Stormwater Strategy' and the 'Clean Streams Accord', which focus on water quality in Blenheims urban area and in the Rai Valley respectively. Ongoing monitoring of recreational freshwaters will assess the effectiveness of these and other programmes.

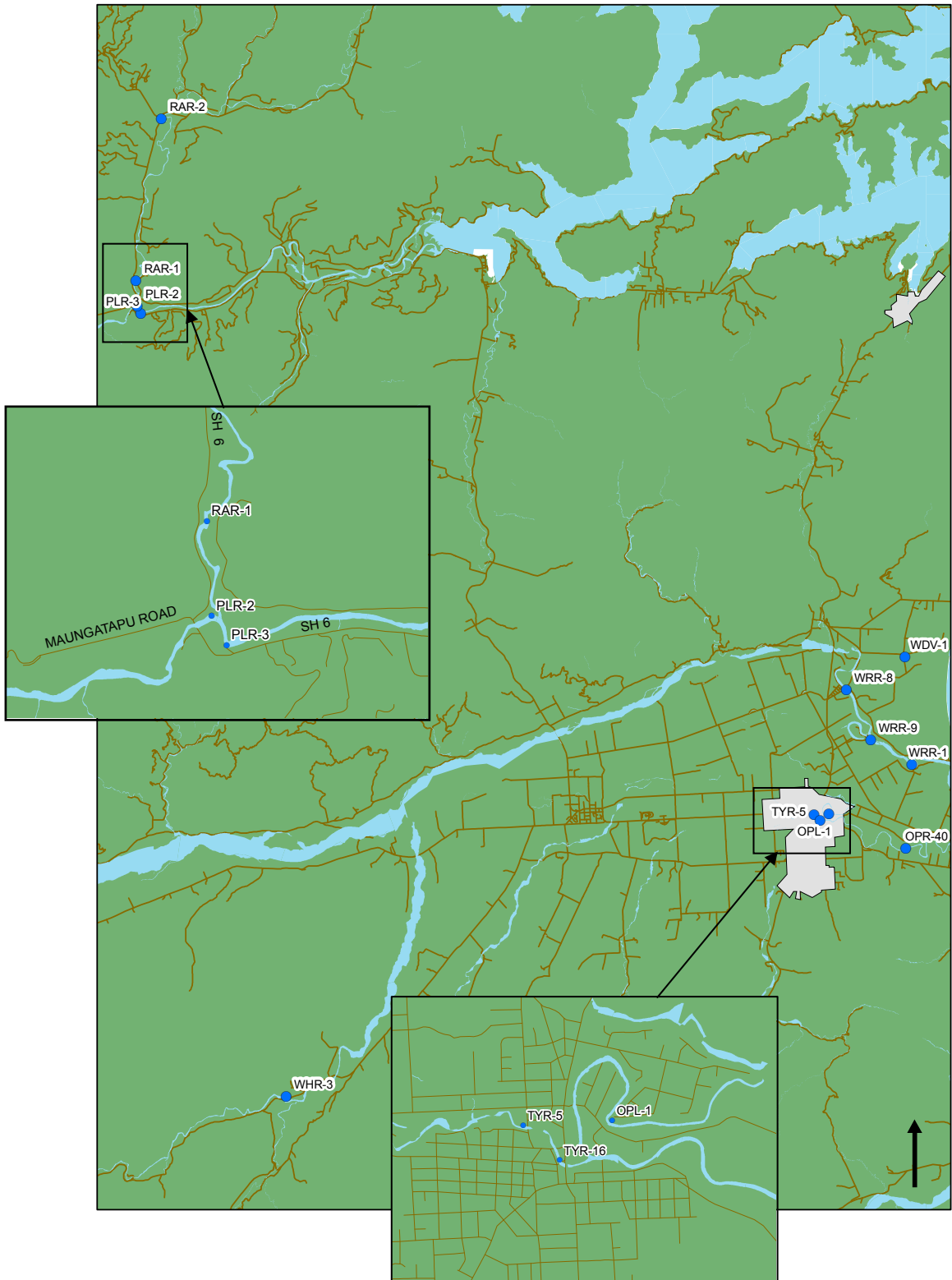
Regular monitoring of each site is recommended to allow for comparisons in freshwater quality each year and to assign complete SFRG grades to each site. It is also recommended that the Sanitary Inspection Categories be recalculated as there are inconsistencies between monitoring data and the Sanitary Inspection Category results.

6. REFERENCES

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- Nagels, J. W., Davies-Colley, R. J., Donnison, A. M. and Muirhead, R. W. (2002) *Faecal contamination over flood events in a pastoral agricultural stream in New Zealand*. Water and Science Technology. Vol. 45, 45-52.

APPENDIX 1

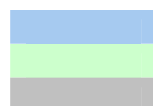
Freshwater Bathing Site Locations



APPENDIX 2

Results from the weekly Bathing Water (Freshwater) sampling beginning 1st November 2007 to 31st March 2008

	Taylor @ Hutcheson Street Bridge	Taylor @ Riverside	Opawa @ Malthouse Reserve	Opawa @ Elizabeth Street Footbridge	Wairau @ Blenheim Rowing Club	Wairau @ Wairau Rowing Club	Wairau @ Ferry Bridge	Wairau Diversion @ Neals Road	Pelorus @ Totara Flat	Rai @ Brown River Reserve	Rai @ Rai Falls	Pelorus @ Pelorus Bridge	Waihopai @ Craiglochart Bridge #2	alert	action
Sampling Week	TYR-5	TYR-16	OPR-40	OPL-1	WRR-1	WRR-9	WRR-8	WDV-1	PLR-3	RAR-2	RAR-1	PLR-2	WHR-3		
Week 1	111	271	478	111	10	10	5	75	87	87	238	5	30	260	550
Week 2	87	75	178	271	10	40	40	20	30	150	137	10	20	260	550
Week 3	87	124	20	53	5	5	30	40	40	150	75	10	40	260	550
Week 4	99	75	111	137	10	10	53	5	20	178	40	20	10	260	550
Week 5	75	87	64	53	20	5	306	87	20	30	64	20	53	260	550
Week 6	364	192	164	222	5	20	99	238	406	271	288	453	831	260	550
Week 7	1700	2000	87	364	30	5	164	40	1200	1700	2000	1200	2000	260	550
Week 8	99	164	384	99	20	53	124	111	288	324	624	10	99	260	550
Week 9	271	384	20	207	53	87	207	10	75	624	87	5	5	260	550
Week 10	111	64	124	99	64	111	30	697	1100	1200	1400	124	192	260	550
Week 11	99	111	207	207	20	20	53	30	20	384	53	30	2000	260	550
Week 12	254	2000	1100	178	164	20	10	20	75	254	87	111	738	260	550
Week 13	178	164	75	178	87	406	30	30	75	406	40	30	10	260	550
Week 14	137	192	150	192	111	87	124	30	53	271	40	20	64	260	550
Week 15	99	99	87	222	178	64	164	30	324	384	453	30	75	260	550
Week 16	238	164	64	53	99	87	64	75	64	453	40	20	40	260	550
Week 17	87	364	238	192	591	429	306	254	124	192	254	20	222	260	550
Week 18	178	137	64	238	478	406	624	384	150	344	324	40	111		
Week 19	178	344	10	124	192	124	124	30	20	137	99	10	87		
Week 20	222	453	75	87	30	20	75	40	30	75	207	30	20	260	550
Week 21	178	271	64	111	10	30	30	5	5	238	75	30	75	260	550



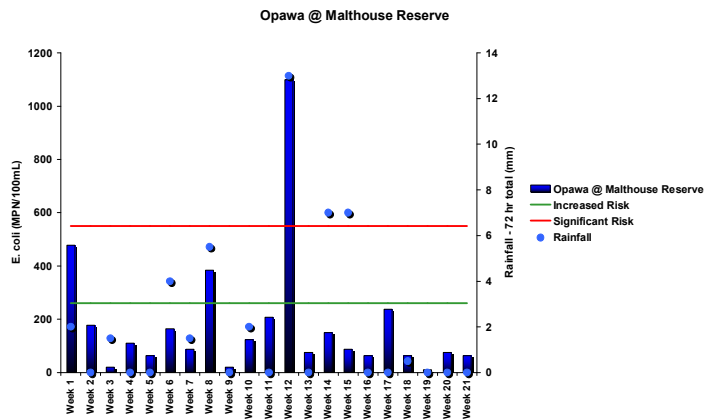
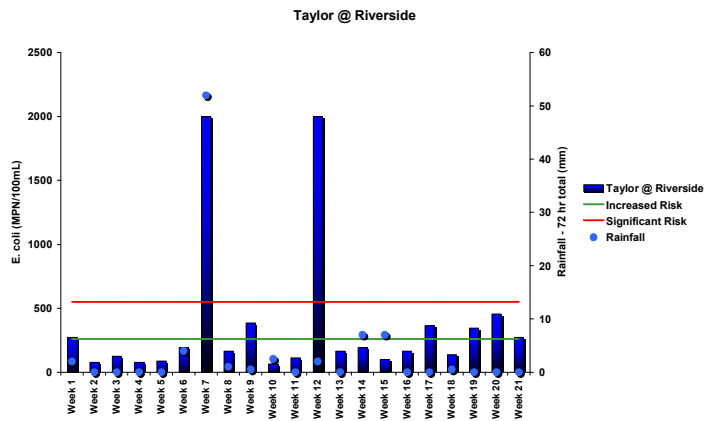
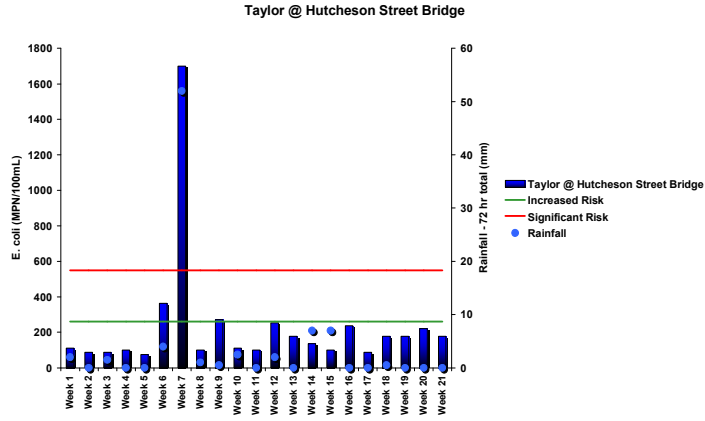
No sample taken due to time constraints

No samples taken as river was in flood.

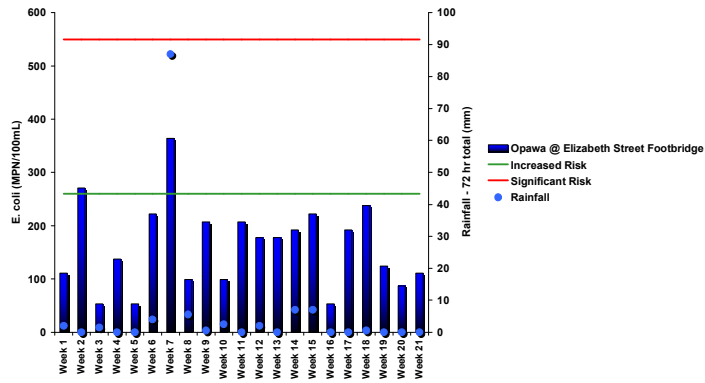
Less than values are halved i.e. <10 MPN/100mL becomes 5.

APPENDIX 3

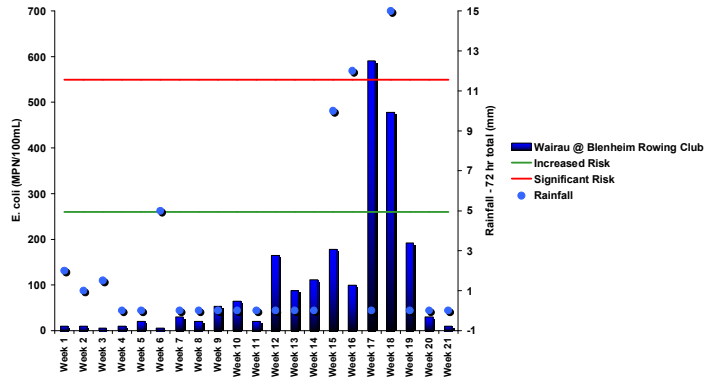
Graphed results for each Freshwater Bathing site for the Summer 2007-08 period in relation to MfE's bathing water standards (action level and alert levels).



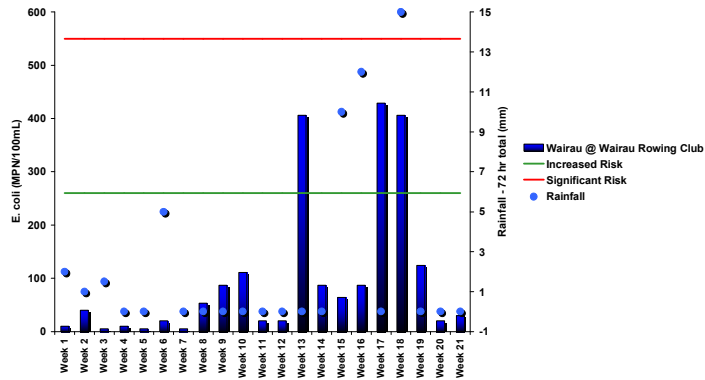
Opawa @ Elizabeth Street Footbridge

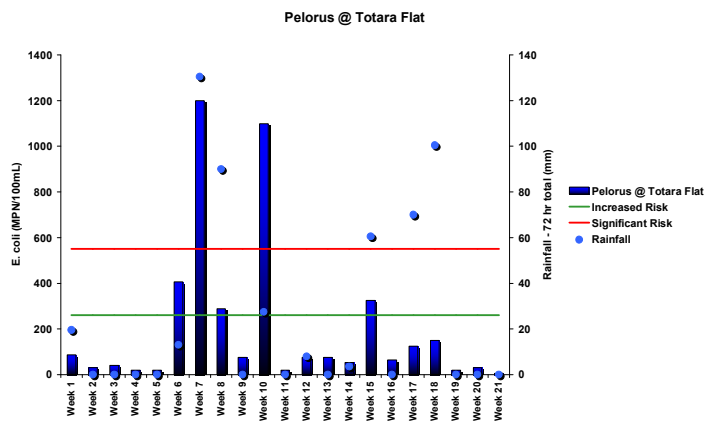
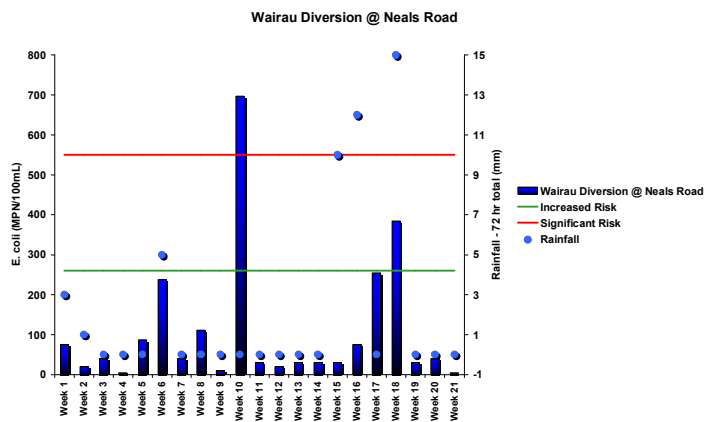
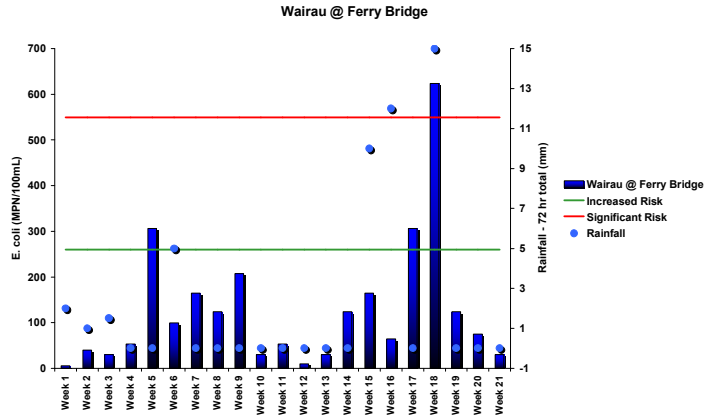


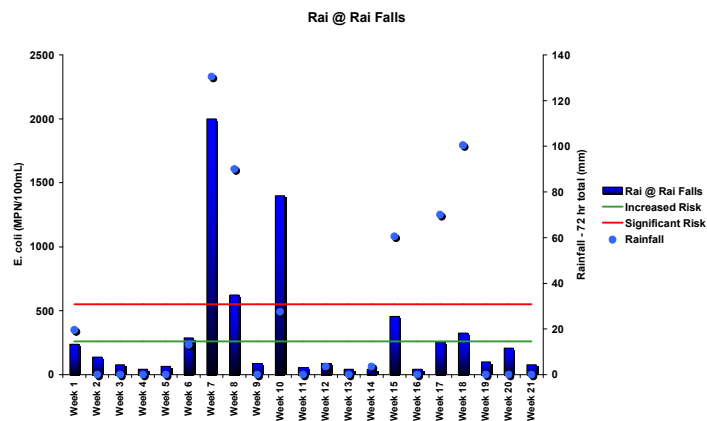
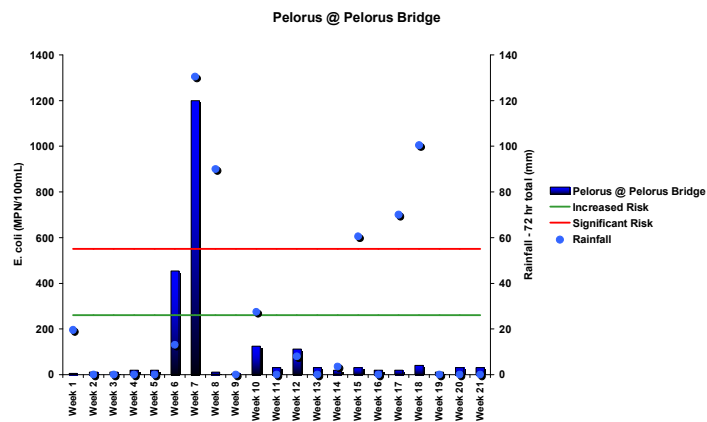
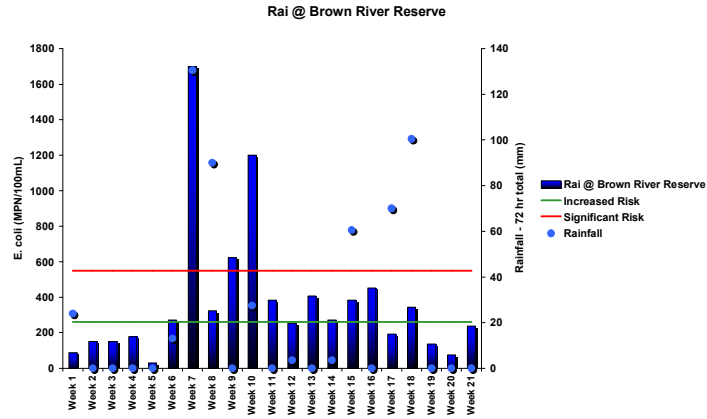
Wairau @ Blenheim Rowing Club

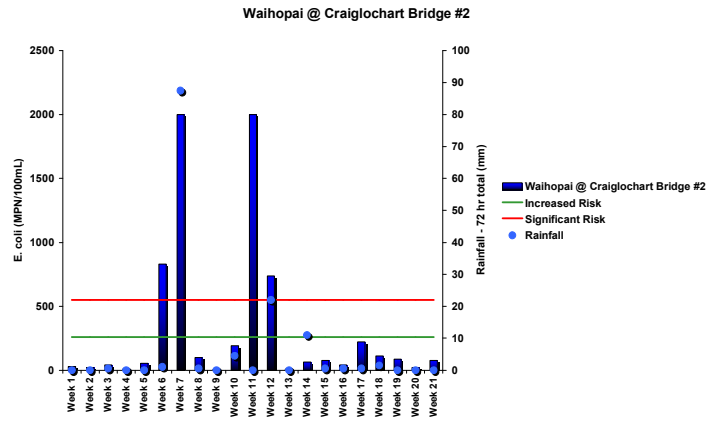


Wairau @ Wairau Rowing Club









APPENDIX 4**2007-08 Microbiological Assessment Category Results****Opawa at Elizabeth St Footbridge**

***** Microbiological Assessment Category

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

	sample season	sample size	median	exceed 260 to 550	exceed >550	%days <550
Year	2007	21	178	2	0	100
Year	2006	18	130.5	0	1	94
Year	2005	22	178	5	1	95
Year	2004	20	111.5	1	0	100
Year	2003	23	124	2	2	91
Total	0	104	137	10	4	96

Assessment Results

Microbiological Assessment Grade - C

Hazen Percentile Result - 482.1

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

Opawa at Malthouse Reserve

***** Microbiological Assessment Category

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

	sample season	sample size	median	exceed 260 to 550	exceed >550	%days <550
Year	2007	21	87	2	1	95
Year	2006	19	64	1	2	89
Year	2005	21	53	0	0	100
Year	2004	20	215	2	7	65
Year	2003	23	100	3	4	82
Total	0	104	99	8	14	86

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 2000

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

Pelorus Bridge

***** Microbiological Assessment Category

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

	sample season	sample size	median	exceed 260 to 550	exceed >550	%days <550
Year	2007	21	20	1	1	95

Year	2006	19	20	2	1	94
Year	2005	22	30	0	2	90
Year	2004	19	30	0	1	94
Year	2003	20	20	0	1	95
Total	0	101	30	3	6	94

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 820.05

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

Pelorus at Totara Flat

***** Microbiological Assessment Category

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

	sample season	sample size	median	exceed 260 to 550	exceed >550	%days <550
Year	2007	21	75	3	2	90
Year	2006	19	40	1	2	89
Year	2005	24	20	2	1	95
Year	2004	19	111	2	2	89
Year	2003	19	87	2	2	89
Total	0	102	53	10	9	91

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 755.6

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

Rai at Brown River Reserve

***** Microbiological Assessment Category

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

	sample season	sample size	median	exceed 260 to 550	exceed >550	%days <550
Year	2007	21	271	8	3	85
Year	2006	19	87	3	2	89
Year	2005	23	207	4	2	91
Year	2004	40	157	8	4	90
Year	2003	45	150	13	6	86
Total	0	148	157	36	17	88

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 1340

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

Rai at Rai Falls

***** Microbiological Assessment Category

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

	sample season	sample size	median	exceed 260 to 550	exceed >550	%days <550
Year	2007	21	99	3	3	85
Year	2006	19	53	1	4	78
Year	2005	26	87	1	4	84
Year	2004	43	137	9	5	88
Year	2003	56	192	10	9	83
Total	0	165	137	24	25	84

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 1325

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

Taylor at Hutcheson

***** Microbiological Assessment Category

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

	sample season	sample size	median	exceed 260 to 550	exceed >550	%days <550
Year	2007	21	137	2	1	95
Year	2006	19	192	5	0	100
Year	2005	21	207	4	4	80
Year	2004	20	171	3	1	95
Year	2003	23	124	2	2	91
Total	0	104	178	16	8	92

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 1210

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

Taylor at Riverside

***** Microbiological Assessment Category

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

	sample season	sample size	median	exceed 260 to 550	exceed >550	%days <550
Year	2007	21	164	6	2	90
Year	2006	19	178	6	0	100

Year	2005	21	192	4	3	85
Year	2004	20	137	2	1	95
Year	2003	9	124	0	1	88
Total	0	90	164	18	7	92

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 782

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

Waihopai at Craiglochart

***** Microbiological Assessment Category

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

	sample season	sample size	median	exceed 260 to 550	exceed >550	%days <550
Year	2007	21	75	0	4	80
Year	2006	19	20	0	1	94
Year	2005	14	35	0	1	92
Year	2004	20	46.5	1	1	95
Year	2003	18	75	1	0	100
Total	0	92	40	2	7	92

Assessment Results

Microbiological Assessment Grade - D

Hazen Percentile Result - 879.6

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

Wairau at Blenheim Rowing Club

***** Microbiological Assessment Category

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

	sample season	sample size	median	exceed 260 to 550	exceed >550	%days <550
Year	2007	21	30	1	1	95
Year	2006	18	30	0	0	100
Year	2005	21	40	0	1	95
Year	2004	20	25	2	0	100
Year	2003	19	75	3	0	100
Total	0	99	30	6	2	97

Assessment Results

Microbiological Assessment Grade - C

Hazen Percentile Result - 288

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

Wairau at Ferry Bridge

***** Microbiological Assessment Category

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

	sample season	sample size	median	exceed 260 to 550	exceed >550	%days <550
Year	2007	21	75	2	1	95
Year	2006	18	40	1	0	100
Year	2005	21	75	0	0	100
Year	2004	20	64	3	0	100
Year	2003	19	40	1	0	100
Total	0	99	64	7	1	98

Assessment Results

Microbiological Assessment Grade - C

Hazen Percentile Result - 297.9

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

Wairau at Wairau Rowing Club

***** Microbiological Assessment Category

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

	sample season	sample size	median	exceed 260 to 550	exceed >550	%days <550
Year	2007	21	40	3	0	100
Year	2006	17	40	0	0	100
Year	2005	22	30	0	1	95
Year	2004	20	58.5	2	0	100
Year	2003	19	99	2	2	89
Total	0	99	40	7	3	96

Assessment Results

Microbiological Assessment Grade - C

Hazen Percentile Result - 418.65

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

Wairau Diversion at Neals Road

***** Microbiological Assessment Category

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

	sample season	sample size	median	exceed 260 to 550	exceed >550	%days <550
Year	2007	21	40	1	1	95
Year	2006	18	64	2	0	100
Year	2005	21	75	0	0	100

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Year	2004	20	81	3	1	95
Year	2003	19	178	6	1	94
Total	0	99	75	12	3	96