

**ISSUE: Recreational Swimming Water Quality Programme
– Final Results 2014-15**

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To: Environmental Management Committee, 28 April 2015

From: Jean-Charles Perquin, Environmental Monitoring Programme
Manager

Date: 26 March 2015

Report Type:	<input checked="" type="checkbox"/> Normal operations	<input checked="" type="checkbox"/> Information	<input type="checkbox"/> Decision
Purpose:	<input type="checkbox"/> Infrastructure	<input checked="" type="checkbox"/> Public service	<input type="checkbox"/> Regulatory function
	<input type="checkbox"/> Legislative function	<input checked="" type="checkbox"/> Annual\Long Term Plan	<input type="checkbox"/> Other
Significance:	<input type="checkbox"/> Triggered	<input checked="" type="checkbox"/> Not Triggered	

Executive Summary:

This report provides the Committee with a summary of the final results of the 2014-15 recreational swimming water quality programme which was outlined at, and supported by the Committee, at its 13 October 2014 meeting¹.

The council collected water samples from 47 coastal and 13 freshwater swimming sites throughout Northland at weekly intervals from 24 November 2014 to either 9 or 23 February 2015.

The samples were tested for bacterial indicators of faecal contamination to indicate the risk to swimmers of contracting gastro intestinal illnesses and other infections. The results of each sampling run were published on the council's website² and the LAWA ("Land, Air, Water Aotearoa) website³.

In general, microbiological water quality was good for swimming at the vast majority of coastal and most of the freshwater swimming sites either all or most of the time.

A total of 31 coastal sites met the guideline values considered suitable for swimming 100% of the time. A further 13 sites had *Enterococci* concentrations within the guideline values on all but one sampling occasion, and the remaining three sites on all but two sampling occasions. Overall, 590 out of 609 (96.9%) samples met the guideline values.

Four freshwater sites met the guideline values considered suitable for swimming 100% of the time. Six sites had *E. coli* concentrations within the guideline value on all but one sampling occasion and two sites on all but two sampling occasions. The remaining site was classified as unsuitable for swimming on five sampling occasions. Overall, 146 out of 161 (90.7%) samples met the guideline value.

¹ <http://www.nrc.govt.nz/upload/18722/EMC%20Agenda%20-%202013%20October%202014.pdf>

² <http://www.nrc.govt.nz/Living-in-Northland/At-the-beach/Swimming-water-quality/Swimming-water-quality-results/>

³ <http://www.nrc.govt.nz/Environment/LAWA/>

Microbial Source Tracking (MST) to identify the source(s) of contamination at sites with consistently elevated faecal bacteria levels was undertaken at eight sites in the 2014-15 swimming season, with strong ruminant markers being detected at five of the eight sites.

Additional sampling was commenced at the Whangarei Falls site for pathogens in June 2014. Two sampling rounds have been completed, with few pathogens being detected.

Legal compliance and significant assessment:

The activities detailed in this report are part of the council's day to day operations, which are provided for in the council's 2012-22 Long Term Plan and 2014-15 Annual Plan, and are therefore in accordance with the Council's decision making process and sections 76-82 of the Local Government Act 2002.

The programme also contributes to the council's statutory obligations under section 35 of the Resource Management Act 1991 for state of the environment and plan effectiveness monitoring and reporting.

Recommendation:

1. That the report Recreational Swimming Water Quality Programme – Results 2014-15 dated 26 March 2015, prepared by Jean-Charles Perquin, Environmental Monitoring Programme Manager, be received.

Report

Testing

Water samples collected from coastal and freshwater swimming sites were tested for faecal indicator bacteria *Enterococci* (*Ent.*) and *Escherichia coli* (*E. coli*) respectively.

Guidelines and grading system

Test results were compared with the Ministry for the Environment (MfE) and Ministry of Health (MoH) *Microbiological Water Quality Guidelines (2003)* – Table 1.

Table 1: MfE/MoH microbiological guidelines for coastal and freshwater swimming water quality

	Freshwater	Coastal
Acceptable level (suitable for swimming)	<i>E. Coli</i> ≤ 260/100mL	<i>Ent.</i> ≤ 140/100mL
Alert level (potentially unsuitable for swimming)	260/100mL < <i>E. Coli</i> ≤ 550/100mL	140/100mL < <i>Ent.</i> ≤ 280/100mL
Action level (unsuitable for swimming)	<i>E. Coli</i> > 550/100mL	<i>Ent.</i> > 280/100mL

Summary of final results for 2014-15

Table 2 and Table 3 show the comparison of test results for each coastal and freshwater swimming site with the guidelines.

Many of the test results that exceeded guidelines values occurred around the time of rain events and are therefore attributed to stormwater runoff from land contaminated by faecal material. More detailed results including a map and tables are presented in Appendix 1.

Microbial source tracking

Microbial Source Tracking (MST) to narrow down the source(s) of contamination at sites with consistently elevated faecal bacteria levels was undertaken at eight sites in the 2014-15 swimming season. Strong ruminant markers were detected at five of the eight sites. Weak ruminant and strong wildfowl and plant decay markers were detected at two sites (both at Matapouri), while a weak human marker was detected at the “Victoria River” site. The latter result, if confirmed, warrants further investigation, particularly given previous results for the site.

MST has been undertaken at a total of 25 sites – listed in Table 4 – since the 2007-08 swimming season with the results showing that:

- 22 sites were contaminated by wildfowl (ducks and/or gulls) faeces,
- 18 sites by ruminant faeces,
- 4 sites with dog faeces, and
- 3 sites by human faeces.

Table 4: Results from MST work undertaken since 2007. Sources in bold indicate a strong positive marker. Sources not in bold designate a positive or a weak positive marker. Site names in bold are permanent monitoring sites and sites with an asterisk indicate a coastal enclosed site. D: Dog, H: Human, R: Ruminant, W: Wildfowl, P: Plant decay. Note: 2014-15 results for Ruakaka and Victoria river sites are provisional.

Site	2007-08	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Coopers Beach stream		D/W	R/W				
Kaihu River			R/W				
Kapiro Stream			R/W				
Kerikeri River			W	R	R/W/P		
Langs Beach stream (car park)	R/W	W	D/R/W				
Langs Beach stream (midway)	R/W	W					
Mangawhai motor camp*			W	W			
Matapouri northern bridge*			R/W		R/W/P	R/W/P	R/W/P
Matapouri southern bridge*			W				R/W/P
Ngunguru by school			W	W			
Ocean Beach stream	W		H/R/W				
Omamari Beach stream			R				
Otamure Bay stream	R/W	R/W	R/W				
Pacific Bay stream		W					
Pahi 150m NW of jetty*		H		W	W/P		
Pahia at Te Haumi River					W/P		
Pahia at Waitangi Bridge					R/W	R/W	R
Raumanga Stream	W				H	R/W/P	R
Ruakaka River below motor camp					R	R	R/W
Tirohanga Stream						R/P	R
Victoria River				W	W/P/H	W/P	H
Waipu Cove stream		W	D/R/W				
Waitangi River						R/W/P	R
Whangarei Falls	R/W	W	D/R/W				
Woolleys Bay Stream						W/P	

Update on pathogen testing at Whangarei Falls

Additional sampling, which was outlined and supported by the Committee at its 14 April 2014 meeting⁴, was commenced at Whangarei Falls site in June 2014 to investigate further the relationship between faecal indicator bacteria levels and the presence of pathogens in the water. A further sampling round will be carried out in the near future after a rain event. Preliminary results from the first two sampling rounds are summarised in Table 5.

Table 5: Pathogen testing at Whangarei Falls – interim results. ND: Not detected.

Pathogen analysis	Count	
	11/6/14	20/1/15
Bacteria (MPN/100mL)		
<i>Total coliforms</i>	>24,000	9,200
<i>Escherichia coli</i>	880	230
<i>Enterococci</i>	260	<10
<i>Salmonella spp.</i>	<0.3	<0.3
<i>Campylobacter spp.</i>	12	<0.3
<i>Escherichia coli O157</i>	<0.3	<0.3
Protozoa (/10L)		
<i>Cryptosporidium parvum oocysts</i>	<1	<1
<i>Giardia lamblia cysts</i>	1	<1
Viruses (presence/absence)		
Enteric viruses incl.: Norovirus, Enterovirus, Adenovirus, Hepatitis A & E viruses, Rotavirus	ND	ND

Results from water sampling undertaken on 11 June 2014 showed that the faecal indicator bacteria (FIB) level exceeded the “Action/Red” level for the swimming guidelines. Several pathogens were also detected, namely 12 *Campylobacter* and 3 *Giardia* cysts (detected in a 30L sample, giving a result of 1 *Giardia* cyst per 10L). However, no viruses were detected in the sample.

Results from water sampling undertaken on 20 January 2015 showed that the FIB level was below the “Action/Red” level for the swimming guidelines. No pathogens were detected in the water sample.

In summary, the results indicated that a few pathogens were present in water when the FIB level was elevated and exceeded the swimming guideline, whereas no pathogens were found in water when the FIB level was low and below the guideline. This, albeit small sample set, supports that the swimming guideline is indicative of health risk/swimming suitability. However, given the level of pathogens detected in the sample which had an elevated FIB level, the guideline appears to be conservative.

Proposed mitigation work in the Hatea River catchment

A letter has been received from the Whangarei District Council (WDC) requesting development of a collaborative approach for riparian planting and fencing improvements within the Hatea River catchment. An approach is currently being scoped and will be developed in collaboration with the WDC. The proposed scope will be discussed with the Whangarei Catchment Group and reported to the Environmental Management Committee for formal adoption.

⁴ <http://www.nrc.govt.nz/Resource-Library-Archive/Agendas-and-minutes-archive2/Environmental-Management-Committee/2014/Environmental-Management-Committee-Agenda---14-April-2014/>

APPENDIX 1
Results for 2014-15

In total, there were either 12 to 14 sampling occasions for each site during the season. Results for both coastal and freshwater sites are presented in Table 6 (together with a comparison with previous swimming seasons dating back to 2007-08), Figure 1 and Figure 2. The total number of sites monitored varies from season to season, although a core set of 20 permanent sites are monitored each season. Appendix 2 lists the sites that have been removed from the programme since 2007 following the site selection process in collaboration with relevant stakeholders.

Table 6: Coastal and freshwater percentage of samples within the 'suitable for swimming' criteria – interim results

COASTAL

Category	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
95-100% samples <280/100mL <i>Ent.</i>	27	21	45	22	26	29	29	31
90-95% samples <280/100mL <i>Ent.</i>	13	8	13	21	16	13	11	13
75-90% samples <280/100mL <i>Ent.</i>	4	12	5	16	5	5	7	3
<75% samples <280/100mL <i>Ent.</i>	1	2	0	2	1	0	0	0
Total number of sites	45	43	63	61	48	47	47	47

FRESHWATER

Category	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
95-100% samples <550/100mL <i>E. coli</i>	1	2	6	4	2	4	3	4
90-95% samples <550/100mL <i>E. coli</i>	2	5	2	2	3	0	4	6
75-90% samples <550/100mL <i>E. coli</i>	6	7	6	9	3	6	4	2
<75% samples <550/100mL <i>E. coli</i>	12	5	9	9	2	2	1	1
Total number of sites	21	19	23	24	10	12	12	13

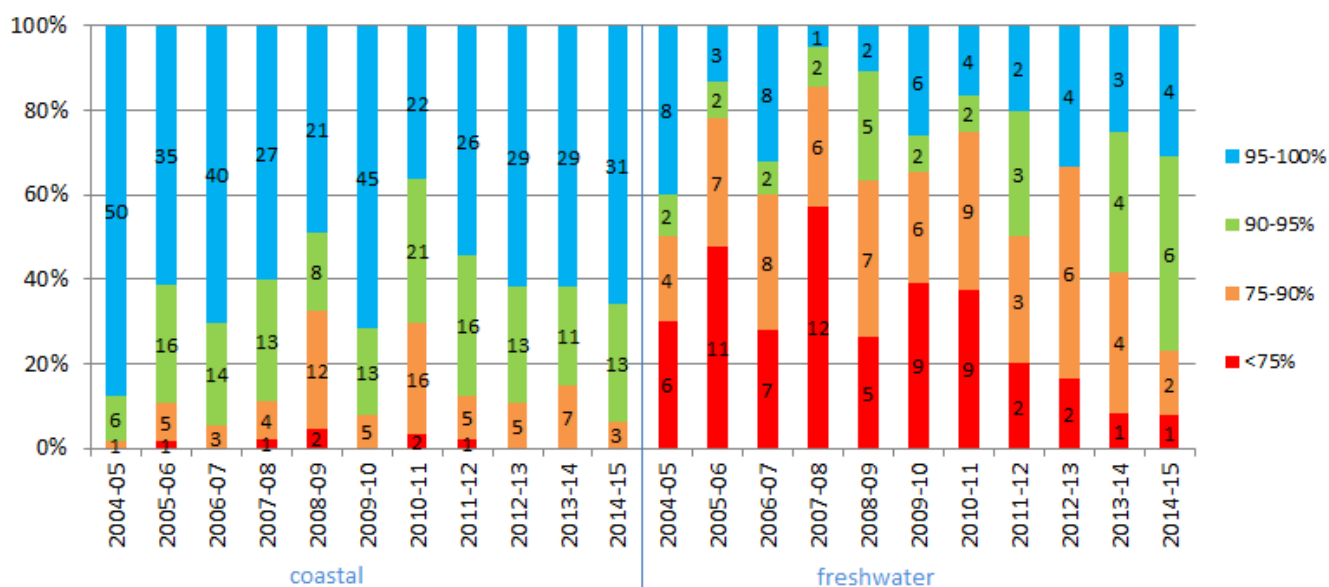


Figure 1: Coastal and freshwater percentage of samples within the "suitable for swimming" criteria

The results from faecal indicator bacteria testing in 2014-15 were improved for both freshwater and coastal sites compared with the 2013-14 season.



Figure 2: End of season (MfE) suitability for swimming grades 2014-2015

APPENDIX 2: Sites removed from the swimming water quality monitoring programme since 2007-08

Site name	Site No.	Year removed	Reason for removal
Wairoa Stream (Ahipara)	105053	2007-08	Consistent high bacteria level ●
Lake Taharoa	100452	2007-08	Redundant site
Doves Bay	101537	2007-08	Consistent low bacteria level ●
Windsor Landing (Kerikeri)	105707	2007-08	Consistent low bacteria level ●
Opito Bay	101538	2007-08	Consistent low bacteria level ●
Russell mid-south	105711	2007-08	Consistent low bacteria level ●
Matauwahi Bay	102636	2007-08	Consistent low bacteria level ●
English Bay	100802	2007-08	Consistent low bacteria level ●
Kawakawa River	100643	2007-08	Consistent low bacteria level ●
Otiria Stream	105376	2007-08	Consistent high bacteria level ●
Ngunguru cable marker	100061	2007-08	Redundant site
Pataua North	105992	2007-08	Redundant site
Okiato Point	105712	2008-09	Consistent low bacteria level ●
Ngunguru boat ramp	101300	2008-09	Redundant site
Paihia below junction	101186	2008-09	Redundant site
Kaikou River	108919	2009-10	Staff safety concerns
Whakapirau	106100	2009-10	Staff safety concerns
Langs Beach stream middle	104539	2010-11	Consistent high bacteria level ●
Langs Beach north	108317	2010-11	Redundant site
Rarawa camp site	109874	2010-11	Consistent low bacteria level ●
Taupo Bay	109868	2010-11	Consistent low bacteria level ●
Tauranga Bay	109869	2010-11	Consistent low bacteria level ●
Coopers Beach stream	101870	2011-12	Consistent high bacteria level ●
Lake Coca Cola	110323	2011-12	Consistent low bacteria level ●
Aurere River Beach Road	110324	2011-12	Rationalisation
Waitangi River Lily Pond	110325	2011-12	Staff safety concerns
Kapiro Stream Purerua Road	102838	2011-12	Consistent high bacteria level ●
Waipapa Stream Charlies Rock	110348	2011-12	Not popular site
Mangakahia River Twin Bridges	105973	2011-12	Consistent high bacteria level ●
Otaua Stream	108510	2011-12	Consistent high bacteria level ●
Kaihu River at campground	102221	2011-12	Consistent high bacteria level ●
Omamari Beach Stream	102305	2011-12	Rationalisation
Ocean Beach Stream	102077	2011-12	Consistent high bacteria level ●
Langs Beach Stream	100686	2011-12	Consistent high bacteria level ●
Waipu Cove Stream	101207	2011-12	Rationalisation
Otamure Bay Stream	108859	2011-12	Consistent high bacteria level ●
Kerikeri Skudders Beach	100974	2011-12	Not popular site
Opua foreshore	101418	2011-12	Rationalisation
Shipwreck Bay	109870	2011-12	Consistent low bacteria level ●
Pahi rocky groyne	102579	2011-12	Redundant site
Mangawhai Harbour pontoon	110320	2011-12	Rationalisation
Urquart's Bay	108311	2011-12	Rationalisation
McLeod Bay	101254	2011-12	Rationalisation
Pataua South footbridge	102217	2011-12	Consistent low bacteria level ●
Pataua South Frog Town	109887	2011-12	Consistent low bacteria level ●
Matapouri Beach	110321	2011-12	Consistent low bacteria level ●
Kowharewa Bay	106444	2011-12	Rationalisation
Ngunguru Norfolk pine	100076	2011-12	Consistent low bacteria level ●
Whananaki footbridge	103147	2011-12	Rationalisation
Bland Bay	109889	2011-12	Consistent low bacteria level ●
Pahi at rocky Groyne	102579	2012-13	Redundant site