

Consent 04 0277 Compliance Monitoring Report 2003-2011 - Kaituna River Partial Re-diversion to Maketu Estuary



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*Working with our communities for a better environment
E mahi ngatahi e pai ake ai te taiao*





Kaituna-Maketū river diversion compliance monitoring 2003-2011

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Cover Photo:
Maketu Estuary looking down Papahikahawai Channel behind the spit.

Acknowledgements

Thanks go to laboratory staff for their assistance with sample handling and analysis. Over the years a number of summer students working for Bay of Plenty Regional Council have done a great job in assisting with sample collection.

Executive summary

This report covers compliance of Consent 04 0277 held by the Department of Conservation for the re-diversion of 100,000 m³ per tidal cycle of water from the Kaituna River back into Maketū Estuary for the period covering 2003 to 2011. In February each year the consent requires water quality monitoring in the estuary at three sites over an incoming tide, shellfish monitoring for bacterial levels and once every third year a survey of shellfish numbers and size. Since the last report in 2003 all monitoring and reporting requirements have been achieved.

Results from compliance monitoring show the influence of partial river re-diversion has been low with no significant adverse impacts on water quality being found. However, bacteriological quality of the Kaituna River, despite improving over the last 20 years, is still lower (higher cell numbers) than average measurements in the estuary. Data from the estuary show strong correlations between bacteria and nutrients and low salinity (ie. fresh water inflow). Guidelines for bathing and shellfish gathering waters are still being met in the estuary based on sampling in February each year.

There appears to be no adverse impact on cockle densities at any of the monitoring sites from the fresh water being re-diverted back into the estuary. Adverse impacts on the cockle bed densities have occurred at sites nearer the entrance as a result of sand migration into the estuary. Cockle size has also been adversely impacted by an unknown factor possibly associated with the physical changes related to sand infilling the estuary as the distribution of occurrence is not consistent with a freshwater impact.

One reason very little impact on water quality has occurred is that not all the water entering via Fords Cut is fresh water. Depending on tide, wind and waves conditions, the water entering the estuary via Fords Cut can at times be predominantly salt water. The reduced fresh water inflow has not been sufficient to re-establish saltmarsh which was one of the re-diversion objectives. The reduced flow granted for Consent 04 0277 (only 100,000 of the 400,000 m³ per tidal cycle) may have been insufficient to stop sand infilling the lower estuary and degrading the shellfish habitat.

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Part 1: Introduction

1.1 Consent 04 0277

Consent 04 0277 held by the Department of Conservation provides for the diversion of 100,000 m³ per tidal cycle into Maketū Estuary via Ford's Cut control structure. It replaces an earlier consent for staged re-diversion granted in February 1994. This report addresses compliance and results of monitoring required under conditions 7.1, 7.2 and 7.3 of consent 04 0277. Conditions 7.1 and 7.2 require monitoring of water and shellfish quality in the estuary while 7.3 is for the purpose of monitoring population dynamics of shellfish beds.

The objective of the monitoring programme is to ensure that re-diversion of Kaituna River water does not result in significant adverse impacts on the water quality or ecology of Maketū Estuary.

1.2 Background

1.2.1 River flow history

Historically, natural flow of the Kaituna River was through Maketū Estuary which shaped its ecology and morphology. Prior to 1907 a portion of the river flowed through the estuary via Papahikahawai Channel on the north side of the estuary adjacent the sand spit. Part of the natural dynamics of the river-estuary system included breaching the sand spit enclosing the estuary. This occurred in 1907 at Te Tumu where the current river mouth is located. The spit breach remained open and slowly migrated to the east. Between 1925-28 Fords Cut (twin cuts) were made to divert river water back through the estuary. Then in 1954 the Kaituna River Board made a decision to divert the Kaituna River out of Maketū Estuary. In 1956 the river was diverted out to sea at Te Tumu with Fords Cut and Papahikahawai Channel blocked. Between 1956 and 1995 a small amount of water seeped through the road/causeway used to block Fords Cut and on spring tides it was over topped.

Since the diversion, local people have strongly advocated the return of the river to Maketū Estuary. In 1983, the Minister for the Environment asked the Commissioner for the Environment to report on environmental issues and options for Maketū Estuary. The enquiry was critical of the initial decision to divert the Kaituna River, and recommended re-diversion of the river to the estuary.

In 1991 Department of Conservation made an application for diversion of up 400,000 m³ per tidal cycle and dredging of the estuary. In 1994 Bay of Plenty Regional Council granted consent for a staged re-diversion of 100,000 m³ and a diversion structure was completed in 1995. However, a High Court injunction was taken out preventing the use of the consent. Then in February 1996 the control structure was damaged and gates fully opened illegally, followed two months later by a High Court decision allowing use of the consent. In January 1997 the gates were closed to 20,000 m³ per tidal cycle to allow for the staged monitoring to be undertaken as required by the consent

More recently in 2009 Bay of Plenty Regional Council established the Kaituna River and Ongatoro/Maketū Strategy Implementation Project. In 2011 the hearing panel for the strategy recommended full re-diversion and that the Regional Council commit to progressing this.

1.2.2 Water quality and estuary changes over time

In terms of ecology and physical state, diverting the river out of the estuary has had a number of major adverse impacts. Amongst these is the loss of 160 ha (95%) of maritime marsh between 1939 and 1979 due to reduced freshwater inflow (KRTA 1986). Also since the river diversion in 1956, sand inflow to the estuary from the open coast has been infilling the lower estuary. There is no data for the initial rate of infilling but later gauging showed a 34% reduction in intertidal volume between 1972 and 1985 (Rutherford *et al.*, 1989). Then a gauging by Domijan *et al.* (1996) indicated a further reduction of 150,000 m³ (17.3%) between 1985 and 1996. Shallowing of the estuary has been most pronounced in the central to entrance areas and along with the loss of river flow had adverse impacts on the more important shellfish beds.

Compared to its original undisturbed state, water quality of the Kaituna River has undoubtedly declined over a long period of time in line with development and increasing intensification of land use both in the upper and lower catchment. The earliest quantitative water quality data for the lower Kaituna River were collected by Ministry of Works from 1969 to 1974. In 1975 White *et al.* (1978) examined the distribution of phosphorus and inorganic nitrogen which both increased along its length and peaked downstream of the AFFCO outfall. From 1985 -1987 the Bay of Plenty Catchment Board repeated sites in the lower Kaituna River. Then in 1990 the Bay of Plenty Regional Council initiated a regular monitoring programme.

There are many reports and studies now published for the lower Kaituna River and one of the latest to provide an overview is the 2007 Bay of Plenty Regional Council report (Park 2007). This report showed phosphorus levels and trends down river were very similar to 1975 while inorganic nitrogen levels have increased.

In 1991 when the Department of Conservation made its application for the re-diversion of the river, bacterial and nutrient levels were the main water quality issues. Key contributors at the time were point source discharges such as Te Puke sewage and AFFCO freezing works but improvement now puts the focus back more widely on diffuse impacts from activities such as dairy farming. In Appendix 3 graphs using the full time series of data from the Te Matai site in the lower Kaituna River are shown. One shows the increase in nitrate nitrogen over time while the others show bacterial numbers to have significantly decreased since the early 1990's, primarily as a result of AFFCO's improvements to its discharge.

Part 2: Location and methods

2.1 Location of sampling sites

The initial resource consent for re-diversion of Kaituna River water back into Maketū Estuary required water quality surveys at 10 sites through the estuary. For Consent 04 0277 only three of the original ten sites are monitored as shown in Figure 2.1 below. The shellfish plots for measuring density and size are the same as those established prior to re-diversion. Location of shellfish samples collected for bacterial analysis varies from year to year depending on where the beds have moved. The locations shown in Figure 2.1 below are the most consistent sites for collection.



Figure 2.1 Location of sampling sites for compliance monitoring of Consent 04 0277 for partial re-diversion of the Kaituna River into Maketū Estuary.

2.2 Water quality

Consent 04 0277 requires monitoring of bacteria (total coliforms, faecal coliforms, enterococci), nutrients (ammonium nitrogen, nitrate nitrogen, total nitrogen, dissolved reactive phosphorus, total phosphorus) and salinity at high, mid and low tide, at sites 1, 5 and 9. These surveys are to be conducted in February each year over a half tidal cycle. Water samples are surface grab samples with all analyses using standard methods and International Accreditation New Zealand registered laboratories.

2.3 Shellfish quality

In February each year Consent 04 0277 requires the bacteriological quality of five shellfish samples to be assessed from the central area of the estuary. These samples should include at least two pipi and two cockle samples. Shellfish were tested for total coliform, faecal coliform and enterococci bacteria.

2.4 Shellfish population dynamics

Monitoring requirements of the first consent resulted in the establishment of five sites in Maketu Estuary at a range of tidal heights for the purpose of assessing possible changes in density and size structure of shellfish populations. Consent 04 0277 requires these sites to be monitored once every three years in February. Site 1 has generally not been monitored as it has been through rapid cycles of erosion or accretion.

Each of the shellfish sites has been located using differential GPS to survey their positions. Each site had blocks measuring 20m by 10 m arranged parallel to the channels. Most sites also had a range of tidal heights (up to three). Within each of these blocks samples were taken randomly within ten 5x4 m subdivisions of each block to ensure representation from the whole area.

Within each block 50 samples were taken using a 15 cm deep, 13 cm diameter corer. Sample numbers are based on the results of a pilot survey conducted for the Department of Conservation (Gorter 1993). Samples were then sieved on 2 mm mesh and the number of cockle (*Austrovenus stutchburyi*), pipi (*Paphies australis*) and wedge shell (*Tellina liliana*) recorded.

The criteria used for the number of samples required for length-frequency data was to include a minimum of 20 samples. If less than 200 intact shellfish of any species were collected in the first 20 samples, then additional specimens were collected until either a minimum of 200 had been obtained or all 50 samples had been processed. Length-frequency data was recorded in 5 mm size classes and the results then converted to percentages to standardize size class data for comparison between plots, sites and years.

Part 3: Results

3.1 Water quality

3.1.1 Variations between sites, tides and over time

To highlight variation in water quality between sampling sites along Maketū Estuary, data for re-diversion flows of 100,000 m³ per tidal cycle (late 1996 + 1998-2001) were used to generate means which are shown in Table 3.1 below. Each of the parameters was also tested using one-way analysis of variance to test the influence of tidal state. Fords Cut shows no significant influence of tidal state on any parameter while enterococci numbers at Site 5 were higher at low tide. Site 9 closest the entrance showed significant tidal influence with lowest water quality at low tide.

Table 3.1 Means for water quality parameters in Maketū Estuary at each site for the period over which re-diversion of 100,000 m³ per tidal cycle has occurred (± 95% confidence interval in brackets & n= 38-43).

Site	Salinity	DRP g/m ³	NH ₄ g/m ³	NO _x g/m ³	Ent*	FC*
Fords Cut	12.4 (2.9)	0.024 (0.003)	0.067 (0.012)	0.302 (0.062)	15.8 (8.7)	51.3 (1.4)
5	20.2 (3.1)	0.025 (0.006)	0.079 (0.015)	0.151 (0.043)	6.0 (1.5)	21.7 (1.6)
9	29.5 (1.8)	0.018 (0.003)	0.043 (0.014)	0.038 (0.013)	3.0 (1.4)	5.9 (1.5)

* Geometric means and confidence intervals – numbers/100ml.

Bacterial numbers, oxidised nitrogen and DRP in Maketū Estuary tend to increase up to Fords Cut. This is in line with poorer quality freshwater inflows from the river and agricultural drains around the estuary. However, high variability in salinity and water quality at Fords Cut, results in no significant difference between water quality before and after re-diversion. Site 5 shows a significant difference for nutrient levels and salinity pre and post re-diversion, but not for bacterial numbers. Site 9 shows a similar result to Fords Cut with no significant difference for any water quality parameter pre and post re-diversion.

Despite there being no difference in water quality pre and post re-diversion at Fords Cut which is where Kaituna River flows into Maketū Estuary, correlation between salinity and other water quality parameters shows significant relationships. At Fords Cut DRP, NO_x and enterococci all increase with lower salinity (freshwater inflow). At Site 5 DRP, NH₄, NO_x and faecal coliforms all significantly increase with lower salinity. At Site 9 all parameters show the same significant relationship with salinity.

Graphs showing the faecal coliform and enterococci numbers at each of the sites from 1994 to 2011 are set out in Appendix 2.

3.1.2 Recreational shellfish-gathering water quality guideline

Water quality guidelines for recreational shellfish-gathering areas (MfE, 2003) state “The median faecal coliform content of samples taken over a shellfish-gathering season shall not exceed a Most Probable Number (MPN) of 14/ 100mL, and not more than 10% of samples should exceed an MPN of 43/100mL”. The samples collected at Site 9 are in a shellfish-gathering area. Using samples from this site for the period in which re-diversion (100,000 m³ per tidal cycle) has occurred gives a median faecal coliform result of 2/100mL and 7% of samples exceed 43/100mL. This shows that water quality at Site 9 meets the guideline.

3.1.3 Recreational bathing water guideline

Guidelines for recreational bathing water quality (MfE, 2003) require “no single sample to have greater than 140 enterococci/100 mL to remain in green surveillance mode”. Site 9 is nearest to swimming sites around the entrance of the estuary. Since re-diversion of river water back into the estuary the highest enterococci result was 51/100 mL in 2002 at low tide which is well inside the guideline. Fords Cut and Site 5, although not known as swimming sites, are part of the coastal marine area and also meet the guideline.

3.2 Shellfish quality

Levels of total coliform, enterococci and faecal coliform bacteria were measured in shellfish samples from the mid estuary area covering the main shellfish gathering beds to assess bacteriological quality. Data has been collected more or less annually since 1991, hence a set of baseline samples prior to commencement of river re-diversion exist. The data sets are most complete for faecal coliform and enterococci bacteria. Figure 3.1 below shows results for these two groups of bacteria in both cockles and pipi. All results from 1998 onwards are taken with river re-diversion (100,000 m³ per tidal cycle).

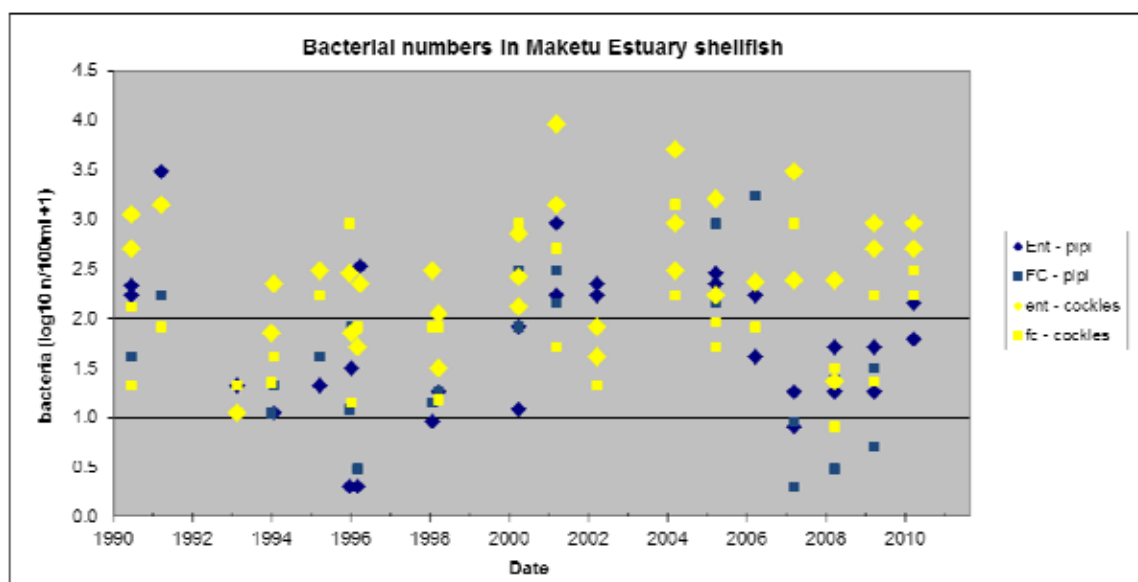


Figure 3.1 Bacterial numbers from 1991 to 2011 in the flesh of cockle and pipi from mid Maketū Estuary shown as log ten transformed data.

An analysis of the log transformed data was made to check for changes over the period of time the river flow has been going through into the estuary and to see if the pre and post re-diversion results are significantly different. Results of that analysis show no significant trends over time for any of the four possible shellfish/bacterial group combinations. The geometric means of both enterococci and faecal coliform bacteria in cockles are lower prior to re-diversion. However, as seen in Figure 3.1 the spread of data is high and T-tests show no significant differences. Geometric mean of enterococci in pipi pre re-diversion is higher than under re-diversion conditions, while the faecal coliform mean is lower. Once again T-tests show no significant differences between the means.

Table 3.2 Bacterial numbers in cockles and pipi from central Maketū Estuary comparing geometric means for samples before and after re-diversion of Kaituna River.

Shellfish	Bacteria (n/100g)	Pre re-diversion	Re-diversion
Cockles	Enterococci	199	397
	Faecal coliforms	61	131
Pipi	Enterococci	65	49
	Faecal coliforms	22	67

Comparison of faecal coliform numbers against the Ministry of Health guideline of a maximum median count of 230/100g or a single sample maximum of 330 shows that both cockle and pipi samples sometimes exceed the single sample limit while both meet the median limit. This result is similar to previous comparisons.

3.3 Shellfish density and size

Shellfish density and size have been monitored at up to five sites in Maketu Estuary in February of 1995, 1997, 1999, 2002, 2005, 2008 and 2011. Sampling of some blocks has not been possible in all years due to channels shifting and taking out the shellfish beds. Site 1 has only been accessed in 2002 and 2011. Cockles are the most widespread and numerous shellfish in the intertidal monitoring sites which means they are the best indicator species to show any changes with the re-diversion of 100,000 m³ of water from the Kaituna River per tidal cycle. Results of cockle density and size have been displayed graphically in Figures 3.2 to 3.9.

At site 2 (Figure 3.2) densities of cockles at both mid tide and low tide plots has declined since sampling started in 1995. Analysis of variance on Site 2 cockle density at low tide showed significant variation between years (P=0.000) with a marked drop from 2002 onwards. Site 2 mid tide cockle densities showed a similar result but densities were lower from 2005 on. The low tide plot was eroded away not long after the 1997 survey and since building back up has experienced a high rate of sand deposition to such an extent it was slightly higher than the mid tide plot. The mid tide plot has also experienced sand deposition migrating in from the entrance, which is likely to be the primary factor for the change in cockle densities. The high tide plot which is least affected from sand deposition has remained relatively stable in terms of cockle densities.

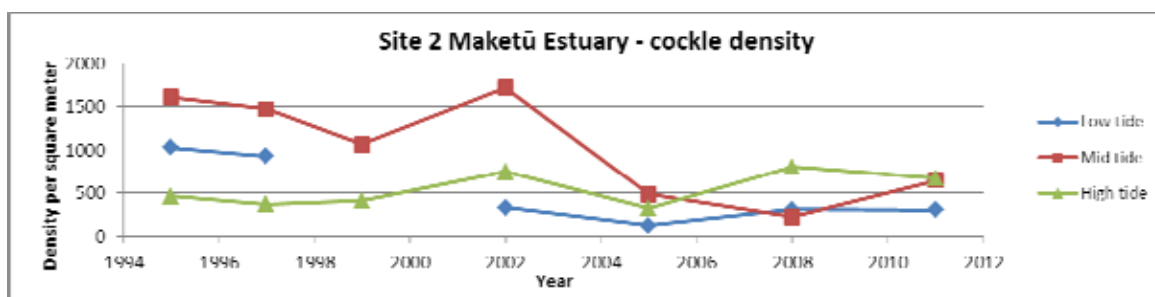


Figure 3.2 Cockle densities from 1995 to 2011 in the low, mid and high tide blocks at Site 2 in Maketū Estuary.

Figure 3.3 shows the maximum and mean size of cockles at all tide levels for Site 2 based on 5 mm length classes. The main change in cockle size at Site 2 from 1995 to 2011 is the smaller mean size at the low tide level. The drop in size at the low tide level matches the loss of habitat (due to shifting channel) around 1999.

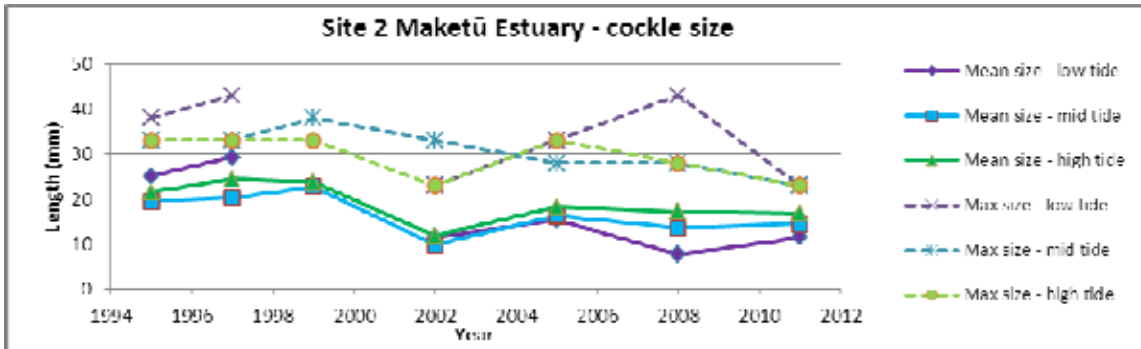


Figure 3.3 Cockle size from 1995 to 2011 in the low, mid and high tide blocks at Site 2 in Maketū Estuary.

At Site 3 densities of cockles surveyed in the mid tide plot has been stable (Figure 3.4). In the high tide plot, which has very little tidal height difference but very stable sediment conditions, densities of cockles have increased from 2008 onwards (analysis of variance – $P = 0.000$). As shown in Figure 3.5 mean cockle size has declined since the 1999 survey at both tidal heights.

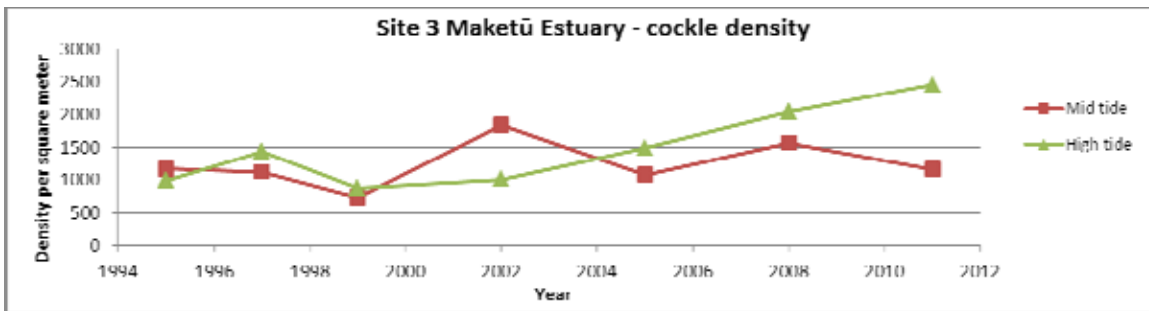


Figure 3.4 Cockle densities from 1995 to 2011 in the mid and high tide blocks at Site 3 in Maketū Estuary.

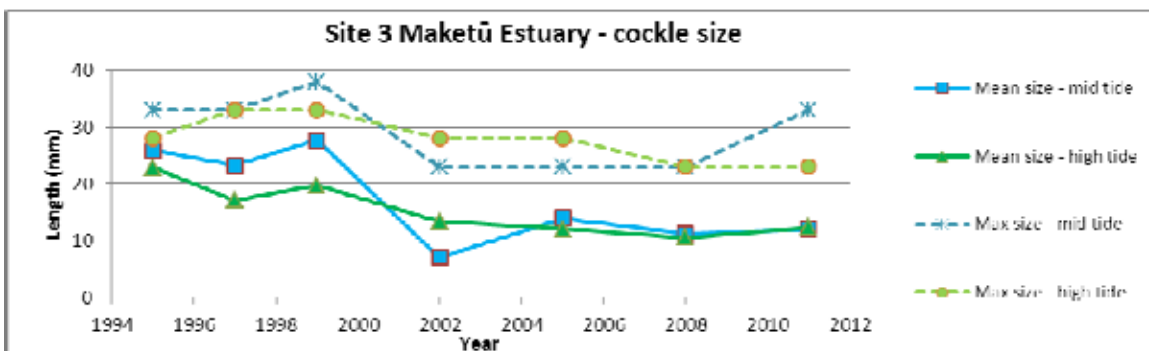


Figure 3.5 Cockle size from 1995 to 2011 in the mid and high tide blocks at Site 3 in Maketū Estuary.

Site 4 has shown minor variations in cockle densities over time (Figure 3.6), particularly in the mid tide block. However, cockle densities for all tide levels remain the same for pre and post re-diversion of the Kaituna River. Size of cockles at Site 4 (Figure 3.7) has shown a reduction of mean size at the low tide level. At the mid and high tide levels there is little change in mean size although a reduction in maximum size at the mid tide level has influenced the mean size.

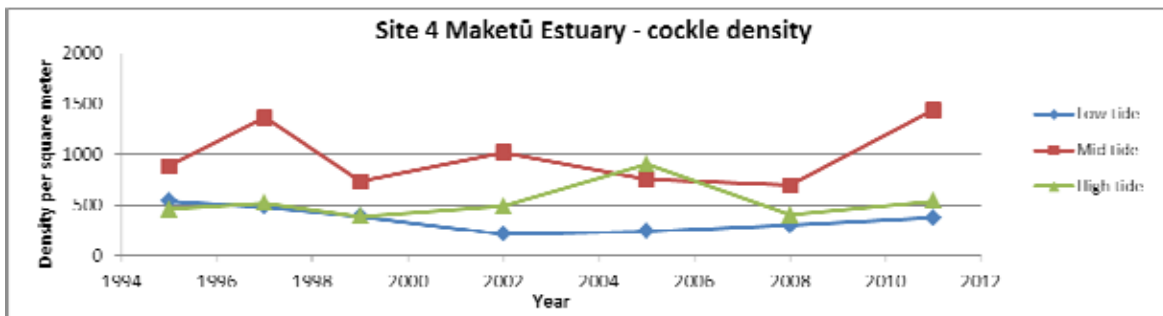


Figure 3.6 Cockle densities from 1995 to 2011 in the low, mid and high tide blocks at Site 4 in Maketū Estuary.

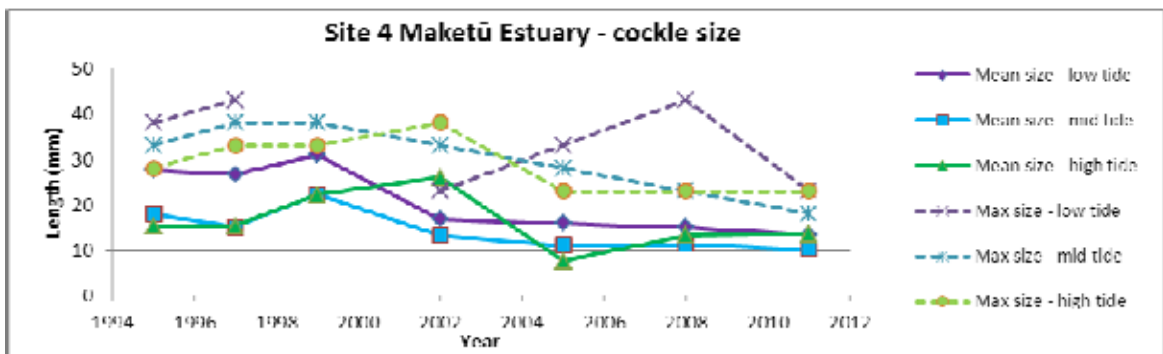


Figure 3.7 Cockle size from 1995 to 2011 in the low, mid and high tide blocks at Site 4 in Maketū Estuary.

Site 5 has shown variations in cockle densities over time (Figure 3.8), particularly in the high tide block which shows an overall increase since 2008 (analysis of variance test, $P = 0.000$) compared to densities prior to river re-diversion. Since the 2002 survey mean cockle size at both tidal levels of Site 5 (Figure 3.9) have declined by around 5 mm.

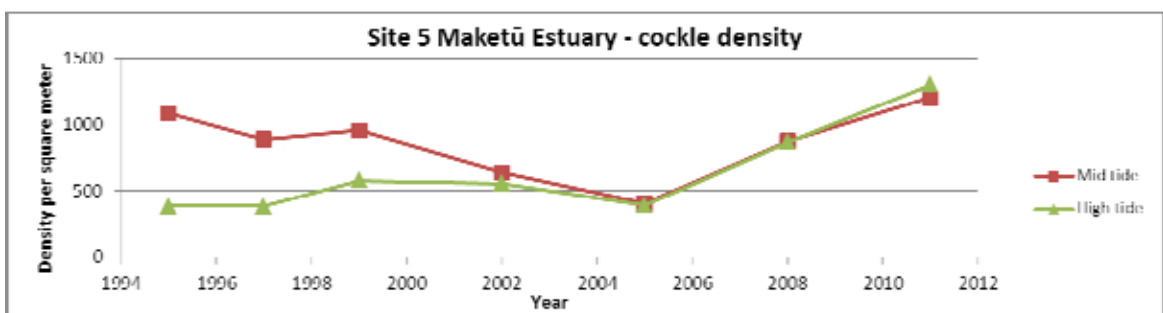


Figure 3.8 Cockle densities from 1995 to 2011 in the mid and high tide blocks at Site 5 in Maketū Estuary.

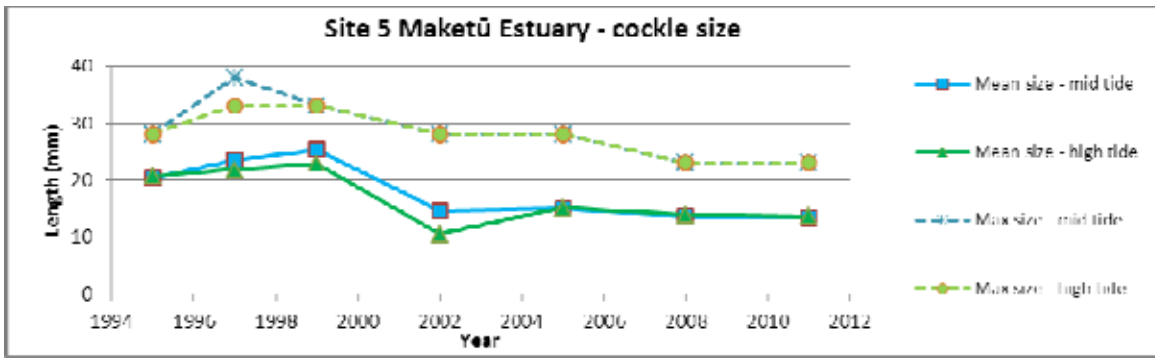


Figure 3.9 Cockle size from 1995 to 2011 in the mid and high tide blocks at Site 5 in Maketū Estuary.

Part 4: Compliance

4.1 Maximum quantity

Condition 3 requires that the quantity of water diverted from the Kaituna River to Maketū Estuary shall not exceed 100,000 m³ per tidal cycle.

Gauging of flows through the diversion structure on 1 March 1996 showed that the quantity of river water flowing through was very close to design flows calculated and allowed for in the consent. However modelling does show that quantities vary with tidal range and during spring tides the flows are above the consented amount. Results for the gauging are presented in McIntosh and Park (1996).

4.2 Monitoring

4.2.1 Water and shellfish quality

Conditions 7.1 and 7.2 of the consent require a range of water quality and shellfish quality monitoring to be undertaken in February each year.

This monitoring has been conducted every year since the last compliance report in 2003. Results of the monitoring are presented in section 3.1 and 3.2 of this report.

4.2.2 Shellfish population health

Condition 7.3 requires the density and size of shellfish to be monitored once every three years at defined sites within Maketū Estuary.

These surveys have been conducted in 2005, 2008 and 2011 as required with results presented in section 3.3 of this report.

4.3 Reporting

Condition 8.1 requires the forwarding of results from the monitoring and surveys to the Bay of Plenty Regional Council within one month of completion. In line with an agreement Between the Department of Conservation and Bay of Plenty Regional the monitoring and reporting is done by Bay of Plenty Regional Council.

This condition has been fully complied with. Under Bay of Plenty Regional Council's new filing software the monitoring results are entered into spread sheets which are linked straight to the compliance folder of the consent records.

Part 5: Discussion and Summary

5.1 Water quality

Analysis of the water quality data from compliance monitoring has shown a clear trend of declining water quality up the estuary. Although it is expected that the re-diversion of river water would contribute to this, variability means there is no significant difference between pre and post re-diversion water quality. Other factors influencing results include a moderate portion of the water entering through Fords Cut being salt water and the drains from agricultural land around the estuary having high bacterial and nutrient loads. In addition bacterial numbers in Kaituna River have significantly decreased since the early 1990's prior to re-diversion (see Appendix 3). Results are also based on sampling each February so it represents drier conditions.

The potential for reduction of water quality in the estuary due to re-diversion is shown by the correlations with salinity. Using the last three years of data from the Te Matai site on Kaituna River gives geometric means for enterococci and faecal coliform of 23 and 72 respectively compared to 16 and 51 at Fords Cut. Full re-diversion of the river would have a much higher influence through the estuary which has been shown by water quality modelling (DHI, 2011) to increase the risk of exceeding guidelines

5.2 Shellfish

A number of the shellfish monitoring plots showed significant changes in density over time. The low and mid tide plots at Site 2 decreased in cockle density while Sites 3 and 5 showed increases at the high tide level. General observations and other shellfish monitoring data from Maketū Estuary highlight sand migration in from the entrance as having an adverse impact. Not only is the mobile sand not suitable habitat for cockles, infilling is resulting in less feeding time due to higher tidal elevation. Infilling of the lower estuary is a response to the lack of river flow and occurred quite rapidly in the past (see "1.2 Background" page 2 of this report) and hasn't yet reached a new equilibrium even with partial re-diversion of 100,000 m³ per tidal cycle as some sand influx has recently occurred. It is most likely that the decline in cockle numbers at Site 2 is entirely due to sand influx and has no link to water quality impacts.

Increases of cockle densities for high tide plots at Sites 3 and 5 are at locations with high sediment stability (little sand migration or sedimentation) and closest to the possible influence of fresh water from the Kaituna River. This strongly suggests that re-diversion has had no adverse effect to date and supports this conclusion for Site 2. However the size of cockles in the estuary has also tended to decline across all the monitoring plots. At some locations such as Site 2 the sand migration will have had an impact and at Sites with larger cockles, fishing pressure has also been high and could account for some of the change. At Site 5 the maximum size of cockles has always been marginal for attractive shellfish gathering and hence rarely fished. In conclusion it would appear that some other factor related to the physical changes in the estuary is reducing cockle size.

5.3 Consent objectives

Some of the key objectives in granting the re-diversion consent relate to restoring the health of the estuary. In particular, slowing the infilling of the estuary by increasing the ebb to flood ratio through the Maketū entrance. This would in turn improve the state and longevity of the shellfish beds. Also the return of freshwater is required for

the re-establishment of marsh areas in the upper estuary. These two objectives were compromised from the outset as only a quarter of the 400,000 m³ per tidal cycle was granted due to concern the water classifications would be breached. While water quality standards for the estuary have been maintained, the reduced flow (100,000 m³) does not appear to be sufficient to stop the estuary infilling, although updated gauging is needed to verify changes over time.

Monitoring of flow into Fords Cut from Kaituna River has also shown that a moderate amount of the water at times is effectively sea water, reducing how much fresh water enters the estuary. To date there is little sign that the very small reduction in salinity is enough to promote a natural re-establishment of the marsh even close to Fords Cut. It has however been beneficial in limiting the sea lettuce blooms that used to reach all the way up the estuary.

5.4 Summary

In summary compliance with all water quality monitoring conditions of Consent 04 0277 for the partial re-diversion of 100,000 m³ of Kaituna River water into Maketū Estuary has been achieved. The influence of the partial re-diversion has been low with no significant adverse impacts being found. Guidelines for bathing and shellfish gathering waters are still being met in the estuary. Adverse impacts on the cockle bed densities have occurred as a result of sand migration into the estuary. Cockle size has also been adversely impacted by an unknown factor possibly associated with the physical changes related to infilling of the estuary. Ecological objectives for the estuary from the re-diversion have not been achieved due to the low re-diversion volume of which only a moderate proportion is freshwater essential for restoration of the estuary.

Part 6: References

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Appendices

Appendix 1 – Copy Consent 04 0277

Consent Number: 04 0277

BAY OF PLENTY REGIONAL COUNCIL

RESOURCE CONSENT

Pursuant to section 105 of the Resource Management Act 1991, **THE BAY OF PLENTY REGIONAL COUNCIL**, by a decision dated 11 June 1998, **HEREBY GRANTS** to:

MINISTER OF CONSERVATION

Department of Conservation
P O Box 1146
ROTORUA

A coastal permit pursuant to section 12 (1) of the Resource Management Act (1991) to **DIVERT WATER FROM THE KAITUNA RIVER INTO MAKETU ESTUARY VIA A CONTROL STRUCTURE AT FORD'S CUT** subject to the following conditions:

1 PURPOSE

For the purpose of diverting Kaituna River water into the Maketu Estuary for enhancement purposes.

2 LOCATION

Fords Cut, upper Maketu Estuary.

3 MAXIMUM QUANTITY

The quantity of water diverted from the Kaituna River to the Maketu Estuary shall not exceed 100,000 m³ per tidal cycle.

4 MAP REFERENCE

NZMS 260 V14 110 774

5 LEGAL DESCRIPTION

Control structure: Road Reserve, Block VI, Te Tumu SD (Western Bay of Plenty District).

Fords Cut: Pt S1, SO38964, Block VI, Te Tumu SD (Western Bay of Plenty District).

6 DIVERSION

Provision shall be made to ensure that the passage of fish through the structure is unimpeded at all times that the gates are open.

7 MONITORING

7.1 In February each year the consent holder shall undertake three surveys over a half tidal cycle, at high tide, mid tide and low tide, at sites 1, 5 and 9 as described in Schedule 1 of this consent, and measure the following parameters:

- i) total coliforms
- ii) faecal coliforms
- iii) enterococci
- iv) ammonium nitrogen
- v) nitrate nitrogen
- vi) total nitrogen
- vii) dissolved reactive phosphorus
- viii) total phosphorus.
- ix) salinity.

7.2 In February each year the consent holder shall sample five shellfish samples (at least two pipi and two cockles) from the central estuary as close as possible to the previous year's sampling site and test for the following parameters:

- i) total coliforms
- ii) faecal coliform bacteria
- iii) enterococci.

7.3 Once every three years, in February (commencing 1999), the consent holder shall measure the mean densities and size of shellfish at the 5 shellfish sampling sites established in the estuary, as described in Schedule 2 to this consent.

7.4 Before 30 July 1998, the consent holder shall establish a relocatable benchmark, in consultation with the Bay of Plenty Regional Council, to enable a detailed cross section to be carried out for the purposes of monitoring sedimentation in the upper estuary.

Consent Number: 04 0277

7.5 Detailed cross sections of the estuary shall be carried out using the benchmark referred to in condition 7.4 at the following times:

- i Before 31 August 1998; and
- ii in August 2004.

8 REPORTING

8.1 The consent holder shall forward the results of the monitoring required by conditions 7.1 to 7.3 within one month of completion of the analyses or monitoring.

8.2 The results of the surveys required by condition 7.5 shall be supplied to the Bay of Plenty Regional Council by 30 August 2004.

9 REVIEW

9.1 The Regional Council may (pursuant to section 128 of the Resource Management Act 1991), within one month of receipt of each years monitoring required under condition 8.1 of this consent, serve notice of its intention to review the conditions of this consent for the purposes of:

- i dealing with any adverse effect on the environment shown by the monitoring required by conditions 7.1 to 7.3.
- ii reviewing the determinands to be monitored and frequency of monitoring required by conditions 7.1 and 7.2.
- iii reviewing the maximum quantity specified in condition 3.
- iv complying with the requirements of a regional plan.

9.2 The Regional Council may (pursuant to section 128 of the Resource Management Act 1991), within one month of receipt of the monitoring required under condition 8.2 of this consent, serve notice of its intention to review the conditions of this consent for the purposes of imposing a condition requiring the control gates to be closed during periods of flooding and/or sea storms.

10 TERM OF PERMIT

This permit shall expire on 30 May 2013.

11 RESOURCE MANAGEMENT CHARGES

The consent holder shall pay to the Bay of Plenty Regional Council such administrative charges as are fixed from time to time by the Regional Council in accordance with section 36 of the Resource Management Act 1991.

Consent Number: 04 0277

12 **THIS PERMIT** is hereby granted under the Resource Management Act 1991 and does not constitute an authority under any other Act, Regulation or Bylaw.

DATED at Whakatane this 20th day of July 1998

For and on behalf of
The Bay of Plenty Regional Council

J A Jones
General Manager

Consent Number: 04 0277

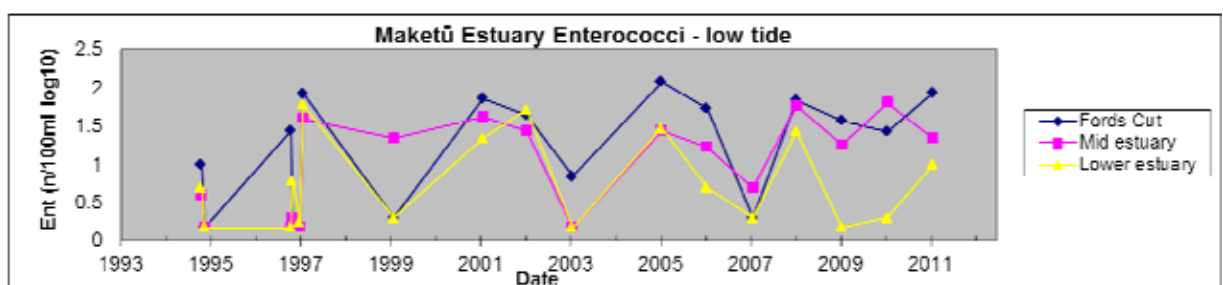
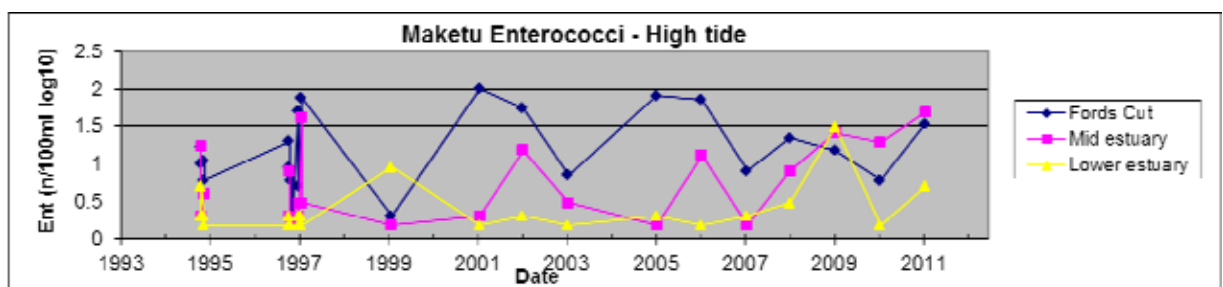
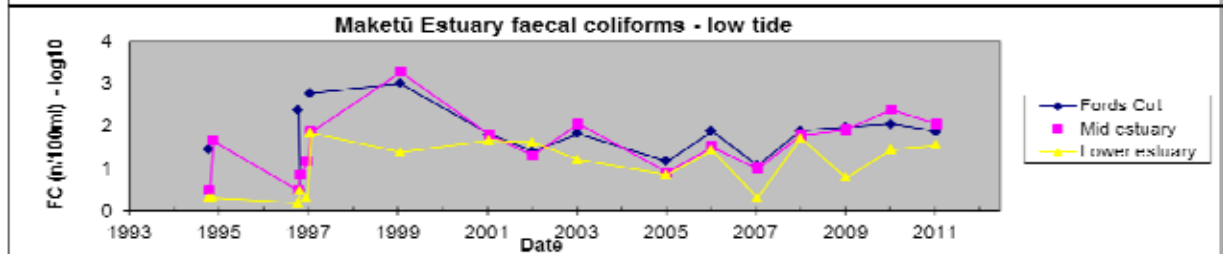
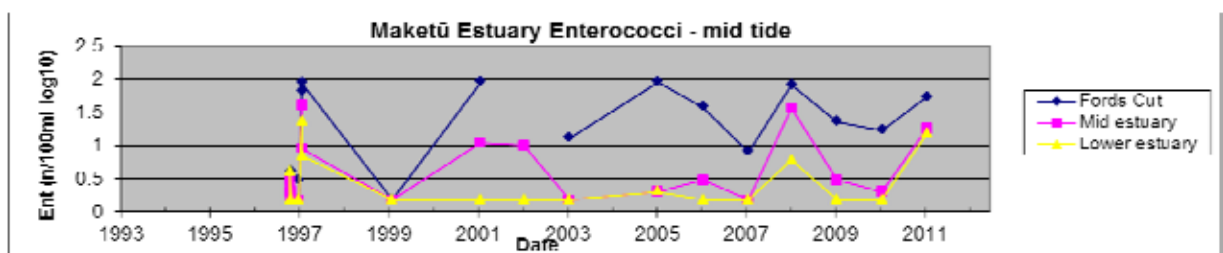
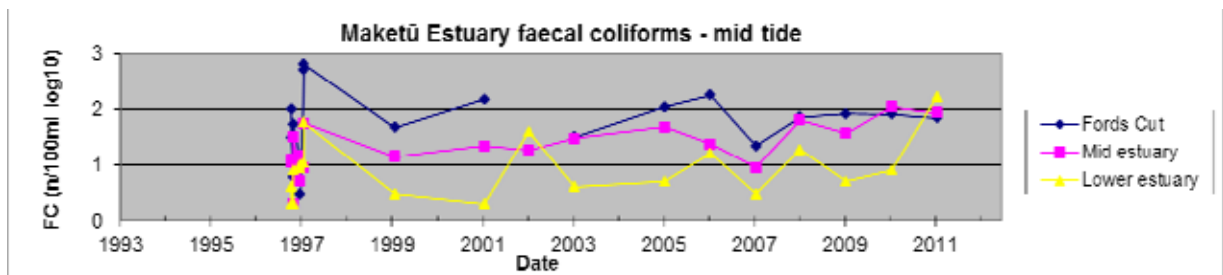
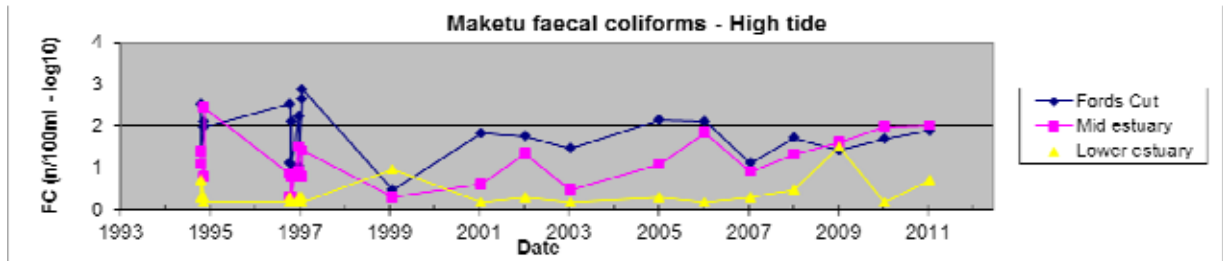
Schedule 1 Water quality monitoring sites in Maketu Estuary for condition 7.1 for Consent 04 0277, based on NZMS 260 series grid plot.

Site	Location	NZMS 260 map reference
Site 1	Fords Cut	U14:1111 7735
Site 5	Mid estuary	U14:1283 7661
Site 9	Mid to lower estuary	U14:1359 7699

Schedule 2 Shellfish monitoring sites in Maketu Estuary for Consent 04 0277, based on NZMS 260 series grid plot.

Location	Relative tide height	Easting	Northing
Site 1	mid tide	2814120.84	6376967.45
		2814139.43	6376962.54
Site 2	high tide	2813598.96	6376905.33
		2813618.88	6376902.00
Site 2	mid tide	2813600.10	6376959.61
		2813620.22	6376957.15
Site 2	low tide	2813600.96	6376997.13
		2813621.06	6376995.14
Site 3	high tide	2813316.53	6376858.14
		2813318.50	6376878.22
Site 3	mid tide	2813239.59	6376825.28
		2813238.44	6376845.16
Site 4	high tide	2812993.14	6377244.81
		2813000.74	6377263.26
Site 4	mid tide	2813044.34	6377217.93
		2813051.73	6377236.55
Site 4	low tide	2813106.69	6377188.96
		2813112.68	6377207.45
Site 5	high tide	2812776.63	6376805.80
		2812782.55	6376824.00
Site 5	mid tide	2812815.71	6376798.20
		2812819.04	6376817.45

Appendix 2 – Graphs of enterococci and faecal coliform bacteria in Maketū Estuary



Appendix 3 – Kaituna River water quality

