Summaries of Environment Division technical investigations and data relating to Waitohu Stream and catchment

Written by Frances Forsyth for Greater Wellington

January 2005

Table of contents

Blaschke, P. & Forsyth, F., 2004: Ecological assessment of the Waitohu Catchment and Stream, Kapiti Coast. Report for Greater Wellington Regional Council. 3

Kingett Mitchell Ltd 2004: aquatic ecology and stream management groups for urban streams in the Wellington region. Unpublished report prepared for Greater Wellington. 4

Caleb Royal 2003:Stream monitoring and the development of Mäori cultural water quality indicators: a project of Te Wänanga o Raukawa. Unpublished report for Greater Wellington Regional Council. 5

Minimum flow review for Waitohu Stream 6

Forsyth, K., Sevicke-Jones, G., Jongens, R., Hastings, K., Gibson, J., 2004: Selecting catchments for streamside management assistance. Report prepared for the River Ecosystems Group of Greater Wellington. 8

Iose, A., 1999: Waitohu walkover notes. Part of Kapiti streams study. Draft unpublished report, Resource Investigations Department, Wellington Regional Council. 9

Waitohu Fish. Based on NIWA data, Royal & Pataka, & notes by Murray McLea. 10

Water quality 11

Waitohu catchment wetlands: brief descriptions from the database 14

Blaschke, P. & Forsyth, F., 2004: Ecological assessment of the Waitohu Catchment and Stream, Kapiti Coast. Report for Greater Wellington Regional Council.

This desktop report investigates significant biological communities in the catchment and the ecological processes and characteristics associated with them. It offers management actions for improvement of water quality and ecological health, and priorities for action.

The consultants identified six significant types of community:

- Forested hill country in the upper catchment,
- Remnant lowland native forest as identified by the Kapiti Coast District Council Ecosites,
- Remnant wetlands and dune swamps as identified by the Kapiti Coast District Council Ecosites,
- Instream,
- Riparian, and;
- Estuarine communities.

They identified the complex relationships between the terrestrial and aquatic, plant and animal communities. The extent of fragmentation in the lower part of the catchment means that the only significant connection between communities here is Waitohu Stream, including the tributaries. Significant inputs of fine sediment and nutrients, and lack of appropriate riparian vegetation contribute to a degradation of ecological communities in and around these vital corridors.

They conclude that the greatest improvements to the ecological health of the catchment will stem from actions focussed on the lowland areas and not in the forested hill country. These would include:

- Nurturing opportunities for restoration of terrestrial vegetation,
- Managing flood control measures to minimise disturbance to instream and riparian communities,
- Reducing fine sediment inputs by controlling runoff and streambank erosion,
- Managing rural subdivision to prevent further loss or fragmentation of remnant and regenerating vegetation,
- Identifying and controlling pollutant discharges to the stream and groundwater, and;
- Educating local residents and providing information of the natural values of Waitohu Stream and catchment.

Kingett Mitchell Ltd 2004: aquatic ecology and stream management groups for urban streams in the Wellington region. Unpublished report prepared for Greater Wellington.

This report is an extension of a 2003 report that investigated 13 streams in the Wellington region. The current report investigates a further 13 streams including Mangapouri Stream, a tributary of Waitohu Stream. The objectives of the investigations were:

- What are the significant ecological characteristics of the streams and/or stream sections?
- What streams/locations require greater protection than others?
- What are appropriate management objectives for the streams/catchments?

The consultants classified the 26 combined 2003-2004 stream sites according to macroinvertebrate community using a TWINSPAN analysis. This divided the streams into seven groups ranging from:

Group One: upper catchment, well-shaded, small forested streams with diverse macroinvertebrate communities made up of relatively 'clean water' taxa (high MCI scores), to;

Group Seven: lower catchment, urban, moderate large streams low diversity communities containing pollution tolerant taxa (low MCI scores)

Mangapouri Stream (along with 11 others from the region including Waiwhetu Stream) fell into *Group Seven*. It had poor riparian vegetation comprising more than 90% grass or pasture, and only three EPT taxa (pollution sensitive invertebrates) that made up less than 1% of the total invertebrate community. Mean QMCI values indicate probable severe pollution.

The consultants then divided the streams into five groups for stream management purposes. Mangapouri Stream catchment is roughly 60% pastoral and falls into *Management Group Three*: urban and rural semi-modified streams that flow through urban and rural landuse where there is some bed scouring and sections of the banks are erosion-prone. They recommend that streams in this group should be managed to sustain a viable and diverse native fish community; and a moderate to high community of pollution sensitive invertebrates (high EPT), by:

1. Maintaining water quality to reduce oxygen depletion, lower water temperatures, reduce excessive algal and macrophytic growths, and reduce the influence of stormwater flows as far as practicable.

2. Improving bank stability by providing up to 50% overhead shading for the stream so that low stature native species may grow.

3. Maintaining at least 5 EPT taxa (pollution intolerant invertebrates) and the invertebrate community comprises at least 10% EPT.

4. Maintaining the diversity of other benthic (streambed) species.

5. Provide sufficient habitat for resident fish species, including migratory fish as appropriate.

6. Preventing stock access to streams where appropriate.

Caleb Royal 2003:Stream monitoring and the development of Mäori cultural water quality indicators: a project of Te Wänanga o Raukawa. Unpublished report for Greater Wellington Regional Council.

Caleb Royal, Pataka Moore and students of Te Wänanga o Raukawa tested water quality in Mangapouri Stream, a tributary of Waitohu Stream. The group used a SHMAK kit to collect data over a 15 month period Stream between March 2002 and June 2003. Data were collected from three sites near the Wänanga, and downstream from Otaki township, and show that the stream faces pressure from high nutrient loading, low dissolved oxygen and high water temperatures.

The impact these pressures have on the stream is reflected in the low species diversity. Native fish and koura numbers were compared with anecdotal records that showed a considerable decline in populations over the last fifty years. The health of fauna in the stream is also poor with many eels showing symptoms of disease such as skin lesions and fin rot. Koura (freshwater crayfish) have low fertility when compared with populations in Waitohu Stream.

Royal, Moore and their students also observed poor water clarity due to dissolved sediment and peat staining, lack of macroinvertebrate habitat due to siltation of the cobbled streambed, and extensive areas of aquatic and terrestrial weeds. Aquatic weeds tend to proliferate where water nutrient levels are high and stream currents are slow.

Table One: Mean water quality values from three sites on the Mangapouri Stream between March 2002 and June 2003.

	Oxygen mg/l	O% saturation	Phosphate mg/l	Nitrate mg/l	Ammonia	pH	E. coli/100ml
Min	0.8	3.3	0.1	0	0	4.87	20
Mean	4.8	47.4	1.1	10.6	0.2	6.4	573
Max	11.5	117.0	10.4	30.1	2.57	7.51	5500

Note, phosphate levels fluctuated according to rainfall and fertiliser application in nearby pasture. Very high levels of E. coli were recorded several times during or after significant rainfall events.

Table Two: Monthly water temperatures (degrees C) in Mangapouri Stream from March 2002 – June 2003.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Min	No data	No data	13.6	13.2	12	12.4	11.3	12.4	13.2	12.3	13.5	14.8
Mean	No data	No data	15.3	14.5	13.3	13.3	12.0	13.6	14.2	12.8	14.4	15.1
Max	No data	No data	17.1	16.5	15.5	14.2	12.7	14.2	15.8	14.1	15.3	15.3

This data was collected over a very brief time period and has a number of gaps.

Minimum flow review for Waitohu Stream

This study has arisen out of concerns that low flows are compromising the life-supporting capacity of ecosystems in and around the stream. The Regional Freshwater Plan (1999) designates that Waitohu Stream be managed for aquatic ecosystems purposes. The minimum flow that should be achieved in low flow conditions in Waitohu Stream is set at 140 l/s. Water restrictions come into force when the flow at the gauging station falls below the second setdown level of 150 l/s. A 2000 investigation of ecosystem health in the stream (Robertson) highlighted how frequently flow was less than 140 l/s (17 times between March 1999 and February 2000). Subsequently, a water supply take from the stream for Otaki township was discontinued.

During summer droughts the flow lost to groundwater just below the rail bridge is sufficient to cause the stream to run dry (Fig. One). Resource Investigation Hydrologists are reviewing instream flow requirements but the project has been postponed due to a lack of low flows in 2003-2004 and again this summer (2004 2005).

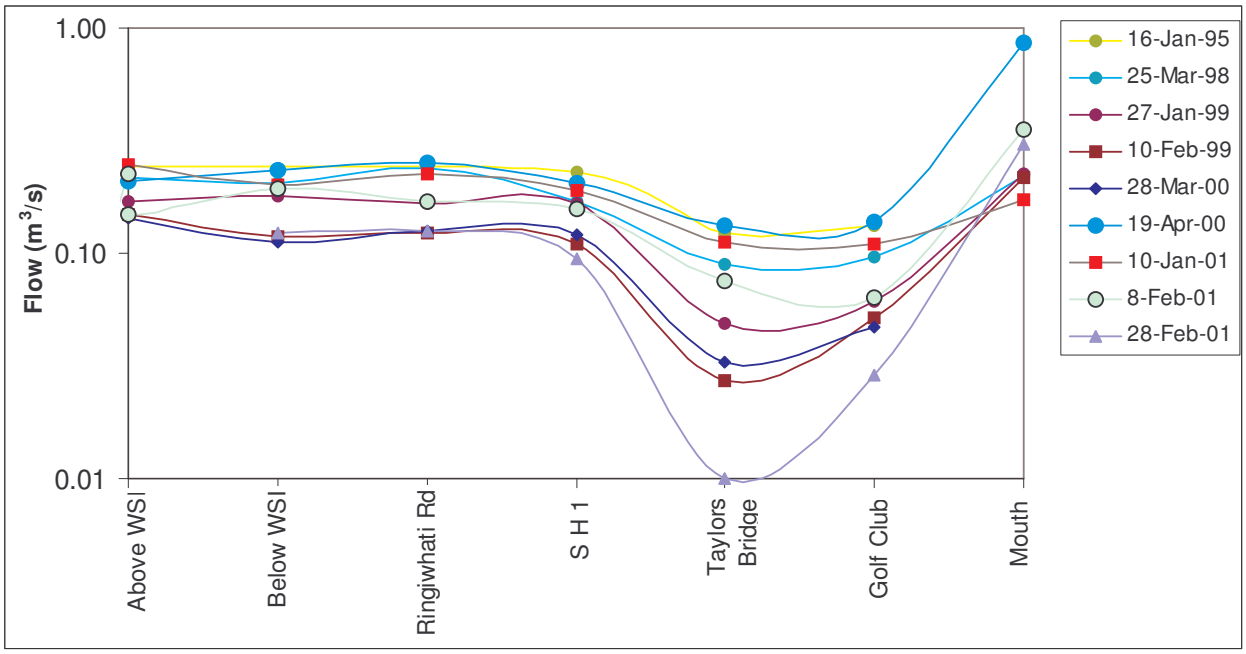


Figure One: Concurrent gauging results for Waitohu Stream showing loss to groundwater near Taylors Bridge (not to scale).

For the purposes of the study the stream has been divided into four reaches (Figure Two). Once an environmental objective has been decided for the stream, eg habitat for fish that are known to live there, then the actual available habitat during low flows will be measured at various places. A low flow will then be recommended that will provide habitat for those fish, except in severe droughts.

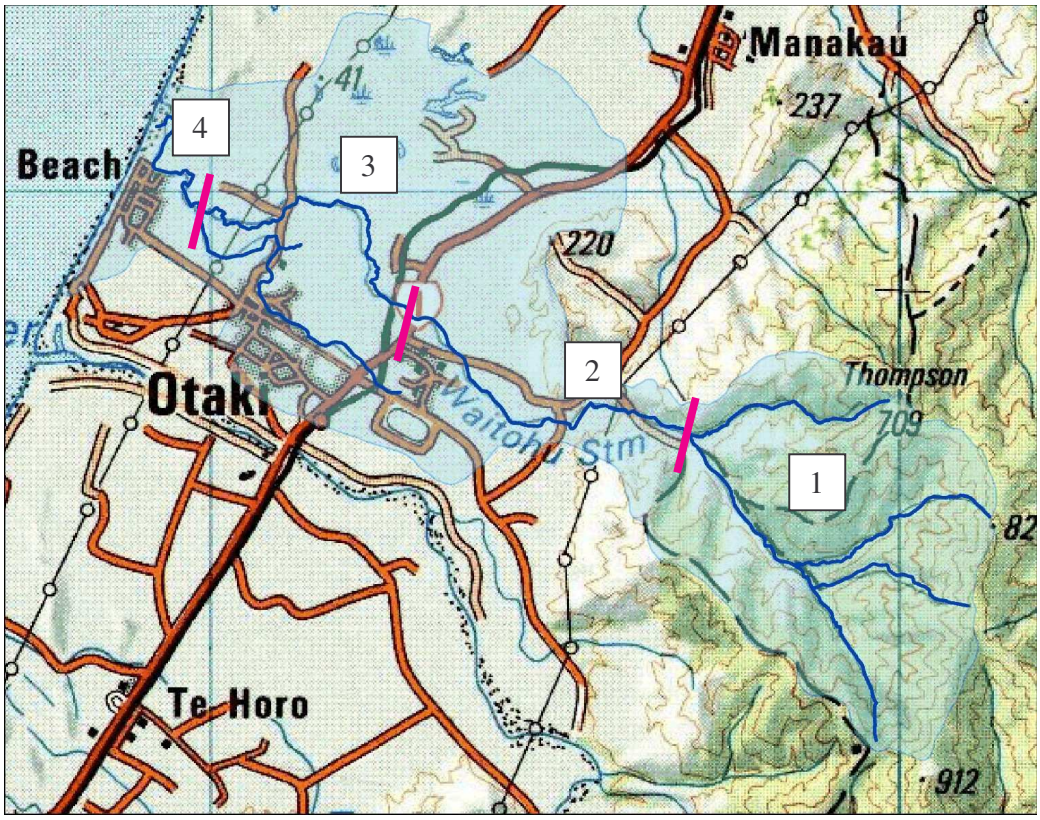


Figure Two: Reaches in the Waitohu Stream for which instream flow objectives will be determined.

Forsyth, K., Sevicke-Jones, G., Jongens, R., Hastings, K., Gibson, J., 2004: Selecting catchments for streamside management assistance. Report prepared for the River Ecosystems Group of Greater Wellington.

The Greater Wellington Riparian Management Strategy (2002) includes criteria to select the streams that will be given assistance for riparian management and what that assistance will be. Waitohu Stream was one of 14 streams selected. Briefly, the criteria are:

- Current high levels of aquatic habitat can be improved,
- Assistance will also successfully address degraded habitat in the catchment,
- The stream will work as a functioning ecosystem for aquatic life that would naturally live there,
- Once rehabilitated it will provide effective links or corridors from sea or lake, and;
- The selected streams are representative of the regional range of stream types.

The criteria were applied in two stages using Geographical Information Systems (GIS) modelling. *Stage One* short-listed a selection of streams with high quality habitat where riparian management should be effective at rehabilitating degraded areas. *Stage Two* applied scores for ecological diversity that could exist in the short-listed catchments. For the third and final stage of the process a panel reviewed the short-listed catchments and checked the GIS desktop results against actual stream and catchment conditions with the aim of reducing the number of catchments to ten.

Table One: Functioning ecosystem potential, Waitohu Stream (4,500 ha).

Length of most at-risk stream (km)	Percentage indigenous and exotic forest	Connection to sea, lake or river	Inanga spawning capability	Likely fish species present[1]	Likely invertebrate species present[2]
12.7	47.7	Tasman Sea	Low: too sandy	16	30

Table Two: Potential of Waitohu stream to provide ecological links and corridors.

KNE (ha, %)	Covenant (GW or DoC (ha, %)	GW supported restoration or GW land	LENZ types[3]	REC types[4]	Eco domains[5]
12.89, 0.28%	1661.34, 36.27%	2 Care Groups GW land (6.8 ha)	7	7	4

[1] The number of fish species (out of a possible 18) with a >50% chance of occurring for more than 200 metres of stream length.
[2] The number of invertebrate species (out of a possible 36) with a >50% chance of occurring for more than 200 metres of stream length.
[3] This exercise used 11 Environment Classes identified in the region, based on climate landform and soil.
[4] This exercise used 18 River Environment Classes based on climate, source of flow and geology.
[5] This exercise used 35 Ecodomains based on geology, geomorphology, climate, biology and local knowledge.

Iose, A., 1999: Waitohu walkover notes. Part of Kapiti streams study. Draft unpublished report, Resource Investigations Department, Wellington Regional Council.

During the six month period from January to June 1999 a survey was undertaken in the Kapiti Coast District of six streams: Waimanu, Wainui, Waimeha, Mangaone, Wharemauku and Waitohu. Each survey ascertained the number and location of water takes and inventoried physical characteristics of each reach, including riparian vegetation[6]. Regional Council Officers walked the length of the streams noting riparian vegetation, stream substrate and banks, erosion and other physical impacts within each reach.

Council Officers were particularly interested in water demand during low flow conditions. Because of this, stream gauging to ascertain flow was carried out in May, several weeks before the survey. At this time Waitohu Stream had a mean flow in each reach of between 329-255 l/s[7]. There were eight surface water takes in the Stream, three with current consents, two with expired consents and three unconsented takes. The Officers concluded that abstracted water was replaced by input from tributaries during the winter months when the survey was carried out. However, they suggest that low flows in the tributaries, and groundwater recharge from the main stream channel of approximately 80 l/s, means these water takes may exacerbate low flows in the main stream channel during the summer.

Twenty five reaches were walked from deep in the forested part of the catchment to the estuary. Cattle had access to the stream from one or both banks in 15 of the reaches. In nine reaches stock access was associated with erosion and in five reaches this erosion was frequent or severe. Those reaches with stock access but without erosion either had no stream banks or banks that were well vegetated with willows. There were only four instances of erosion that were not directly associated with stock access:

1. opposite a field drain discharging to the channel, riparian vegetation above erosion is pasture,

2. under pasture on the TLB where the length of the TRB was planted with willows,

3. opposite the quarry, under pasture, and;

4. under pasture.

Engineered streambank protection had been installed in parts of one or both banks along six reaches but four of these reaches still suffer from stock associated erosion.

Only four reaches had willows and or native forest vegetation on both banks. Seventeen reaches had pasture along most of one bank, and one had pasture on both banks. A further two reaches had inadequate riparian vegetation comprising occasional shrubs, rank grass and weeds on both banks.

The stream had been excavated at four sites: once to create a bund for the quarry, once to create a stop bank and twice in the stream bed itself (reaches 8-9 and 12).

---

[6] A *reach* is defined by marked changes of the vegetation or substrate.

[7] This compares with a mean annual flow at the recorder (reach three) of 680 l/s, with MALF of 140 l/s and a typical flood of 45,000 l/s (data supplied by GWRC, 18 February 2004).

Waitohu Fish. Based on NIWA data, Royal & Pataka, & notes by Murray McLea.

There are over 40 years of records in the New Zealand freshwater fish database for this catchment. Surveys have been carried out in all decades since the 1960's and a reasonably consistent picture of the fish that are present has emerged. Eighteen species have been recorded over this time as well as the koura (freshwater crayfish).

Fourteen native fish species have been recorded. Four of these (shortjaw kokopu, giant kokopu, lamprey and longfin eel) have such low numbers nationally that they require conservation action. Shortjaw kokopu are found in the upper reaches of the stream and favour clear, swiftly flowing water, giant kokopu are found in the mid reaches and prefer pools or gently flowing water. Both species migrate from the sea as juveniles. They face fishers and degraded stream conditions before reaching their preferred habitat. Few giant kokopu have been found in recent years although historically this has been a common food species for local Maori. One lamprey has been recorded in the lower reaches of the Waitohu and they are no longer seen in the Mangapouri tributary. This species requires a gravel bed to spawn so siltation may be an issue. Longfin eel are considered to be threatened by over fishing but are common in this catchment. Shortfin eel are also present. The nationally threatened brown mudfish has not been recorded since 1954.

Low numbers of inanga are found in the stream. This species makes up over 95% of the whitebait run. Inanga spawn in or near the saltwater wedge that extends far upstream during a king tide, laying their eggs on riparian vegetation such as grass, sedge or flax. Taylor and Kelly [8] rated the catchment unsuitably sandy for inanga spawning. However, Murray McLea (GWRC) believes that the scientific parameters used for spawning habitat in this assessment are too narrow, and that prospects for inanga are better than those portrayed by Taylor & Kelly. This view is supported by local Maori.

There are four other species that make up the whitebait run (shortjaw kokopu, giant kokopu, koaro and banded kokopu), these are known collectively by Maori as korohe. Koaro, recently recorded in the upper catchment (2002), is a strong swimmer, navigating many barriers to reach high altitudes, far inland. Whitebait were, historically, a valuable for food resource in the catchment and are regarded by Maori as taonga.

Three species of bully are known in the catchment. Common bully is rare in the lower stream channel but it is abundant in Lake Kopuherehere. This species was also abundant in Lake Waitawa in the 1960's but is now rare there, possibly due to the introduction of perch. Redfin bullies are often present in the middle and upper reaches of the catchment but populations are small. Upland, or non-migratory, bullies were present in the lower catchment in the early 1990s but have not been recorded recently.

Torrent fish occur in the middle reaches where as their name suggests they prefer faster flows. Several weirs in the stream may prevent this species from moving further upstream.

Four introduced fish species are present in the catchment, perch, tench, rudd and brown trout. These compete with native fish for small insect larvae and crustacea. Larger perch also feed on small native fish.

---

[8] Taylor, M.J. & Kelly, G.R., 2001:Inanga spawning habitats in the Wellington region and their potential for restoration. Report prepared for GW by NIWA.

Water quality

The reference site for the Waitohu Stream is at the entrance to Tararua Forest Park and has been monitored since the early 1990s. Another site near the estuary was established at the same time, but was moved slightly upstream away from the influence of saltwater in September 2003. At the same time two new monitoring sites were established on the Mangapouri, an urban tributary of the Waitohu that arises from a spring near Otaki racecourse. The Mangapouri Stream had unexplained poor water quality that the Council felt warranted investigation.

No report on water quality has been produced since these changes were made. As a result this summary is based on an analysis of 12 months of raw data collected for Greater Wellington between September 2003 and October 2004, and summaries from the Wellington Regional Council 2000-2001 State of the Environment Report and baseline water quality reports.

Physico-chemical (pH, temperature etc) results for the refernce site indicate good water quality and this is confirmed by Macroinvertebrate Index (MCI) scores. Water quality deteriorates in both downstream reaches and is at its worst in the lower reaches of the Mangapouri. For each of the characteristics listed below in Table One, except turbidity and total nitrogen, this site has the poorest results of the catchment.

Table One: Water quality at four sites in the Waitohu catchment based on data collected between September 2003 and October 2004.

Physico-chemical and biological characteristics	**Waitohu at Forest Park**	**Mangapouri near SH1**	**Mangapouri below Otaki township**	**Waitohu near estuary**
Median temp (°C)	10.6	12.4	13.7	12.7
and range	7.0-16.6	10.4-15.7	10.1-18.4	9.4-17.9
Median pH	7.4	6.9	6.9	6.9
and range	7.2-7.7	6.8-7.3	6.5-7.2	6.2-7.3
Median conductivity µSiemens/cm	83.6	216.0	227.9	143.7
and range	77.0-93.9	202.4-222.4	159.3-239.5	117.8-209.2
Median percent O2 saturation	99.8	86.2	82	87
Number of times the O2 saturation level fell below 80%	0/14	1/14	7/14	3/14
Median turbidity (NTU)	0.8	7.2	6.9	4.9
and range	0.4-6.5	4.4-15.0	4.0-19.3	1.9-8.3

Physico-chemical and biological characteristics	Waitohu at Forest Park	Mangapouri near SH1	Mangapouri below Otaki township	Waitohu near estuary
Median dissolved reactive phosphorus (mg/L)	0.007	0.012	0.020	0.011
and range	0.005-0.012	0.006-0.033	0.005-0.063	0.005-0.021
Median total nitrogen (mg/L)	0.10	8.37	3.59	1.12
and range	0.05-0.17	4.41-10.10	1.19-4.77	0.48-1.69
Median faecal coliforms (n/100ml)	11	370	1,150	260
and range	1-92	60-3,700	320-30,000	60-760
Median E. coli (n/100ml)	6	270	690	240
and range	1-87	20-3,500	200-19,000	40-640
Mean QMCI	7.99 +/- 0.04	4.48 +/- 0.31	4.67 +/- 0.02	4.65 +/- 0.24
Mean MCI	145 +/- 4.73	84 +/- 5013	79 +/- 2.31	108 +/- 7.81

Note: High readings for faecal coliforms and E. coli were not always associated with rainfall in the previous 24 hours. However, the highest figures for the lower Mangapouri, were recorded after rain.

Change in water quality in Waitohu Stream over the last five years is difficult to gauge. Comparing 2000-2001 with 2003-2004, there appears to have been some improvement at both sites. Mean MCI scores at Forest Park have increased from 140 +/- 6.0 in 2000-2001 to 145 +/- 4.73 in 2003-2004. Scores over 120 indicate good water quality. At Norfolk Crescent near the estuary, turbidity is down (from 8.8 to 4.9) and faecal coliforms are down (from 750 to 260). There were also fewer occasions when oxygen saturation fell below guideline levels (3 out of 14 occasions in 2003-2004 compared with 7 out of 15 occasions in 2000-2001).

Due to the large margin of error in the data set and the lack of comparative data it is not possible to determine whether or not there has been a change in levels of dissolved reactive phosphorus (DRP), (Table Two). Current DRP levels are sometimes higher than the recommended guideline, particularly in the Mangapouri Stream. The ANZECC 2000[9] guideline for DRP sets a default trigger point of 0.010 mg/L for lowland streams. Trigger values are used to assess risk of adverse effects due to nutrients, biodegradable organic matter and pH in various ecosystem types. It is not possible to know how much any of the above changes are due to relocation of the sampling site.

[9] Australia and New Zealand Environment and Conservation Council, 2000: Australian water quality guidelines for fresh and marine waters. ANZECC. Canberra.

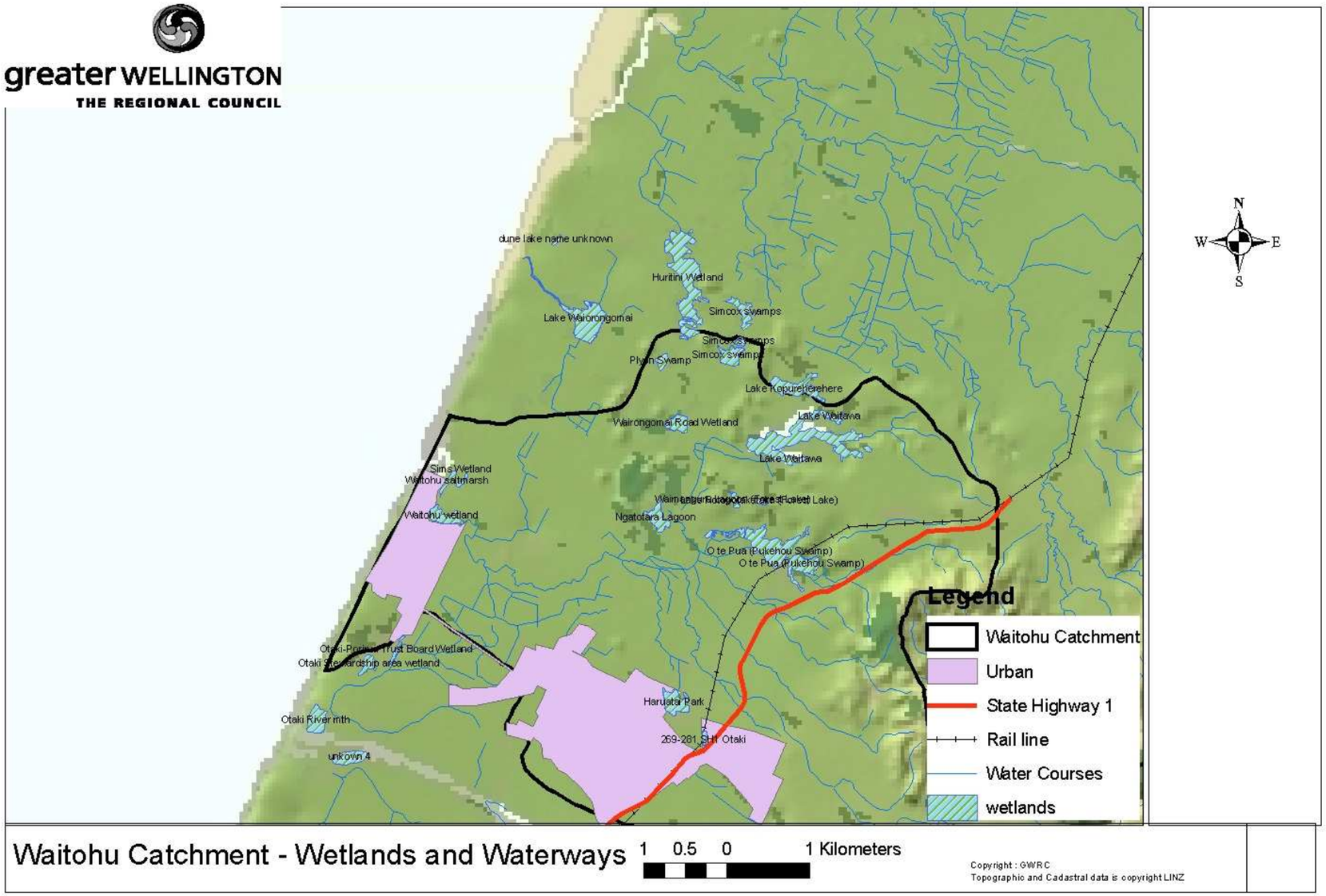
Table Two: change in levels of dissolved reactive phosphorus (DRP) in the Waitohu near the estuary (site 621), 1994 to 2004.

	1991-92[10]	**1994-95**[11]	**1995-96**[12]	**1997-98**[13]	**1999-00**[14]	**2003-04** Note: new site
Median DRP (mg/L)	<0.010	No median	0.005	No median	0.010	0.011
Mean		No mean	No mean	0.010	No mean	0.012 (STDEV 0.005516)
And range	<0.010-<0.010	0.005-0.020	0.005-0.010	no range	no range	0.005-0.021

Community water quality testing was carried out at three sites between June 2000 and February 2003 by the Waitohu Stream Group. This group used a SHMAK kit two or three times a year to test water quality and the results are entered into a Greater Wellington database. Invertebrate and habitat scores for each sampling date are then aggregated into a graph depicting overall stream health and change over time.

The reference site for the community project is Waitohu Stream at State Highway One where the overall stream health score ranges from excellent to moderate with no overall trend. The second site is at the Golf Course bridge, above the confluence with the Mangapouri. Overall stream health ranges from very good to very poor with a downward trend over time. The third site on the Mangapouri was tested on two occasions in 2000, when overall stream health was rated very poor.

[10] Baseline water quality of streams and rivers in the Wellington region 1991/1992
[11] Baseline water quality of streams and rivers in the Wellington region 1994/1995.
[12] Baseline water quality of streams and rivers in the Western Wellington region 1995/1996.
[13] Baseline water quality of streams and rivers in the Western Wellington region 1997/1998
[14] Baseline water quality of streams and rivers in the Western Wellington region 1999/2000.



Waitohu catchment wetlands: brief descriptions from the database

Name	Area (ha)	Type	Hydrology comments	Notable vegetation and fauna
Simcox Swamps	10	Ephemeral wetland	Large change to natural hydrology. Most of catchment modified.	Manuka scrub with open areas of Sphagnum and Isolepis prolifer
Pylon Swamp	12	Ephemeral wetland with open-water	Severe historic drainage, grazed	Two small clumps of bamboo spike-sedge, uncommon in the region. Records of Australasian bittern.
Lake Kopureherehere	20	Open-water, wetland-dryland forest	Convoluted dune lake grazed to the edge. Fluctuating levels exacerbated by irrigation takes.	Raupo reedland, tawa forest and kahikatea/pukatea forest. Considrable exotic tree species, gorse and hornwort.
Lake Kaitawa	25	Open-water, wetland-dryland	Convoluted dune lake, adjacent pasture is drained. Popular water sports area.	Raupo reedland, manuka wetland, sedgeland and kahikatea. Camping ground, boatsheds and jetties. Gorse, willow, blackberry, hornwort and waterlily.
Waimangaru Lagoon (Forest Lakes)	5	Open-water and wetland	Water levels appear to have been higher in the past.	Raupo reedland, sedgeland, bamboo spike sedge, azolla. Exotic trees and pine plantation. Some edges grazed.
Rotopotakataka Lake (Forest Lakes)	5	Open-water, wetland dryland	Modified lake, some fingers recently created. Lake levels appear higher than historically. Irrigation water take.	Mixed indigenous/exotic, mown grass. Sedgeland, flaxland. Tradescantia.
Ngatotara Lagoon	15	Open-water and wetland.		Raupo reedland, flaxland, crake habitat.
O te Pua (Pukehou Swamp)	20	Wetland, little open water.	A drain cuts through the middle of this wetland. Constructed ponds near Taylor's Rd	One of the largest wetlands remaining in the Ecological District. Harakeke, flaxland, swamp forest. Japanese honeysuckle.
Haruatai Park	10	Dune swamp forest	Grazed edges.	Kahikatea, pukatea and tawa. Rank pasture, gorse, blackberry, tradescantia and climbing asparagus.
269-281 SH1 Otaki	<5		Constructed pond at one end.	Very small, raupo reedland, sedgeland.
Otaki Stewardship Area Wetland	27.6	Dunes and wetlands	Dune swale behind Recent dunes	Small sedgeland wetland in a much larger dune area with plantation pine and macrocarpa.
Otaki-Porirua Trust Board Wetland		Dunes and wetlands	Dune swale behind Recent dunes	A second wetland within the above dune complex. Both of these wetlands are part of Kapiti Ecosite K176
Waiorongomai Rd Wetland				No information on this site.
Sim's Wetland		Not known	Owner maintains as a duck pond.	Access to site not forthcoming.
Waitohu Wetland	0.3	Saltmarsh	Water levels fluctuate less than historically due to flood protection work at the stream mouth. Previously cleared and grazed.	Significant reedland sedgeland, grassland and herbfield part of a 12 ha area known as Waitohu Rivermouth. Supports 25 species of birds including Australasian bittern.
Waitohu Saltmarsh		Saltmarsh	Water levels fluctuate less than historically due to flood protection work at the stream mouth. Grazed.	Reedland sedgeland, grassland and herbfield