

NORTHLAND RIVERS HABITAT ASSESSMENT

2008 - 2010



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Northland Regional Council
Private Bag 9021
Whangarei 0140
Freephone: 0800 002 004

**NORTHLAND
REGIONAL
COUNCIL** 

EXECUTIVE SUMMARY

River habitat assessments are undertaken biennially by the Northland Regional Council (the Council) at a selection of sites on rivers around the region. Sites assessed are all in the Regional River Water Quality Monitoring Network (RWQMN).

Habitat assessments follow the protocol detailed in Pfankuch D. J. (1975), 'Stream Reach Inventory and Channel Stability Evaluation'. This allows for the quality of the riparian environment to be assessed (stream health), along with an estimate of the amount (quantity) of different habitats present and the stability of the environment.

Other data collected by the Council is used to aid interpretation of results from the habitat assessments. This includes water quality data collected through the RWQMN and results from the Council's macroinvertebrate monitoring programme.

This report presents the results from habitat assessments undertaken in 2008 and 2010. A total of 25 sites were assessed in 2008 and 35 sites in 2010. Also included in this report is some provisional trend analysis of results from the last four rounds of sampling (2005, 2007, 2008 and 2010).

In 2008, no sites recorded excellent stability, eight sites recorded good stability, 15 sites recorded fair stability and two sites recorded poor stability. The two most stable sites were the Waipoua River and Waipapa River at Forest Ranger.

Also in 2008, no sites recorded poor habitat, 14 sites recorded marginal habitat, nine sites recorded sub-optimal habitat and two sites recorded optimal habitat. The two best sites were the Waipoua River and Waipapa River at Forest Ranger.

In 2010, no sites recorded excellent stability, 13 sites recorded good stability, 14 sites recorded fair stability and two sites recorded poor stability. The two most stable sites were Kaihu River and Waipoua River.

Also in 2010, two sites recorded poor habitat quality, 13 recorded marginal habitat quality, 18 recorded sub-optimal habitat quality and two recorded optimal habitat quality. The two best sites were Mangahahuru at Main Road and Waipapa River at Forest Ranger.

Trends observed over four samples (taken in 2005, 2007, 2008 and 2010) indicate that habitat quality has improved at nine sites, declined at ten sites and remained stable at three sites. In comparison, channel stability has increased at 13 sites, declined at three sites and remained stable at four sites.

Investigation needs to be done at sites that have declining habitat quality and those that appear to have declining populations of macroinvertebrate species. Some investigation also needs to be done at sites that show a decline in stability, to identify if this decline is as a result of land-use or human activity, or natural events. Information collected through investigations would allow for accurate interpretation of results and could help focus land-management resources in areas that are most at need.

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1. INTRODUCTION

This report has been prepared as a continuation of the Northland Regional Council's (the Council) State of the Environment Monitoring Programme. It presents the results from habitat assessment work undertaken in 2008 and 2010, along with an initial analysis of data collected over the last five years, to identify any emerging trends in habitat quality or channel stability at 35 River Water Quality Monitoring Network sites. Data from the 2007 round of monitoring is available in a separate report entitled *Northland Habitat Assessment 2007*.

River habitat assessments are undertaken by the Council in order to monitor stream health and stability and track changes over time in Northland's rivers. They also provide valuable information on the state of Northland's riparian environment and the information can aid in the interpretation of both water quality and macroinvertebrate data collected by the Council at the same sites.

River habitat quality is a reflection of both natural and man-made influences. 'Pristine' river sites generally have good stream health and are characterised by natural factors, such as stream geology, gradient and physico-chemical properties. Impacted river sites (sites located in catchments that drain intensive land-use) tend to have poorer stream health and are influenced more by surrounding land-use and human activity.

Channel stability is not necessarily related to stream health, although it can influence it. Channel stability depends on physical characteristics, such as bank and substrate type, the flow regime and riparian vegetation, as well as human activity, such as surrounding land-use and channel alteration. It is also influenced by climate, in particular rainfall and storm events, and so can be naturally variable.

River ecosystems are an important social, cultural, economic and environmental resource. Monitoring these environments allows us to quantify the resource, identify river systems that require attention and focus resources into these areas.



Photo: Kerikeri River at Stone Store, upstream view

2. METHODOLOGY

2.1. Habitat Assessment Methodology

The habitat assessment protocol used by the Council is both a qualitative (quality of the habitat) and quantitative (amount of each habitat present) assessment of environmental factors at each site, such as channel stability, periphyton abundance, riparian vegetation, the composition of organic and inorganic substrate in the stream and surrounding land-use (see Appendix 1 – Habitat Assessment Field Data Sheet). The protocol used is based on Pfankuch D. J. (1975), 'Stream Reach Inventory and Channel Stability Evaluation'.

Sites are assessed every two years. The procedure used involves visiting the same location at each site, to assess the environmental factors (qualitative assessment) in the immediate vicinity of this location. An upstream and downstream transect of the stream channel from this site is then walked, with quantitative assessments made every 10m or where a new feature is observed, for example, a pool.

The qualitative habitat assessment involves assigning scores to the following stream characteristics: aquatic habitat abundance, aquatic habitat diversity, hydrologic heterogeneity, channel alteration, bank stability, channel shade, and riparian vegetation. Scores for each characteristic range from 0 to 20. At the end of the assessment, these scores are summed to give a total score for habitat quality, where 0 – 38 is a poor habitat; 39 - 73 is a marginal habitat; 74 - 108 is a sub-optimal habitat and 109 - 140 is an optimal habitat.

Stability of the streambed and channel at each site is assessed using the Pfankuch stability index (Pfankuch, 1975). This involves assigning scores to 15 environmental variables (such as bank wasting, deposition, stability of stream bed, etc). The variables are split into upper bank, lower bank and stream bottom. The scores are summed and can range from 38 to 152, where a lower total score indicates a more stable stream channel. Scores <38 represent excellent stability; scores 39-76 good stability, 77-114 fair stability and scores >115 poor stability.

Periphyton abundance is recorded in four classes (diatom, mat algae, filamentous algae, and bryophytes) and each of these is classified as either none, rare, common, or abundant. The same scoring system is used to assess the presence of submerged aquatic plants (macrophytes).

Other factors noted at each site include any evidence of livestock access, channel shading, water odour and other observations of interest. A basic measure of water quality at the time of assessment is also taken, including water temperature, dissolved oxygen, conductivity and water clarity.

The quantitative habitat assessment involves walking a transect of the stream channel, both upstream and downstream, with recordings made at a number of stops. Variables recorded include canopy and understorey cover within 0-5m and 5-20m of the stream bank; stability and bank type of each bank; inorganic and organic substrate on the bottom of the stream; wetted width (edge of water on one bank to edge of water on opposite bank); maximum depth of channel and flow type (run/riffle/pool/shute).

2.2. Other Sampling Data

In addition to data collected using the habitat assessment methodology, water quality data is recorded for each site on a monthly basis and macro-invertebrate data is collected for each site annually. Although these sampling programmes are run independently of the habitat assessments, data collected through them can be used to help interpret the results from the habitat assessments.

Water quality data recorded monthly for each site includes physical properties, such as temperature, dissolved oxygen, water clarity, turbidity, conductivity and pH, and chemical properties, such as the amount of nutrients (ammonium, total nitrogen, and total phosphorus) present in the water. The amount of bacteria present in the water is also measured at each site.

Macroinvertebrate sampling involves collecting benthic (bottom) samples from each site to record the number and type of macroinvertebrates present. Sites are characterised according to whether they have a hard or soft bottom, with different sampling protocols used for each type.

The number of species present (taxonomic richness) at each site is recorded, along with the percentage Ephemeroptera (Mayfly), Plecoptera (stonefly) and Trichoptera (caddisfly) (% EPT). The more species present, the higher the conservation value of each site.

Each site is also given a Macroinvertebrate Community Index (MCI) and Semi-Quantitative (SQ) MCI score, which reflect the species present and their tolerance to environmental changes and human activity, and the number of individuals belonging to each taxon. The higher the score, the less impacted the environment is by human activity. The lower the score, the more 'polluted' a site is.

2.3. Sampling Sites

The sites assessed by the Council are those included in the Regional River Water Quality Monitoring Network (RWQMN). There are currently 35 sites in this network; 31 of which are monitored by the Council and four by the National Institute of Water and Atmospheric Research (NIWA) (shown in pink in Figure 1).



Figure 1: Map showing the 35 Regional Water Quality Monitoring Network sites (National River Water Quality Network sites in pink).

Sites have been gradually added to the RWQMN since monitoring first began in 1996. In 2005, 19 sites had habitat assessments completed. In 2007, 22 sites were assessed; in 2008, 25 sites were assessed and in 2010, 35 sites were assessed. The sites are listed in Table 1 below.

Site Name	Site No.	Year Assessed			
		2005	2007	2008	2010
Awanui @ FNDC take	100363	✓	✓	✓	✓
Awanui @ Waihue Channel	100370	✓	✓	✓	✓
Hakaru @ SH1	109021			✓	✓
Hatea @ Mair Park	101194				✓
Kaeo River @ Dip Rd	102674		✓	✓	✓
Kaihu @ Gorge	102256	✓	✓	✓	✓
Kerikeri @ Stone Store	101530			✓	✓
Mangahuru @ Apotu	100281	✓	✓	✓	✓
Mangahuru @ Main Rd	100237	✓	✓		✓
Mangakahia @ Titoki	101038	✓	✓	✓	✓
Mangakahia @ Twin Bridges	109096	✓	✓		✓
Mangamuka @ Iwiatua Rd	108978			✓	✓
Manganui @ Mitaitai Rd	102257	✓		✓	✓
Mangere @ Knight Rd	101625	✓	✓	✓	✓
Ngunguru @ Waipoka Rd	109100			✓	✓
Opouteke @ Suspension Bridge	102258		✓		✓
Oruru @ Oruru Rd	108979			✓	✓
Paparoa @ SH12	108977			✓	✓
Punakitere @ Recorder	105231	✓	✓	✓	✓
Ruakaka @ Flyger Rd	105008		✓	✓	✓
Utakura @ Rangihua Rd	109020			✓	✓
Victoria @ Thompson's Bridge	105532	✓	✓	✓	✓
Waiarohia @ 2 nd Avenue	105672		✓		✓
Waiarohia @ Whau Valley	107773	✓	✓		✓
Waiharakeke @ Stringer Rd	100007				✓
Waimamaku @ SH12	109098			✓	✓
Waiotu @ SH1	102248	✓	✓	✓	✓
Waipao @ Draffin Rd Bridge	108941				✓
Waipapa @ Forest Ranger	101751	✓	✓	✓	✓
Waipapa @ Waipapa Landing	101524			✓	✓
Waipoua @ SH12	103304	✓	✓	✓	✓
Wairua @ Purua	101753	✓	✓	✓	✓
Waitangi @ Waimate	103178	✓	✓		✓
Waitangi @ Watea	101752	✓	✓		✓
Whakapara @ Cableway	102249	✓	✓	✓	✓

Table 1: RWQMN sites and years sampled

2.4. Sampling Period

Comprehensive habitat assessments are carried out at all sites at the same time or as close as possible to the macroinvertebrate sample collection undertaken by the Council. This means that habitat assessment data can be used when interpreting the results from macroinvertebrate sample collection at each site.

In 2008, assessments were undertaken from the end of March to the start of April. In 2010, assessments were undertaken from mid January to mid April.

2.5. Data Analysis

The data collected in 2008 and 2010 has been entered into Excel to allow for a comparison of the substrate, vegetation, stability, and over all habitat quality across the sites assessed.

In addition, total Pfankuch stability scores and habitat quality scores for each site from 2005, 2007, 2008 and 2010 have been compared, in order to identify any trends occurring over time.



Photo: Hatea River at Mair Park

3. RESULTS

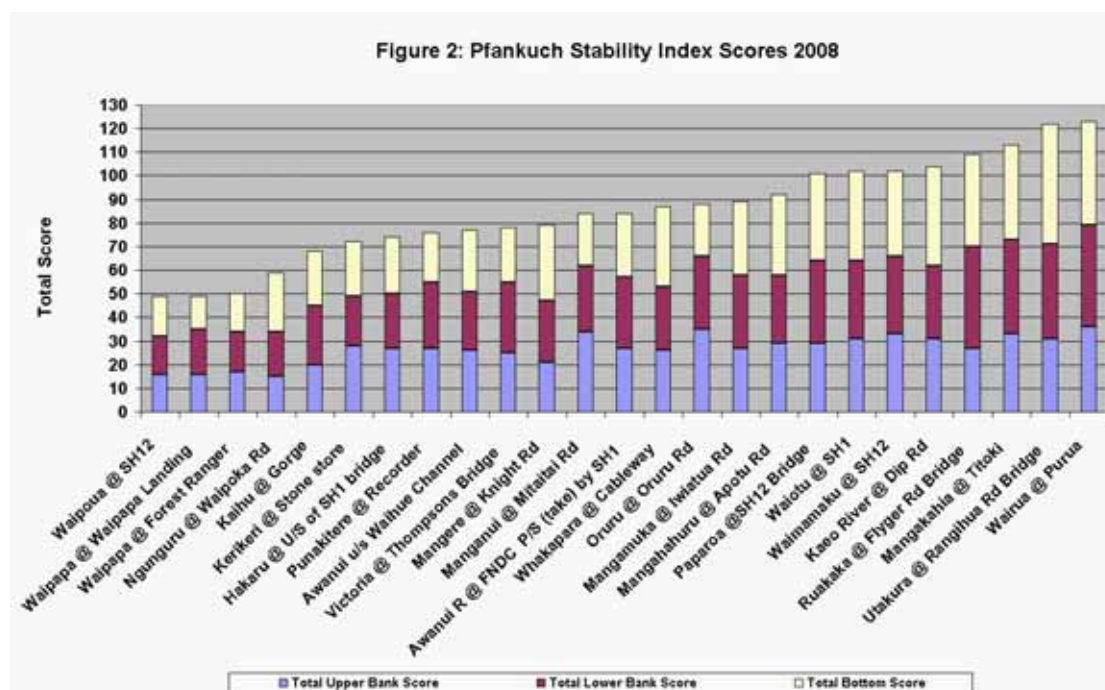
3.1. Results from 2008

Pfankuch Stability Index

Figure 2 shows the total Pfankuch Stability Score, broken down into upper bank, lower bank and bottom scores, for all sites assessed in 2008. Sites are ranked from lowest score (most stable habitat) to highest score (least stable habitat).

Of the 25 sites assessed in 2008, none had excellent stability (a score of less than 38); eight sites had good stability (39-76), 15 sites had fair stability (77-114) and two sites had poor stability (>115).

The three most stable sites were Waipoua (49), Waipapa at Waipapa Landing (49) and Waipapa at Forest Ranger (50). The two least stable sites were Utakura (122) and Wairua (123).

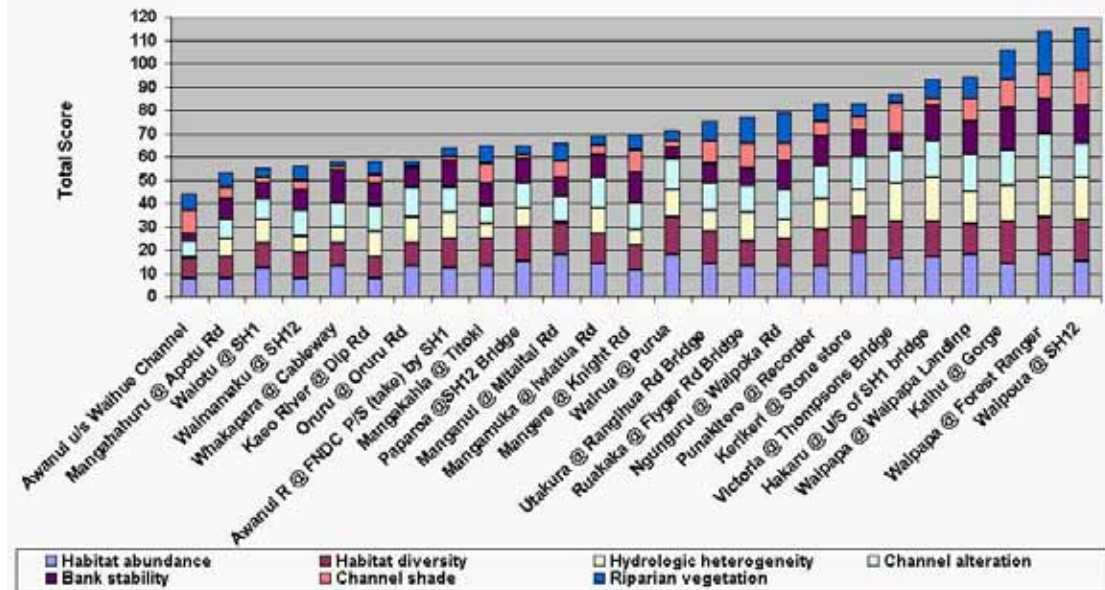


Habitat Quality

Figure 3 shows total habitat quality scores, broken down into component parts, for all sites assessed in 2008. Sites are ranked from lowest score (poorest habitat) to highest score (best habitat).

Of the 25 sites assessed in 2008, none had a poor habitat (a score of less than 38), 14 sites had a marginal habitat (39-73), nine sites had a sub-optimal habitat (74-108) and two sites, Waipapa at Forest Ranger and Waipoua, had an optimal habitat (109-140).

Figure 3: Habitat Quality Scores 2008



3.2. Results from 2010

Pfankuch Stability Index

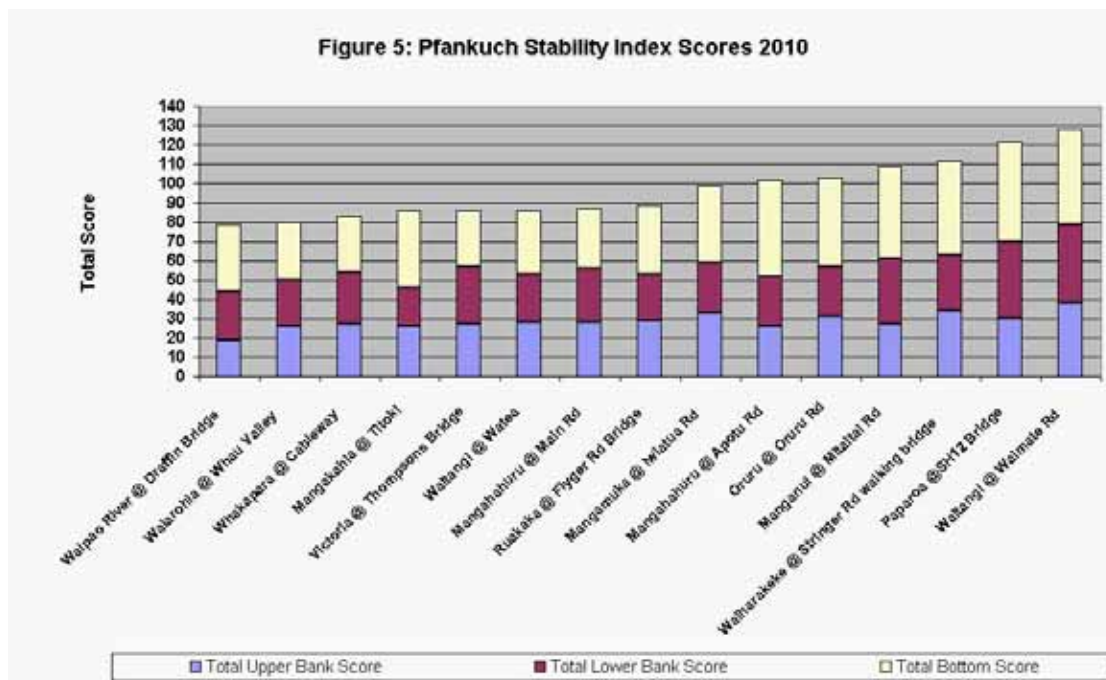
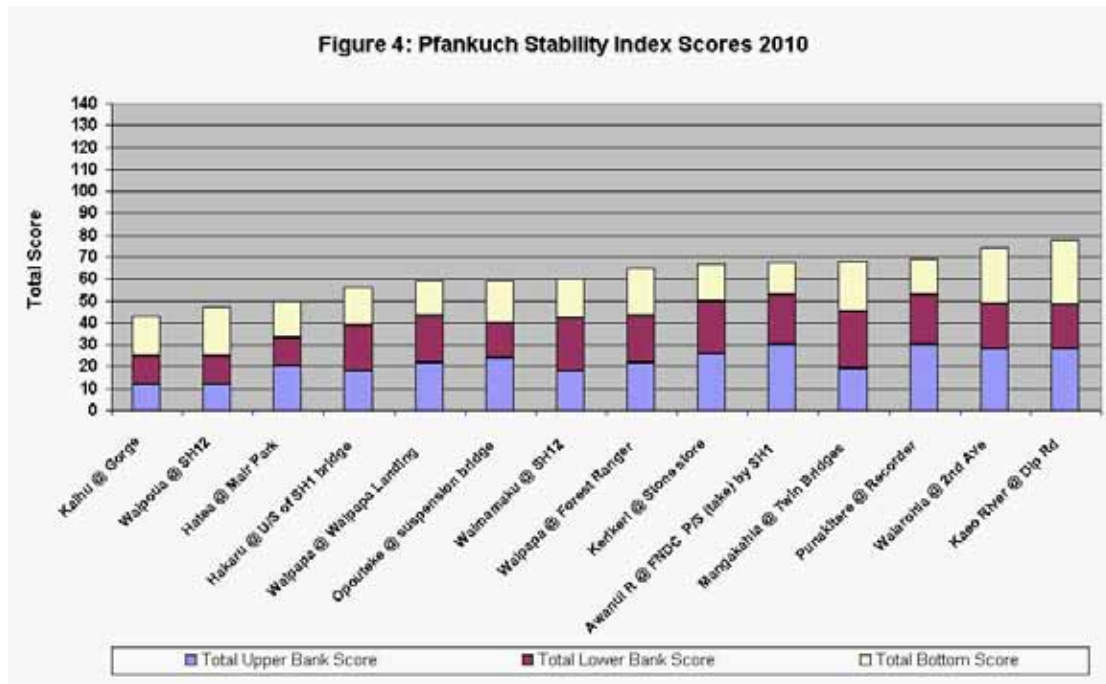
Figures 4 and 5 show the total Pfankuch Stability Score, broken down into upper bank, lower bank and bottom scores, for all sites assessed in 2010. Sites are ranked from lowest score (most stable habitat) to highest score (least stable habitat).

Six sites – Utakura, Ngunguru, Awanui at Waihue channel, Waiotu, Mangere and Wairua - could not be waded due to depth. These sites do not have bottom data and it was therefore not possible to calculate a stability score for these sites in 2010.

Of the sites assessed, no sites had excellent stability; 13 sites had good stability, 14 sites had fair stability and two sites had poor stability.

The two most stable sites in 2010 were Kaihu (43) and Waipoua (47). In comparison, the two most stable sites in 2008 were Waipoua (49) and Waipapa at Waipapa Landing (49). Kaihu was the fifth most stable site in 2008 with a score of 68 and so appears to have become more stable over the past two years. Waipapa at Waipapa Landing was fifth most stable in 2010 with a score of 59 and so appears to be slightly less stable in 2010.

The two least stable sites in 2010 were Waitangi at Waimate (128), followed by Paparoa (122). In comparison, the two least stable sites in 2008 were Wairua and Utakura. Neither of these sites could be graded in 2010 and so a comparison between years cannot be made.



Habitat Quality

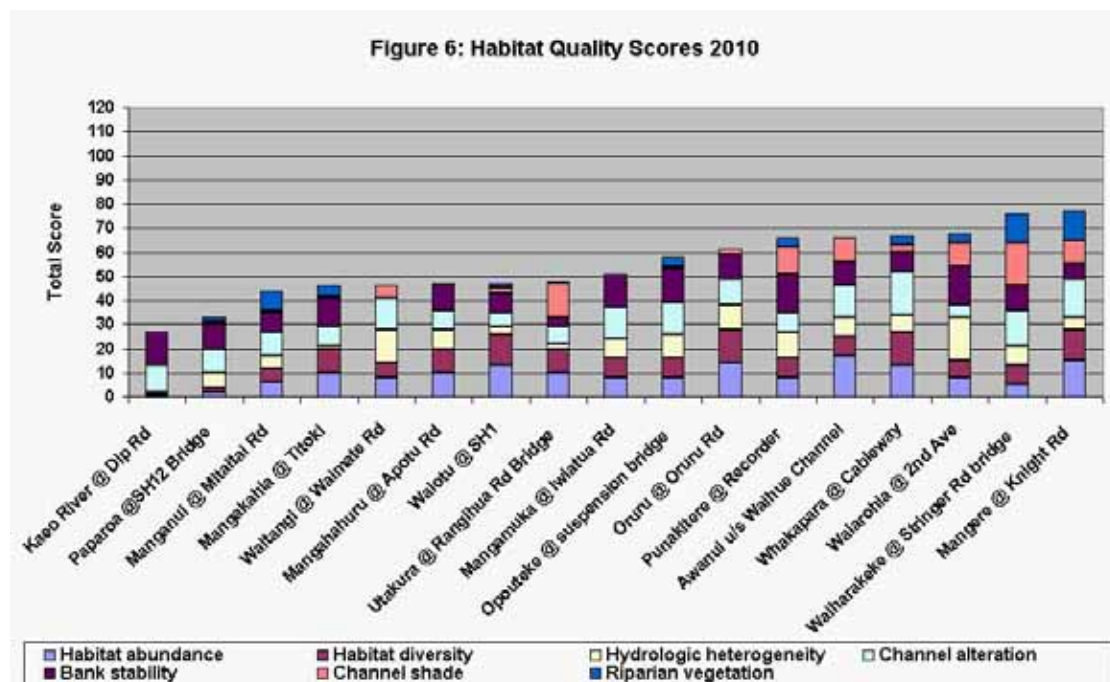
Figures 6 and 7 show total habitat quality scores, broken down into component parts, for all sites assessed in 2010. Sites are ranked from lowest score (poorest habitat) to highest score (best habitat).

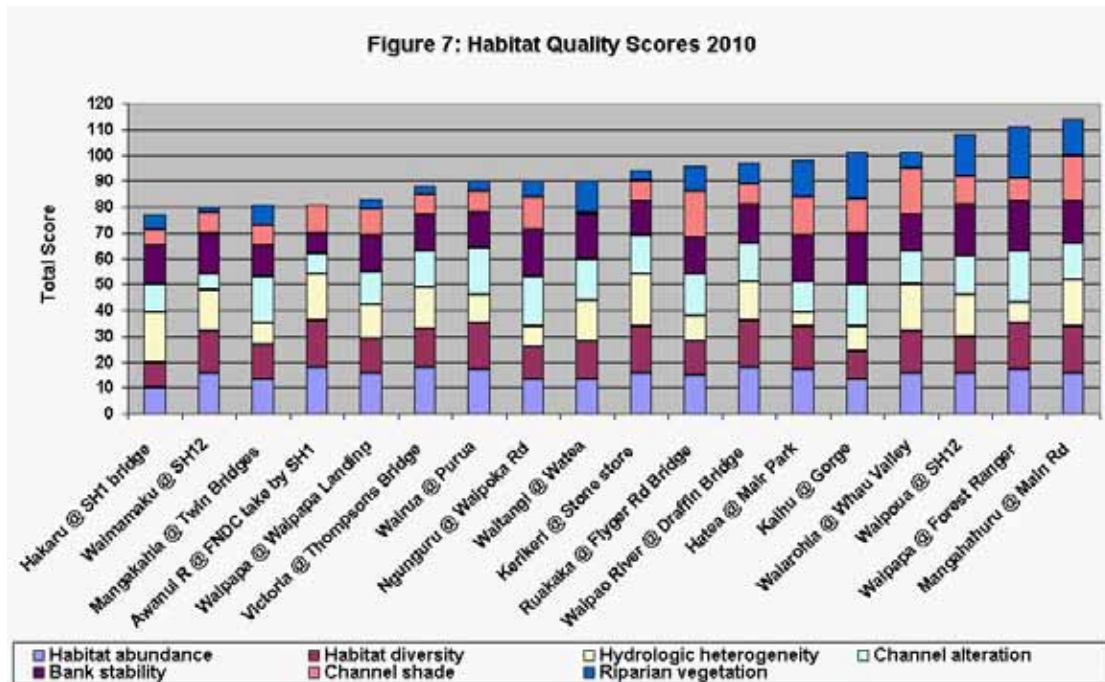
Of the 35 sites assessed in 2010, two had poor habitat quality, 13 sites had a marginal habitat, 18 sites had a sub-optimal habitat and two sites had an optimal habitat.

The two sites with optimal habitat in 2010 were Mangahahuru at Main Road (114) and Waipapa at Forest Ranger (111). In 2008, the two best sites were Waipoua (115) and Waipapa at Forest Ranger (114). Changes in habitat quality at these two sites appear to have been negligible over the last two years, even though the site on the Waipoua River has fallen one grading from optimal to sub-optimal. The Mangahahuru at Main Road was not assessed in 2008 and so a comparison of scores at this site cannot be made.

The two poorest sites in 2010 were the Kaeo River (27) and Paparoa (33). In 2008, the two worst sites were Awanui at Waihue Channel (44) and Mangahahuru at Apotu Road (53). Awanui at Waihue was graded thirteenth poorest in 2010 with a score of 66. This indicates that habitat quality at this site has improved slightly in the last two years. Mangahahuru at Apotu Road was graded sixth poorest in 2010 with a score of 47. The difference between the score in 2008 and 2010 is negligible suggesting there has been little change in habitat quality at this site in the last two years.

In 2008, Kaeo was graded sixth poorest with a score of 58. This indicates that habitat quality has deteriorated at this site over the last two years. In 2008, Paparoa was graded tenth poorest with a score of 65. This indicates that habitat quality at this site has also deteriorated over the last two years.





Site Data Summary 2010

Data collected in 2010 from 35 sites monitored indicates that:

- 20 sites are open to livestock access
- 18 have over 50% bank stability
- 17 have under 50% bank stability
- Five out of 29 sites have a soft bottom sediment
- 13 out of 29 sites have a hard bottom; and
- 11 have a mixed bottom sediment

A full summary of these results can be seen in Appendix 3.

Of the two sites with a habitat quality grade of optimal, one had good stability and one had fair stability. Of the 15 sites with a habitat quality grade of sub-optimal, nine had good stability and six had fair stability. This indicates that sites with good habitat quality are those that are more stable.

Of the ten sites with a habitat quality grade of marginal, three had good stability, six had fair stability and one had poor stability. Of the two sites with a habitat quality grade of poor, one had poor stability and one had fair stability. This indicates that sites with poorer habitat quality are those that are less stable.

3.3. Emerging trends

Pfankuch Stability Index

Figures 8, 9, 10 and 11 show Pfankuch Stability Index Scores for sites that have three or more years' data. The method for surveying stream stability is subjective and so minor variations in score from year to year may be as a result of surveyor bias.

Figure 8: Pfankuch Stability Index Scores 2005-2010

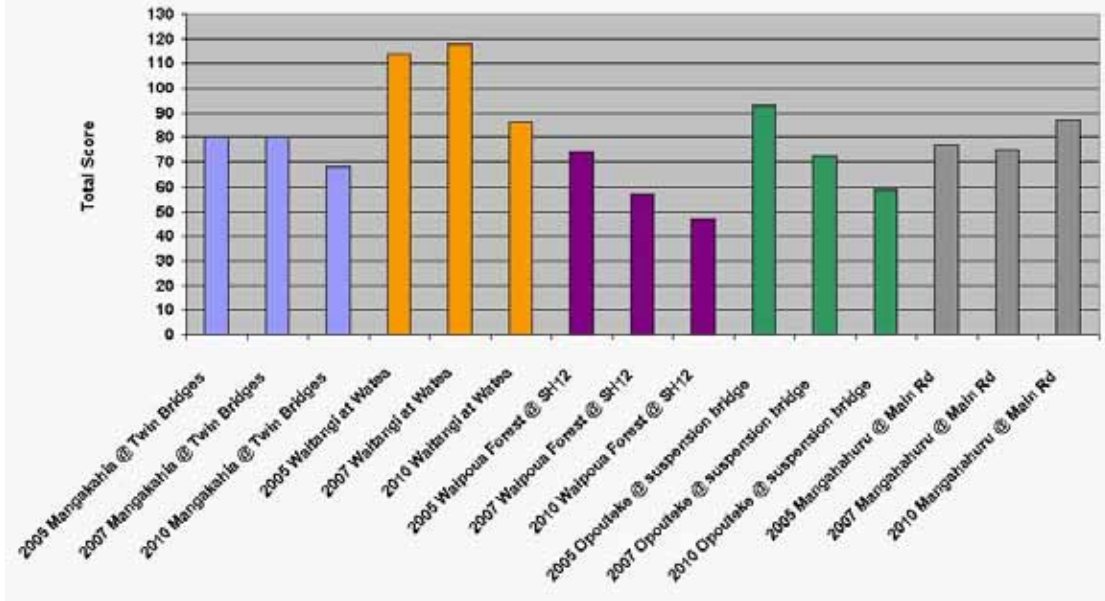
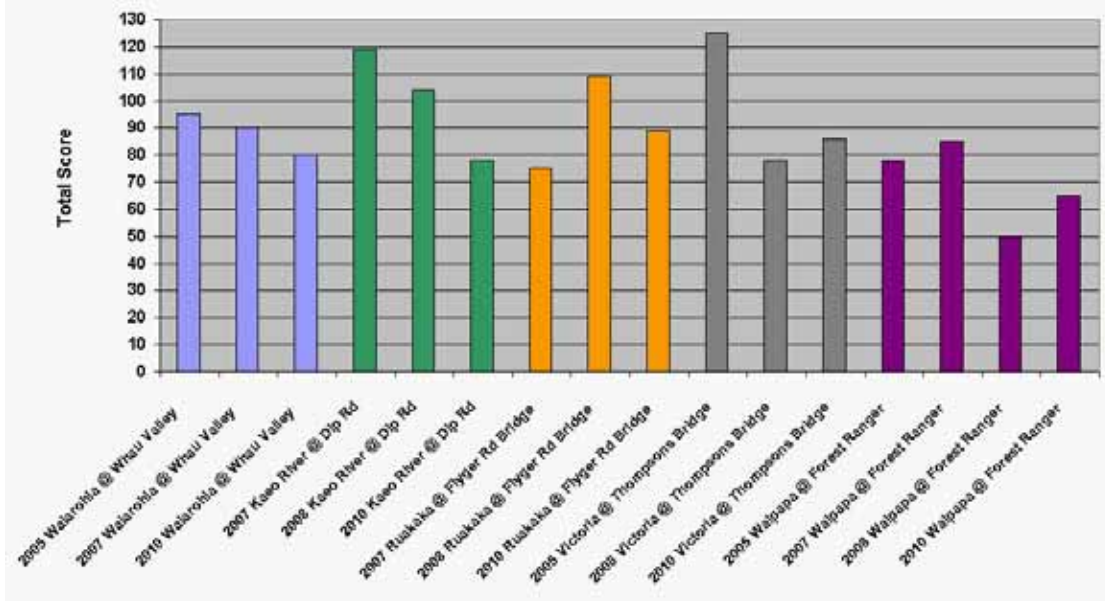
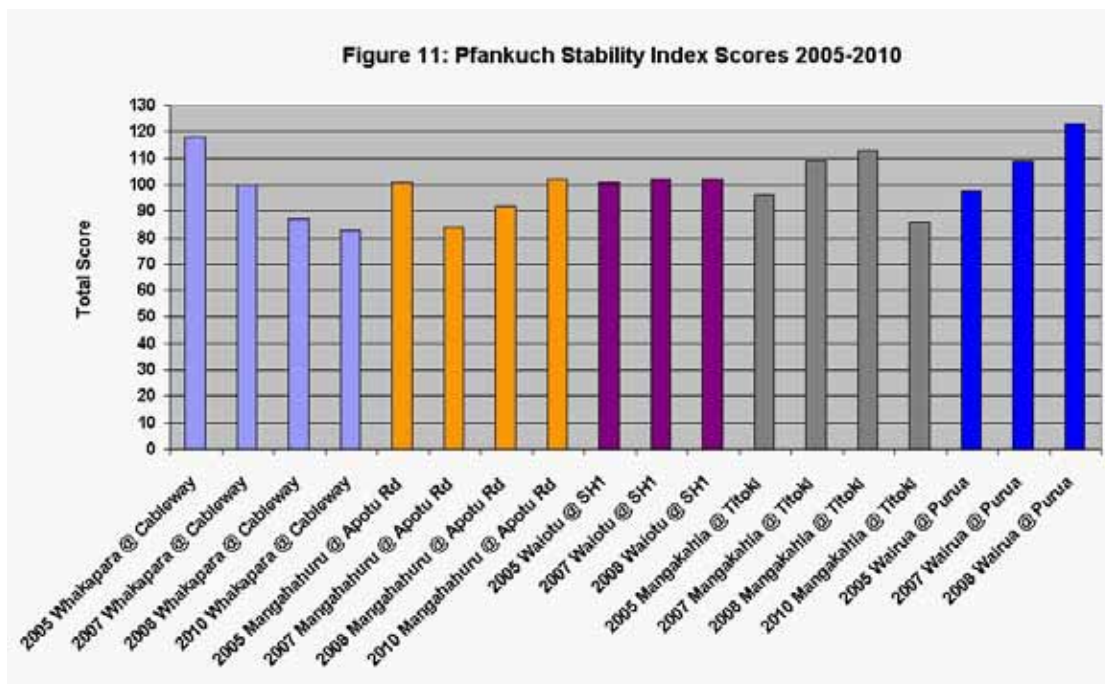
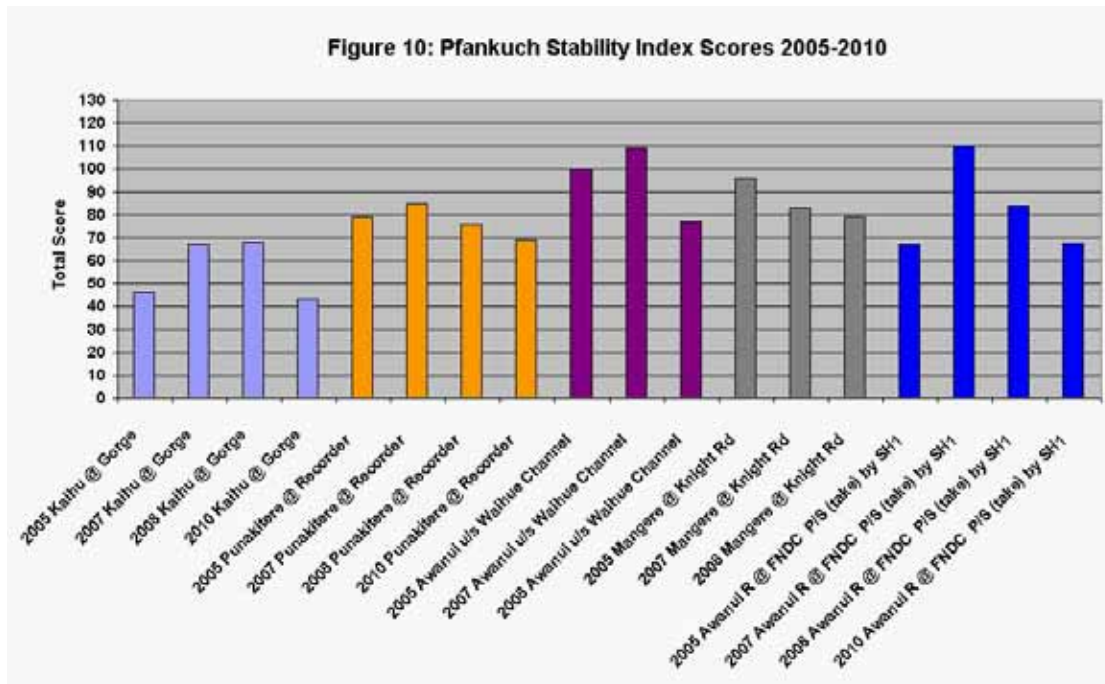


Figure 9: Pfankuch Stability Index Scores 2005-2010



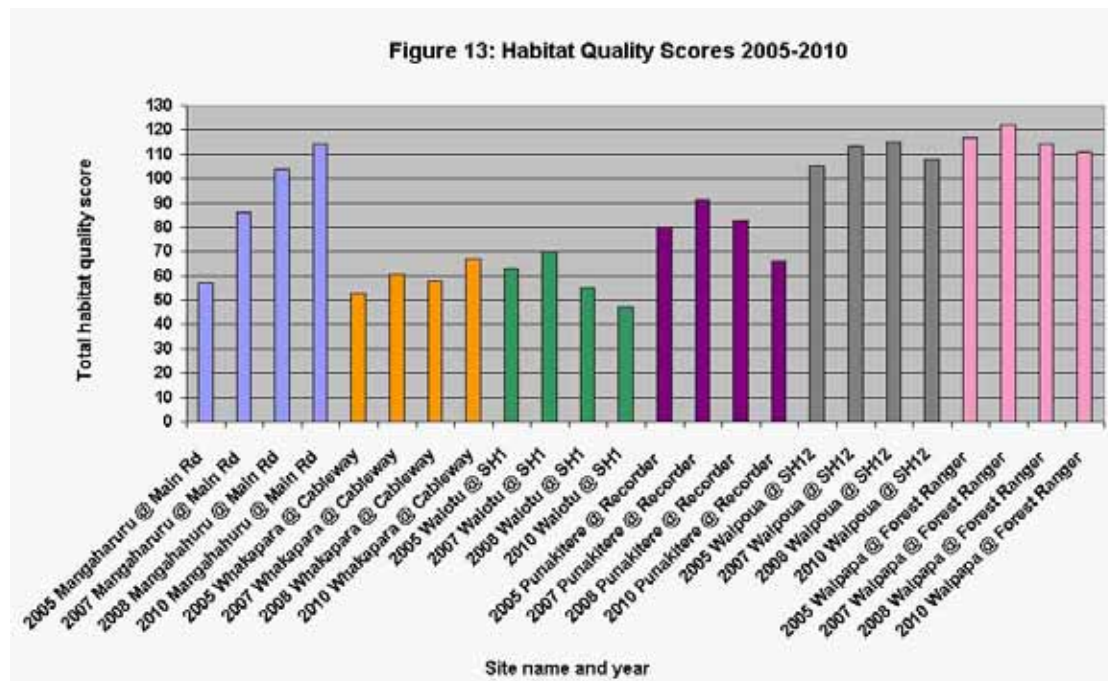
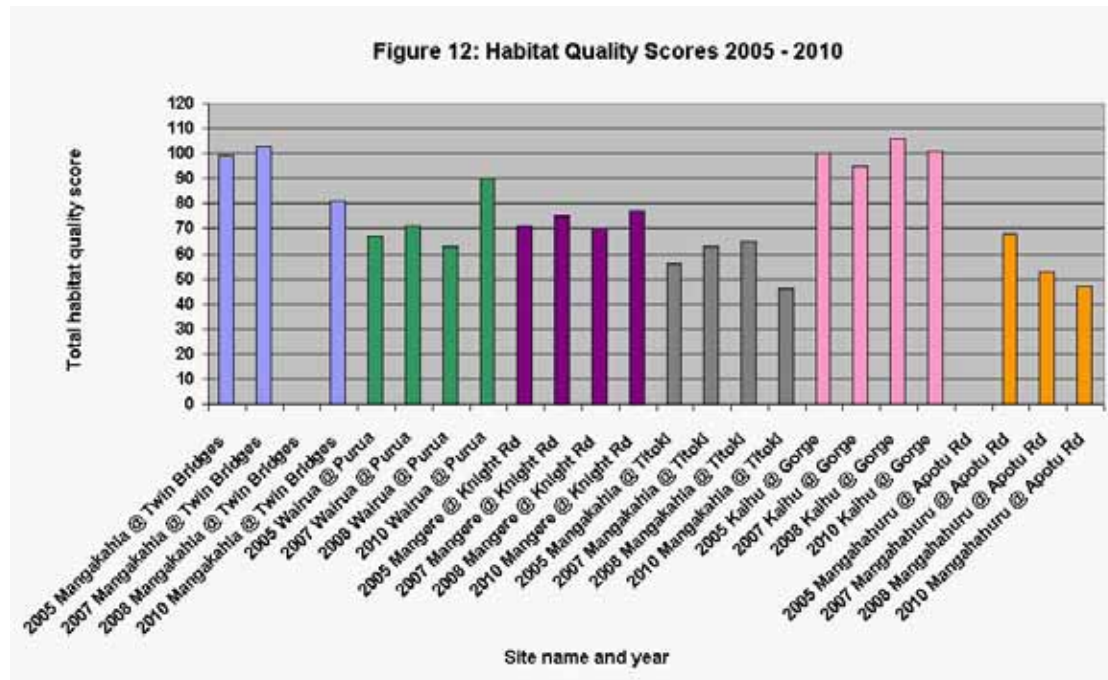


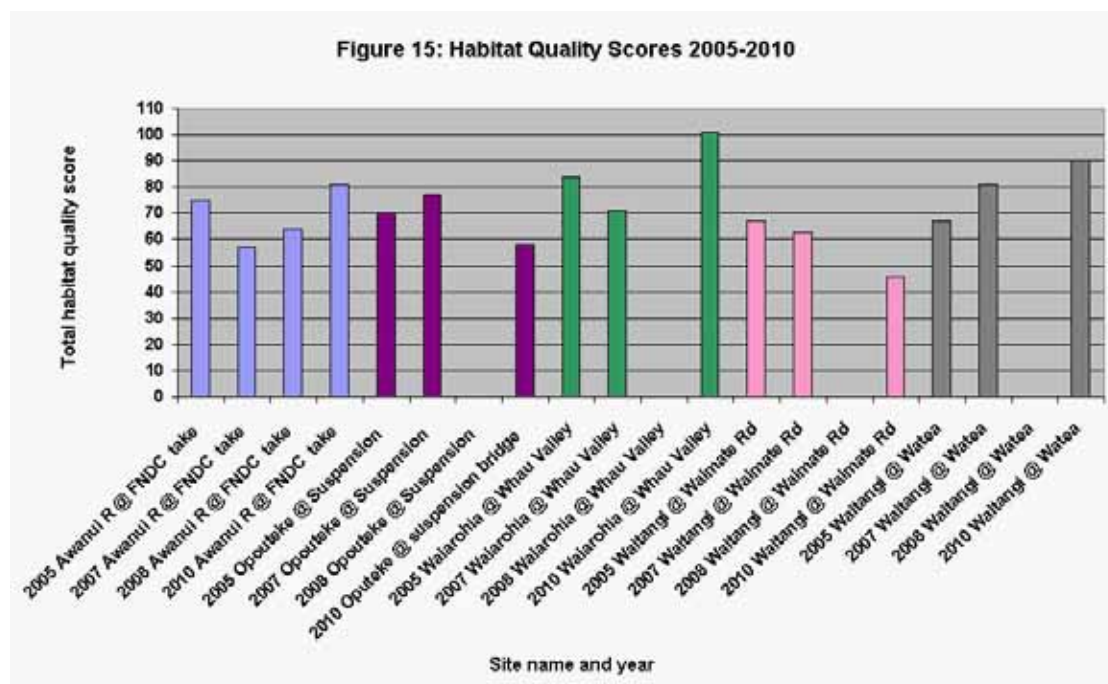
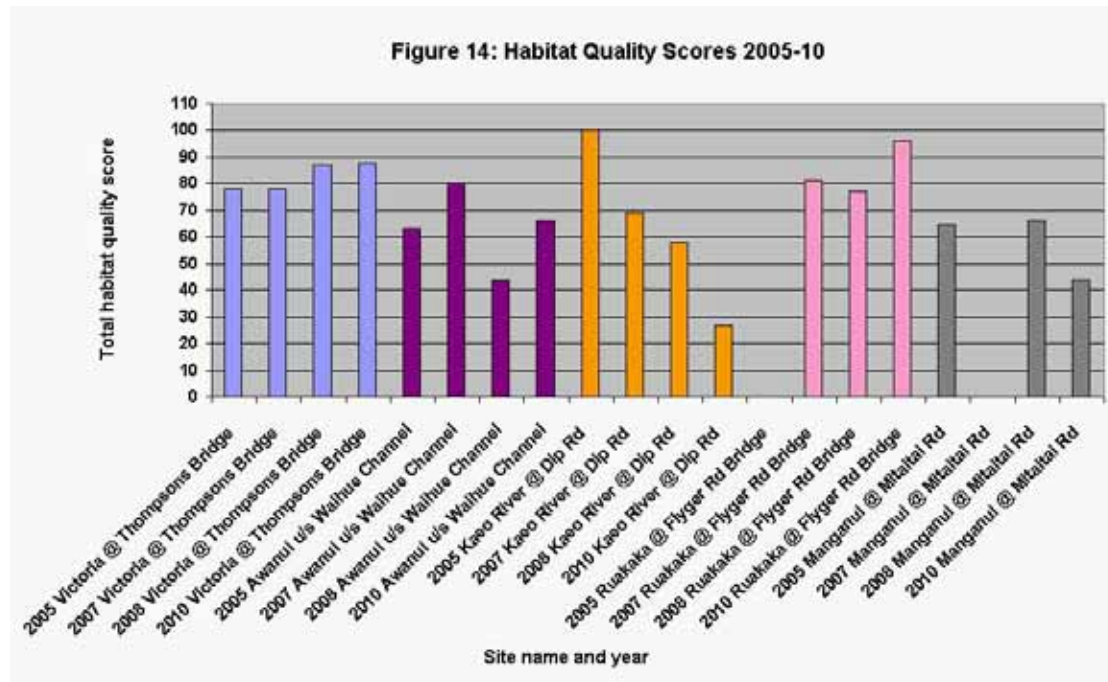
Overall, since 2005, the stability of 13 sites appears to have improved; the stability of three sites, Ruakaka River, Wairua River and Mangahahuru at Main Road, appears to have decreased and the stability of four sites, Mangahahuru at Apotu Road, Kaihu River, Awanui at FNDC water take and Waiotu River – appears to be stable.

Seven sites have moved up or down a grade. Two sites have gone from fair to good stability in the last four to five years - Awanui at Waihue and Opouteke River. Four sites have gone from poor to fair stability in the last four to five years – Whakapara River, Kaeo River, Waitangi at Watea and Victoria River. One site – Wairua River - has gone from fair to poor stability in the last four years.

Habitat Quality

Figures 12, 13, 14 and 15 show habitat quality data for sites that have three or more years' data. The method for surveying habitat quality is highly subjective and so minor variations in score from year to year may be as a result of surveyor bias.





Overall, since 2005, the habitat at nine sites appears to have increased in quality; the habitat at ten sites appears to have decreased in quality and habitat quality at three sites has remained relatively stable.

Significant changes appear to have occurred in the Kaeo River (downward trend from sub-optimal to poor habitat quality), Mangahuru at Main Road (upward trend from marginal to sub-optimal), Waitangi at Watea (upward trend from marginal to sub-optimal), Wairua (upward trend from marginal to sub-optimal), Ruakaka (downward trend from sub-optimal to marginal) and Punakitere (downward trend from sub-optimal to marginal).

Discussion

The table below is a composite of ranking results from the Habitat Assessment work undertaken in 2010, water quality results taken from the Annual River Water Quality Report 2008-09 (no ranking was undertaken in 2009-10) and macroinvertebrate rankings taken from the Northland Macroinvertebrate Monitoring Programme Report 2010. These results, when compared, allow for a fuller interpretation of results from all three programmes.

Site Name	Habitat Quality	Pfankuch Stability Index	Water Quality	Number of taxa	MCI and SQMCI Scores
Mangahuru @ Main Road	1 st	21 st	12 th	8 th	3 rd / 2 nd
Waipapa @ Forest Ranger	2 nd	8 th	2 nd	5 th	6 th / 6 th
Waipoua	3 rd	2 nd	1 st	1 st	2 nd / 1 st
Waiarohia @ Whau Valley	4 th	16 th	21 st	3 rd	10 th / 11 th
Kaihu	5 th	1 st	3 rd	6 th	18 th / 26 th
Hatea	6 th	3 rd	16 th	23 rd	22 nd / 8 th
Waipao	7 th	15 th	19 th	20 th	9 th / 7 th
Ruakaka	8 th	22 nd	35 th	25 th	1 st / 5 th
Kerikeri	9 th	9 th	9 th	26 th	29 th / 14 th
Waitangi @ Watea	10 th	20 th	8 th	22 nd	34 th / 34 th
Ngunguru	11 th	N/A	22 nd	32 nd	20 th / 12 th
Wairua	12 th	N/A	24 th	30 th	21 st / 32 nd
Victoria	13 th	19 th	7 th	7 th	7 th / 17 th
Waipapa @ Waipapa Landing	14 th	5 th	10 th	24 th	31 st / 9 th
Awanui @ FNDC take	15 th	10 th	28 th	10 th	14 th / 16 th
Mangakahia @ Twin Bridges	16 th	11 th	4 th	17 th	16 th / 22 nd
Waimamaku	17 th	7 th	5 th	12 th	15 th / 21 st
Hakaru	18 th	4 th	23 rd	9 th	24 th / 25 th
Mangere	19 th	N/A	32 nd	19 th	28 th / 27 th
Waiharakeke	20 th	27 th	25 th	16 th	8 th / 3 rd
Waiarohia @ Second Ave	21 st	13 th	13 th	11 th	26 th / 18 th
Whakapara	22 nd	17 th	17 th	21 st	17 th / 23 rd
Awanui @ Waihue Channel	23 rd	N/A	34 th	29 th	32 nd / 30 th
Punakitere	24 th	12 th	17 th	13 th	19 th / 15 th
Oruru	25 th	25 th	27 th	31 st	33 rd / 31 st
Opouteke	26 th	6 th	6 th	14 th	12 th / 24 th
Mangamuka	27 th	18 th	11 th	4 th	4 th / 4 th
Utakura	28 th	N/A	29 th	33 rd	13 th / 20 th
Waiotu	29 th	N/A	26 th	28 th	35 th / 35 th
Mangahuru @ Apotu Rd	30 th	24 th	30 th	15 th	30 th / 28 th
Waitangi @	31 st	29 th	14 th	2 nd	11 th / 13 th

Waimate					
Mangakahia @ Titoki	32 nd	18 th	20 th	18 th	5 th / 19 th
Manganui	33 rd	26 th	33 rd	34 th	27 th / 33 rd
Paparoa	34 th	28 th	31 st	35 th	25 th / 29 th
Kaeo	35 th	14 th	15 th	27 th	23 rd / 10 th

The **Kaeo River** is subject to frequent flooding events, erosion/cutting and deposition. It is likely that these events have had an impact on habitat quality at this site. Some parts of the Kaeo River are also open to stock access, which may have an impact on habitat quality. Habitat quality has fallen from sub-optimal to poor in the last five years.

However, the site has fair stability and stability appears to have improved in the last five years from poor in 2005. This may be due to channel stabilisation work that has been undertaken on the river for flood prevention purposes. Habitat quality will take longer to recover than channel stability and may not improve unless riparian fencing and planting is undertaken, to reduce the effect of livestock on riparian vegetation.

There is currently insufficient water quality data for this site to complete formal trend analysis however, no trends are apparent in the data collected to date. The site ranks number 27th out of 35 for macroinvertebrate species richness (number of species present), which would be a reflection of poor habitat quality and availability and lack of channel shading. It has an MCI and SQMCI value that indicate moderate levels of pollution.



Photo: Kaeo River, upstream view

The site on the **Mangahuru at Main Road** is within an area of native bush and is fenced from livestock access, although livestock do occasionally access this area. The surrounding land-use is exotic forestry and pasture. There is some bank cutting and erosion of the bends in the river however the banks are relatively stable. Habitat quality has risen from marginal to optimal in the last five years and the site has fair

stability. The improvement in habitat quality may be a reflection of a more stable channel and low-intensity land-use in the upper catchment. It may also be a reflection of maturing riparian vegetation and an increase in channel shading.

Time trend analysis of data collected for this site indicates an increasing trend in turbidity. However, water quality is generally good. The site ranks eighth for macroinvertebrate species richness and eighth for %EPT, which is a reflection of good habitat quality and good channel shading. The site has an MCI and SQMCI that indicate clean water and the site ranks third and second respectively in these categories.

This site is in the upstream catchment of the Mangahahuru River, which feeds into the Wairua River. In comparison, the site further downstream at Apotu Road has marginal habitat quality and fair stability. This site ranks 15th for macroinvertebrate species richness and 29th for % EPT. The site has an MCI and SQMCI that indicates severe pollution, which is a reflection of the more intensive pastoral land-use in the downstream catchment of this river.



Photo: Mangahahuru at Main Road



Photo: Mangahahuru at Apotu Road

The **Waitangi at Watea** site is above the Haruru Falls, in a small area of bush, towards the bottom of the Waitangi River catchment. The site is not open to livestock access. Habitat quality has risen from marginal to sub-optimal in the last five years at the site. The site has fair stability.

Time trend analysis on water quality data collected from this site indicates an increasing trend in dissolved oxygen and pH and a decrease in total phosphorus and dissolved reactive phosphorus. These trends suggest an improvement in water quality.

However, the site ranks 22nd for macroinvertebrate species richness and 33rd for %EPT. The site has an MCI and SQMCI score indicating severe pollution. Although this site ranks highly for habitat quality and has good water quality, in-stream habitat was greatly affected by flooding three years ago. A high proportion of in-stream habitat and bank-side vegetation was lost from the site and the macroinvertebrate community would have been greatly reduced. Scouring of the river bed also created deep pools, which are less attractive to certain macroinvertebrate fauna. It will take time for the habitat to recover and for macroinvertebrates to re-colonise suitable habitat at this site.

In comparison, the site upstream at Waimate Road has marginal habitat quality and poor channel stability. Water quality at this site is moderate. However, the site ranks second for macroinvertebrate species richness. It has an MCI and SQMCI score that indicate mild and moderate pollution respectively. This site is in an area of intensive pastoral farming and is open to livestock access, with little shading, however a variety of in-stream habitats, including woody debris, silts and gravels; riffles, pools and runs increase the taxonomic richness.



Photo: Waitangi at Watea



Photo: Waitangi at Waimate

The **Wairua River** catchment is large with several rivers draining into it, including the Mangahuru and Whakapara. The catchment comprises mixed, intensive land-use but at the sampling site, surrounding land-use includes native bush and pastoral farming. The site assessed is open to livestock access and has 20% channel shading. Habitat quality at this site has gone from marginal to sub-optimal in the last five years. However, channel stability has gone from fair to poor in the same time.

Time trend analysis of data collected from the site indicates an increase in conductivity, dissolved oxygen, pH and clarity and a decrease in nutrients. This suggests that water quality is improving at the site.

The site ranks 30th for macroinvertebrate species richness and 24th for %EPT. The MCI and SQMCI score indicate moderate and severe pollution respectively.



Photo: Wairua River

The **Ruakaka River** catchment is relatively small and land-use is largely pastoral farming, with areas of native bush in the upper catchment. The site assessed is not open to livestock access and has 90% channel shading. Habitat quality has declined from sub-optimal to marginal in the last five years. Channel stability is fair.

Time trend analysis has not been undertaken on water quality data for this site. Water quality is generally very poor, with the site ranked worst for water quality out of 35 sites monitored in 2008-09.

The site ranks 25th for macroinvertebrate species richness but third for %EPT. The site has an MCI that indicates clean water and an SQMCI that indicates mild pollution. These results appear contradictory however the sampling methodology used at this site favours the high scoring taxa found in woody debris and so this pushes the MCI and SQMCI scores up, even though the species richness is low. These scores should therefore be used with caution.



Photo: Ruakaka River

The **Punakitere River** is a major tributary of the Waima River that flows into the Hokianga Harbour. The catchment of this site is largely pastoral and the site has 60% channel shading and is open to livestock. Habitat quality at this site has declined in the last five years from sub-optimal to marginal. Channel stability is good.

Time trend analysis carried out on water quality data for the site indicates increasing water clarity and pH and a decrease in nutrients. However, water quality at this site is still impacted by intensive land-use and is generally poor.

The site ranks 13th for macroinvertebrate species richness and 19th for %EPT. The MCI score for the site indicates moderate pollution and the SQMCI score indicates severe pollution. Both of these scores show a progressive downward trend over the last ten years indicating a decline in macroinvertebrate species at this site.

The decline in habitat quality may be due to storm events changing the channel dynamics, or may be due to damage caused by livestock access. More work needs to be done to investigate declining habitat quality and macroinvertebrate species at this site.

4. SUMMARY

In total, 25 sites were assessed in 2008 and 35 sites in 2010. No sites were assessed as having excellent channel stability in either year. In 2008, eight sites had good channel stability, 15 sites had fair channel stability and two sites had poor channel stability. By comparison, in 2010 13 sites were graded as having good channel stability, 14 sites as having fair channel stability and two sites had poor channel stability.

In both years, only two sites were assessed as having high habitat quality, indicating optimal habitat for aquatic biota. These sites were Waipoua River and Waipapa at Forest Ranger in 2008 and Mangahahuru at Main Road and Waipapa at Forest Ranger in 2010.

In 2010, 57% of sites were open to livestock access. Generally, these sites were graded as having only fair channel stability.

In 2010, 43% of sites had channel shading greater than 50% and 57% had channel shading less than 50%. Channel shading is an important physical characteristic for macroinvertebrate abundance, as shading controls in-stream temperature and riparian vegetation provides material for in-stream habitats.

Provisional analysis of data collected over the last five years indicates that the habitat at nine sites has improved, the habitat at ten sites has declined and three sites have remained stable. In addition, stability has increased at 13 sites, declined at three sites and remained stable at four sites.

Ten sites have changed grades, either for stability or habitat quality or both, over this period. Three sites have gone from marginal to sub-optimal habitat quality – Mangahahuru at Main Road, Waitangi at Watea and the Wairua River. One site has gone from sub-optimal to poor habitat quality – the Kaeo River. Two sites have gone from sub-optimal to marginal habitat quality – the Ruakaka River and Punakitere River.

Two sites have gone from fair to good stability – Awanui at Waihue Channel and the Opouteke River. Four sites have gone from poor to fair stability – the Whakapara River, Kaeo River, Waitangi at Watea and Victoria River. One site has gone from fair to poor stability – the Wairua River.

Some of these changes require further investigation to enable an accurate interpretation of these results to be made.

5. RECOMMENDATIONS

- Continue with biennial stream habitat assessments, in conjunction with annual macroinvertebrate monitoring, at all RWQMN sites.
- Conduct a review of the current assessment protocol against the new protocol released in 2009, "Stream Habitat Assessment Protocols for Wadeable Rivers and Streams in New Zealand". Identify differences between the two protocols and assess whether or not data gathered through each protocol is comparable.
- Examine macroinvertebrate data and water quality data collected for each site, in conjunction with habitat assessment data, for the 2012 State of the Environment Report.
- Investigate declining water quality/macroninvertebrate scores/stream health and stability at all sites that show a downward trend.
- Carry out multivariate statistical analysis of the macroinvertebrate data with the habitat assessment and water quality data.
- Investigate implementation of a fish monitoring programme at all RWQMN sites, which would be conducted annually with the aim of monitoring fish populations at these sites.

6. REFERENCES AND FURTHER READING

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