

4th April 2019

Healthy Rivers Hearings Panel  
C/o Steve Rice  
Rice Resources Ltd

**Response to questions from the Hearing Panel – Block 1 Plan Change 1 – Healthy Rivers**

Kia ora

Thank you for the opportunity to present at the recent hearing relating to Waikato Regional Council Proposed Plan Change 1 (and Variation1) – Waikato and Waipa River Catchments (Block 1).

The purpose of this letter is to provide a response to the questions posed to the Department of Conservation team by the Hearing Panel on the 25<sup>th</sup> March 2019. Response are provided in Appendix One below.

The response to question 1 has been prepared collectively by Department of Conservation staff. The response to questions 2 – 5 has been provided by Ms Kate McArthur. The response to question 6 has been provided by Dr Ngaire Phillips.

Please contact Angus Gray ([agray@doc.govt.nz](mailto:agray@doc.govt.nz)) in the first instance if you seek any further clarification of matters raised or responded to in this letter.

Nga mihi,

Jacob Williams  
RMA Planner  
Department of Conservation Shared Services Hamilton Office

**Appendix One: Response to questions raised at Waikato Regional Council Proposed Plan Change 1 (and Variation1) – Waikato and Waipā River Catchments (Block 1) dated 25<sup>th</sup> March 2019**

**Responses provided on behalf of the Director-General of Conservation**

***1. Question from the Hearings Panel - How much freshwater monitoring does the Department undertake in the Waikato River and Waipā River catchments?***

The Department of Conservation (the Department) undertakes freshwater biodiversity monitoring in the upper catchment of the Waikato River including undertaking the following:

- Regular sports fish surveys in the upper Waikato catchment; drift dives, abundance counts, spawning counts.
- Catfish monitoring in Lake Taupo.
- Monthly/Quarterly didymo monitoring

The Department also holds a consent for a fish trap in the Waipa stream, a tributary of the Tongariro River in the upper catchment of the Waikato River which is monitored for nine months of the year. Department staff check sports fish here for spawning information, timing of spawning, and quality of fish.

In the lower Waikato and Waipā catchments the Department undertakes the following freshwater monitoring:

**Whangamarino Wetland**

- Water level monitoring
  - Data loggers taking continuous measurements of water level along two transects

**Whangamarino Weir/Whangamarino River**

- Water level gauging every 2 years
- Monitoring water level at Ropeway every 2 years
- Whangamarino River siltation survey every 6 years

**Lake Ruatuna**

- Water quality sampling (replicating Waikato Regional Council protocols for lake water quality monitoring: e.g. DO, Nitrate, Total N, Total P, zooplankton). This is undertaken monthly.

**Lake Rotopiko**

- Pest fish survey (netting all three lakes). This is undertaken annually.

## Responses from Ms McArthur

### 2. Question from the Hearings Panel - Paragraph 46 of Ms McArthur's evidence – in terms of the river sub-catchments identified in this paragraph, what are the profiles, how do these ranking relate to each other, are/can they be ranked in some other way (plus any other info along these lines that would assist the Panel)?

Table 1, which is the base data for Figure 2 of my evidence in chief, shows all of the PC1 sub-catchments with their averaged protection rankings, ranked from best to worst (raw rank). The 'AddProtRnk' attribute in West et al. (2019) (attached) is defined as follows:

*“The cumulative extent of freshwater features contained in third-order sub-catchments, when ranked to provide representation of a full range of river, lake and wetland ecosystems, non-migratory freshwater fish, important habitats for the maintenance of migratory freshwater fish populations, and intensively managed DOC Ecosystem Management Units (EMUs). In contrast to the other rankings, sub-catchments having greater than 80% of their extent within protected lands are constrained to occupy the highest rankings (0–0.25); rankings outside this range indicate the relative ability of sub-catchments with lower levels of protection to complement the biodiversity values that are represented within sub-catchments having high levels of protection. As with the other rankings, values range from 0 to 1, and are expressed as a proportion of all freshwater features in mainland New Zealand so that catchments with values in the range 0–0.1 represent the top 10%, those with values in the range 0.0–0.2 represent the top 20%, and so on.”*

Because the protection ranking attribute is averaged for the PC1 sub-catchments it does not show the national protection rankings as percentage categories described above. This is because the PC1 sub-catchments and the West et al. (2019) sub-catchments do not fit together spatially (West et al. 2019 found a third-order sub-catchment provided the best spatial resolution for protection priority ranking). To demonstrate where the sub-catchments of the Waikato River fit with respect to national priority for protection rankings, the original model data for the Waikato River catchment are shown in Figure 1 below.

A draft list of priority river and stream sites (aquatic SNAs) specifically for the Waikato Region was produced by Collier et al. (2010)<sup>1</sup> using a similar prioritisation method to West et al. (2019) as mentioned in my evidence in chief. Appendix 2 of Collier et al. (2010) contains the priority list and further information on sites identified within the Waikato-Waipā catchments can be provided by WRC staff.

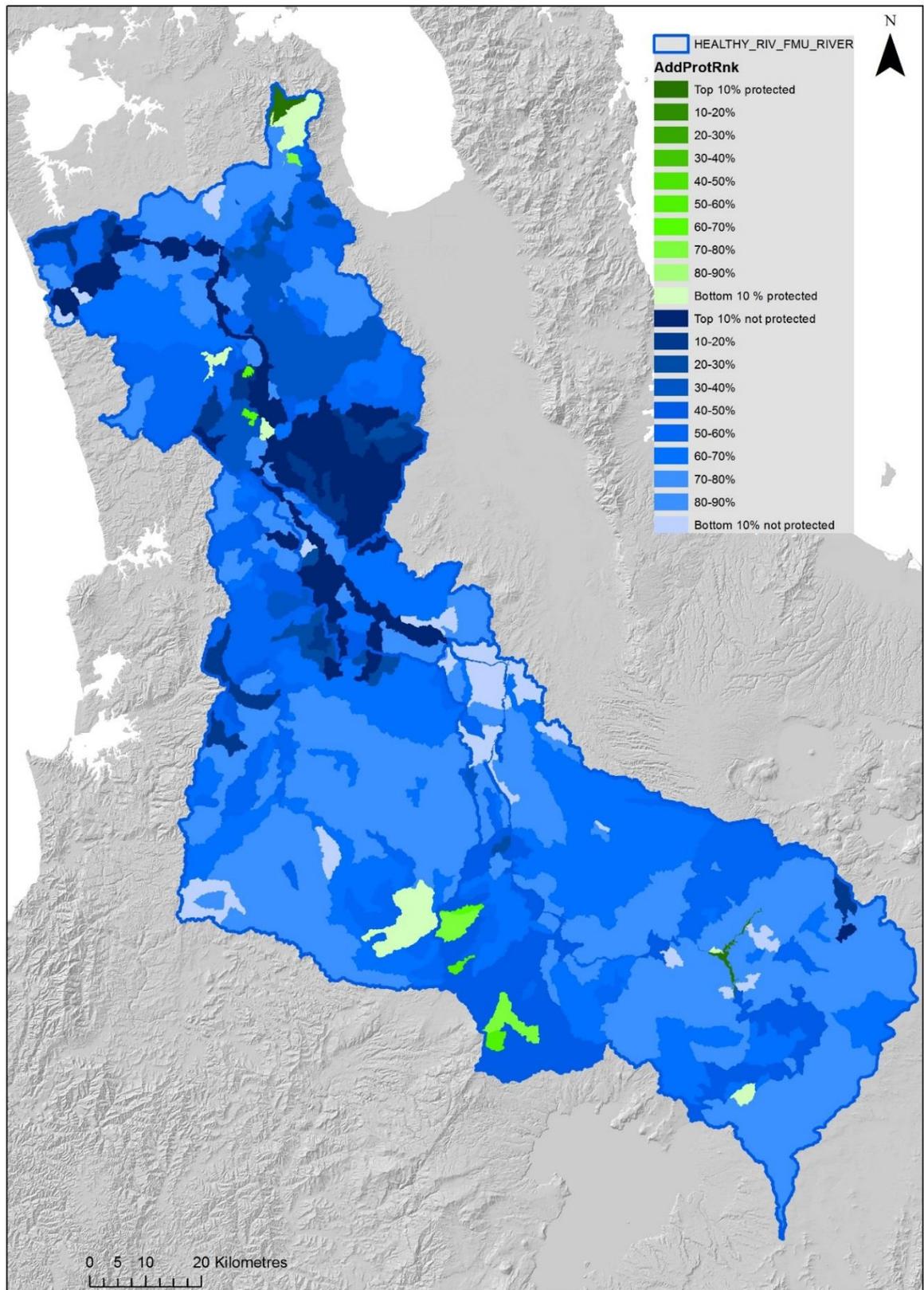
**Table 1.** Averaged protection rankings for PC1 sub-catchments. Highlighted sub-catchments rank in the top-10 rivers (Lake Waikare sub-catchment also highlighted) for indigenous fish using the FENZ geodatabase.

Catchment name	Avg_AddProtRnk	Raw rank
Komakorau	0.412	1
Mangakotukutuku	0.420	2
Awaroa (Rotowaro) at Harris/Te Ohaki Br	0.450	3
Mangawara	0.473	4
Mangatawhiri	0.478	5
Waikato at Rangiriri	0.482	6
Waitawhiriwhiri	0.491	7
Waikare	0.510	8
Waikato at Huntly-Tainui Br	0.512	9
Waikato at Bridge St Br	0.523	10
Mangatangi	0.542	11

<sup>1</sup> Collier K, Clements B, David B, Lake M, Leathwick J 2010. Significant natural areas of the Waikato region: streams and rivers - Methodology and draft list of priority sites. Environment Waikato Technical Report 2010/19. Document #: 1480934.

<b>Catchment name</b>	<b>Avg_AddProtRnk</b>	<b>Raw rank</b>
Kirikiroa	0.543	12
Awaroa (Rotowaro) at Sansons Br	0.567	13
Mangakino	0.568	14
Matahuru	0.588	15
Waikato at Horotiu Br	0.595	16
Kaniwhaniwha	0.602	17
Waipa at SH23 Br Whatawhata	0.606	18
Awaroa (Waiuku)	0.625	19
Whangamarino at Island Block Rd	0.628	20
Waikato at Narrows	0.632	21
Mangauika	0.632	22
Whangape	0.640	23
Waipa at Mangaokewa Rd	0.641	24
Mangawhero	0.649	25
Ohote	0.661	26
Waipa at Otewa	0.664	27
Mangatutu	0.670	28
Waikato at Waipapa	0.672	29
Mangaone	0.692	30
Waiotapu at Campbell	0.695	31
Waikato at Mercer Br	0.703	32
Opuatia	0.709	33
Mangapiko	0.710	34
Puniu at Wharepapa	0.717	35
Mangaohoi	0.718	36
Waipa at Waingaro Rd Br	0.723	37
Waikato at Port Waikato	0.727	38
Moakurarua	0.731	39
Firewood	0.733	40
Tahunaatara	0.740	41
Mangaonua	0.742	42
Waikato at Ohakuri	0.750	43
Pokaiwhenua	0.756	44
Waitomo at SH31 Otorohanga	0.759	45
Waikato at Ohaaki	0.762	46
Whangamarino at Jefferies Rd Br	0.764	47
Waipa at Pirongia-Ngutunui Rd Br	0.767	48
Mangamingi	0.768	49
Whakauru	0.769	50
Waipapa	0.771	51
Otamakokore	0.778	52
Waiotapu at Homestead	0.786	53
Mangaharakeke	0.786	54
Mangakara	0.791	55
Pueto	0.794	56
Waikato at Karapiro	0.795	57
Waitomo at Tumutumu Rd	0.797	58
Waikato at Whakamaru	0.797	59
Kawaunui	0.800	60
Waikato at Tuakau Br	0.800	61
Puniu at Bartons Corner Rd Br	0.803	62
Waerenga	0.804	63
Torepatutahi	0.804	64
Little Waipa	0.806	65
Waipa at Otorohanga	0.820	66
Ohaeroa	0.832	67
Whirinaki	0.841	68

<b>Catchment name</b>	<b>Avg_AddProtRnk</b>	<b>Raw rank</b>
Mangapu	0.846	69
Mangarapa	0.850	70
Mangaokewa	0.850	71
Whakapipi	0.851	72
Karapiro	0.853	73
Mangarama	0.907	74



**Figure 1.** National priority for protection sub-catchment rankings for the Waikato and Waipā catchments (West et al. 2019).

**3. Question from the Hearings Panel - Footnote 12 of Ms McArthur's evidence – can you provide a list of the waterbodies where nuisance benthic periphyton may proliferate? How degraded are they?**

I have re-reviewed the LAWA observations for each of the water quality monitoring sites in the Waikato and Waipā catchments. In taking a more considered look at the LAWA data<sup>2</sup> I found only one site of those rivers listed in paragraph 90 of my evidence in chief which had a comment relating to periphyton proliferation or nuisance growth: Mangatawhiri River at Lyons Rd At Buckingham Br (periphyton). The LAWA site description notes: "*The substrate at this site consists of cobbles and there can be extensive filamentous green algae growth during summer low flows.*"

Accordingly, I wish to amend footnote 12 of my evidence in chief to read: "*Nuisance periphyton is noted to affect ~~some~~ one of the above listed sites in the LAWA database.*" I apologise to the Hearing Panel for this error, the footnote in my evidence was not intended to be misleading.

For the information of the Hearing Panel I have also reviewed the Council technical reports associated with periphyton cover and requested the last five years of data for sites in the Waikato-Waipā catchments. WRC developed regional guidelines for monitoring aquatic plant cover in wadeable streams (Environment Waikato Technical Report 2006/47; Collier et al. 2007) and then updated the guidelines in 2014 (Waikato Regional Council technical Report 2014/03; Collier et al. 2014). These guidelines encompass rapid periphyton cover and macrophyte assessments. From 2007 periphyton and macrophyte assessment were done in all monitored wadeable streams regardless of substrate type. I note the recommendations of the TLG for periphyton were to develop a percent cover attribute for surveillance monitoring as per the protocols in this technical report (Scarsbrook 2016; Waikato Regional Council Technical Report 2018/66).

In reaching the conclusion that periphyton generally did not reach nuisance levels, the TLG relied on information in a technical report by Collier and Hamer (2010)<sup>3</sup>. A more recent report by Pingram et al. (2016; Waikato Regional Council Technical Report 2014/46) sets out the results of monitoring using the protocols of Collier et al. (2014) to report on the ecological condition of non-tidal, perennial, wadeable streams in developed land in the Waikato Region using a three-year rotating panel of randomly selected sites, relative to reference condition sites (>85% of land in indigenous cover). Sixty-eight percent of long-term sites are hard bottomed and 32% are soft bottomed waterways across the Waikato Region. Of the monitored sites, five are in the Upper Waikato Zone, three in the Central Waikato Zone, two in the Lower Waikato Zone and six in the Waipā Zone (see Figure 2 attached).

The Pingram et al. (2016) report found the majority of streams on developed land had poor ecological health. With respect to regional macrophyte and periphyton cover, macrophyte cover estimates averaged 31% of channel length, while periphyton cover by long filaments and thick mats averaged 9% of substrate surfaces at the time of sampling, with 11% of wadeable stream length estimated to exceed 25% cover by long filaments and thick mats (this is the degree of cover threshold in Policy 6(d) of the operative Waikato Regional Plan for contact recreation).

I have requested the periphyton cover site data for sites in the Waikato and Waipā catchments to provide a more accurate understanding of where nuisance periphyton growth may occur in these catchments, which (if made available in time) I will include the results of in Block 2 hearing evidence.

While I largely agree with the conclusion of the TLG that nuisance periphyton is not likely to be a current major issue for most waterbodies in the Waikato-Waipā catchments, I maintain the view that periphyton control in hard bottomed rivers is necessary as part of a suite of attributes associated with providing for ecosystem health. The poor state of ecological health found by Pingram et al. (2016) at a large proportion (~30% of stream length MCI <80; Figure 3) of wadeable rivers and streams supports the need for tributary contaminant management.

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<sup>2</sup> My initial review of the LAWA site descriptions was focused on assessing broad substrate type (i.e., hard or soft bottomed).

<sup>3</sup> I can find no reference to such a report, however there is a report by Collier and Hamer (2012) which comprises the results of ecological monitoring of wadeable streams in the Waikato Region up to 2011 and is likely to be the correct reference document referred to by the TLG.

**4. Question from the Hearings Panel - In terms of paragraph 103 of Ms McArthur's evidence, can you provide a list of the poor current state of some catchments referred to in this paragraph?**

Paragraph 103 of my evidence in chief (Block 1) notes there are some sub-catchment sites with poor current state with respect to ammonia and nitrate (with little improvement planned in PC1 via Table 3.11-1). Dr Scarsbrook's evidence to the hearing panel (dated 11 March 2019) contains a table (Table 3b) of the current state of nitrate and ammonia compared to the Table 3.11-1 targets in PC1, which also shows the NOF band for the current state of these attributes. The determination of the current state of water quality at sub-catchment sites is the subject of further expert conferencing, yet to occur. In the interim I have used Dr Scarsbrook's updated current state values and associated NOF bands.

- Kawaunui Stream at SH5 Br: C band<sup>4</sup> for nitrate median
- Waiotapu Stream at Campbell Rd Br: C band<sup>5</sup> for ammonia median
- Mangamingi Stm Paraonui Rd Br: C band for nitrate median
- Komakorau Stm Henry Rd: C band for nitrate 95th percentile, ammonia median and ammonia maximum
- Mangarawa Stm Rutherford Rd Br: C band for nitrate 95th percentile
- Whakapipi Stm at SH22 br: C band for nitrate median and 95th percentile

**5. Question from the Hearings Panel – Can you provide the West et al. 2019 paper?**

See attachment (in press proofs).

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<sup>4</sup> Growth effects on up to 20% of species (mainly sensitive species such as fish). No acute nitrate toxicity effects.

<sup>5</sup> 80% species protection level: Starts impacting regularly on the 20% most sensitive species (reduced survival of most sensitive species)

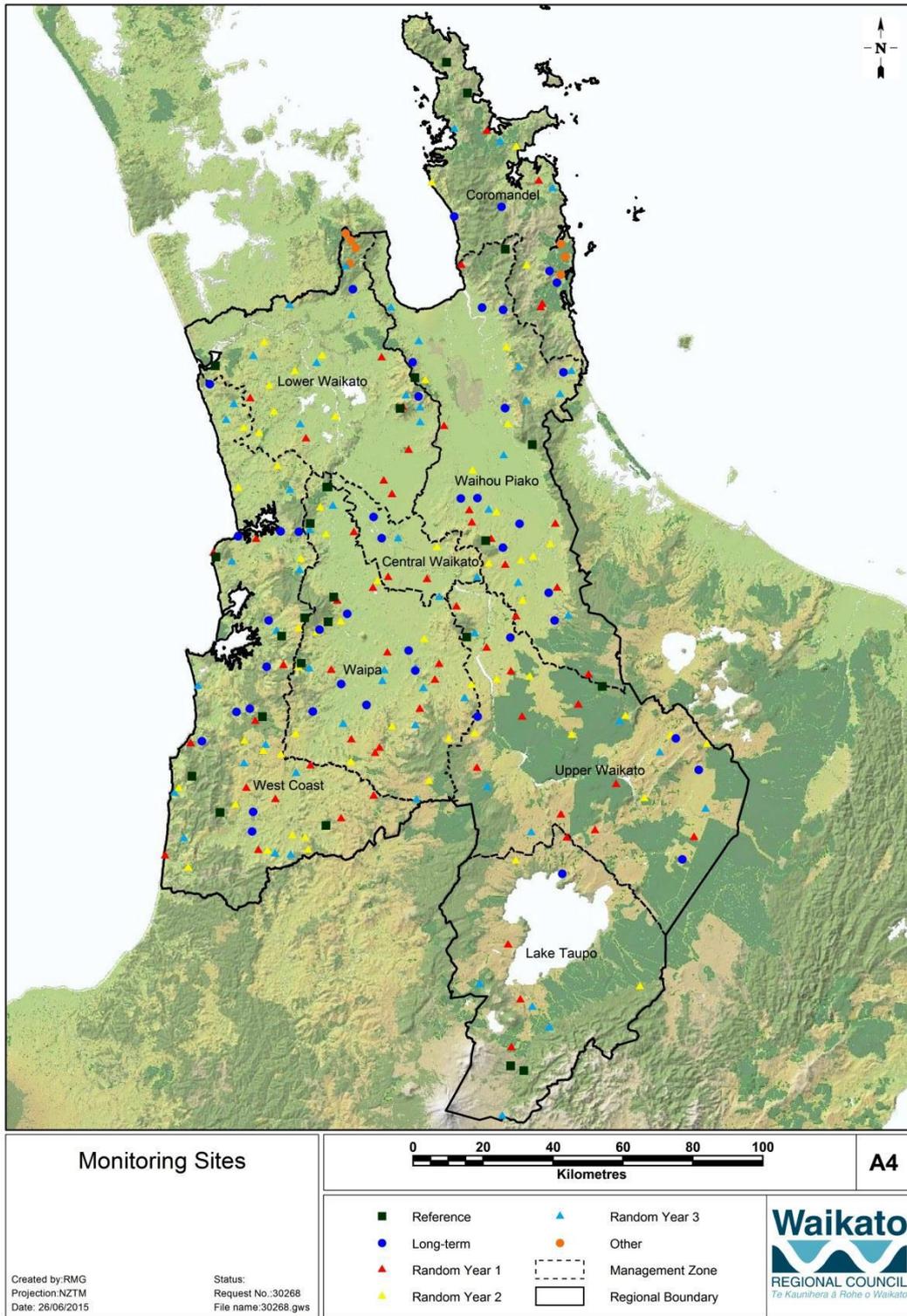
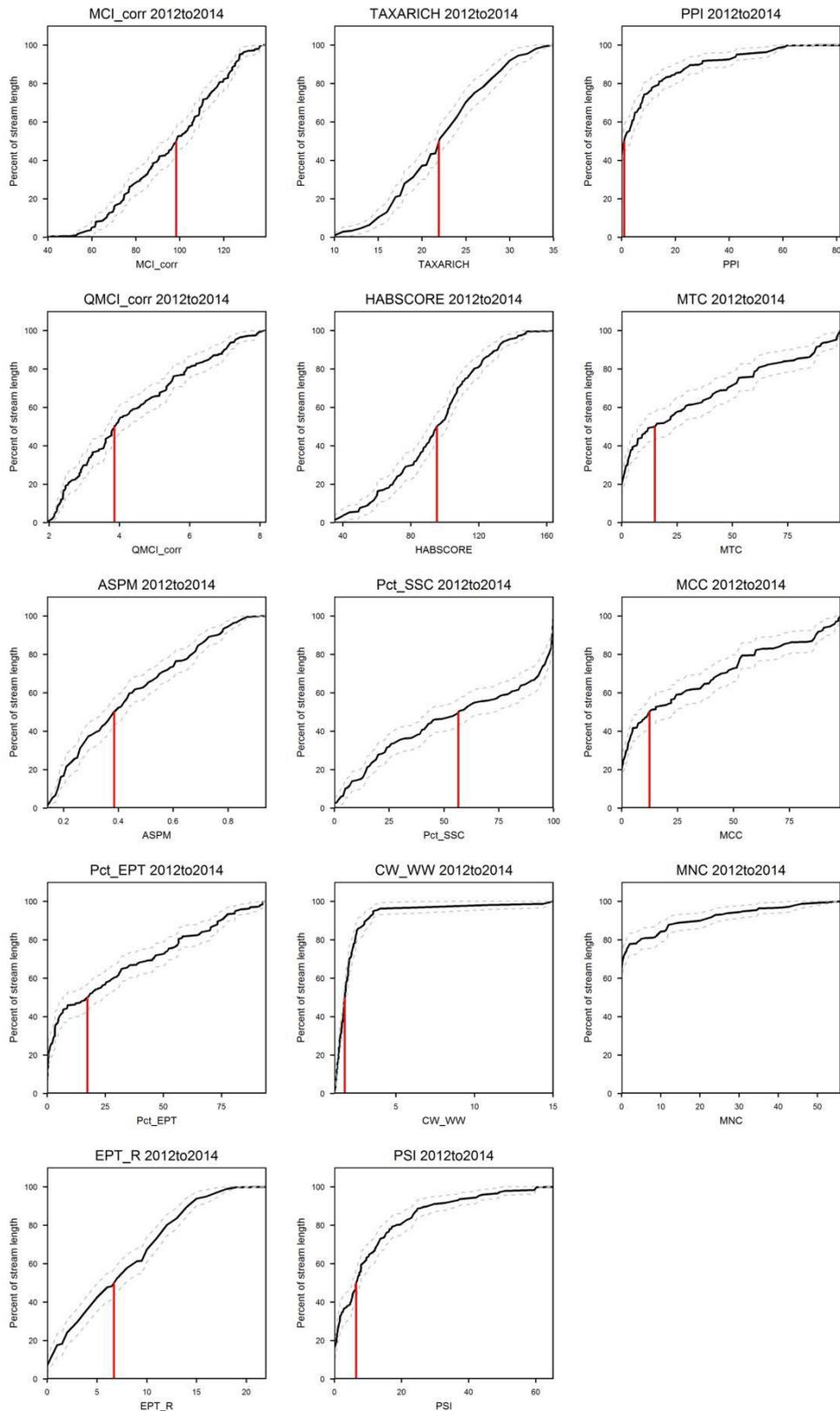


Figure 2. Reproduced from Figure 1 of Pingram et al. (2014).



**Figure 3 (Pingram et al. (2016)):** Cumulative frequency distributions of extent estimates for physical and biological indices, for 2012 to 2014. Red vertical lines indicate median values. MCI (MCI\_corr), QMCI (QMCI\_corr), Channel width:wetted width (CW\_WW), Habitat quality score (HABSCORE), Macrophyte channel cloginess (MCC), Macrophyte total cover (MTC), Percent sand/silt/clay (Pct\_SSC), Periphyton proliferation index (PPI), Periphyton slimyess index (PSI), EPT\* richness (EPT\_R), Percent EPT\* abundance (Pct\_EPT), ASPM, taxa richness (TAXARICH).

**Response from Dr Ngaire Phillips**

**6. *Question from the Hearings Panel - Is there information available to calculate/show the catchments of each lake identified in Ngaire Phillips evidence?***

The lake catchment areas are shown for individual lakes in the existing Freshwater Management Unit map 3.11-1 of the notified plan change and are available at a more refined scale from Waikato Regional Council GIS staff.