Profiles of Priority Riparian Restoration Streams in the Waihora Ellesmere Trust Riparian Restoration Programme

Report Prepared at the Request of the Waihora Ellesmere Trust
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INTRODUCTION

On the third of July 2009, as part of its Sustainable Farming Fund supported Riparian Restoration Programme, the Waihora Ellesmere Trust held a Riparian Restoration Priorities Meeting to identify the eight priority catchments for the focus of the riparian restoration project[i]. Those attending the meeting included representatives from Ngai Tahu, Canterbury Regional Council (Environment Canterbury - ECan), Selwyn District Council, Waihora Ellesmere Trust and the Regional Biodiversity Officer[ii].

A set of criteria was developed and applied to the catchments of Lake Ellesmere/Te Waihora and they were ranked according to the criteria. These were then reviewed in terms of the potential efficacy of targeting them at that point in time and a final set of 8 priority catchments selected[1]. Criteria with particularly high averages and which were therefore critical for the selection were, in highest to lowest order: cultural value, connectivity, potential of fencing effectiveness, linkage with agency priorities, significant willow problem, water quality, existing opportunities (eg for research), and potential to leverage additional funding other then the Environmental Enhancement Fund (which potentially provided funding for the plants/trees).

Those top eight catchments were, in order of priority: Hororata, L2/L1/Liffey, Waikekewai. Kaituna, Johnsons Road Drain, Wainiwaniwa, Silverstream, and Leeston. It was agreed at the meeting that the list of the top eight restoration priority catchments could be reviewed and modified on subsequent occasions.

[1] For instance, the Selwyn River catchment ranked high initially, but the feasibility of effective restoration work on such a large catchment was considered impractical and so smaller catchments with greater likelihood of measurable beneficial outcomes were selected.

(Map prepared and provided by Environment Canterbury, all subsequent maps in this report are taken form this map)

The eight catchments were therefore identified as priority catchments for the development of catchment profiles by Lincoln University. Student time and staff supervisory time and the use of University testing facilities would be an in-kind contribution to the project.

The development of profiles has, however, been difficult as the Lincoln University contribution was always based on and subject to the availability and interest of students. It has also proven difficult to obtain permission from landowners to access their properties for the purpose of developing baseline monitoring at times when student and staff have been available to undertake the baseline work. Moreover, much of the existing data on which it was intended to base the research was not readily extractable from databases and the University and the Trust have put considerable effort into attempting to overcome this issue. The resultant extensive database that was intended to provide the initial starting point for monitoring only became accessible in 2012 as a result of work by the University's recently established Waterways Research Centre[iii].

The profiles presented here therefore reflect a combination of data from various acknowledged sources that existed at the time of the initial selection and that informed, but did not determine, the initial selection of, and research undertaken by students and staff in subsequent years

PROFILES

The profiles are presented in the order of the ranking of the streams as at that July 2009 meeting and do not represent any subsequent reprioritisation, if there has been one, of the priority restoration catchments. Two data sources have been used – the Environment Canterbury (Canterbury Regional Council - ECan) online GIS surface water quality database[iv] and the Lincoln University Waterwatch data or data collected during water courses taught at Lincoln University[v]. The data for each profile is presented in as standard a format without compromising the data source as practicable. The date of the data is the closest available to the date when the

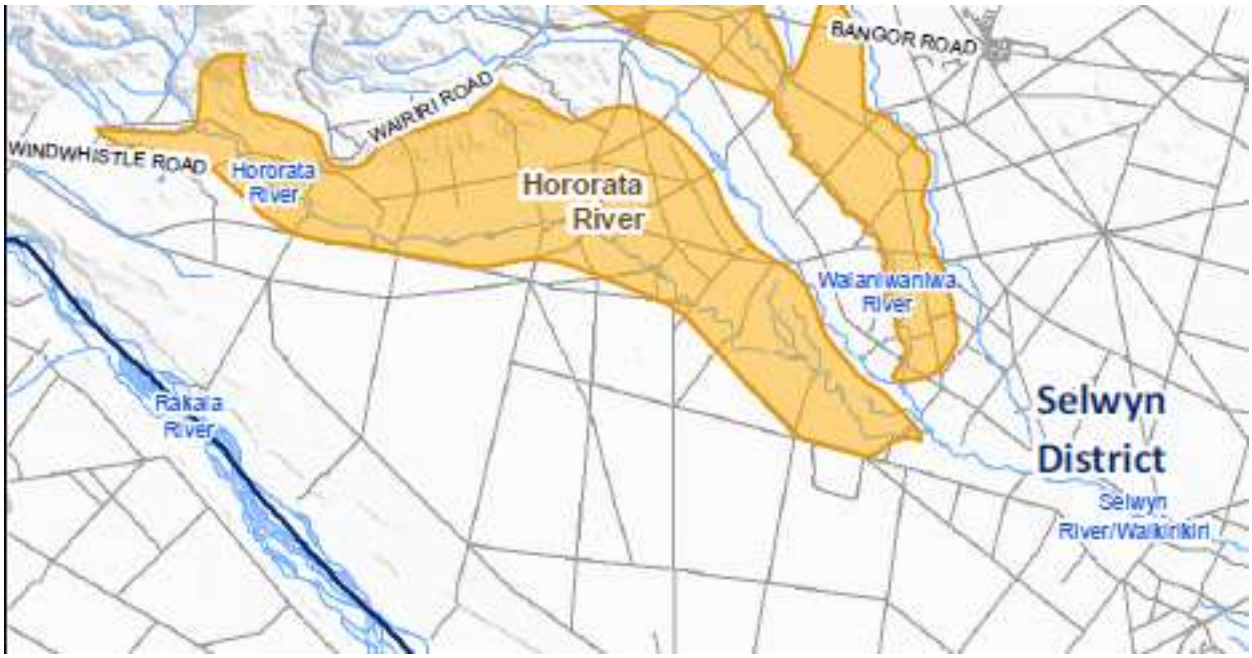
prioritising occurred. This means that sometimes data collected through the Waterwatch programme is preferred to that from ECan and at other times the ECan data is preferred. In some cases the two are presented together and where there are considerable differences between measurements taken from proximal areas (eg the Liffey/L2 then the average of the data or all the data sets is provided. Notably there are no data for the Liffey/L2 from a point near where they enter Lake Ellesmere/Te Waihora, but the length of the stream is measured from the Lake entry to the 'origin' of the L2.

The specific data sources are provided with each catchment table. Where no measured information is available the tabular cell is left blank. A proxy is used for Johnsons Road Drain as there appear to be no data for that waterway. Data on length is an estimate of the main stem length of each stream based on measurements of the indicated streams in the aforementioned ECan GIS. The riparian length is a doubling of that main stem length estimate and is included to enable restoration efforts to be placed in context as they may occur on only one side of a stream.

There are a number of gaps in the data tables and it is hoped that data will be added over time to enable changes to be recorded. The area in public and private ownership while conceptually easy to articulate is in reality almost impossible to provide without detailed on the ground surveys. Expectations that this might be achievable as a rough and ready estimate have been confounded by the complexities of ownership that warrant a PhD in themselves. Indeed a full analysis of changes would need to use all the data available on each site.

The profiles presented here are intended as snap shots only, in the hope that the gaps will inspire future researchers.

Hororata River



		2005*			
Health	Nitrate Nitrogen (mg/L)	0.9			
	Soluble phosphate (PO4) (mg/L)				
	Faecal Coliforms				
	Suspended solids				
	Water clarity (nephelometric turbidity units) (NTU)	clear			
	Dissolved oxygen (mg / L)				
	Dissolved oxygen saturation (%)				
	Water temperature (°C)	15.1			
	pH	6.6			
	Conductivity (salinity) (mS/m) (field)	11.4			
Length (m)	River length	38900			
	Riparian length	77800			
Ownership status	Public				
	Private				
Riparian Status	Unfenced				
	Fenced				
	Restored				

**ECan SQ34808 Confluence with the Selwyn River 7 Feb 2005.*

L1 Creek (Liffey Stream)/ L2 River

		2009			
		Liffey Stream easting 1558470, northing 5168200	L2, Yarrs Lagoon Y1 Easting 1557070, northing 5163300****		
Health	Nitrates (NO3-N) (mg / L)	7.0*, 4.95**	4.1		
	Soluble phosphate (PO4) (mg / L)	0.4*, 0.19**	0.35		
	Faecal Coliforms		5		
	Suspended solids	*231.8#*	*119.9##*		
	E.Coli		2.06		
	Salmonella		0.25		
	Water clarity (nephelometric turbidity units) (NTU)		1.75		
	Dissolved oxygen (mg / L)	9.3***	7.6		
	Dissolved oxygen saturation (%)	80.25**	72.3		
	Water temperature (°C)	13.9**	13.2		
	pH	7**	6.7		
	Conductivity (salinity) (µS / cm)	247**	240		
Length(m)	River length	8620			
	Riparian length	17240			
Ownership status	Public				
	Private				
Riparian Status	Unfenced				
	Fenced				
	Restored				

Source: *Envirotown 4th April; ** Average of two measurements – Waterwatch (6th September) Envirotown (4th April), *** Waterwatch (6th September) , ****ERST 611 (26th March). *# total solids, ERST 311, 16 Aug 2010, easting 1559100, northing 5166350; ## total solids, ERST 311 6 Aug 2007, easting 1558930, northing 5165950.*

Waikekewai Creek

		2009 SQ34540		
Health	Nitrates (NO3-N) (mg / L)	3.0		
	Total phosphorus mg/L	0.017		
	E. Coli (MPN/100mL)	330		
	Suspended solids (mg/L)	0.3		
	Water clarity (nephelometric turbidity units) (NTU)	Clear 0.3		
	Dissolved oxygen (mg / L)	3.1		
	Dissolved oxygen saturation (%)	31.5		
	Water temperature (°C)	14.9		
	pH	7.2		
	Conductivity (salinity) (µS / cm)	27		
Length (m)	River length	11200		
	Riparian length	22400		
Ownership status	Public			
	Private			
Riparian Status	Unfenced			
	Fenced			
	Restored			

** ECAN 17 March 2009, Gullivers Rd, beside Hall*

Kaituna River

		2009*			
Health	Nitrates (NO3-N) (mg / L)	0.20			
	Soluble phosphate (PO4) (mg / L)	0.24			
	E.Coli				
	Suspended solids				
	Water clarity (nephelometric turbidity units) (NTU)	8.67			
	Dissolved oxygen (mg / L)	10.89			
	Dissolved oxygen saturation (%)	102.78			
	Water temperature (°C)	12.8			
	pH	7.18			
	Conductivity (salinity) (µS / cm)	86.25			
Length (m)	River length	14110			
	Riparian length	28220			
Ownership status	Public				
	Private				
Riparian Status	Unfenced				
	Fenced				

	Restored				

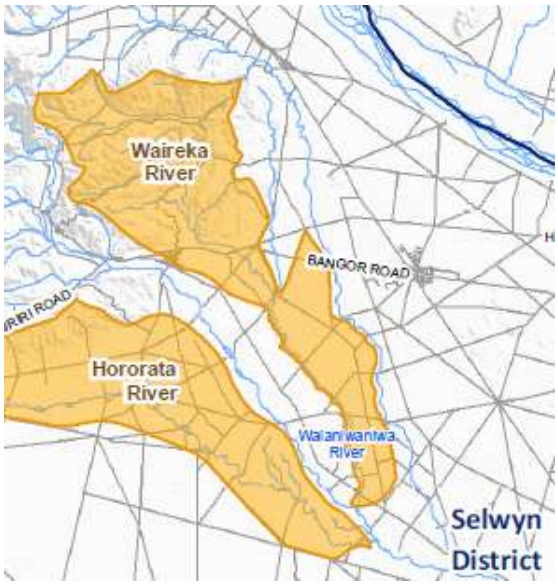
Source: *Waterwatch, average of 17 measurements over Feb-March 2009 at easting 1578900, northing 5159500. There is excellent ECAN data on these parameters up to 2008.

Johnsons Road Drain/Pakakowai Stream proxy

		2007*			
Health	Nitrates (NO3-N) (mg / L)	5.4			
	Total Phosphate (mg / L)	0.15			
	E.Coli	520			
	Suspended solids	5.8			
	Water clarity (nephelometric turbidity units) (NTU)	2.8			
	Dissolved oxygen (mg / L)	9.6			
	Dissolved oxygen saturation (%)	83.7			
	Water temperature (°C)	9.6			
	pH	8.9			
	Conductivity (salinity) (µS / cm)	26			
Length (m)	River length	1800			
	Riparian length	3600			
Ownership status	Public				
	Private				
Riparian Status	Unfenced				
	Fenced				
	Restored				

- Data (except length) is from nearest proximal measuring point: SQ30994 Lambies & Mansons Drain from ECAN which has good data going back to 1985

Waianiwaniwa River (Waireka River)



		2006*			
Health	Total Nitrogen (mg / L)	0.30			
	Total Phosphorus (mg / L)	0.021			
	E.Coli (MPN/100mL)	38			
	Suspended solids	n/a			
	Water clarity (nephelometric turbidity units) (NTU)	Clear 1.9			
	Dissolved oxygen (mg / L)	14.8			
	Dissolved oxygen saturation (%)	138.1			
	Water temperature (°C)	12.1			
	pH	8.9			
	Conductivity (salinity) (mS/m)	17			
Length (m)	River length (m)	38400			
	Riparian length	76800			
Ownership status	Public				
	Private				
Riparian Status	Unfenced				
	Fenced				
	Restored				

Data from: *ECan site SQ30944, 4 Sept 2006,* except length.

Silverstream

		2010 Easting 1552140 Northing 5161870*			
Health	Nitrates (NO3-N) (mg / L)	2.16			
	Soluble phosphate (PO4) (mg / L)	0.18			
	Coliforms	1950			
	E. Coli	112.5			
	Salmonella	6.25			
	Total dissolved solids (TDS) (mg / L)	133.6			
	Total suspended solids (TSS) (non filterable solids) (mg / L)	0.8			
	Water clarity (nephelometric turbidity units) (NTU)	1.58			
	Dissolved oxygen (mg / L)	10.33			
	Dissolved oxygen saturation (%)	105.9			
	Water temperature (°C)	17.2			
	pH	7.2			
	Conductivity	205.5			

	(salinity) (µS / cm)				
Length	River length (m)	6200			
	Riparian length	12400			
Ownership status	Public				
	Private				
Riparian Status	Unfenced				
	Fenced				
	Restored				

*Data, except length, from: ERST 203 10 March 2010

Leeston Creek

		2006*			
Health	Total nitrogen, (mg / L)	0.30			
	Total Phosphorus (mg / L)	0.021			
	E Coli (MPN/100mL)	38			
	Suspended solids	n/a			
	Water clarity (nephelometric turbidity units) (NTU)	Clear, 1.9			
	Dissolved oxygen (mg / L)	14.8			
	Dissolved oxygen saturation (%)	138.1			
	Water temperature (°C)	12.1			
	pH	8.9			
	Conductivity (salinity) (mS/m)	17			
Length	River length (m)	2730			
	Riparian length	5460			
Ownership status	Public				
	Private				
Riparian Status	Unfenced				
	Fenced				
	Restored				

- Data, except length, from *ECan site SQ30989 at main road into Leeston 4 September 2006.*

NB Phosphorus is an element (P). Phosphate is a molecular anion (PO4_3-), part of phosphoric acid (H3PO4). The use of the term in these profiles is based on the recorded version which varies depending on who recorded the measure.

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[i] Restoration priority meeting notes of 03-07-09, Waihora Ellesmere Trust files.

[ii] Those in attendance were: Peter Chamberlain (Chair WET Riparian sub-group), Malcolm Anderson (WET General Manager), Golda Varona (WET Exec Officer), Kate Lewis (ECan Resource Care), Wayne McCallum (Regional Biodiversity Officer), Vicki Rollinson (SDC), and Jason Arnold (Ngai Tahu)

[iii] Markham – Short, Ruth 2012 Compilation of Lincoln University Water Quality Monitoring Data for Lake Ellesmere/Te Waihora catchment 1993 – 2011 WCFM Report 2012-001 Waterways Centre for Freshwater Management, Lincoln University and University of Canterbury, Christchurch. P.64.

[iv] http://ecan.govt.nz/services/online-services/gis-mapping/pages/enter-gis.aspx

[v] Markham- Short *op. cit.*