

**Braided river bird
surveys of the Waiau
River and eight
smaller Canterbury
rivers, spring 2008**



**Environment
Canterbury**
Your regional council

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Executive summary

Environment Canterbury staff led bird count surveys of the Waiau River and eight smaller rivers during the spring 2008 breeding season. This complements annual bird count surveys of other Canterbury braided rivers undertaken by the Department of Conservation in recent years.

The Waiau River had only been partially surveyed for birds on one other occasion, over 30 years ago. The 2008 survey revealed the Waiau River to be a habitat of outstanding significance for threatened native birds. It supports the northern-most known breeding population of wrybill, internationally significant populations of black-fronted terns and black-billed gulls, and a regionally significant population of banded dotterel.

Of the eight smaller rivers surveyed, the Kahutara, Kowai and Mason had the best habitat and numbers of specialist braided river bird species. The Pareora and Kahutara had the highest total bird counts of the smaller rivers, mainly due of large numbers at the river mouths.

There were no flows along extensive sections of the Eyre and Kowai rivers by October 2008. Therefore, no specialist braided river birds were able to breed in these sections. In the Hapuku, Hanmer and Kowai rivers, generally poor habitat for braided river bird species was reflected in the low numbers counted. The Pareora had lower than average flows and lower than expected numbers of banded dotterels.

Recommendations for future surveys are contained at the end of the report.

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1 Introduction

Braided rivers are one of the most important remaining habitats in Canterbury for endemic bird species. Water abstraction, predation by introduced mammals, and encroachment by exotic weeds all threaten to reduce breeding success in this specialist group of birds (Dowding & Murphy 2001, Dowding & Moore 2006, Melville & Battley 2006, O'Donnell 2000, Wilson 2001).

Environment Canterbury has important responsibilities for setting environmental flows, flood protection, river bed consents, and maintaining indigenous biodiversity, and therefore has a critical interest in monitoring braided rivers including the birdlife.

The NZ Department of Conservation is the leading central government agency responsible for the conservation of New Zealand's natural and historic heritage. The Department manages or administers indigenous/native wildlife on behalf of New Zealanders. The goal of the Department of Conservation is to survey all braided rivers in Canterbury on a regular cycle. However, their resources are limited and they can not survey all the rivers in the region.

Land management agencies and the public need sound information to guide water use decisions. To make these assessments, planners and managers urgently need up-to-date counts of birds on rivers so that the significance of each river's fauna can be assessed. Many counts are more than 25 or 30 years old now (e.g. the Waiau River surveyed in 1975) (O'Donnell, 2008, unpublished data), and some bird species have declined significantly in that time (Dowding & Moore 2006, Melville & Battley 2006).

This report documents results from bird count surveys of nine braided rivers during the spring breeding season led by Environment Canterbury. Rivers surveyed were the Waiau, Eyre, Hanmer, Hapuku, Kahutara, Kowai, Kowhai, Mason, and Pareora. These surveys supplement surveys undertaken by the Department of Conservation, groups such as the Ashley River Care Group, and Ashburton Forest and Bird.

2 Methods

The standard methods for braided river bird surveys developed by the Department of Conservation were used to conduct the surveys¹.

Rivers were subdivided into sections (Appendix 1) so repeat counts could be compared. Surveys were conducted in October and November on foot or from an ATV (all terrain vehicle or farm bike) except for the Waiau River. The Waiau River surveys were done by foot with jetboat support. A few sections of the Waiau were done by jetboat only - these are noted in the comments sections of the spreadsheets. The methods and sections are summarised in Table 2.1.

For the small rivers the counts were also usually done heading downstream, but depending on access were sometimes in an upstream direction.

Birds observed during field surveys were recorded on a standard data sheets developed by DOC (or a notebook in a few instances), and stored in Excel spreadsheets in the Environment Canterbury Land and Coastal Resources Monitoring Section.

Grid references for nesting pairs or colonies of key species (wrybill, black-fronted tern, black-billed gull, and southern black-backed gull) were recorded and subsequently mapped. Where apparent errors in colony locations were detected from mapping, the original data sheets were checked and the surveyors given copies of the maps and original data sheets to correct. The corrections were entered into the maps, original data sheets, and spreadsheets.

¹ Braided bird river survey protocols DOCDM-322956 and the draft Breeding Season Counts of Water Birds on Braided Rivers (both DOC unpublished internal documents)

Table 2.1 Summary of rivers surveyed and methods used, October – November 2008 (order of rivers is from north to south)

River	Survey sections (no.)	Date(s)	Max no of surveyors across river bed	Total number of surveyors	Distance surveyed (km)	Method
Hapuku	2	27/11	1	1	3.9	Foot
Kowhai	1	28/11	1	1	7.0	Foot
Kahutara	2	26/11	1	1	6.4	ATV and foot
Hanmer	2	13/11	1	2	10.8	Foot
Mason	3	21/11	1	1	4.5	Foot and ATV
Waiau	14	16-17, 21-23/10, 13/11	7	13	101	Jet boat and foot
Kowai	5	19/11	1	1	10	ATV
Eyre	9	7 & 20/11	1	2	39.8	ATV
Pareora	3	6/11	1	4	13.5	4wd

A graph showing the flow levels for the Waiau River for the month preceding the survey was copied from the Environment Canterbury website and inserted into the spreadsheet to give an indication of past floods and likelihood of nesting colonies being present on the river (Appendix 3).

A section higher up the Kowhai River was selected for survey on recommendations by local ECan staff, because the lower section (below the Kowhai Ford to the river mouth) had been surveyed the recently year by Lindsay K. Rowe for Ford Bros and Works Infrastructure (Rowe 2008).

3 Results and discussion

Summary counts of key braided river bird species and total bird numbers are shown in Table 3.1. Key species of conservation concern are wrybill, black-fronted tern and black-billed gulls. Numbers of black-backed gulls are also included as they are potential predators of these species. Of the nine rivers surveyed in 2008 most had less terrestrial weed cover than previous years due to large winter floods (based on observations and comments from a wide variety of people contacted during the surveys).

A total of about 101 km of the Waiau River were surveyed, much of it (about 70 km) for the first time. About 30 km of the Emu Plains section of the Waiau River was surveyed in 1975 by the then Wildlife Service (Bell 1975). In the 1975 survey, the Waiau had the highest number of black-fronted terns of the 14 braided rivers surveyed (along with the Ashley and Waitaki rivers), and was ranked as 'high' for wildlife values². However, had the entire river been surveyed it probably would have ranked as 'outstanding' given the current findings.

The 2008 count showed that the Waiau River contains an internationally significant population of black-fronted terns, with 520 counted (Table 3.1). Since 2000, only three other rivers have ever had maximum counts this high or higher (the Lower Rangitata, Lower Ohau, and Wairau) (C. O'Donnell, DOC, unpublished data); and since the 1960s, only seven other rivers have ever had total counts of greater than 500 black-fronted terns³.

² The survey was of Canterbury Rivers from the Conway to the Waitaki (excluding the Mackenzie Country for logistic reasons).

³ Ashburton (1981/2007), Lower Rangitata (2007/2007), Ahuriri (1994/2001), Tekapo (1994/1998), Lower Ohau (1991/1995), Waitaki (2001/2001), and Wairau (2005/2005). Years in parenthesis above slash line indicate most recent date when over 500 terns were counted. Years below slash line indicate the most recent date count data was available. Source: C. F. O'Donnell, DOC, unpublished data.

Table 3.1 Summary of braided river specialists and all birds counted (rivers listed in geographical order from north to south). The detailed results of the river surveys are contained in Appendix 2.

River	Banded dotterel	Wrybill	Black-fronted tern	Black-billed gull	Black-backed gull*	Total birds counted
Hapuku	2	0	0	0	0	6
Kowhai	0	0	0	0	1	4
Kahutara	23	0	8	200	15	321
Hanmer	0	0	0	0	0	14
Mason	6	0	3	0	0	51
Waiau	451	11	520	2035	2108	5897
Kowai	11	0	0	0	6	41
Eyre	0	0	0	0	30	83
Pareora	2	0	0	0	212	364

* black-backed gulls are potentially important predators of breeding braided river bird species

In addition to high numbers of black-fronted terns, two large breeding colonies of endangered black-billed gull were recorded on the Waiau River. One colony was below the Twin Bridges (of about 800 birds), and one just upstream of the SH bridge at the Waiau township (of about 600 birds), with a grand total of 2035 black-billed gulls counted. Four-hundred and fifty banded dotterels, a species of concern ('gradual decline' - Hitchmough *et al.* 2005), were also found. This is almost 1% of the total estimated New Zealand population of 50,000 (Dowding & Moore 2006).

The Waiau River is now the northern-most known breeding location for wrybill (previously it was the Ashley River). Eleven wrybill were recorded, including five pair (with three confirmed breeding, i.e. nests with eggs were found). In the 1975 survey of the Waiau, no wrybill were recorded (Bell 1975).

There are at least two possible scenarios to explain this 'rediscovery' of wrybill on the Waiau River. One is that wrybill have always been on the river, but were overlooked. Comparing similar sections, in the 30 km section surveyed in both 1975 and 2008 only one pair of wrybill were counted in 2008 (and none in 1975). The other nine wrybill recorded in 2008 were in sections of the river not previously surveyed. This species is probably significantly undercounted in this type of river survey, as illustrated by a Fauna Survey Unit (FSU) river bird count of the upper Rakaia River, where only about 10% of wrybill known to be present were recorded (O'Donnell and Moore 1983). The other possibility is that wrybill have recolonised the river; however, this seems less likely given the current population trends and breeding distribution.

Of the eight small rivers surveyed the Kahutara, Kowai, and Mason had the best habitat and numbers of specialist braided river bird species (e.g. banded dotterel, black-fronted tern, and black-billed gull) (Table 3.1). The Pareora and Kahutara rivers had the highest numbers of total birds counted, mainly due to large numbers at the river mouths.

A couple of the smaller rivers, in spite of having very good substrates for bird habitat (e.g. finer shingles), had very low or no flows for significant sections and therefore low bird numbers; these included the Eyre River, especially in the lower sections, and the Kowai River.

The Pareora, although it had consistent flows throughout, had lower dotterel numbers than expected. The flows during the survey were below the average for that time of year, and below the level when dotterels are normally found breeding on the river (R. Gould, Environment Canterbury, *pers. comm.* 2008).

The Kowhai and Hapuku rivers near Kaikoura had only single channels and/or larger boulder substrates which provided less suitable habitat for braided river birds, reflected in the low or nil numbers of specialist braided river birds recorded.

In interpreting these results it is important to take into account that surveys are just a snapshot of a river at that time. This is illustrated by comparing the annual DOC-led survey of the Waimakariri River with ongoing monitoring for black-billed gulls which took place during the 2008 season at least weekly (unpublished data) (Table 3.2). Depending on the date when the survey was done black-billed gull numbers for the river below the gorge were anywhere between 71 to over 1200 birds.

Table 3.2 Numbers of black-billed gulls recorded on the Waimakariri River in 2008

Date	Numbers	Type	Notes
28-29 Oct	71	4 small colonies	DOC-led annual Waimak River Survey
Early Oct	250+	Breeding colony	Bleak House Road
Mid Nov	1200 nests	Breeding colony	Haul Road / Harewood Crossbank
Mid Dec	270	Breeding colony	1.5 km below Eyre River

For endangered colonial nesting species such as black-billed gulls, repeated surveys (e.g. helicopter or fixed wing) within one season, or several seasons of data may be necessary to accurately gauge the use or importance of a river.

4 Recommendations

- Resurvey the Pareora River earlier in the season and/or when flows are higher as normally there are more banded dotterels using the river than was indicated by the count this season.
- Resurvey the Kahutara, Kowai, and Mason rivers twice annually (mid/late September and mid November) for the next two years, then reassess the need for future surveys after considering the amount of bird count variability between years and other regional survey priorities. Extend the survey to other sections of as these rivers which contain good habitat for braided river bird species to give a more complete picture of these rivers.
- Survey the following rivers in future seasons: Waihao, Otaiao, and Hakataramea (based on recommendations by ECan and/or DOC staff).
- Seek advice on when to re-survey the Waiau River from DOC and other ECan staff.

5 Acknowledgements

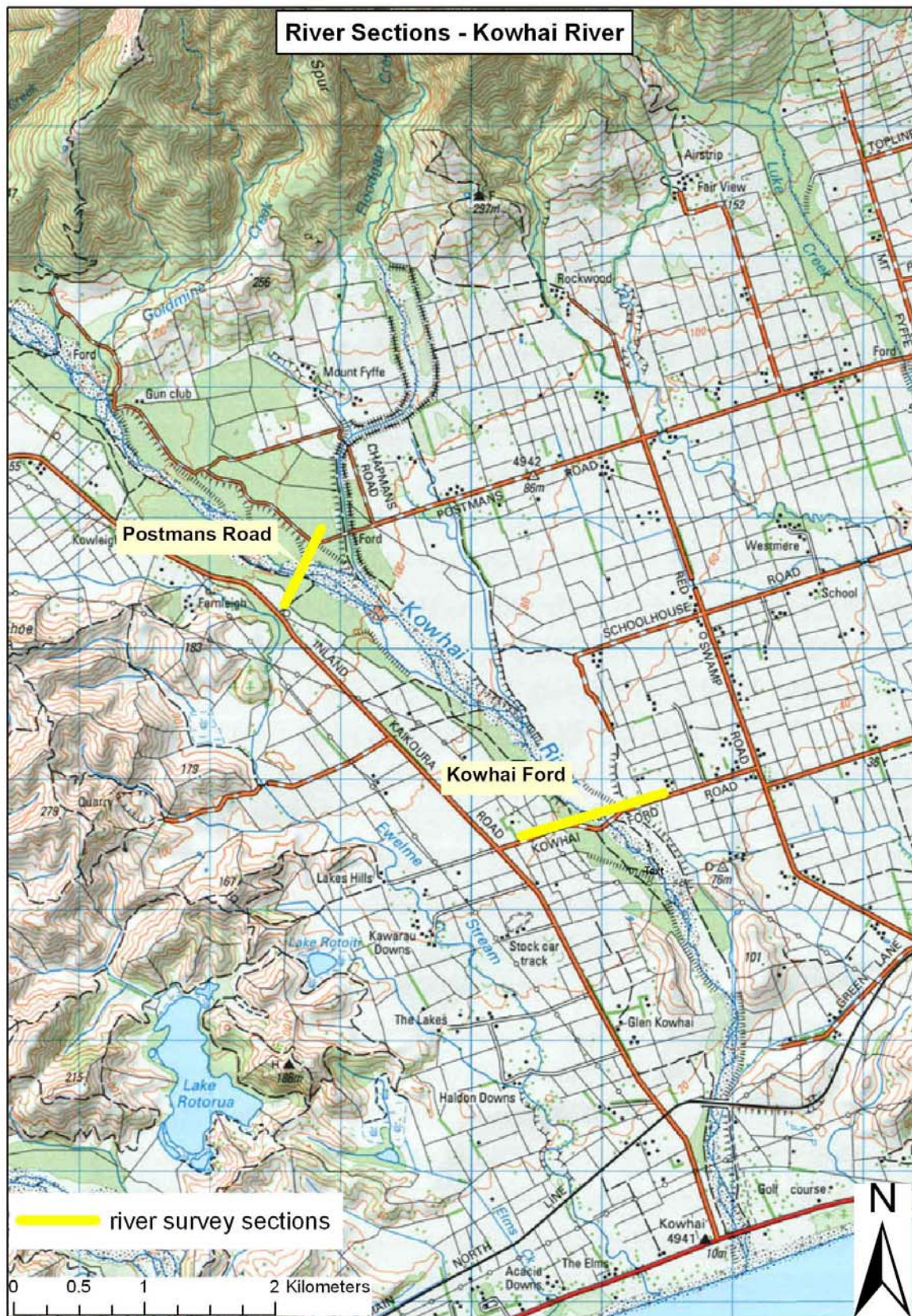
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Appendix 1 – Maps of river sections and bird colonies

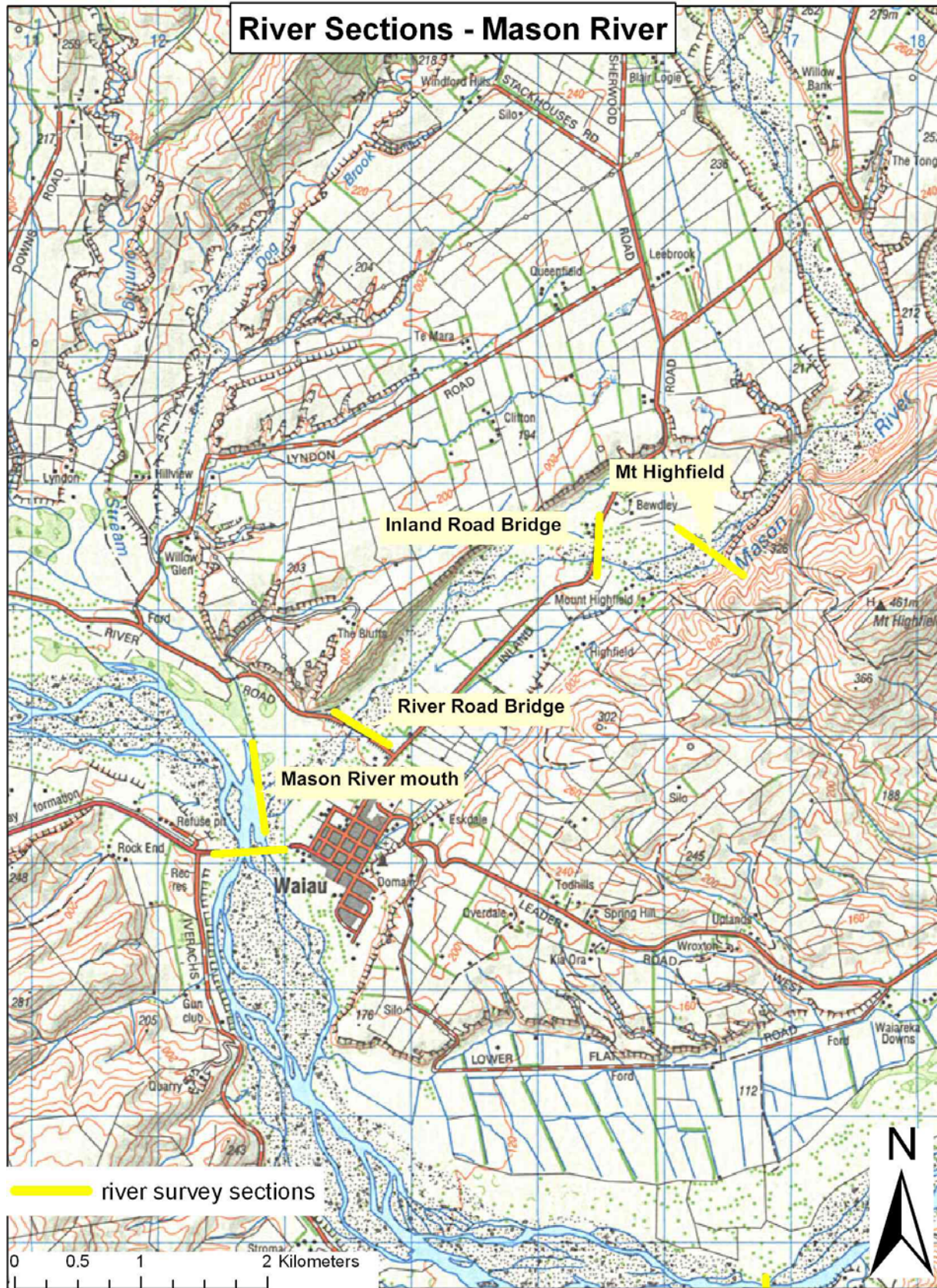


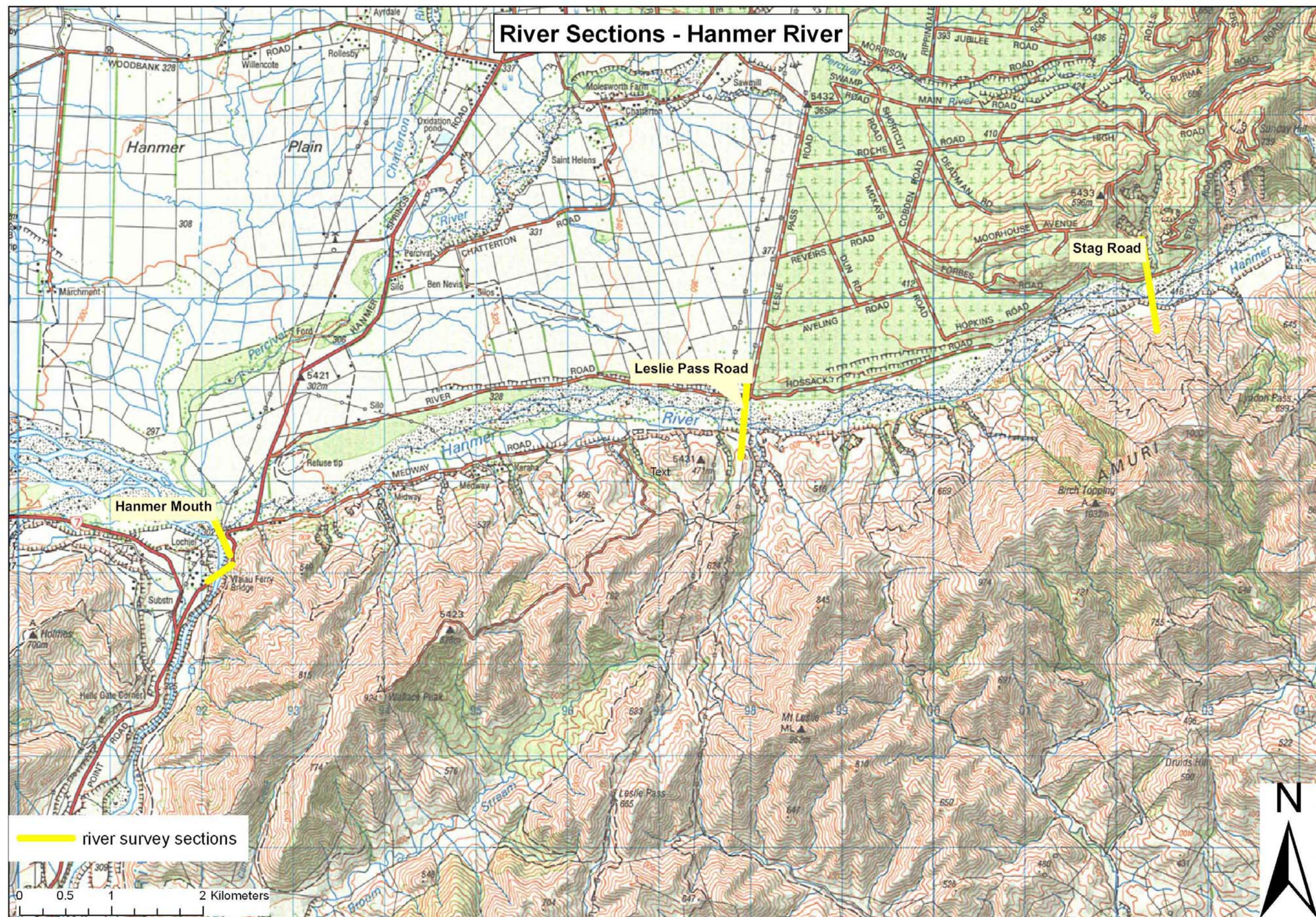


River Sections and black-fronted tern colony - Kahutara River

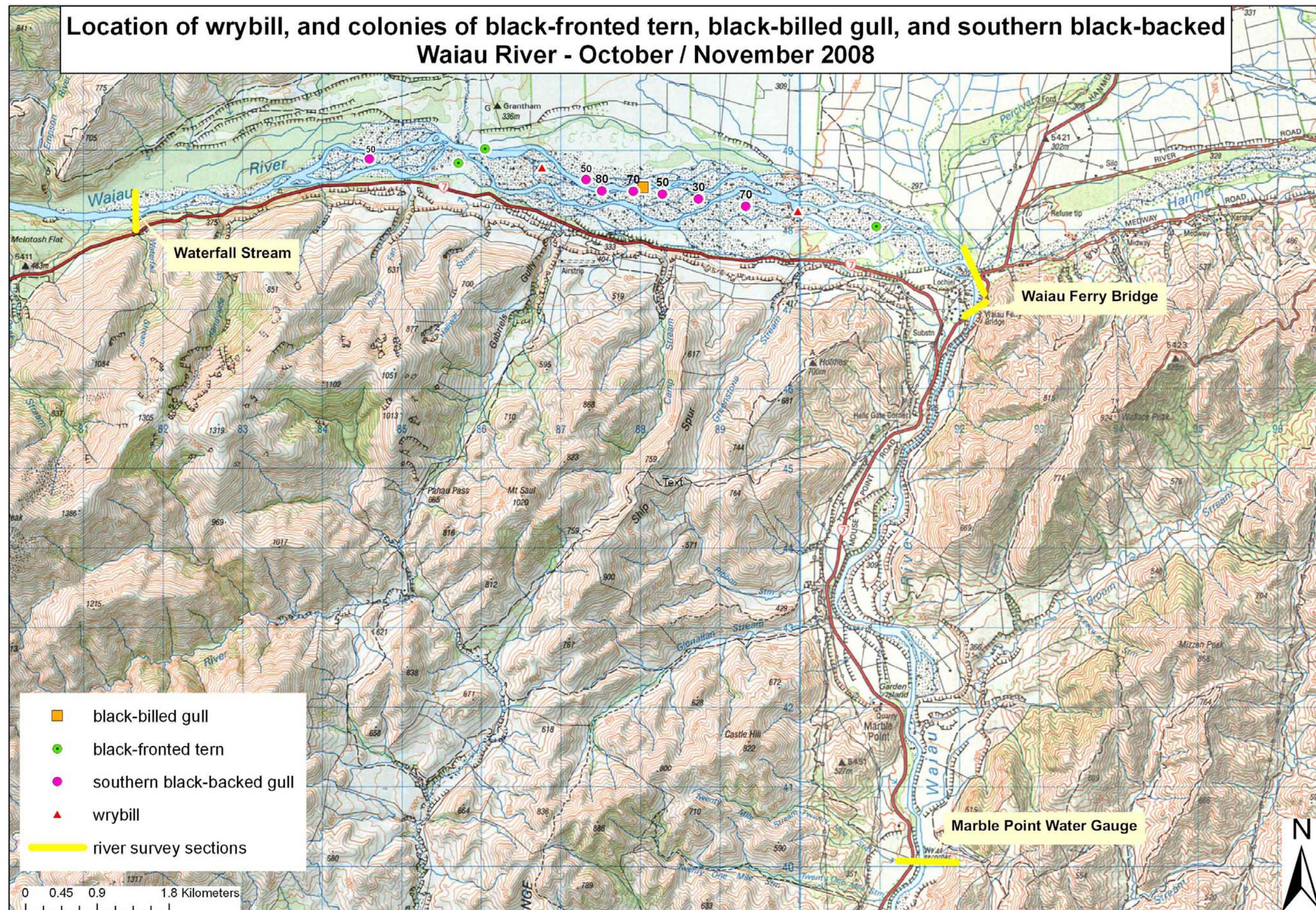


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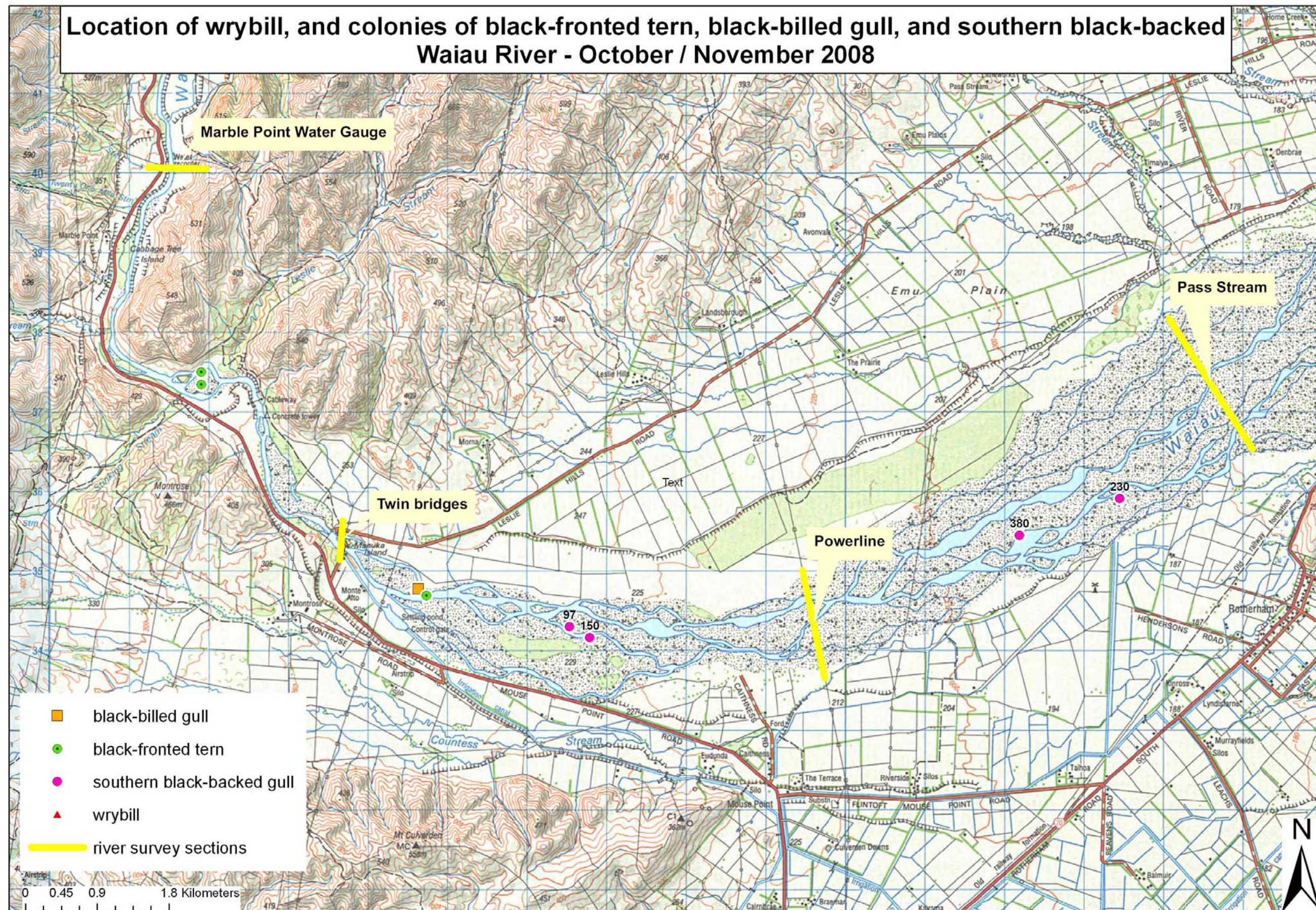




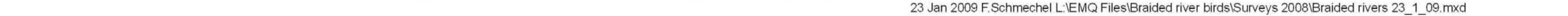
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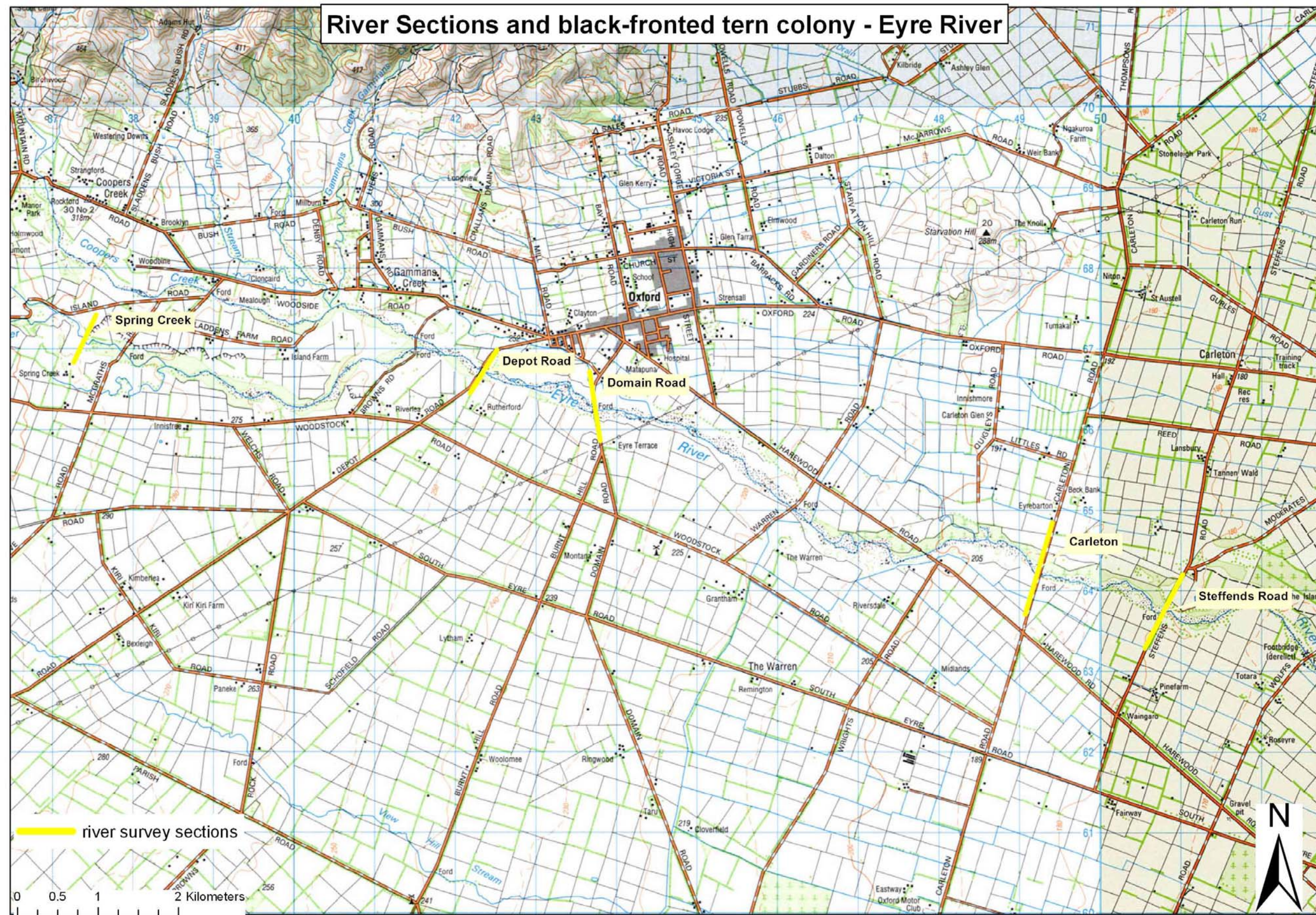


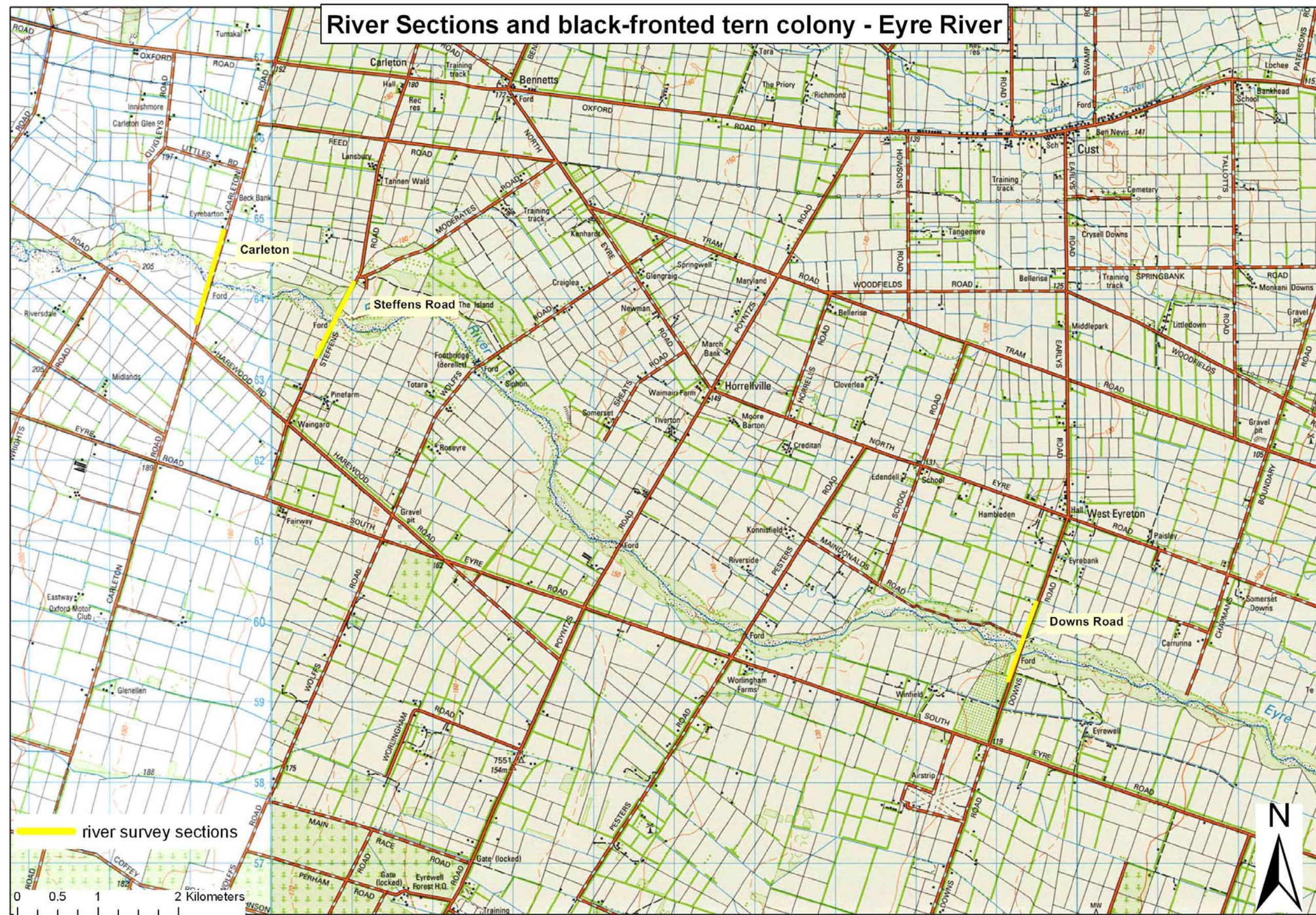
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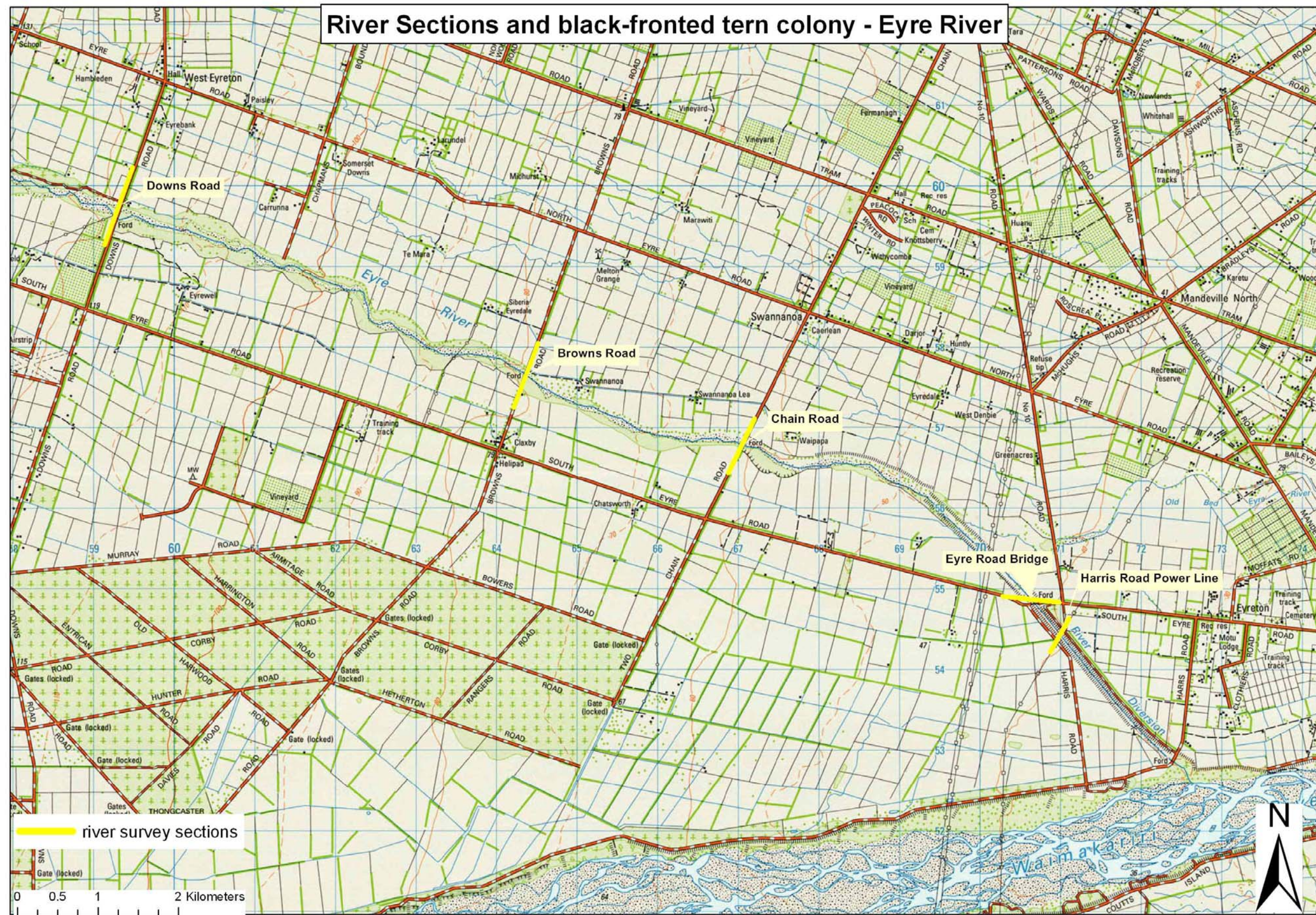






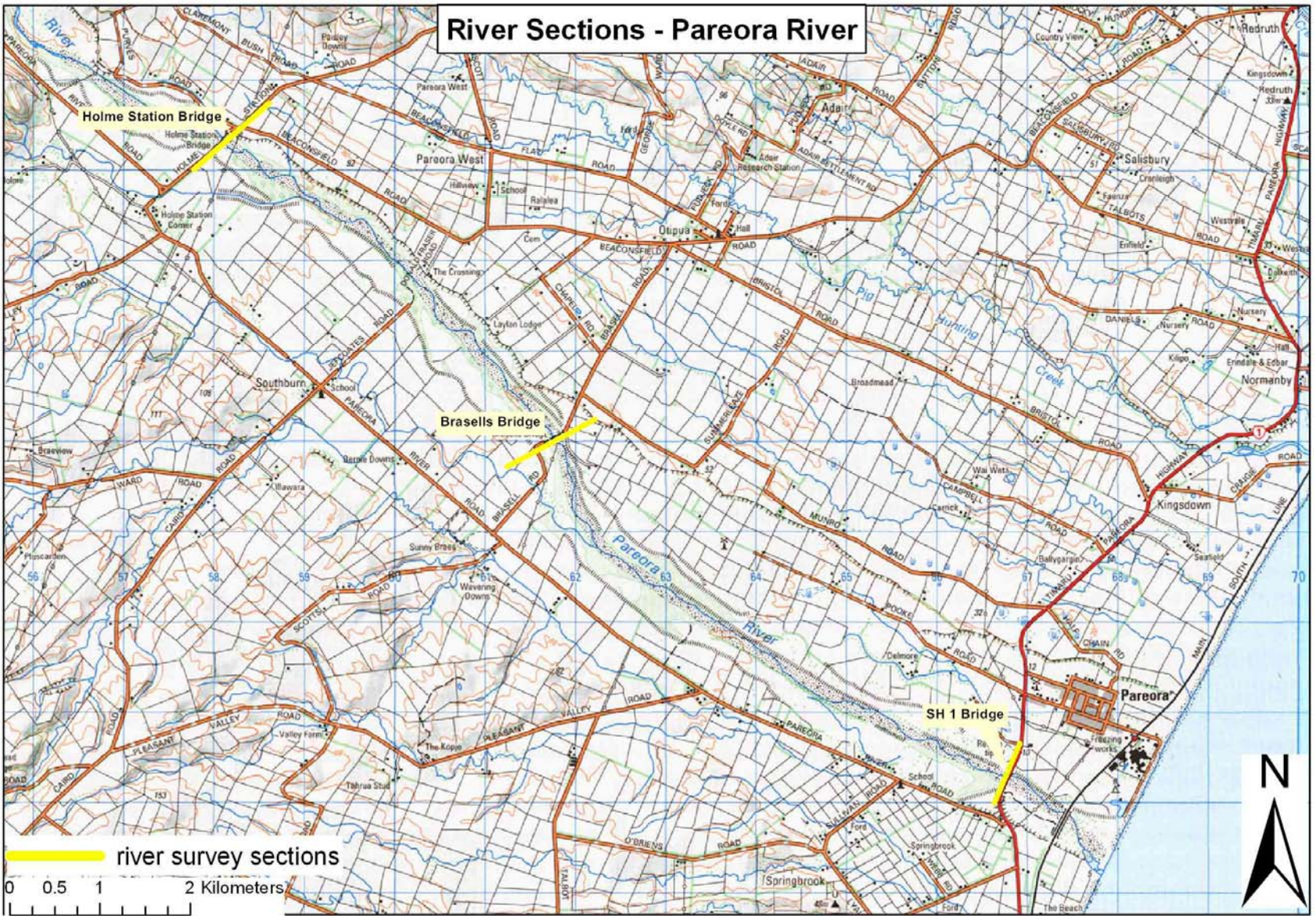






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Appendix 2 – Results of braided river bird surveys

Hapuku River

Species	Concrete abutment or groyne to SH1 Bridge	SH1 Bridge to Grange Road	Total
Banded dotterel		2	2
Wrybill			
Black-fronted tern			
Black-billed gull			
Southern black-backed gull			
Duck species			
Paradise shelduck	1		1
Spur-winged plover			
Canada goose			
SIPO			
Pied stilt			
White-fronted tern			
White-faced heron			
Pipit	2	1	3
date	27/11/2008	27/11/2008	
Kms	1.6	2.3	3.9
Surveyors	Frances Schmechel	Frances Schmechel	
Weather	Overcast, cool, light rain/drizzle	Overcast, cool, light rain/drizzle	
Flows	Strong, swift, dirty flows	Strong, swift, dirty flows	
Comment	River up, couldn't cross in many places. Poor habitat (substrate), mainly single channel.	River up, couldn't cross in many places. Poor habitat (substrate), mainly single channel in many areas.	

Could not get down to rail bridge / mouth (gates on two 2wd roads, probably accessible with 4wd)

Kowhai River

Species	Postmans Road to Kowhai Ford	Kowhai Ford to mouth (see notes below)	Total
Banded dotterel		9	
Wrybill			
Black-fronted tern			
Black-billed gull			
Southern black-backed gull	1		1
Duck species			
Paradise shelduck			
Spur-winged plover	3	3	3
Canada goose			
SIPO		2	
Pied stilt		16	
White-fronted tern			
White-faced heron			
date	28/11/2008	28/09/2007	
Kms	3	4	7
Surveyors	Frances Schmechel	Lindsay Rowe	
Weather	Clear, warm, still		
Flows	Moderate flows, clear / milky.		
Comment	Mostly single channel (98%). Thick yellow tree lupin in river bed except where cleared out by winter floods.	This section was done under contract last season and was therefore not repeated. The results are documented in a report 'Birds present in the Kowai River: a report for Ford Bros and Works Infrastructure'	

Kahutara River

Species	River mouth to SH1 Bridge	SH1 Bridge - Dairy Farm Road Ford	Total
Banded dotterel		23	23
Wrybill			
Black-fronted tern		8	8
Black-billed gull	200		200
Southern black-backed gull	14	1	15
Duck species		8	8
Paradise shelduck	2	9	11
Spur-winged plover	2		2
Canada goose			
SIPO		2	2
Pied stilt	1	8	9
White-fronted tern			
White-faced heron		2	2
Black shag		1	1
Little shag	2		2
Pied shag		3	3
Red-billed gull	35		35
date	26/11/2008	26/11/2008	
Kms	6.1	0.3	6.4
Surveyors	Frances Schmechel	Frances Schmechel	
Weather	Overcast, warm	Overcast, warm	
Flows	Clear, moderate flows.	Clear, moderate flows. River bed very wide in places, esp further up.	
Comment	ATV to E2556300, N5865700, walked after that.		

Locations for colonies/wrybill

SPECIES	EASTING	NORTHING	NUMBERS	NOTES
BBG	2558484	5863497	200	roosting
BFT	2556229	5865677	6	4 incubating

Hanmer River

Species	Stag Road to Leslie Pass Road	Leslie Pass Road to Hanmer Mouth	Total
Banded dotterel			
Wrybill			
Black-fronted tern			
Black-billed gull			
Southern black-backed gull			
Duck species			
Paradise shelduck		2	2
Spur-winged plover		8	8
Canada goose			
SIPO	2		2
Pied stilt			
White-fronted tern			
White-faced heron			
Harrier	2		2
date	13/11/2008	13/11/2008	
Kms	4.8	6	10.8
Surveyors	Frances Schmechel	Mark Parker	
Weather	Fine, warm		
Flows	Clear, mainly single channel.		
Comment	Large areas cleared by winter floods. Thick weed cover in other areas of river bed.		

Access to powerlines via Hamner, gate on road north of powerlines
 Contacts: The Hossack 324-3033 and DOC (Waimak) 313-0820.

Mason River

Species	Mason River mouth to River Road Bridge	River Road Bridge to Inland Road Bridge	Inland Road Bridge to Mt Highfield	Total
Banded dotterel	2		4	6
Wrybill				
Black-fronted tern	1	2		3
Black-billed gull				
Southern black-backed gull				
Duck species		2	10	12
Paradise shelduck	3	4	2	9
Spur-winged plover		3		3
Canada goose				
SIPO	2			2
Pied stilt	6	6	4	16
White-fronted tern				
White-faced heron				
date	21/11/2008	21/11/2008	21/11/2008	
Kms	1	2.5	1	4.5
Surveyors	Frances Schmechel	Frances Schmechel	Frances Schmechel	
Weather	fine, warm	fine, warm	fine, warm	
Flows	moderate clear flows	moderate clear flows	moderate clear flows	
Comment		Above River Rd bridge bouldery. 1 irrigation intake and 1 gravel operation. Track rough and blocked off in places.	Had to stop to return ECan trailer for WOF check.	

Waiau River bird survey results 2008

Species	Upper gorge			Upper Emu Plains		Lower Emu Plains		Middle Gorge		Lower braides around Parnasus / SH1 bridge				Lower gorge		2008	Emu plains section (29 km) 2008	Middle section Waiau (30 km) 1975
	Waterfall Stream to Waiau Ferry Bridge	Waiau Ferry Bridge to Marble Point water guage	Marble Point water guage to Twin Bridges	Twin bridges to Powerline	Powerline to Pass Stream	Pass Stream to Murray Down	Murray Down to Waiau Bridge	Waiau Bridge to Sandersons Road	Sandersons Road to Cheddar Valley	Cheddar Valley to Hematite Stream	Hematite Stream to Leamington Rd	Leamington Rd to SH1 bridge	SH1 bridge to Spotwood access	Spotwood access to River mouth	River mouth			
Banded dotterel	101	8	10	56	50	33	13	56	no count	2	18	43	20	22	19	451	208	292
Wrybill	4	0	0	0	0	2	0	0		0	2	0	1	2	0	11	2	0
Black-fronted tern	97	0	98	130	14	62	5	53		1	1	17	15	4	23	520	264	217
Black-billed gull	50	0	0	1179	10	0	720	0		0	4	63	0	2	7	2035	1909	73
Southern black-backed gull	332	1	1	242	694	144	19	2		16	172	340	53	13	79	2108	1101	1240
Duck species	0	6	0	20	14	8	11	17		0	9	9	35	0	8	137	70	27
Paradise shelduck	1	0	2	7		17	6	0		3	16	2	9	9	8	80	30	P
Spur-winged plover	40	6	1	20	32	18	5	0		6	0	56	25	2	0	211	75	6
Canada goose	245	0	0	23	28	20	1	0		4	0	9	2	0	0	332	72	41
SIPO	46	4	2	23	13	24	2	0		0	0	9	16	5	0	144	62	173
Pied stilt	27	8	4	12	6	9	0	0		1	4	7	6	5	4	93	27	88
White-fronted tern	0	0	0	0	0	0	1	0		0	0	0	0	0	65	66	1	0
White-faced heron	1	0	0	1	3	0	0	0		1	2	0	0	0	0	8	4	4
Black shag	1		5	1	14	2	16	7		4			5	13		68	40	22
Black swan															1	1		
Caspian Tern										1					5	6		
Feral goose																		3
Grey duck																		22
Harrier				4	3			1			1	2				11	8	
Kingfisher				1			1						4			6	2	
Little shag													5			5		
Mallard																		120
NZ shoveler																		2
Pied shag														14	1	15		
Pipit	3															3		
Pukeko						1										1	1	
Red-billed gull		1													16	17		
Scaup															14	14		
Variable oystercatcher															4	4		
Welcome swallow				1												1	1	
date	21/10/2008	13/11/2008	13/11/2008	16/10/2008	16/10/2008	17/10/2008	17/10/2008	17/10/2008	no count	23/10/2008	21/10/2008	21/10/2008	21/10/2008	22/10/2008	22/10/2008			October
Kms	11.7	8.6	7.3	6.3	7.4	4.5	4.1	6.4	3.7	17.9	2.7	5.7	4.5	7	3.2	101		30
Surveyors	P Grove, Z Hill, F Maddigan, J Hobin, N Brodie	F Schmechel, M Parker, P Grove		V Lucas, M von Tippelskirch, J Tweed, Z Hill, P Grove, F Schmechel, M Parker		V Lucas, M von Tippelskirch, B Young, Z Hill, P Grove, F Schmechel				F Schmechel, A Spencer, A Crossland, M Parker	F Schmechel, M Parker, B Gabites, M von Tippelskirch			F Schmechel, A Spencer, A Crossland, M Parker			(Bell 1975)	
Weather		Fine and warm		Partly cloudy		Partly cloudy				Steady rain increasingly heavy. Had to cut survey short.	Mild, mainly fine, light cloud			Overcast and occasional light showers.				
Flows		Normal flows		Flows moderate, water bluish opaque		Flows up and water brown			no count due to weather	Flows coming up and water brown								
Comment	Needed more surveyors for this section (2 or 3)	Jet boat and walked wide shingle sections	Jet boat and walked wide shingle sections							Only walked gravel bars up to E2524127, N5832975. Boat only from this point up.	Could have used more surveyors on this section in some parts			Quite a lot of wide gravel bars - walked all of them	Did a walk around the mouth and north			

Locations for colonies and wrybill on the Waiau River 2008

SPECIES	EASTING	NORTHING	NUMBERS/NOTES
black-billed gull	2488027	5848537	50
black-billed gull	2494638	5834780	800
black-billed gull	2512745	5839180	600
black-billed gull	2529907	5831320	50, approx location
black-fronted tern	2485749	5848954	8
black-fronted tern	2486046	5849017	40, nests
black-fronted tern	2490959	5848046	24
black-fronted tern	2491910	5837503	75 ad, eggs & chicks
black-fronted tern	2491910	5837345	20 ad
black-fronted tern	2494740	5834695	40
black-fronted tern	2506060	5837869	10
black-fronted tern	2506231	5838013	32
black-fronted tern	2508913	5839974	10
black-fronted tern	2516084	5835508	30
black-fronted tern	2528503	5831449	5
black-fronted tern	2540736	5825648	17, breeding colony
pieb stilt	2516047	5835407	10
southern black-backed gull	2484571	5848100	20
southern black-backed gull	2487315	5848633	50
southern black-backed gull	2487511	5848493	80
southern black-backed gull	2487906	5848484	70 with eggs
southern black-backed gull	2488271	5848449	50
southern black-backed gull	2488723	5848390	30 with eggs
southern black-backed gull	2489315	5848297	70
southern black-backed gull	2496538	5834302	97
southern black-backed gull	2496790	5834167	150
southern black-backed gull	2502191	5835448	380
southern black-backed gull	2503449	5835914	230
southern black-backed gull	2508503	5839538	10
southern black-backed gull	2509441	5839983	50
southern black-backed gull	2509725	5839984	30
southern black-backed gull	2514168	5835880	70
southern black-backed gull	2515194	5835757	350
southern black-backed gull	2528018	5831301	110
southern black-backed gull	2529712	5831102	160, eggs
southern black-backed gull	2530428	5831016	150, eggs
southern black-backed gull	2535964	5830045	25, suspect nesting
white-fronted tern	2540708	5825554	65 roosting
wrybill	2486761	5848779	2 adults
wrybill	2489975	5848232	2 adults, with nest
wrybill	2509249	5840036	2
wrybill	2527533	5831594	2 adults, 1 egg
wrybill	2536683	5828888	1
wrybill	2536704	5828713	2 adults, 2 eggs

Kowai River

Species	Mouth	Mouth to SH1 Bridge	SH1 Bridge to Railroad Bridge	Railroad Bridge to Stokes Road	Stokes Road to Marshmans Road	Total
Banded dotterel	7	4				11
Wrybill						
Black-fronted tern						
Black-billed gull						
Southern black-backed gull	6					6
Duck species	5	2	3		2	12
Paradise shelduck	4				2	6
Spur-winged plover						
Canada goose						
SIPO						
Pied stilt		4				4
White-fronted tern						
White-faced heron						
Black shag	1					1
Variable oystercatcher	1					1
date	19/11/2008	19/11/2008	19/11/2008	19/11/2008	19/11/2008	
Kms	0.5	1.6	4.5	1.6	1.8	10
Surveyors	Frances Schmechel	Frances Schmechel	Frances Schmechel	Frances Schmechel	Frances Schmechel	
Weather	fine, sunny	fine, sunny	fine, sunny	fine, sunny	fine, sunny	
Flows		Small channel, single, clear flows. No flows (except occasional pools) between E2489820, N5779282 and mouth	Sections with no flow: E485821, N5778982 to E2486212, N5779032 and from E2486394, N5779278 to E2488808, N5779814	No flow most of this section	No flows from Stokes Rd to E2484048, N5779192. Above that consistent flow, channel bed narrower, willow lined	
Comment		Bed well cleared out, several meters of clear shingle	Lots of clear shingle but no flows	no river birds seen		

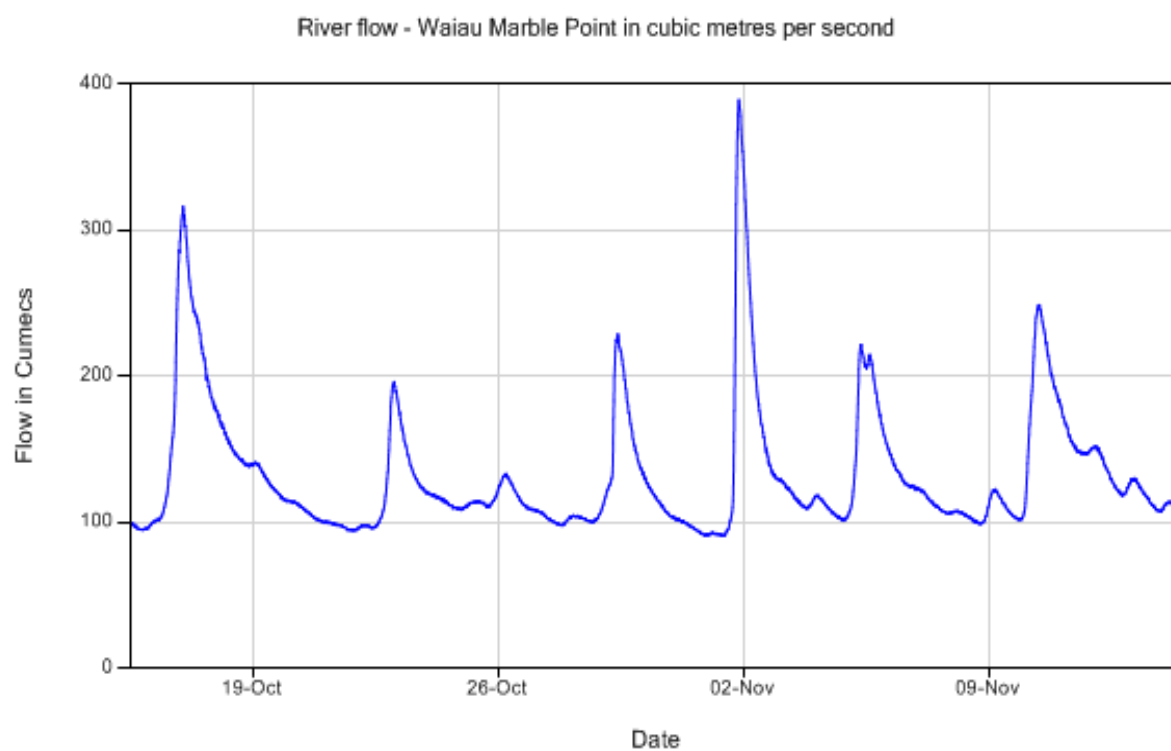
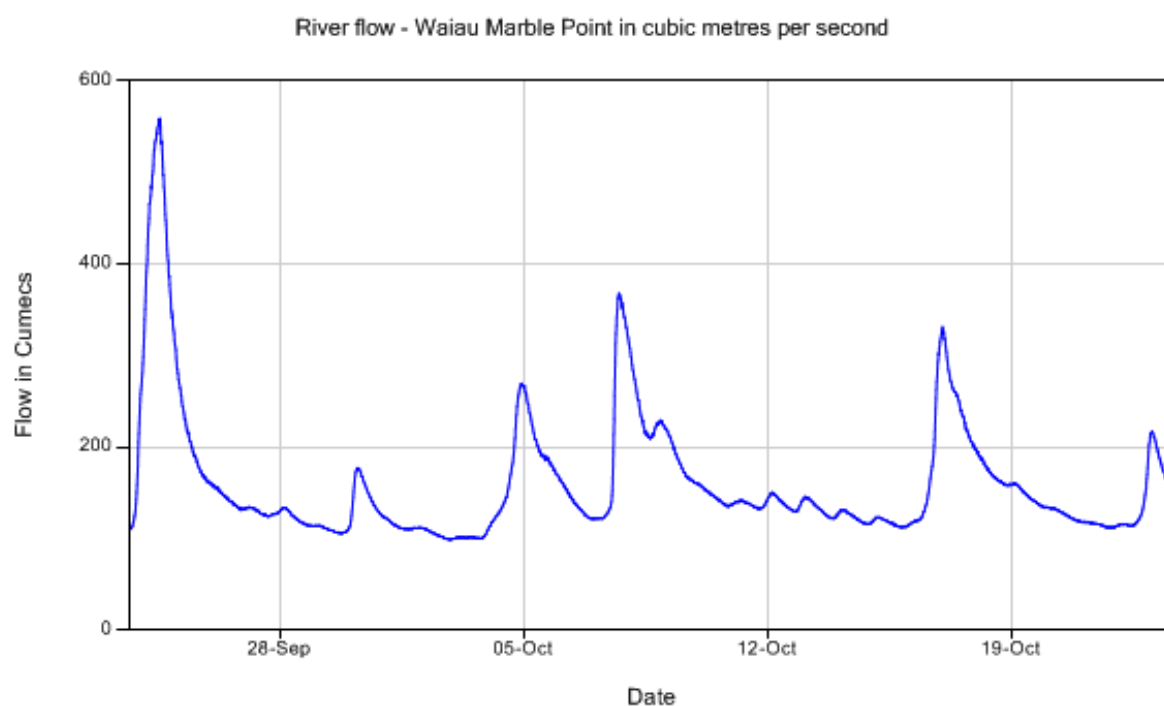
Eyre River

Species	Harris Road Power line to Eyre Road bridge	Eyre Road bridge to Chain Road	Chain Road to Browns Road	Browns Road to Downs Roads	Downs Road to Steffens Road	Steffens Road to Carleton Roads	Carleton Road to Domain Road	Domain Road to Depot Road	Depot Road to Spring Creek	Total
Banded dotterel										
Wrybill										
Black-fronted tern										
Black-billed gull										
Southern black-backed gull				30						30
Duck species				4			7		2	13
Paradise shelduck				4					2	6
Spur-winged plover									3	3
Canada goose										
SIPO							3			3
Pied stilt						6	7		11	24
White-fronted tern										
White-faced heron										
Harrier		2		1						3
Kingfisher				1						1
date	7/11/2008	7/11/2008	7/11/2008	20/11/2008	20/11/2008	20/11/2008	20/11/2008	20/11/2008	20/11/2008	83
Kms	0.6	4.2	2.9	5.7	10.9	1.8	6.5	1.5	5.7	39.8
	Frances Schmechel					Mark Parker				Surveyors
	Overcast, cool, showers									Weather
	No flows, occasional small pools									Flows
ATV entire distance. Trailer shuttle used 20/11/08.	Good substrate and relatively weed free but no river birds found									Comment
	Section with flows									
	E	N		E	N					
	2437381	5767140	to	2438489	5766784					
	2448343	5761663	to	2450000	5764100					

Pareora River

Species	SH1 Bridge - mouth	Brassells Bridge - SH1 Bridge	Holme Station - Brassells Bridge	Total
Banded dotterel	2			2
Wrybill				
Black-fronted tern				
Black-billed gull				
Southern black-backed gull	211		1	212
Duck species		6	1	7
Paradise shelduck	2		2	4
Spur-winged plover	5	2		7
Canada goose				
SIPO		2		2
Pied stilt	4	4	10	18
White-fronted tern		3		3
White-faced heron	2	3		5
Black shag		2	1	3
Black swan	4			4
Kingfisher		1	4	5
Mallard	35	35	7	77
Pipit	8	3	4	15
date	6/11/2008	6/11/2008	6/11/2008	364
Kms	2	6.5	5	13.5
Surveyors	Frances Schmechel, Dale McEntee, Bruce Scarlett, Roger Gould	Frances Schmechel, Dale McEntee, Bruce Scarlett, Roger Gould	Frances Schmechel, Dale McEntee, Bruce Scarlett, Roger Gould	
Weather	Fine, mild, sunny			
Flows	Low (normal 1.7 - 2.4; today about 0.7 or 0.8)			
Comment	Normally more banded dotterel on river, but probably too late in season and flows too low			

Appendix 3 – Waiau River flows





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