Ashley Rakahuri
RIVERCARE GROUP

Management and monitoring of shorebirds in the Ashley-Rakahuri River during the 2023-24 season

Black-billed gulls moving chicks because of drying river

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1. Summary

The Ashley-Rakahuri Rivercare Group was formed in 1999. Its main goal is to protect key shorebird populations in the lower reaches of the Ashley-Rakahuri River, in the 21km stretch between the Okuku river junction and the upper estuary below the SH1 road bridge. This is the 19th annual report from the Group.

The Group's finances and administration are in good shape. We are mostly self-funded for our day-to-day existence, with finances coming from a trap making and selling project, donations and sponsorship via Karikaas Natural Dairy Products Ltd cheese sales. Grants for larger special projects (such as weed clearing) come from ECan and DOC.

Activities were focussed on management to assist the feeding and breeding of the threatened indigenous species in the river, particularly the wrybill (ngutupare), black-billed gull (tarapuka), black-fronted tern (tarapirohe) and banded dotterel (pohowera). Our work is focussed on addressing the main threats to the birds which can be summarized as habitat, predation and human disturbance.

ECan is currently overseeing and funding the writing of a long-term plan for the Ashley-Rakahuri river. Progress on this has currently stalled, if it is completed, it should become the guiding document for future management.

Annual bird count. Braided river bird numbers were very similar to those of 2022 and above average for the last 24 years. There has been enough bare gravel to sustain bird interest in the river. Banded dotterel numbers were at a record high

Nesting season monitoring. Eighteen wrybill nests were found from 16 pairs this year – continuing the general upward trend. All but 2 of these nests produced chicks but at best approximately 11 fledglings were produced. There was a problem with chicks being predated, especially in the Smarts area – where cats were probably the culprits. Fledgling production for BFT was 56%, this was considerably better than for the last few years. This result was boosted by the fact that there were no nesting season floods, and the two colonies which were outside our trapped area did well. One colony was wiped out by Norway rats and harriers. There was one small multiphase BBG colony with a total of about 184 nests. Productivity per nest was only about 56%, this was partly due to harriers taking eggs but very likely some of the nests were made but not used. Other species weren't properly monitored, but they appeared to do well.

Weeds. Weeds weren't an issue this year.

Predator control. Catch continued to be very high both along the river and at the estuary. Some progress was made with Norway rats – 30 were trapped at a colony, which had developed at dumped carcasses, on the berm. Also, our new rat dog was successful at finding rats living and breeding under logs on the fairway. A Pindone poisoning programme targeted at Norway rats wasn't successful in its primary purpose. Mice were by far the main consumers. We need to change our predator control methods more towards hunting the main species – Norway rats and cats – rather than just expecting results from our widely spaced single lines of traps. More seasonal targeting needs done at breeding sites.

Human Disturbance. This has continued to be quite minor within the main area of interest to ARRG. But there was significant disturbance upstream during Crate Day. Two large BFT colonies were impacted with eggs broken in one of them.

Gravel extraction. There were 3 gravel operations on the river but there was little activity from 2 of them. Southern Screenworks have worked in the Smarts area and have been very receptive to our advice and proactive in keeping the public out of their working area.

2. Introduction

The braided rivers of the South Island are a unique habitat of outstanding importance to endemic wildlife (Cromarty & Scott 1996, Dowding & Moore 2006). In particular, they provide breeding habitat for a range of threatened shorebird species, some of which depend largely or entirely on braided rivers for their survival. Braided rivers commonly have large areas of bare, mobile shingle, multiple channels, and variable flows (O'Donnell & Moore 1983). However, their ecological values are increasingly threatened; most have been invaded by weeds and introduced mammalian predators and are further degraded by a wide variety of human activities. This is well covered in DOC's publication 'Management and research priorities for conserving indigenous biodiversity on New Zealand's braided rivers' (O'Donnell *et al*, 2016).

The Ashley-Rakahuri is a medium-sized river located in North Canterbury. From the Ashley Gorge, the river flows east and enters the sea about 25 km north of Christchurch. Halfway to the coast it is joined by its major tributary, the Okuku river. In contrast to the larger snow-fed rivers, the Ashley-Rakahuri is fed by rainfall from the foothills and has relatively low flow rates. The estuary where the Ashley-Rakahuri drains into the Pacific Ocean has large areas of tidal mudflats and is recognised as one of the best shorebird feeding sites on the South Island's eastern coastline.

Ashley-Rakahuri / Saltwater creek estuary (2018).

The shorebird values of the Ashley-Rakahuri are well-recognised. The Ashley-Rakahuri River and estuary are included in a list of wetland sites which meet criteria prescribed to be of international importance by the International Union for the Conservation of Nature (IUCN) (Cromarty & Scott 1996). Following surveys of Canterbury rivers in the 1970s and early 1980s, the New Zealand Wildlife Service ranked their wildlife and conservation values; the Ashley-Rakahuri was one of five rivers given the highest possible ranking of 'Outstanding' (O'Donnell & Moore 1983). In 2009, declining bird numbers over the previous 25 years led to a reclassification of 'Regional' importance (Hughey *et al.* 2010). Together with the estuary, it is recognised as the most readily accessible site on the east coast for seeing a wide range of shorebirds.

The Ashley-Rakahuri Rivercare Group (ARRG) is a community group formed in 1999 to assist with management of the lower reaches of the Ashley River. Its main aims are to protect shorebirds and their habitat in the riverbed, to monitor breeding success, and to promote these activities to the wider public, while at the same time recognising other sympathetic users. In 2005, the Group became an incorporated society. Between 2004 and 2012, the Group received considerable 'set-up' funding from the Pacific Development and Conservation Trust, the New Zealand National Parks and Development Foundation, the Habitat and Protection Fund of World Wildlife Fund and the Lotteries Environment and Heritage Committee. Currently, the Group supports itself by local fund raising, sponsorship from Karikaas Natural Dairy Products Ltd, and donations, with larger projects funded by grants from outside agencies, particularly Environment Canterbury (ECan). The activities undertaken since 2004 have been described in the Group's annual reports (Dowding & Ledgard 2005, 2006, 2007, 2008, 2009, 2010; Ledgard & Dowding 2011; Ledgard, Spurr and Crossland, 2012; Ledgard and Mugan, 2013; Ledgard & Dowding, 2014, Ledgard, 2015, 2016, 2017; Ledgard and Davey, 2018, 2019, 2020, 2021, 2022, 2023), which also record the results of bird monitoring, habitat enhancement, predator control, and advocacy, and make recommendations for future management. The present report documents the management activities and monitoring of birds that were undertaken during the 2023/24 season. An analysis of longer-term results from 2000-2015 is given in the 2013-14 report, with a scientific paper by Eric Spurr and Nick Ledgard published in *Notornis* 63(2), 2016.

In the past, the river has provided breeding habitat for significant numbers of black-fronted terns (BFT) and many hundreds of pairs of black-billed gulls (BBG). In the 1990s and early 2000s, the number of gulls in particular declined substantially (Dowding & Ledgard 2005). The Ashley-Rakahuri used to be described as the most northerly river on which wrybills breed, following a southward contraction of the core range of the species over the past century (Riegen & Dowding 2003). However, a number of wrybill pairs have now been recorded breeding on the Waiau river, which is about 70 km north of the Ashley-Rakahuri. The Ashley birds remain the northern-most population which is known to have been stable for some time. These three key species have been the main focus of management activities of the Group; all are endemic, have declining national populations and are considered threatened. However banded dotterel (BD) require more focus – they are known to be threatened elsewhere in the country, and they are more at risk from predators along the Ashley where they often nest on the edges of the river, rather than on islands.

The threat categories of all New Zealand birds were revised in 2021. The most endangered species on the Ashley-Rakahuri River was thought to be the black-billed gull (BBG) at Nationally Critical, but this has now been downgraded to Declining following a census by Mischler, 2018. The black-fronted tern (BFT) is still classified as Nationally Endangered despite evidence of extremely poor breeding success from several locations – including the Ashley. This is the second highest ranking under the New Zealand scheme and reflects a predicted decline of 50-70% over 33 years.

The wrybill has been reclassified from Nationally Vulnerable to Nationally Increasing. The banded dotterel (BD) also has been allocated a new threat status – it is now Declining when it was previously Nationally Vulnerable. The other two main shorebird species which breed on the river, the pied stilt (PS, poaka) and the South Island pied oystercatcher (SIPO, torea), are listed as Declining and Not Threatened respectively.

Threats to these birds are summarized as follows:

Habitat Threats

- Weed growth on the fairway. These species require bare gravel to nest on and until recently, bird numbers have shown a close correspondence with the amount of bare gravel present. Floods of approximately 10-year return period are required to clear weeds, so weed clearing by hand, machine or by spraying is often necessary.
- Constriction of the fairway. All species but the banded dotterel strongly prefer islands to nest on, islands only occur in braided sections of the river, and constriction causes channelization. Recently there has been some spraying on the berm and removal of dead trees in order to widen the fairway. With a narrow fairway, it is more easily entirely covered by floods.
- Gravel extraction. Braided rivers only exist where there is a large amount of sediment, and gravel extraction has been linked internationally with the destruction of braiding. Bed levels have been declining along the Ashley since surveying began, yet large scale gravel extraction continues. Until recently there has been no attention paid to damage to bird habitat caused by extraction – nesting islands were taken away and flow around others cut off.
- There could well be food supply issues which we are not aware of.
- Climate change is predicted to bring about more floods. Floods are the most serious natural threat to the birds, an increase in nesting season flood frequency, combined with the other threats, could be disastrous. Warmer winter conditions could lead to greater predator numbers.

Predation

- Norway rats have been the main danger in recent years. BFT are most at risk with entire colonies being wiped out. These rats are at home on the river, so nesting on islands gives no protection. Often, they are trap-shy – and just a few rats can easily wipe out the eggs or chicks of a 20-nest colony. Other species are also affected. Feral/stray and perhaps domestic cats are interpreted to be a significant predator of BFT and wrybill chicks. Hedgehogs are probably a serious danger to all species that don't nest on islands. Harriers

have been observed to take eggs of BD and BFT and are a major predator of fledgling BBG. SBBG do not seem to be a major problem, they do not nest on the river and numbers are generally low.

Human Disturbance

- This is largely caused by four-wheel drives and motorbikes. At present the former aren't a major issue on the ARRG section of the river – due to blocking of access to the river, education and publicity. Motorbikes and quadbikes are out on the river more often that 4wds, but pose less of a threat. Dog walkers and other pedestrians are also a minor problem.

Future riverbed and bird management is currently the subject of a new plan by ECan Braided River Revival staff. The Ashley was chosen to be the first river to be subject to this process.

Locations mentioned in this report are shown Figure 1.

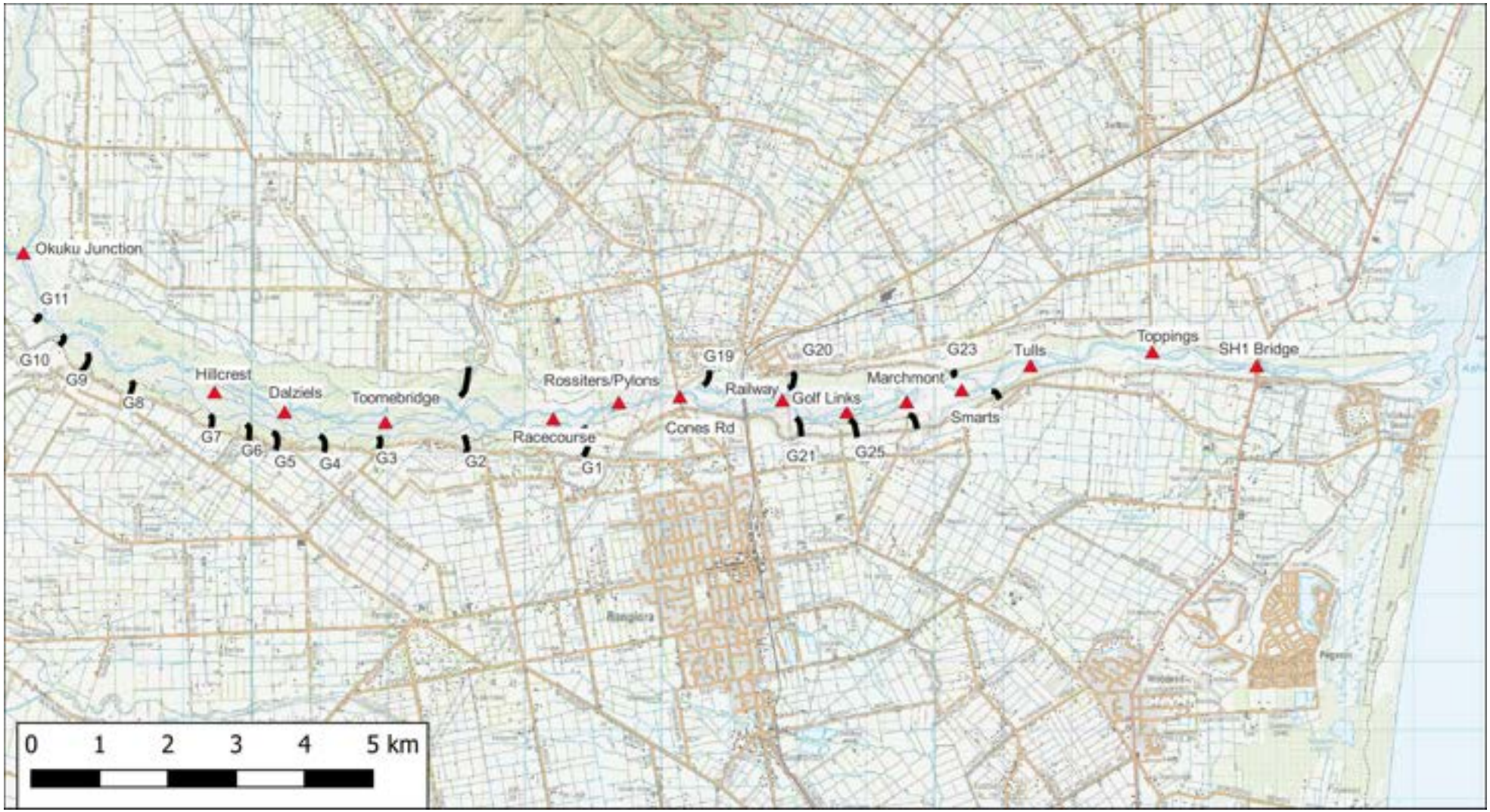


Figure 1. Locations

3. Annual Bird Survey

Surveying is a crucial part of our management activities – it allows us to some extent to judge the success of our efforts. However, work in the recent years have shown the main influences on bird numbers are weeds and floods – which our activities have little effect on.

Surveying this year consisted of:

- The annual survey, for the 24th consecutive year. This used to be from the Okuku junction to State Highway One (SH1), but for the last 5 years it has included the reach down to the estuary.
- Continuation of a monthly survey that Nick Ledgard has been doing in the Groyne 1 – Groyne 2 area.

This year the annual count was done on 18 November – a very similar date to most years. Flow was low at 4.9 cumecs at the gorge and conditions were fine with a cool easterly wind. Due to the low flow the river was quite channelized with not enough shallow feeding riffles. The usual four reaches were surveyed from about 9am with 28 participants. In the afternoon the reach from SH1 to the estuary was done by one surveyor. Figures and graphs shown in this report exclude those from this reach (unless stated or obvious) – for consistency with previous surveys. Birds were counted per kilometre, as is now standard in Canterbury, and the results have been sent to ECan who are now collating them from all rivers.

Radios were extensively used as better communication leads to less double counting and a better quality survey. In one reach (B) results were relayed by radio and recorded only by the group leader, in others all participants recorded their own counts.

3.1 Results

Figure 2 and Figure 3 summarize the numbers of the species (other than black-billed gulls) that we are most interested in. BBG are not included as the numbers can be highly erratic from year to year – from tens to over a thousand. These numbers are from the Okuku junction to State Highway One. Appendices two and three tabulate the numbers.

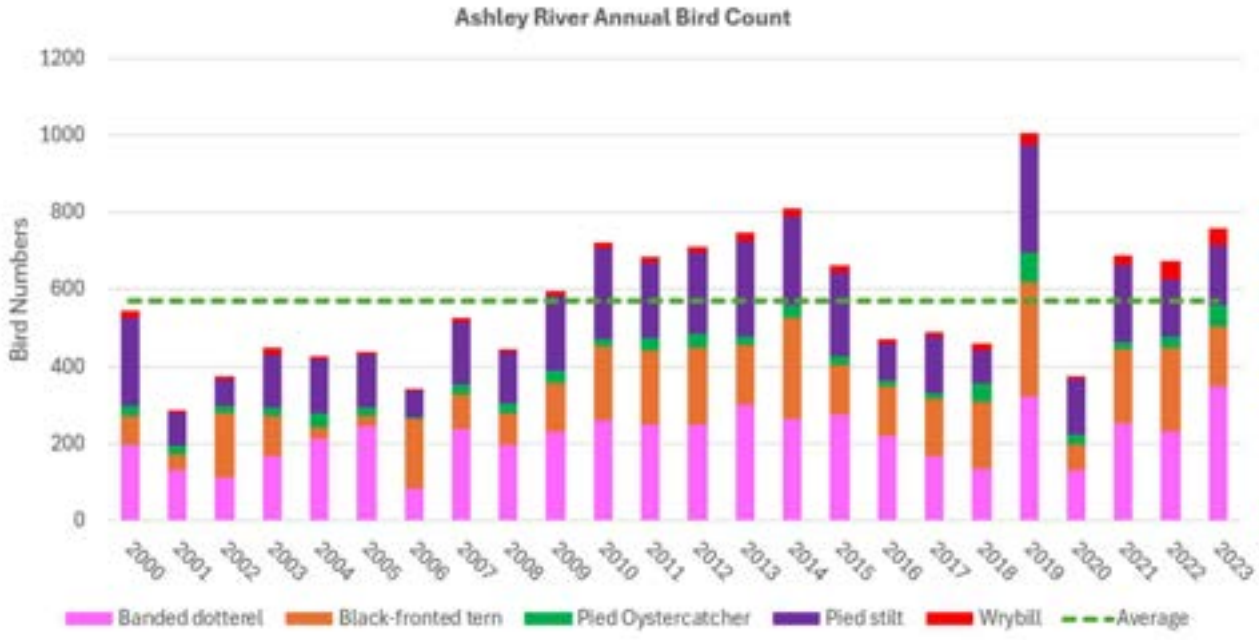


Figure 2. Annual bird count, 2000 to 2023, with average shown

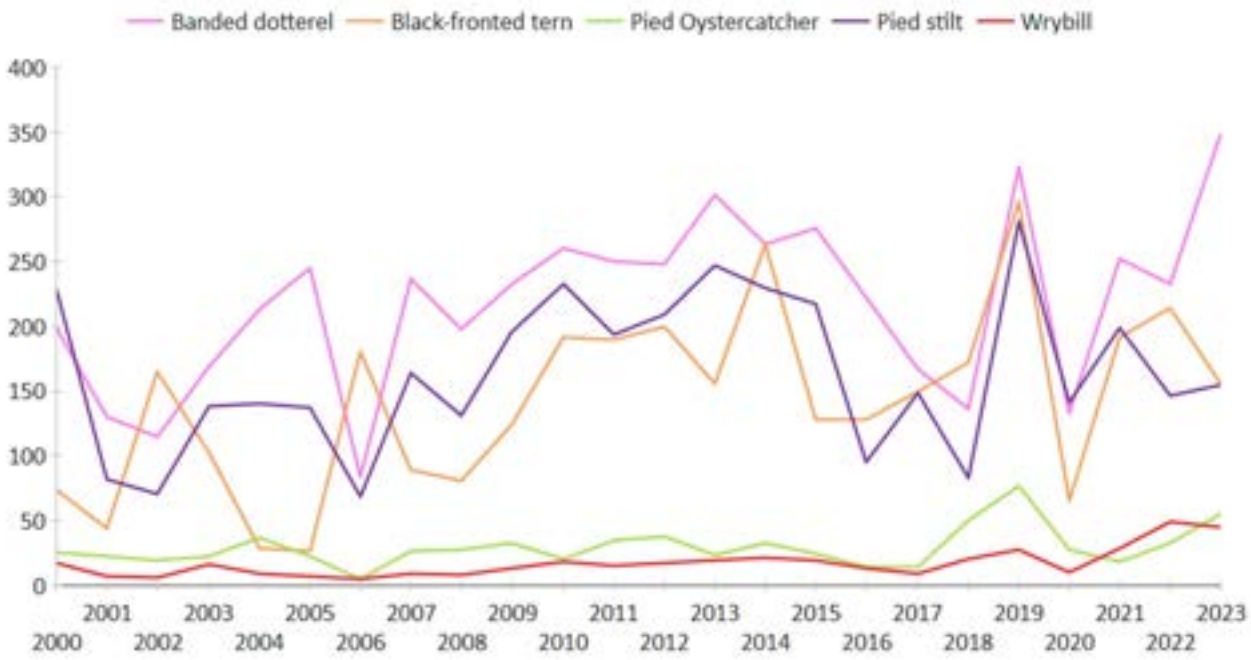


Figure 3. Annual bird count 2000 to 2023

Some comments:

- Total braided river bird numbers were very good, slightly up on those from the last two years. This reflects the quite low level of weed on the fairway. However, fledgling percentages give a much better indication of success or failure of the group's activities than annual count numbers.
- We were worried about the very low black-fronted tern numbers this season in parts of the river (e.g. Groyne 2 and Smarts) where they are usually abundant. The survey numbers were down from last year, but not nearly as much as feared. This was because of new colonies found in unexpected parts of the river. A small colony of about ten nests was present at the Okuku junction – with another two colonies above it outside our survey area. A large one of around 30 nests was near the Toppings Road access to the river. A third colony was just downstream from the railway bridge, we were aware of this one before the count.
- Wrybill numbers (45) were very similar to those of last year – at near historic highs. However, many of these birds do not appear to have nested here – and they may have been displaced by flooding on the Waimakariri. The season started as per normal with wrybill observed on the river from late August and the first nests found in mid-September. Many but not all of the 10 birds colour banded in the last two years (and B(WBW)) had returned. From mid-October, on several occasions in several locations, groups of at least 3 pairs were seen feeding and chasing each other – none of these birds were banded. This situation continued, with the new pairs often being within the nesting territories of earlier arrivals. They seemed to be moving around a lot. For example, both Nick and I visited the Swamp Road area not long before the annual count. We both saw 1 wrybill. On the annual count 9 were seen here. The day before the survey 11 wrybill were seen at Smarts, on the survey the number was much lower. Recently wrybill have also been seen in unusual places – e.g. 2 at the Okuku junction and 1 at Toppings.
- Banded dotterel numbers were at a record high (349 vs 323 in 2019) – could this be because of birds flooded out from Hawkes Bay rivers? Pied oystercatcher numbers were up, and pied stilt numbers were similar to last year. BBG have behaved extremely erratically this year, but there was a very small colony downstream from the railway bridge and another seemed to be developing at Toppings. Only 17 BBG were counted on the survey, but on 23 November there were approximately 250 at Toppings.

- The generally good correlation between BFT, PS and wrybill numbers continues to be interesting. These birds have quite different feeding and to an extent nesting requirements. Is this a common feature of other rivers?

Figure 4Figure 5 and Figure 5 (including the reach between SH1 and the estuary) depict where the birds were counted in 2023 and 2022.

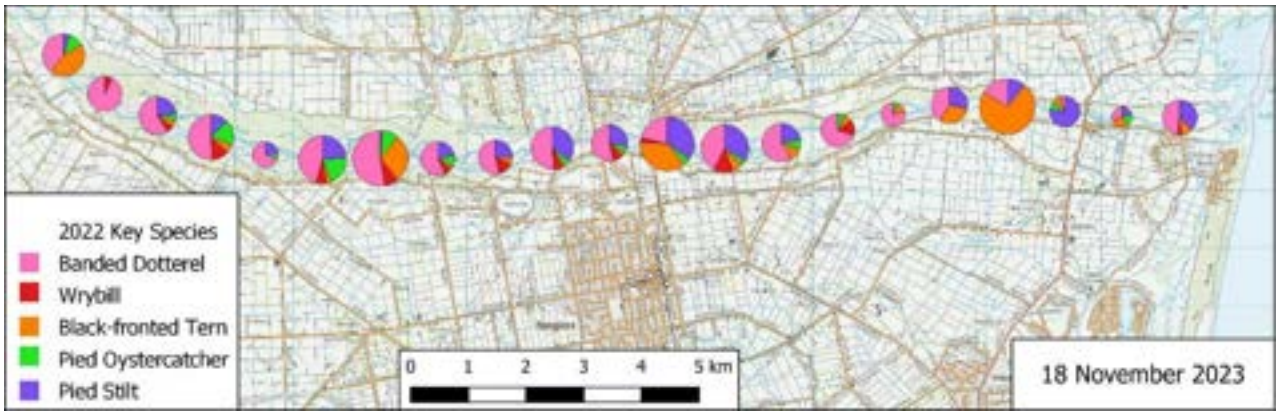


Figure 4. 2023 bird count by kilometre

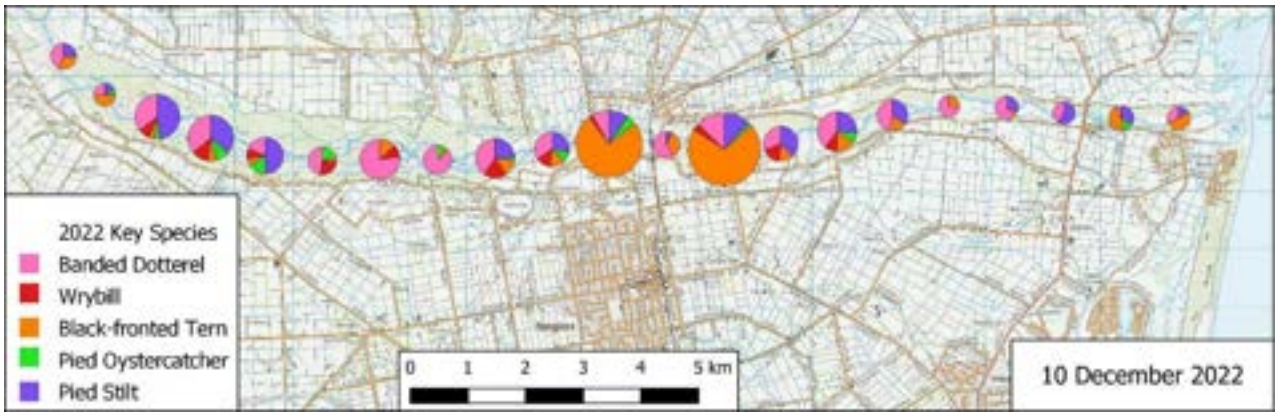


Figure 5. 2022 bird count by kilometre

Figure 6 depicts bird numbers per kilometre with the fairway area and the braid length of each kilometre shown. This was done mainly off November 2023 satellite photos with some reference to drone photos and earlier satellite images.

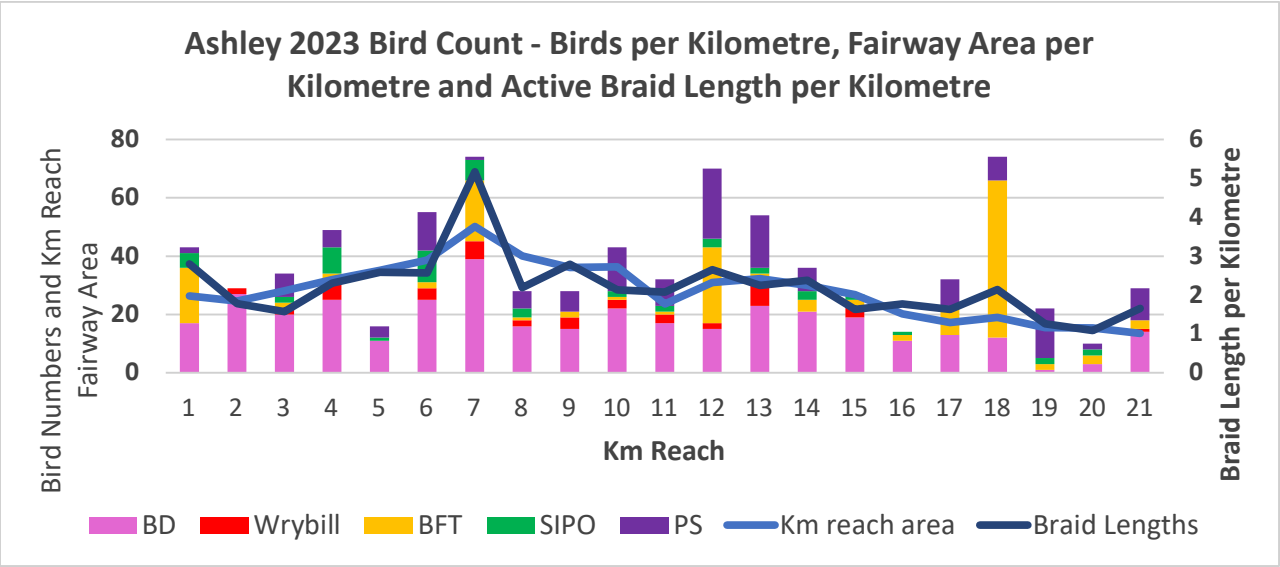


Figure 6. Birds, fairway area and active braid length per kilometre

There is some correlation between fairway area and bird numbers, and unsurprisingly a better correlation with braid lengths. The length of braids within each kilometre is a function of the sinuosity of the braids but more so the number of braids. The main determinant on number of braids is width/area of the river, but braiding can sometimes develop where the river is narrow – e.g. in kilometre 18.

Other determinants of bird numbers would be the nesting quality of islands and the feeding habitat in the braids. The capriciousness of birds is no doubt a factor – they aren't entirely predictable. Proximity to trees is also a factor – braided river birds strongly avoid trees. Sections of braid adjacent to trees were removed from the length totals, and the result was plotted. But the result doesn't differ much from the unedited braid length picture.

Arbitrarily splitting up the river into 1 km lengths means that in places a well braided and wide section of the river can be included with a narrow and poorly braided section. If data were recorded digitally, i.e. the coordinates of each bird location recorded, much better information could be gained.

A very obvious recommendation is that the fairway should be widened wherever possible to the same width as in Kilometre 7. This is part of what we normally refer to as the Groyne 2 area. Widening the river along the north bank upstream from here is entirely feasible.

3.2 Annual Survey Conclusions

Braided river bird numbers were very similar to those of 2022 – there has been enough bare gravel to sustain bird interest in the river.

However, banded dotterel numbers were at a record high. Speculatively this perhaps has been the result of birds being displaced from Hawkes Bay rivers by Cyclone Gabrielle – Hawkes Bay Today, 5 Sep 2024.

Black-fronted tern numbers declined somewhat, this was almost certainly due to the better nesting and feeding environment in the river above the Okuku junction. Two large and successful colonies were present just above the junction. Prior to 2021 BFT numbers along this section of river were probably low, they have increased due to floods and probably somewhat due to vegetation clearance. This influence on bird numbers in the ARRG section of the river needs to be recognized in the future.

4. Nesting Season Monitoring

4.1 Wrybill

Wrybill nesting has been closely monitored for many years. The nests of this species are relatively easy to find and nest numbers are not so large as to preclude finding and monitoring them all. Fledgling success is also feasible to determine – but with a lot of work. However it is by no means sure that fledgling wybill escape predators, especially cats, and actually leave the river to attain breeding adulthood. Nests and outcomes are noted below.

No.	Bands	Locn	Nest Found	East	North	Htchd	Fldgd	Notes
1	-	G1	24/11/24	1564640	5207666	Y	Y	Fldgd Jan 13
2	-	Rossiters	-			Y	?	Nest and chick not seen, chick inferred from behaviour
3	BWBW	G2	20/9/23	1563432	5207619	Y	N	Nest posn approx
4	KOWY	G2	19/9/23	1563311	5207721	Y	Y	Flying Nov 24
5.	-	G2	10/10/23	1562982	5207456	N	N	Eggs taken by rat 10 Oct
6.	KOWG	G3	5/10/23	1561640	5207572	Y	Y	Half fldgd chick Nov 28, flying juv Jan 2
7.	-	Km 6	-	-	-	Y	Y	Nest not found, chick seen
8.	KOWB	Swamp Rd	20/9/23	1558836	5208206	Y	Y?	No chick or fledgling seen
9.	KOYY	Km 3-4	-	-	-	Y	Y	Nest not found, KOYY with juv seen
10.	-	Railway	-	1567653	5207710	Y	Y	Nest not found to Jan. Chick & fldg seen on trail camera.
11.	-	Railway – Golf Links, Km 12.4	-	1568334	5207695	Y	Y	Nest locn approx – tiny chick seen there. Fldg later seen in area
12.	KOYG	Marchmont	16/9/23	1569608	5207834	N	N	Eggs taken by harrier – 20 Sep
13.	KOYG	Marchmont	12/10/23	1569662	5207852	Y	N	Hatched by 3/11
14.	KOYG	Marchmont?	-	-	-	Y	N	Chicks seen 5 Jan, gone by 10 Jan.
15.	-	Smarts	25/10/23	1570099	5207947	Y	N	Hatched (?) by 12 Nov.
16.	BRBR	Smarts	-	1570354	5208030	Y	N	Tiny chick seen near nest site 16/10/23
17.	-	Smarts	-	1570672	5207961	Y	Y	Tiny chicks seen 26 Oct.
18.	-	SH1	-	-	-	Y	?	Chick reported early Nov.

Before the nesting season started 5 of the potential 11 wrybill that ARRG has had banded on the river in recent years were seen and photographed at the estuary. These were BWBW (banded in 2010 and in 2023 had only one blue band left), KOYG, KOYY, KOWY, KO?? (bands on right leg missing) and BRBR. One of these, KOWY was first seen on 6 August and last seen at the estuary on 4 September.

Wrybill mainly nested in areas favoured in previous years with most nests in the Marchmont – Smarts and Groyne 2 area. A chick was seen just down from SH1, indicating a nest in this area. This is something not seen before. On several occasions a wrybill was seen feeding on an island at the Okuku junction. No nest was found here, but the bird flew off upstream. Perhaps there was a nest above the junction – also something not noted before. There was the possibility of another nest between the Cones Rd and Railway bridges – but a flying juvenile seen there may have been from below the railway bridge.

There is an ongoing problem with predation in the Marchmont – Smarts area. Four pairs of wrybill nested there, KOYG actually nested three times and lost her efforts every time. Eggs from the first nest were taken by a harrier, eggs from the other nests hatched, but chicks disappeared. Only one fledgling was observed for certain from the other three nests – which all hatched. It is possible that some of the birds had second nests which weren't found. Cats are the suspected predator of the chicks.

Two nests in the Railway – Golf Links area successfully hatched chicks.

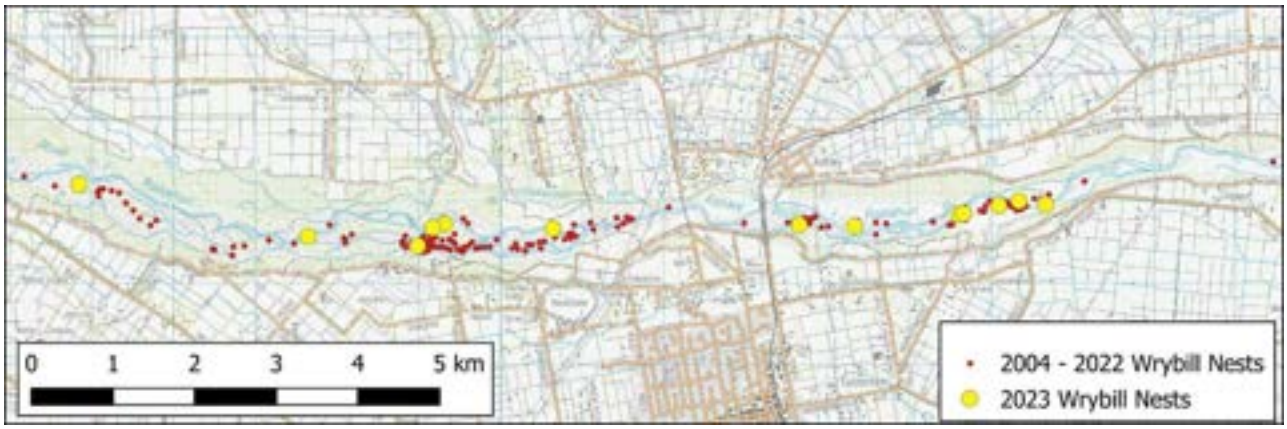


Figure 7. Wrybill nest locations, 2004 – 2023

Figure 8. KOYG at first nest

Wrybill Conclusions

This year there were 18 wrybill nests found or interpreted – but three of these were of KOYG and all of these failed. The general increase in wrybill nesting over the years is however continuing. All but two of these nests produced chicks, but at best around 11 fledglings were interpreted to be produced. There is a problem with chicks being predated, especially in the Smarts area where cats are thought to be the culprits. Productivity was only

about 60% per nest but perhaps 69% per pair. Our monitoring isn't good enough, but we don't have the resources to do better. Ideally we should carefully monitor fledglings as these are probably vulnerable to predators before they leave the river.

4.2 Black-fronted Tern

BFT are by far the least successful nesters on the river, so more effort was put into monitoring and trying to protect them than for other species. This year there were BFT colonies in 4 locations (Figure 9) within the ARRG area between the Okuku junction and SH1. There were also 2 large and relatively successful colonies immediately upstream from the Okuku confluence and a further 2 km up - we only did a small amount of monitoring of these.

Figure 9. BFT colony locations - 2004 - 2023

Colonies are usually found from at least weekly inspections of the likely nesting sites – and less frequent inspections of less likely sites. But this year we only found the easternmost (Toppings) and westernmost (Okuku junction) colonies within our area on the November annual survey – as they weren't where they were expected. Monitoring of the colonies was not done on a strict schedule, but approximately two to three times a week. This consisted of:

- Location of new nests and usually checking of others that had been previously found.
- Installing, shifting and downloading of trail cameras at nests.
- Installing, checking, rebaiting and shifting of traps. At most colonies one trail camera was placed at a trap to monitor trapping success.

This year two ECan summer students helped with monitoring the Toppings and Okuku junction colonies.

Locations of nests etc. were recorded in QField and transferred into QGIS. As the Okuku junction and Toppings colonies were found when chicks were beginning to hatch, counts were made of nests after the birds had left the sites. This was done by walking 6m spaced lines and recording nests on QField. There is some inaccuracy in this method – stilt and partially made BBG nests can be mistaken for those of BFT, as can natural accumulations of twigs. However, stilt nests can often be filtered out as they are usually much closer to water than those of the terns. If a BFT nest has hatched, there will be chick droppings around it. But it was necessary to count this way to minimize disturbance. Nest counts were also done this way above the Okuku junction.

Trail cameras used were Moultrie M 4000-i and A-900i and Browning Dark Ops. Cameras were attached to low stones where they are very difficult to see – usually less than 2m from a nest. This can result in poor focus, but mounting them further away results in poorer motion detection. Better results would be obtained from mounting them higher and pointing them downwards, e.g. on a stake, but they would be much more visible and not feasible on this river given the number of people around.

The maps (Figure 11 to Figure 13) presented below have drone photography or Sentinel satellite bases taken during the nesting season.

Statistics tabulated below have a significant margin of error. There would almost certainly be nests that weren't found (but no more than an additional 10%) however no colonies of significant size were missed. Fledgling counts are very difficult, and those given are likely to be a little less than reality – it seems likely that predators, especially cats, took some before they left the river. Despite the deployment of many trail cameras, outcomes at many nests had to be interpreted. Eggs in some nests could have been predated by harriers, not Norway rats, but the latter are the most likely culprit. This year, whilst rats were caught at the colonies, they seemed to be avoiding the traps and even cameras. In the table below the records are of nests, which may have 1 – 3 eggs, except the fledglings – which are individual chicks.

Locn	Date found	Nests	Hatch	Unknown	Abd	Rat	Cat	Unknown Pred.	Harrier	Fldged
ARRG Area										
Groyne 2	18 Oct	12	0			5		2	5	0
Railway	14 Nov	12	11				3			8
Toppings	16 Nov	38	?							31
Okuku Jnct	16 Nov	22	15		6					7
Groyne 2		2								2
Total		**86**								**47**
Upstream from Okuku junction										
Lower colony	15 Nov	21								?
Upper colony	15 Nov	50								?

Figure 10 shows schematically the BFT nesting – from first nest made to last finished. As two of the colonies were found quite some time after they commenced, start dates were done by working backward from first nests hatched – but there is some error in this.

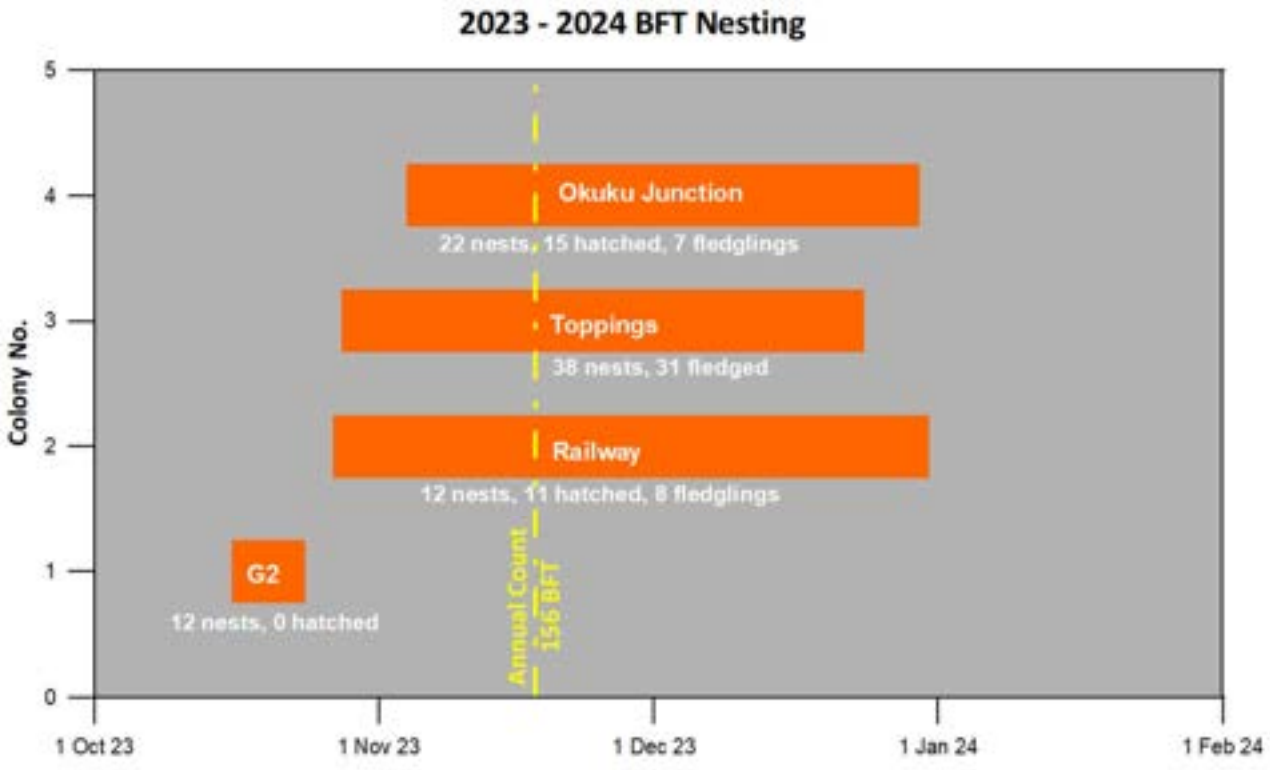


Figure 10. BFT nesting timing

Groyne 2 (airfield) Colony

The first nests were found here (Figure 11) on 18 October, and between then and 24 October twelve were found – spanning two islands and the mainland. This colony was extremely similar in layout to one of 2022 – a short distance upstream. From the number of birds in the area, many more nests would almost certainly have been made if the existing ones hadn't been devastated by Norway rats and harriers. No eggs were hatched.

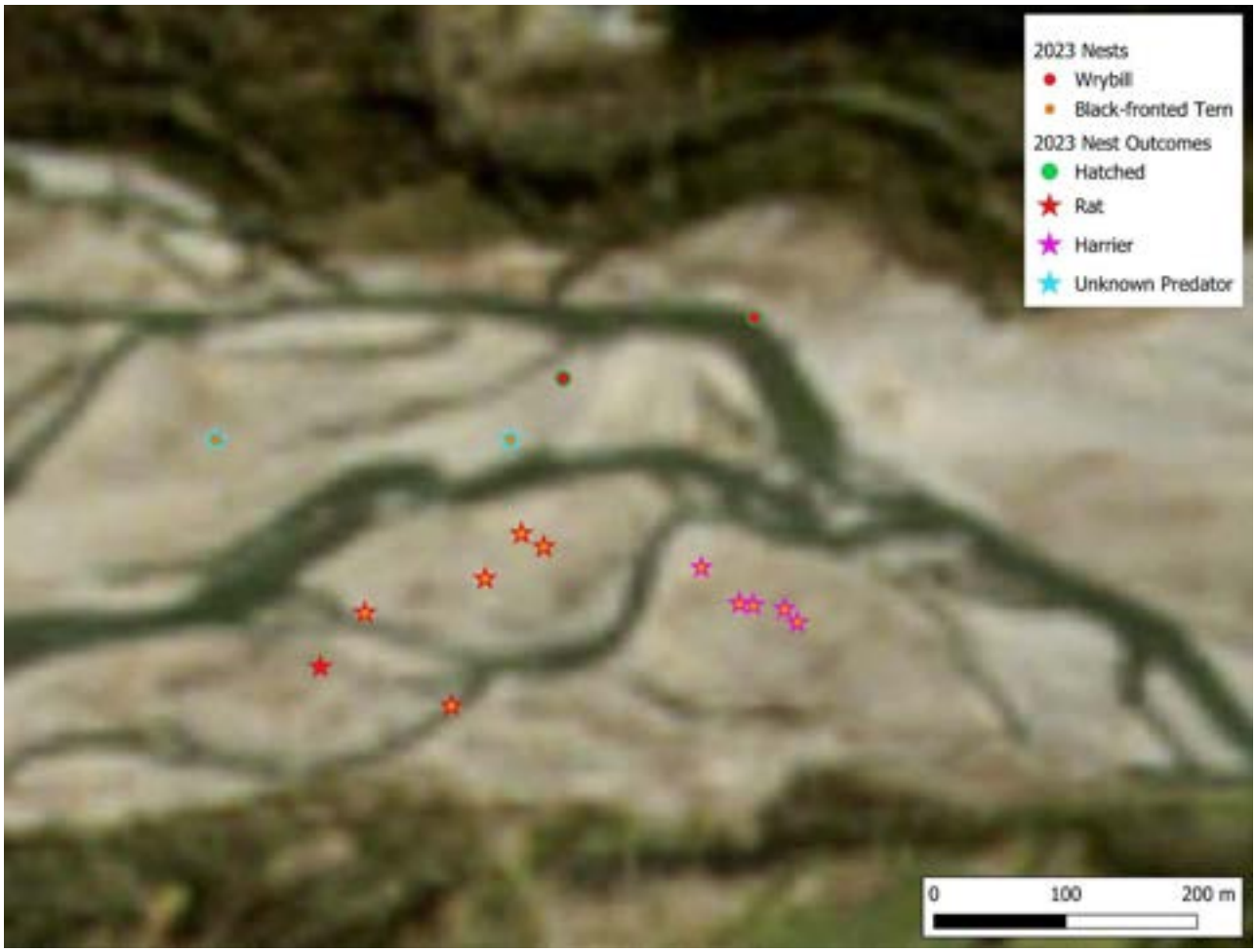


Figure 11. Groyne 2 BFT colony

The presence of rats was known in this area before the nesting season. Dogs from Wildlife Protection Services found rat sign on the riverbed during a visit from 3 to 8 August. Tracks were also apparent in silt deposited from a July 23 flood. Confirmation of rat presence was made by trail cameras, with preferred sites being banks of small islands and debris. The dogs couldn't excavate the rats or disturb them, so on 22 August a large loader was used to shift debris and excavate along the banks where rats had been found. Unfortunately, no rats were found – and the work had to be abandoned because the river sediments were too soft for the loader to safely cross. Rat tracks were again found in silt on about 9 October near a wrybill nest (southwesternmost nest on the maps). Traps were emplaced here, but the wrybill eggs were soon taken.

Twelve BFT nests were found spread over two islands and the mainland to the east. Trail cameras showed that eggs from 3 BFT nests on the large island to the west were taken by Norway rats, eggs were also taken from the other 2 nests with Norway rats being the interpreted predator. All eggs were also taken from the 5 nests on the mainland to the east – cameras at 2 locations showed harriers to blame. Shells were left at these locations. The presence of shells at the other 3 locations suggests harriers ate these eggs too – by 24 October. High flow made checking the nests on the northern island impossible for some time, but on 13 November they were found to be empty without shells. A large Norway rat was caught near here, rats or harriers could have been the culprits.

In about a week all eggs were taken and the colony was deserted. The interpreted impact of harriers was larger than normal, we don't usually see a significant number of nests taken by them.

There were traps at 13 locations – under most cover suitable for rats. These consisted of 7 Fenns in mesh enclosures, 5 run through DOC 150s and a live capture rat trap. Main bait used was peanut butter. A total of 6 Norway rats, and no other species, were caught. Most catches were after all the nests had lost eggs.

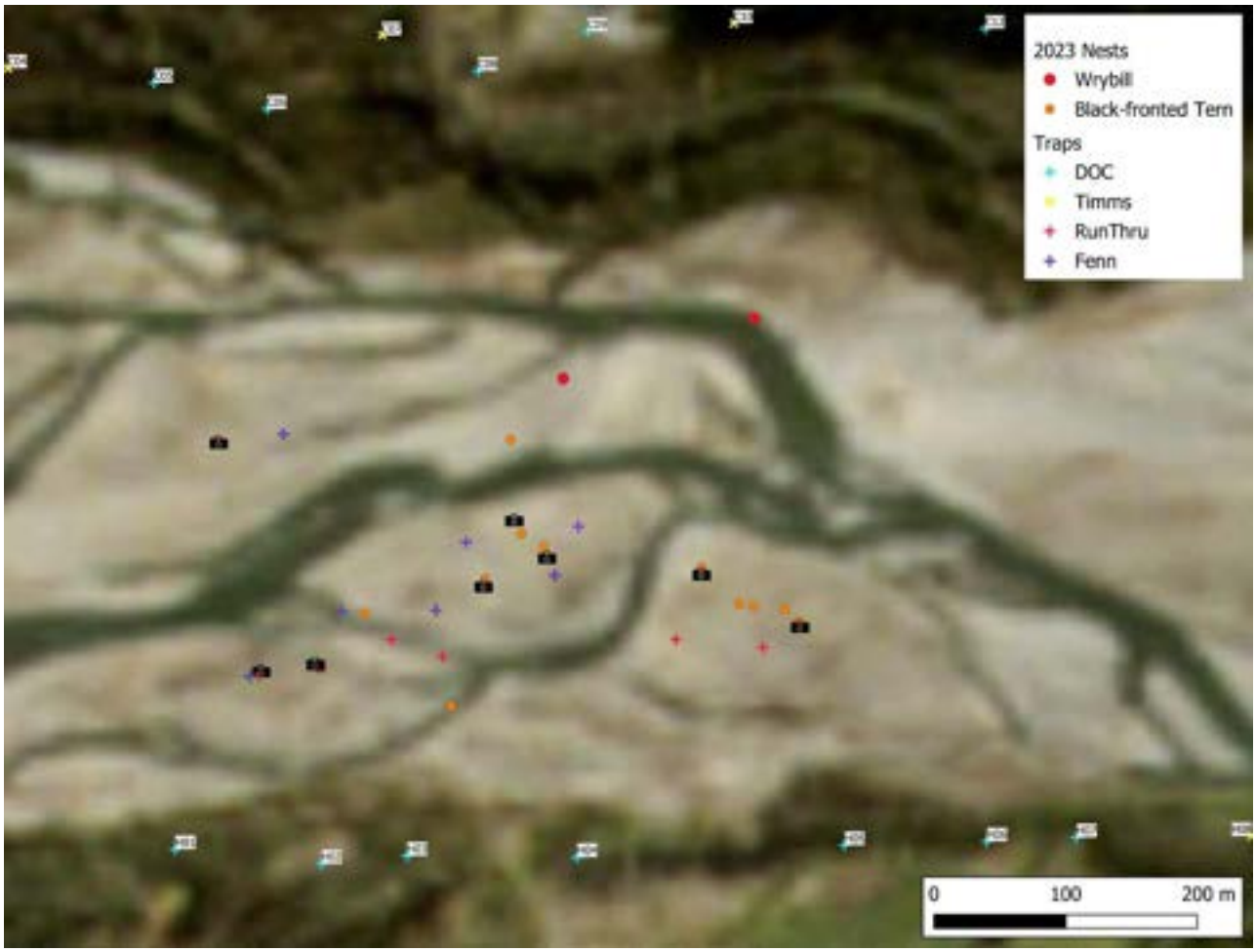


Figure 12. Groyne 2 BFT colony, nests, traps and trail cameras

Railway Colony

There were 12 nests found between 14 November and 29 December about 500m downstream from the railway bridge (Figure 13). However, some of the nests were present some time before found – hatch dates suggest the first egg was laid around 23 October. Most were on the "mainland" with 2 on a large island which runs under the railway bridge. The nests were between about 400 and 700m downstream from the bridge. In this area there were also BBG nests and a wrybill nest. A BD with small chicks hatched locally was seen near the NE end of the BFT colony.

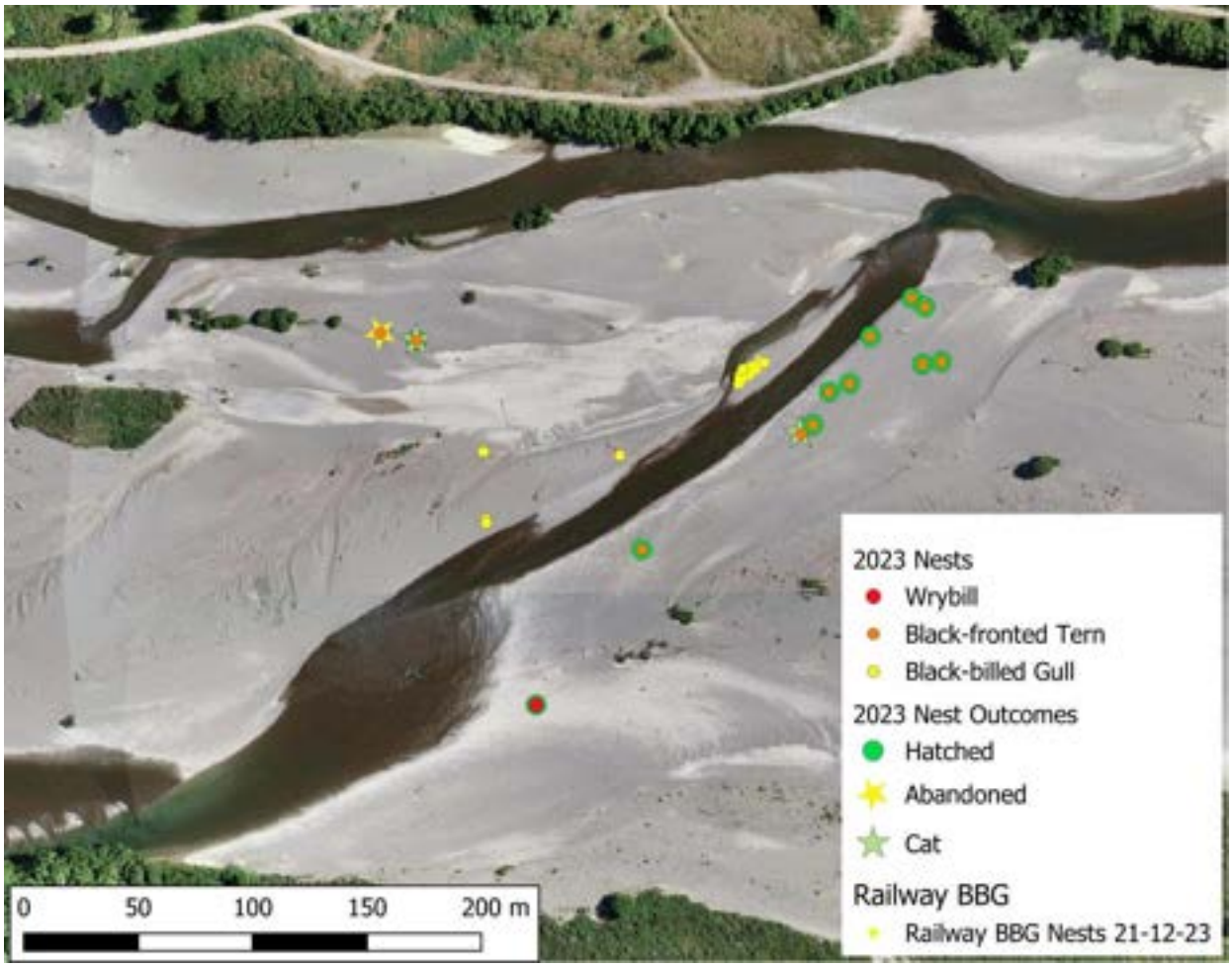


Figure 13. Railway BFT colony

This was a very successful colony. The only predation was by a cat. A distinctive black cat took a newly hatched chick from a nest on the "mainland" on 19 November and knocked the other egg out (Figure 14). The parent bird pushed the egg back into the nest, but the cat returned the next night and took the next newly hatched chick. This cat also, several days later, took 3 chicks from a nest on the island and caused abandonment of another nearby nest. Unless the cat crossed a bridge, it swam across significantly flowing water. What was almost certainly the same cat was seen about 300m west of the colony on 15 December. It seems odd that having found the colony, it didn't systematically target it.

Figure 14. Cat at BFT nest

An unusual occurrence was captured by a trail camera. A BFT sitting on the nest with 2 chicks was given a worm by its mate, a few minutes later a non-breeding BFT flew up the river and was offered the worm (Figure 15). It took it, but came back several times in the next few days to bully the chicks.

Figure 15. BFT on nest feeds passing non-breeding BFT

Unusually, once hatched, the chicks moved eastwards away from the water into an area of driftwood which could potentially have harboured predators. To avoid disturbance, no attempt was made to monitor them in this area, but about 8 fledglings which must have been from this colony were later counted to the northeast. This isn't a very reliable number. When the river went dry, on 15 January, 3 non-flying chicks were seen moving upstream near the railway bridge. They weren't seen again and were assumed not to survive.

There were 14 trail cameras deployed in this area either at BFT nests or on the BBG colony (Figure 16). One was stolen.

Traps were placed at 22 locations but very little was caught – a Norway rat at the south end of the colony and a hedgehog at the northeast end. In response to the cat predation, live capture cat traps were placed in 4 locations for several nights – but these were unsuccessful. It seems highly possible that the success of this colony was due to the destruction of a Norway rat colony on the north bank of the river about 650m downstream.

There was some human disturbance in this area – 2 incidences of 4wds near the colony were captured by trail cameras (as were pedestrians on several occasions), signs were stolen, quad bike tracks were seen and a dog was seen running through the BBG colony. However, no damage seems to have been done. Figure 17 shows a BFT being disturbed off its nest in which there were 2 chicks, late on Crate Day. These were the only 4wds seen below the Okuku junction on the 2 December outing.

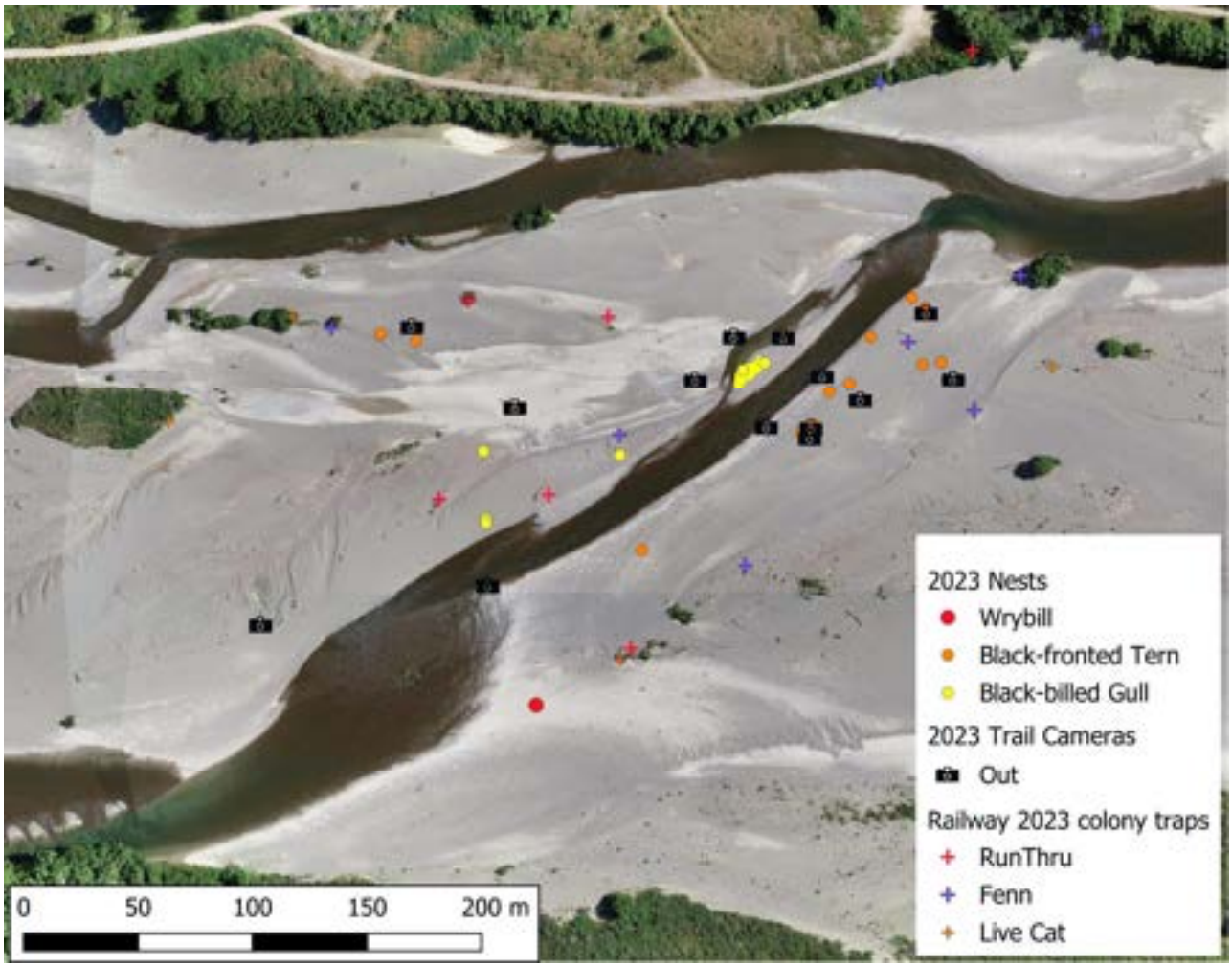


Figure 16. Railway BFT colony, nests, traps and trail cameras

Figure 17. BFT disturbed off nest on Crate Day

Toppings Colony

This colony was immediately south of where Toppings Road intersects the river. Here a 2.3ha island occurred at a bend in the river – with a shallow braid forming its southern boundary. Flow dried out to the south during the season. This was a fairly weed-free island with only a small amount of driftwood and logs.

Nests were first found on the annual survey of 16 November. At this stage chicks were already hatching. To avoid disturbance of the quite large and dense colony, monitoring was kept to a minimum and no attempt was made to find all the nests until chicks had fledged. Monitoring (approximately twice weekly) was done mainly by ECan summer students, who proved very capable at this work.

Figure 18 shows BFT nests found soon after the colony was located and nests found after chicks had fledged. The latter count was done along 6m spaced N-S lines using QField on cell phones. There was an aborted attempt by BBG to nest in the eastern half of the island – unfinished BBG nests can be easily mistaken for those of BFT. Only nests confidently thought to be those of BFT were counted. Chick poo at nests is an obvious indicator that they are of BFT. In total 38 nests were counted.

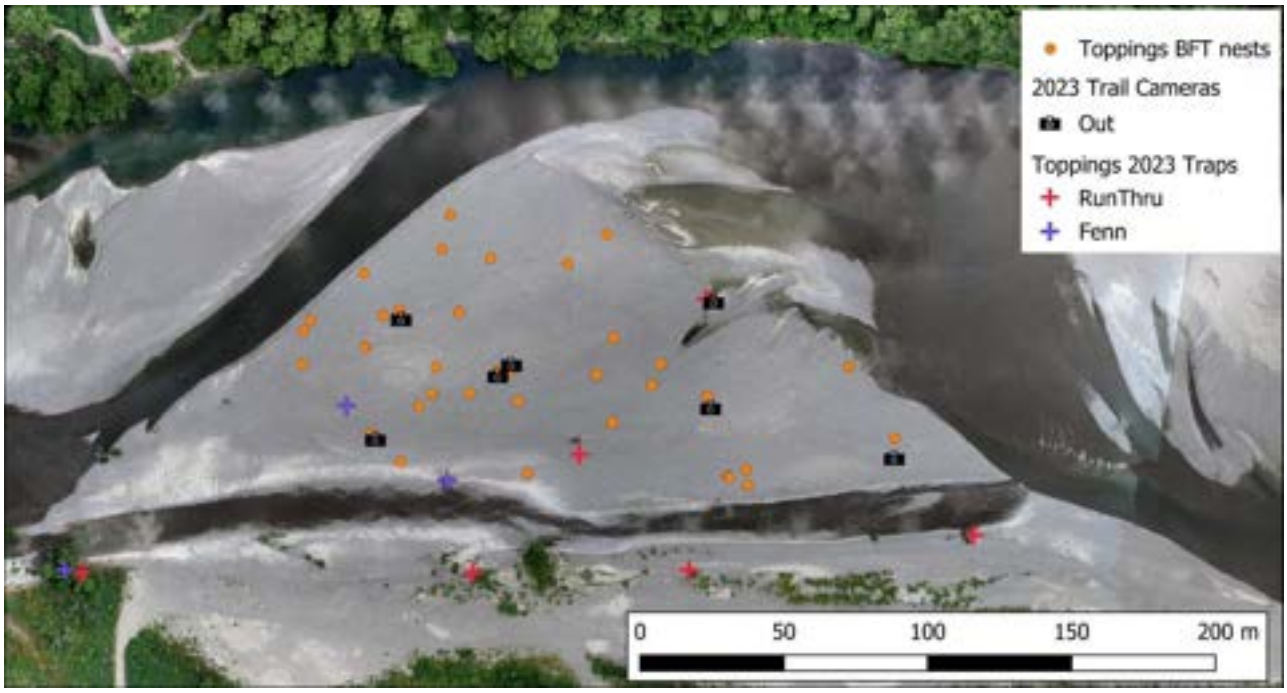


Figure 18. Toppings BFT colony, nests, trail cameras and traps

Trail cameras were deployed at 7 nests, these were mainly pulled out when checking them became too intrusive. No photos of predators were taken. Canada geese, BD, BBG and PS were seen on photos as well as BFT adults and chicks. Fish, worms, cicadas and other insects were fed to BFT chicks.

Traps were placed at 9 locations, the initial plan was to use more if predators were a problem – but this didn't prove necessary – predators (ground or air) did not seem to be an issue for this colony. Only 3 predators were caught – 2 hedgehogs and a Norway rat. All were in traps on the berm south of the island. ARRG do not have permanent trap lines in this area – the closest are 1.5km upstream and 1.5km downstream. Permanent traps downstream of SH1 catch many Norway rats and it isn't understood why there are so few in the Toppings area. In 2019 there was a small BFT colony and a BBG colony about 500m downstream from the 2023 BFT colony. These were also very little affected by predators – only 1 Norway rat was caught and 3 BBG chicks were found to have been killed by harriers.

There didn't appear to be much human disturbance in this area. A 4wd was intercepted along the northern edge of it, and on a different occasion quad bikes with a dog were also intercepted in a similar position. A probable stilt nest was run over by a 4wd with an egg broken and there was a dead BFT fledgling downstream from the island that appeared to have been killed by a 4wd. As this is only 1.5km upstream from SH1 where it is impossible to totally block access, this was a good outcome.

On 21 December fledglings were counted - they were spread around the island along the edge of the water. Three counts yielded 27, 30 and 31 fledglings with 3 – 5 smaller chicks. This seems to have been a quite synchronous colony and the fledglings do not appear to have quickly moved away – as sometimes happens. Thus, this was an unusually robust count – but it will likely have been a small underestimate of numbers. The nest count may if anything have been a slight overestimate. **Minimum productivity of this colony was 82%.**

Okuku Junction Colony

This colony was found during the November 16 annual bird survey. It was located immediately down from the junction on a 2.2ha island (Figure 19).

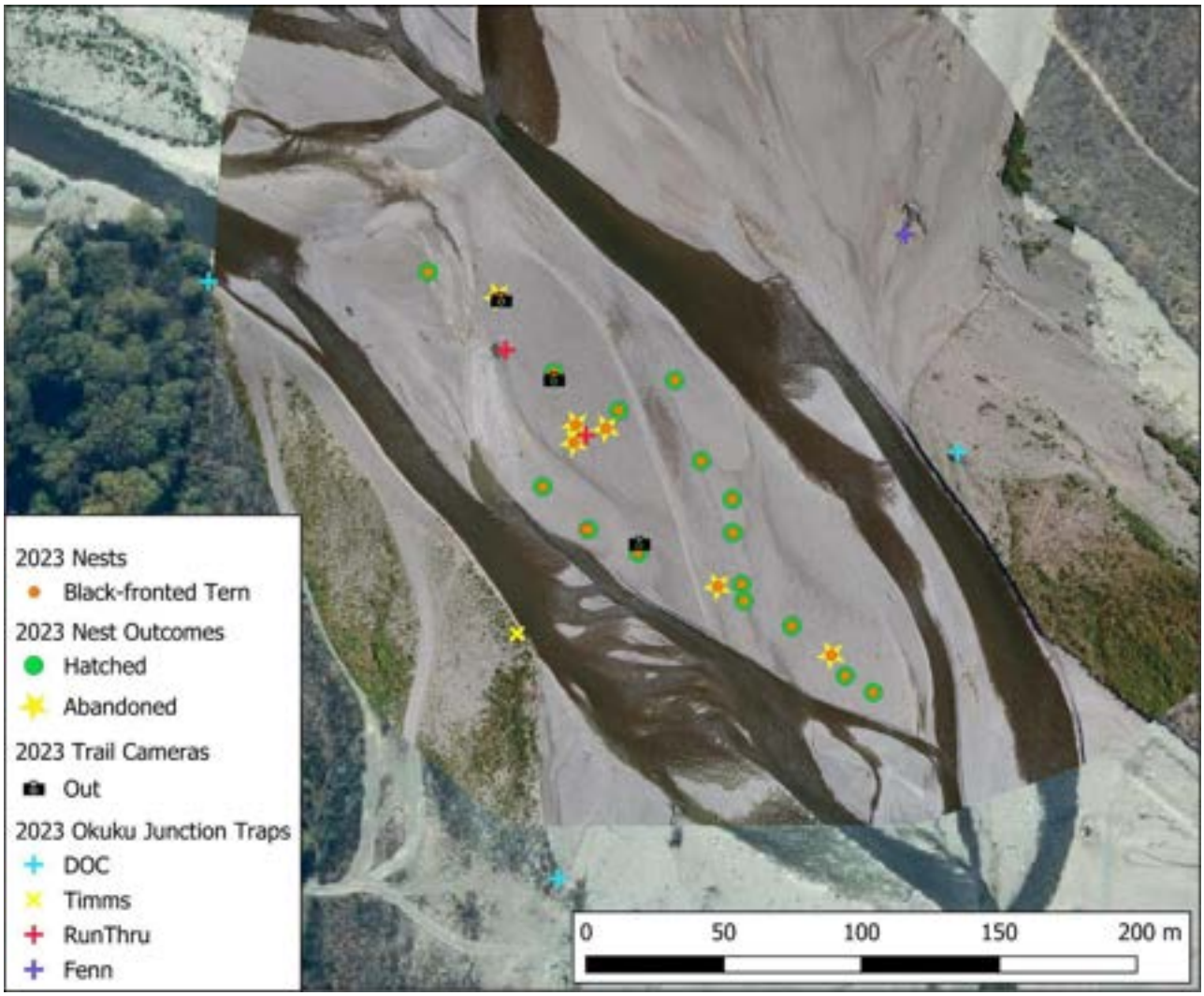


Figure 19. Okuku junction BFT colony nests, outcomes, traps and trail cameras

As with the Toppings colony, this one was capably monitored mainly by ECan summer students. Twenty-two nests were found, 7 of these during a grid search after the birds had left on 12 February. Of these 15 hatched eggs and 7 were abandoned. The first observed chicks to be hatched were on 29 November. There did not seem to be a Norway rat problem at this colony given the number of nests that hatched eggs, abandonment could have been caused by a cat or stoat.

Three trail cameras were placed at nests with nothing untoward seen.

Traps were installed at 7 locations, 3 on the south bank, 2 on the north and 2 on the nesting island. There was very little cover on the island under which to place traps. It was planned to put more traps out if a predator problem was evident, but only hedgehogs and a weasel were caught on the south bank and a cat in a DOC 150 run through trap on 12 February on the island. Norway rats weren't a problem here. The closest of our permanent trap lines to the Okuku junction are downstream 1.5km on the north bank and 2.4km on the south bank. Both of these trap lines catch Norway rats, as did traps at 2019 and 2020 BFT colonies near G9 about 1.2km downstream.

A few vehicle tracks were seen going through the colony, but there didn't appear to be damage done.

On several occasions 8 fledglings were counted on the island, but these included one with a broken or probably malformed wing. This bird was seen on multiple visits up to 12 February. It continued to be fed and looked healthy. We discussed euthanizing it but never did so.

On most visits when fledglings were counted, smaller chicks were also present. It may possibly have been the case that fledglings moved away to be replaced by newly fledged chicks. However, it seems more likely that they were predated by the cat which was caught or other predators.

The outcome from this colony was 7 fledglings from 22 nests or 32%. A cat or cats seem to have been the problem here – causing abandonment of nests and predation of chicks.

Groyne 2 area, individual nests

Late in the season there were two individual BFT nests in the Groyne 2 area. Two chicks from these fledged and joined a flock of adults which were roosting in this area for weeks – into early February 2024.

A captive fledgling was released here during this time. It had been found as a small chick on the Waimakariri, taken to Christchurch (of course a very unwise thing to do) where it was given to a couple to raise. When released, the bird flew off then quickly joined the flock on the ground, was seen the next day but never again. BFT fledglings are fed by their parents to an extent for a significant period of time – so the released one had little chance of survival. However, see Figure 15 where a bird on a nest is feeding a non-breeding adult.

Colonies above the Okuku Junction

Two colonies centred on points about 0.3 and 2.2km upstream from the Okuku junction were found by DOC during their 15 November bird count between the gorge and the junction.

These colonies weren't monitored to the extent of those within the ARRG main area of interest – and no trapping was done.

Colony One

This colony was on an island of dimensions about 600 x 60m just above the Okuku junction. Figure 20 shows the nests on an airphoto base with photos taken in early 2024. During the 2023 nesting season there was significant weed cover developing, but it had grown and thickened by the time of the photography – to the extent that birds probably won't nest here in 2024.

Figure 20. BFT colony just above Okuku junction

The colony was unusually close to the west bank of the river, but scrub rather than trees on the bank probably allowed this – most braided river birds don't nest or even feed close to high vegetation. Before Crate Day 6 nests were found and in several visits until 24 January 2024 another 8 were found. On 12 February we did a grid search and found another 7 – for a total of 21 nests.

When first visited on 30 November the colony was very busy with 8 chicks observed, 8 were also seen on 2 and 3 December. On 30 December the area was very quiet.

On Crate Day (2 December) most vehicles came up from the Okuku and along the bare gravel north of the colony. Our protestors directed vehicles to the north of the northern edge of the colony, but they came within about 10m of small chicks and a nest – causing a lot of distress to them.

On 11 December a gravel extractor was working without a renewed bird survey within 40m of the southernmost nest. He was very cooperative and this was resolved with Andrew Crossland visiting the area on 18 December. He reported *the colony looks to be in good shape with many adult and at least 11 newly fledged (and already flying) chicks present, plus active nests.* But on 26 December there were no BFT present – apart from 3 flying by – and there was evidence of predators being active. The first nest looked at, a newish one 40m from the gravel track,

had been interfered with by a predator - 1 of the 2 eggs was missing, the remaining egg was out of the nest and something had been scratching around in the nest area. The next nest was abandoned and had 1 of the initial 3 eggs left and no poo around to indicate chicks had hatched and been fed. Another still had 2 eggs, but one was broken and the nest was abandoned. Another nest looked to have hatched chicks, but there was a pile of fledgling feathers close by. A nest near the north end of the island which was occupied at the time of crate day was no longer visible, and the driftwood it was beside had been shifted - maybe a vehicle involved. In a quick walk through the area two other piles of probable fledgling feathers were found.

This colony started well and eggs weren't being taken – probably no Norway rats in the area. But after hatching cats or stoats did a lot of damage and caused abandonment of the colony – hopefully some fledglings escaped.

Colony Two

The second colony, about 2.2km upstream from the junction, was mainly on an island of about 3.2ha area. The image on Figure 21 also dates from some 6 months later than the colony and weeds are now much larger and abundant. There was small BFT colony in the same location at the time of the 2021 Crate Day. This was where vehicles got out of control of the DOC rangers and drove through the colony. But no evidence of nests destroyed was found.

This remains the most likely looking island for BFT to nest above the Okuku junction, but the amount of weed there perhaps rules out nesting in 2024.

Between 30 November and 2 December, prior to or during Crate Day, 14 nests were found. From the number of birds in the area, this was most of the nests present. On 26 December and 13 January a further 3 nests were found on the "mainland" WSW of the island. On 19 January a further nest was found on the island.

Figure 21 shows 4wd tracks through the island, eggs were broken from flying stones in 2 nests, an unbroken one was thrown out of another, and a distressed chick was wandering around after vehicles had straddled the nest. Considering that a reported 170 vehicles were present, the damage was less than expected. Two trail cameras were installed just for Crate Day – they showed vehicles in the distance repeatedly disturbing birds off nests. Orange dots show nests active at the time of discovery, red stars show nests found by grid search after the area had been abandoned by terns.

This colony grew a lot after Crate Day and was initially very successful - it appeared that there were no rats to take eggs.

On 26 December 6 chicks were seen, on 5 January there were approximately 20. On 13 January there were 12 fledglings seen with 5 small chicks and no problems evident other than broken eggs at one of the nests off the island.

Walking 6m spaced grid lines on 24 January detected another 32 probable nest sites both on the island and WSW of it. This brings the total to 50 nests – a very large colony by Ashley standards. However some of the nests found after the birds had left are perhaps dubious. On this day the island was essentially abandoned with no nests occupied and no chicks seen. Most nests/potential nests were empty. The remains of 2 predated BFT were found.

It appears that stoats or cats hit this colony hard, killed some birds and frightened the remainder off. Productivity is uncertain, hopefully some of the fledglings escaped, but they weren't seen downstream from the colony.

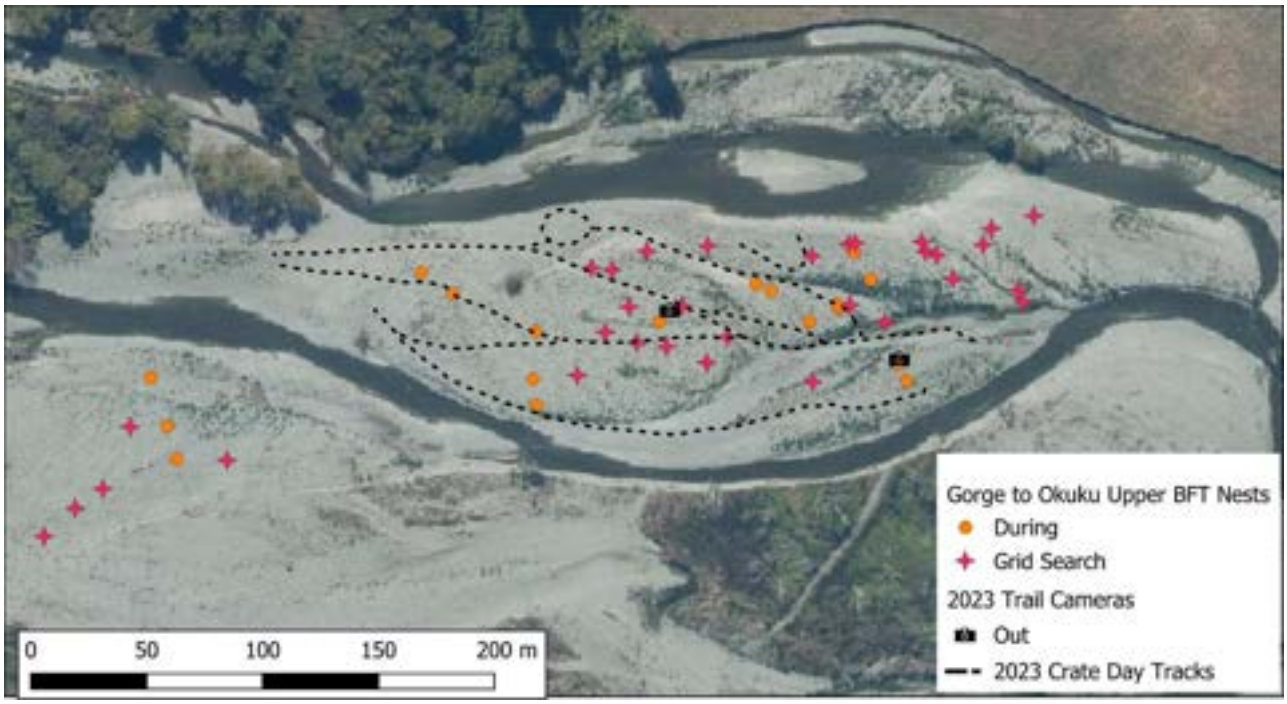


Figure 21. BFT colony 2km above Okuku junction

BFT Conclusions

There were 5 colonies within the ARRG area and 2 more just upstream from the Okuku junction. Fledgling success was better than for quite some time – with fledglings per nest being 56% (Figure 22). This was mainly due to a very successful colony at Toppings where, despite being outside our trap lines, very few predators were present. A colony in the Railway area was also quite successful, this may have been influenced by destruction of the Norway rat colony a few hundred metres downstream. A cat caused damage, but strangely didn't persist in the area. Norway rats and harriers wiped out a colony at Groyne 2, despite us knowing the rats were there and taking measures against them. A colony at the Okuku junction achieved a good hatching rate, but only 7 fledglings were produced from 22 nests. One of the main reasons for success was the lack of nesting season flooding.

Figure 23 shows the locations of BFT nests from 2018 to 2023.

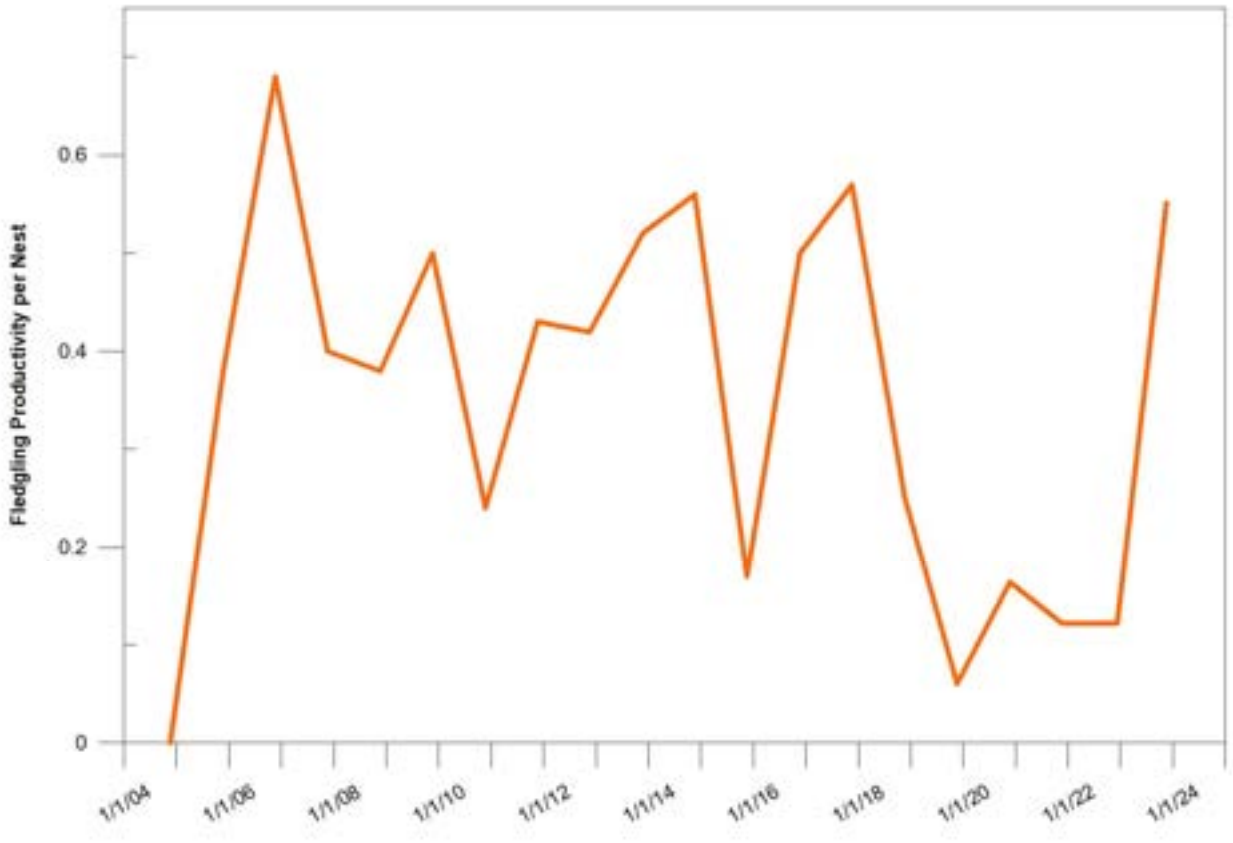


Figure 22. BFT fledgling per nest productivity

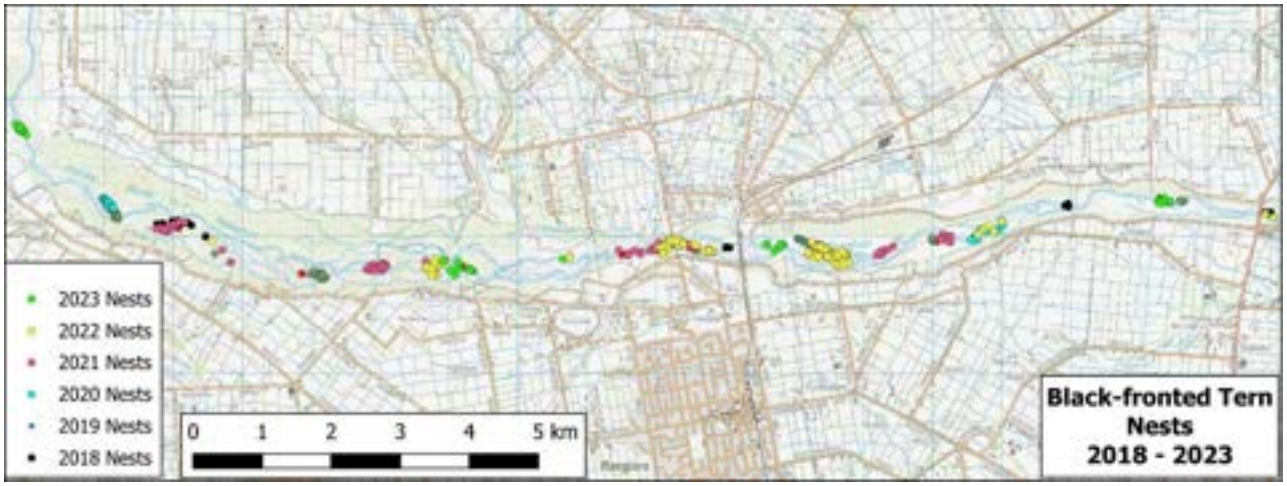


Figure 23. BFT nests, 2018 to 2023

4.3 Banded Dotterel

As is usual we didn't attempt to find and monitor BD nests, and none were GPS located. However, many must have been present given the record number of birds counted on the annual survey. Also, many chicks were observed.

4.4 Black-billed Gull

This season there were several aborted attempts to nest. Gulls started to gather near Cones Rd bridge in early August. By late August – early September there were up to 200 and on 14 September 700 were counted from the bridge. On 26 September there was some mating and nest making going on. And on 1 October there were at least 900 in the area, but they were all gone by the 5th. This was the second abandonment of the site, but this time they didn't come back. There were about 140 abandoned nests without eggs.

There were 2 trail cameras at the site, one recorded a deliberate attempt to frighten the gulls (Figure 24) but they returned and the final reason for abandonment was probably not disturbance.

Figure 24. Frightening BBG

On 25 October about 75 abandoned nests were found some 300m upstream from Groyne 25 (Golf Links area). Egg shells were found in only 2 nests. The timing of this nesting attempt and the reason for abandonment are unknown, but there were still gulls in the area on the 25th and around 100 circled the area on 30 October.

There was also an attempt to nest on the eastern part of the Toppings island (Figure 18). On 22 November there were around 250 BBG in the area. On 19 and 28 November 3 nests were found with eggs and there was a total of around 40 mainly incomplete nests abandoned by 26 November. One bird persisted on the nest for quite some time, but the nest was found empty on 20 December. No chicks or adults were in the area then.

By 21 October BBG had gathered off the end of Raupo Berm, where the river enters the estuary, and about 2,000 were counted from drone photos. By the 25th they had all gone, leaving around 200 nests with no eggs or shells.

There was an unsubstantiated rumour of disturbance. On 26 October a large number of BBG were reported on a Waimakariri island down from Kainga. There seems little doubt that they came from the Ashley estuary.

There was, however, a successful BBG colony on the Ashley. On 14 November there were about 25 nests with some eggs 420m downstream from the railway bridge near the BFT colony covered above. Only a few of these are shown on Figure 25. Bird numbers in the area varied a lot, but on 26 November there were about 100 and a few new nests. Some nests seemed to be made, then abandoned. Success of this small early part of a larger colony was too difficult to monitor. Fledglings left the area, moved upstream, then moved back and were seen in the area of the later sub-colony. The largest count was 12 on 31 December. Nothing untoward was seen on trail camera photos from this area.

The colony was extended by about 40 nests by 4 December on a very small island just downstream from the initial nesting area. On 14 December 120 nests were counted from drone photos, this was probably quite accurate, perhaps a slight overestimate. One hundred and eighteen were counted on 21 December and 98 on 26 December. There were a few stilt nests in the areas the BBG nested, very close to BBG nests. Chicks are unlikely to have survived the bullying – an example of this is shown in Figure 26. This particular stilt chick was large and robust enough to escape being hounded for more than 100m and picked up and dropped on the gravel and in the water.

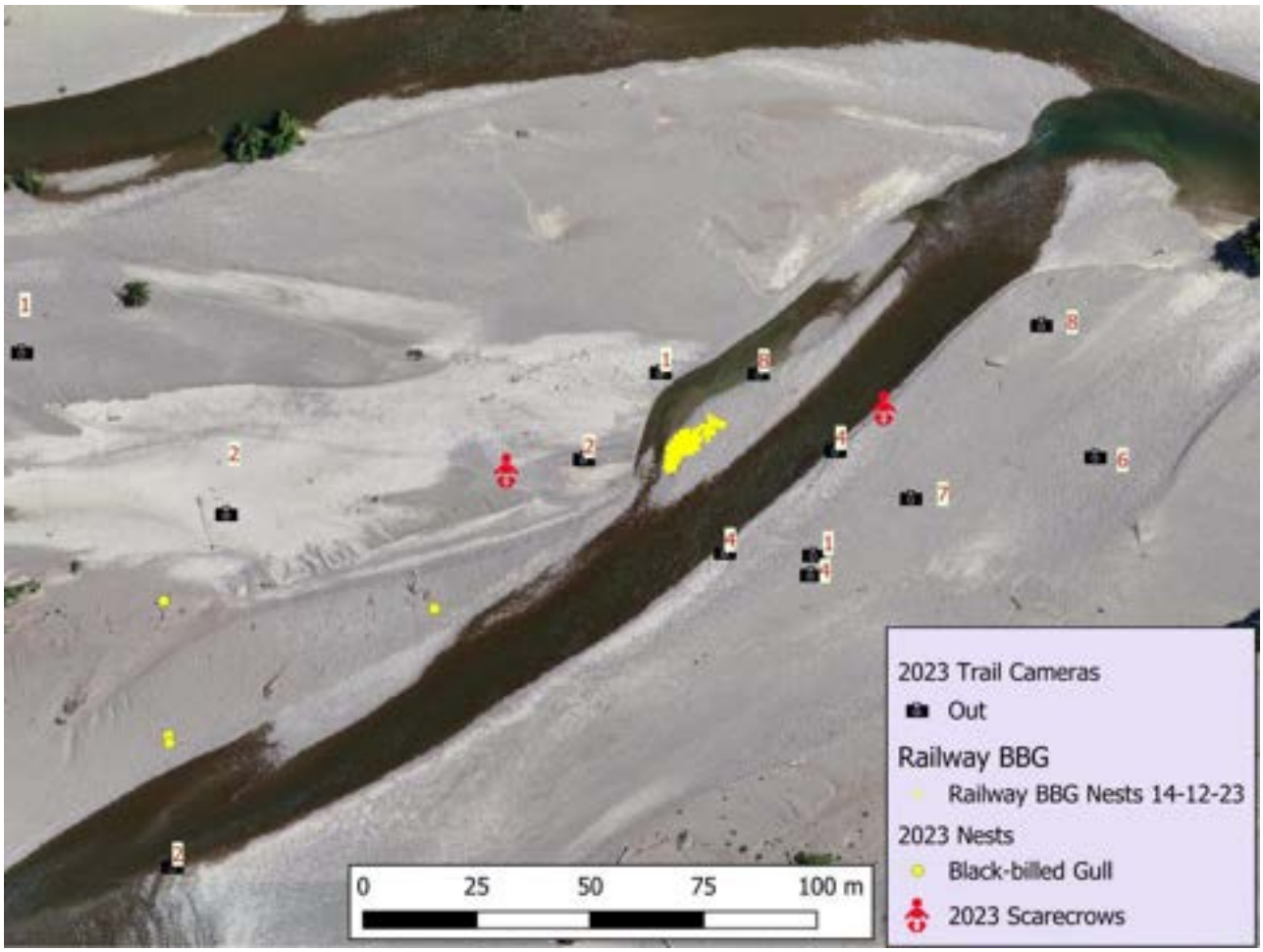


Figure 25. Railway BBG colony

Trail cameras were placed at 4 locations around the island at various times and there were traps and cameras already in place for the BFT colony. Two scarecrows were belatedly put out, including a very rudimentary one, on 26 December.

Figure 26. BBG bullying pied stilt chick

On several occasions images of harriers had been captured on trail cameras. Camera 1 recorded them on 4, 8 and 11 December – but not landing in the colony area. One 12 December one landed 3 times and seemed to be eating eggs. And on 13 December one twice landed. Probable egg predation happened also on 14, 15, 16, 18, 19, 20 and 21 December – usually just once a day for a short period, probably just one nest affected. Nothing was seen on cam 8 from 26/12 to 15/1. But on 22 December there were 4 visits, and 23 December 2 visits – captured on the upstream No. 4 camera. No more harriers were seen until 12 January when one carried away a chick.

Harrier visits ceased 3 days before the scarecrows were put out and another happened two weeks after it was installed. Harrier activity is sporadic and unpredictable, it is entirely possible that the scarecrows did have some effect – and we will be using them in future.

Attacks by harriers are usually only observed during fledgling on this river, it was unusual to see them taking eggs. But camera numbers and locations were much better this year given the small and confined nature of the colony – overlooked by high banks ideal for cameras.

When the colony had been abandoned, 129 nests were counted on the ground. From the air nests were counted/interpreted from visible nesting material or birds in a nesting position. It seems likely that several of the 129 nests counted on the ground had been abandoned without eggs and probable that some had been raided by harriers.

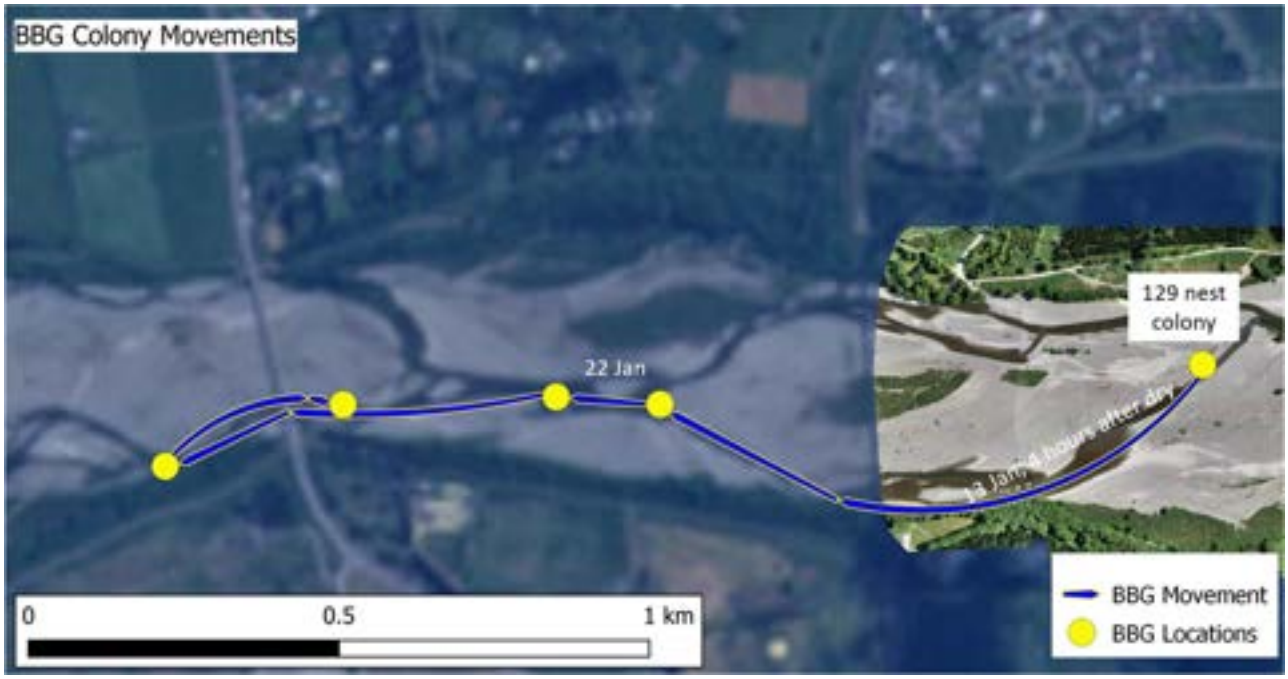
On a number of occasions pedestrians, including fishermen, came close to the colony. A dog was also seen nearby. Several times our signs were interfered with. Two 4wds came within 50m of the colony on 3 December and six within 70m of it on 13 January – but on no occasion did human disturbance prove an issue.

The river around the colony could be seen on trail camera photos to be visibly drying from 4 January and no water was apparent at 1.55pm on 13 January. Creches of chicks had started to form by 12 January and the chicks were moving upstream by 4.29pm on 13 January. Gulls were last seen at this site at 7.53pm and they were about 950m upstream by midafternoon on the 14th. There seems no doubt that the chicks were walked by parents upstream in response to the drying river.

They remained at the second site, where there was flowing water, until the morning of 22 January. A trail camera and a scarecrow were placed at this site. Three people were photographed walking through the area where the birds were nesting and later the camera was stolen. This area is just north of Rangiora. Before this date chicks and adults were scattered around quite a large area but at 9am on the 22nd the river had dried to just above their

position and they were tightly gathered together in a creche. After a while a few adults with chicks walked quite rapidly upstream, then at about 9.30 they started moving en masse. The chicks were guided and herded by adults (see frontispiece – from a video) and they were sped up by adults taking flight. None of the chicks were seen to be flying at this stage. There were two brief halts in their progress, but within a few minutes they were more than 100m upstream.

There were later movements to above the Cones Road bridge then down below it. They started to fledge by the time they were above the bridge – and at one stage quite unusually they were taking shelter from the sun under a willow tree. When just below the bridge, the fledglings were clearly being encouraged to fly by the adults. Young birds that couldn't fly, or didn't want to, scuttled under willows when the rest took to the air. Predation after leaving the colony seems to have been minimal. Two piles of feathers were found near the most upstream site, one under a willow with a cat being the most likely predator, and one out on the gravel – perhaps a harrier. Whilst close to the bridge the birds were very close to people and dogs – but no serious problems seem to have been met with.



The largest count of fledglings, or near fledglings, was 74 on 24 January. These were probably all from the 129 nest colony, the earlier larger ones had probably dispersed by then. Fledgling success is as usual rather approximate, but there seems to have been about 12 from approximately 25 nests in the first phase of nesting and 74 from 129 in the second phase. Overall – about 56%.

BBG Conclusions

Black-billed gulls had several aborted nesting attempts, but a small late two-phase colony downstream from the railway bridge eventuated. There were about 25 initial nests with a later 129. Harriers were photographed robbing nests before eggs had hatched in the second phase. About 12 fledglings were produced from the first phase of nests and about 75 from the second phase of 129 nests. Total productivity was only about 56% - but it proved very difficult to count fledglings and quite a few of the nests may have been abandoned without eggs being laid.

4.5 Pied Oystercatcher and Pied Stilt

No special attempt was made to find SIPO or PS nests this season. None of the former were found and just a few of the latter.

5. Weeds

Weeds weren't a problem this season.

6. Predator Control

6.1 River area

Catch was again very high along the river (Figure 27), and the total was actually slightly more than last year when there were about 100 extra ECan/Excell Biosecurity traps. Catch rate was higher at 0.82 per hundred trap nights vs 0.76 last year (Figure 28).

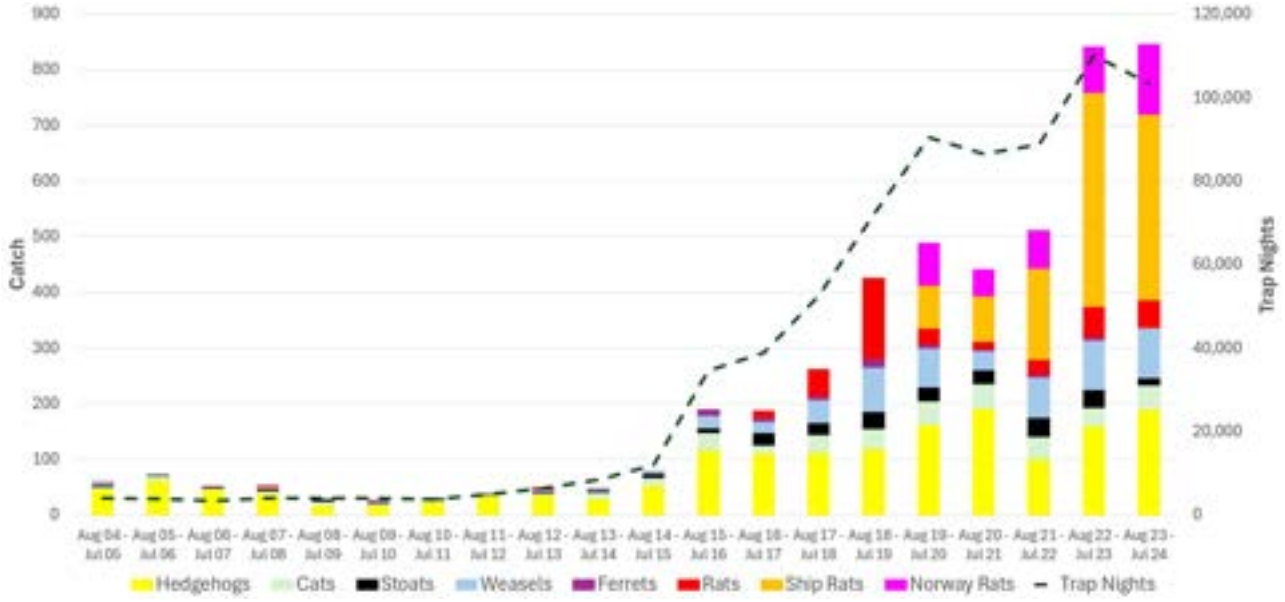


Figure 27. Predator catch since 2004

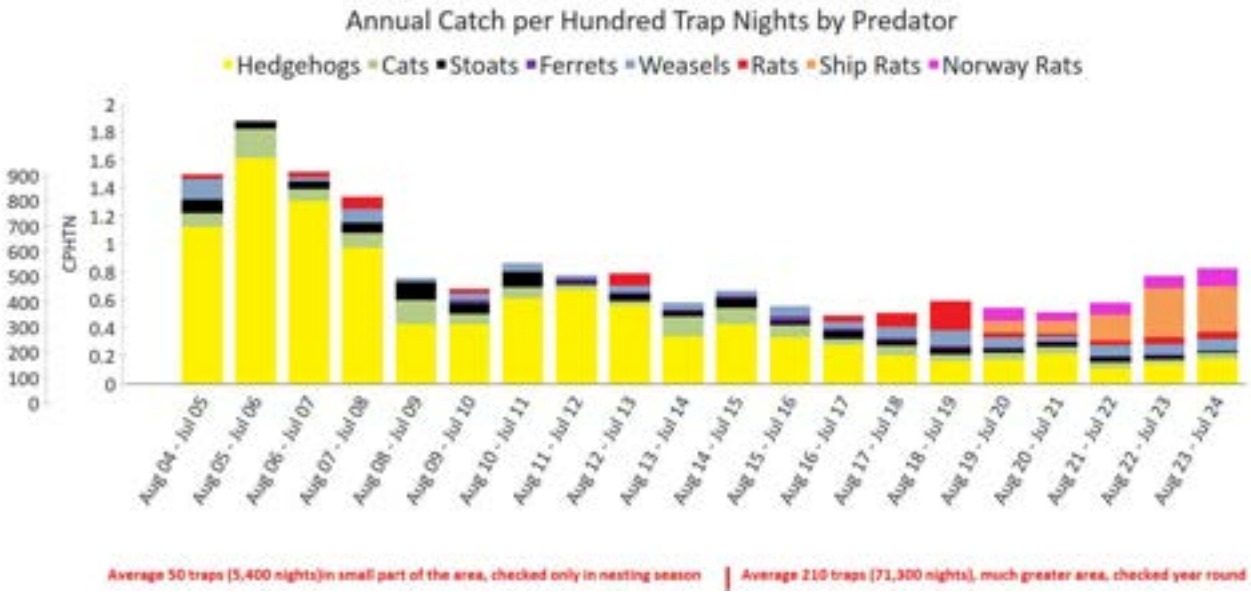


Figure 28. Catch per hundred trap nights since 2004

It has become even more clear that the main ground predator threats to the birds are Norway rats and cats. Ship rats have not been seen on trail cameras or in traps on the fairway, only one weasel has been trapped (none seen) on the fairway since 2020. Evidence of stoats (which can be a very important predator) is rarely seen, and numbers caught dropped from 33 last year to 13 this year – perhaps due to increased cat presence. Mouse numbers have been very high at 221, only exceeded by the 397 Ship rats. There is clearly a mouse plague, this is of concern because they are a food source for the other predators and they trigger out traps so other animals can't be caught.

Thus Figure 29 is more relevant than Figure 27, but the number of cats caught is a very poor representation of the numbers out there. Cats are very reluctant to go into our (mainly Timms) kill traps and we don't have them everywhere - only at some distance from where domestic cats are likely to be found. The cats we do catch are best described as strays – they look like skinny uncared for domestic cats and are of several colours – unlike the classic large muscular tabby ferals cats. However, these strays are breeding along the berm, kittens are sometimes caught.

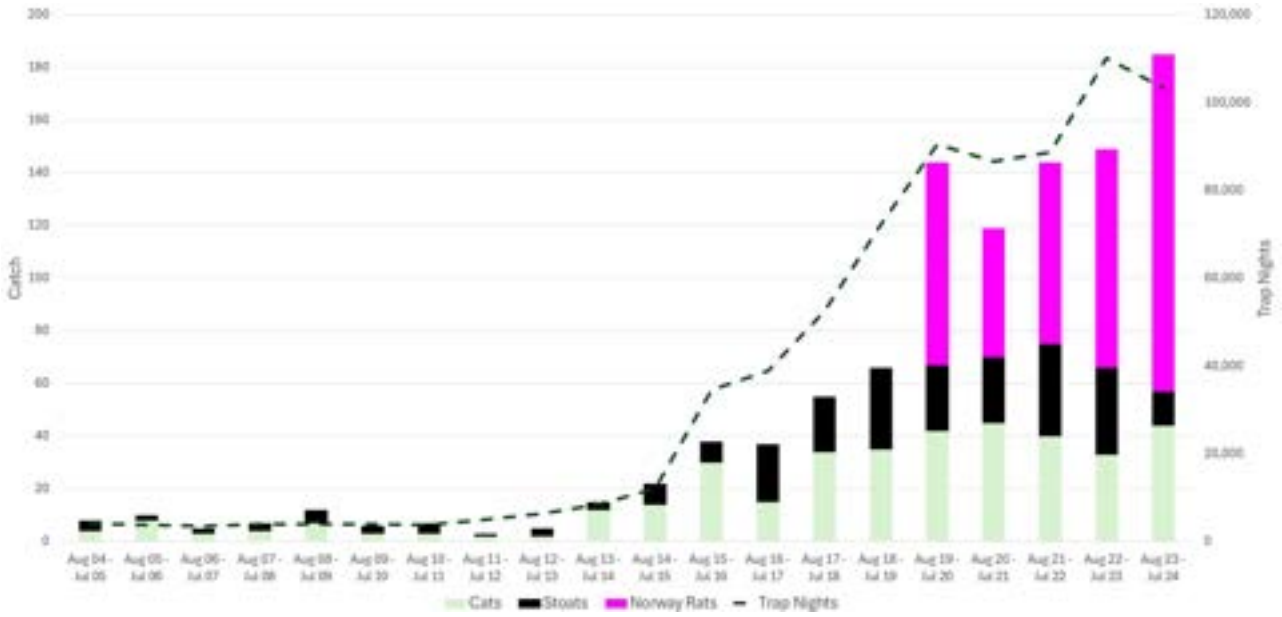


Figure 29. Catch of the most important predators since 2004

Norway rat catch shows no signs of decline, we do not appear to have been affecting their population with our trap lines.

6.1.1 Rat Colony

In September 2023 Nick Ledgard found rat burrows at discarded butchered animal remains (sheep?) near the edge of the fairway downstream from Ashley Village. A few traps at this site caught 5 Norway rats, and when dug out the burrows proved to be just for feeding purposes – they came up under the food. A homeless man living with 2 dogs in a Volvo SUV nearby informed us about another dead animal about 20m away. This was a long-dead pig. Traps put there were immediately much more successful. Trap checking was done on average every couple of days.

Traps used were DOC 200, DOC 150 in run through boxes, and Fenn traps in mesh enclosures with the trap on the ground and dug in flush with the surface. Bait used was mainly peanut butter and salmon food pellets. Between 2 October and 29 November a total of 30 Norway rats were caught – ranging from a baby to half grown to a very large, approximately 0.5kg, male. Three mice and a cat were also caught. Over time there were traps at 17 different locations within a few tens of metres of the feeding and nesting sites. Traps and a camera were left at the site for weeks after the last rat was caught, but no more were caught or seen. A small amount of poison (NO Rats) was placed in the mouth of the "nesting burrow" – see below.

Total catch rate was 7.7 per hundred trap nights. DOC 200 catch rate was 3.4, Fenn rate was 15.8 and DOC 150 was 3.6. Fenn traps were very much more successful than the other trap types – they seemed to be much less intimidating. This has however not always been the case, or at least not to this extent, with Norway rat trapping on the fairway. There will be some influence of trap location, but not enough to negate the fact that Fenns were more successful. There were a few live rats in the Fenn traps, but this also occurs in DOC 200s.

A trail camera showed rats and mice coming out of what looked to be a burrow entrance on Figure 30. However, when it was clear there were no more rats in the area, gorse and broom in the area was cut down and shallow trenches were dug. No burrow was found and there was no spoil to indicate one. The Norway rats were living and breeding in thick grass around the bases of gorse and broom bushes. There was about 30cm of sand thickness on top of gravel in this area – meaning that burrows could have easily been dug.

Figure 30. Two Norway rats in Fenn trap, "burrow" in background

There is little information available about Norway rat nesting along braided rivers, so this description will hopefully be of use. However, we have also found nesting of individual rats under logs on the fairway.

6.1.2 ARRG Rat Dog

In December 2023 Grant and Valerie Davey acquired a partly trained rat dog (Evie) – a Welsh Springer Spaniel. She was bred by Billy Barton of Wanaka for detection work and had some rat-specific training. She has been used mainly on the fairway – outside the nesting season when there are basically no braided river birds she has been on the loose with a GPS collar provided by the group. During the nesting season she must be used on a leash. She detected 2 hotspots of Norway rats under logs or driftwood – near the Cones Road bridge and off Groyne 2.

Figure 31 shows some of Evie's GPS tracks at Cones Road and the locations where she detected rats. The numbers record rats killed. At the location of the easternmost pink star she found rat burrows at a small accumulation of driftwood, her reaction showed that there were rats present. At the time we couldn't dig them up, when I came back later with the dog and a mattock, the rats had left.

The location where 4 rats were killed had a small pile of driftwood, when we dug it out an adult female rat and 3 young ones were disturbed, Evie caught and killed the adult, the young ones were also killed. These are the only rats we've been able to directly kill, most are under logs or driftwood which would require machinery to shift.

The location where 10 rats were killed is a large log. Traps used have been mainly Fenn, but Victors have also been used. The latter effectively kill rats, but are also too easily triggered by mice. The Fenns have been placed in natural cavities under the logs, bait used has been mainly peanut butter – but also sheep nuts and salmon food pellets. Traps were first put there on 7 March 2024 and were still present as of 8 October. A trail camera has also been present for this time. The picture is of the Norway rats returning over and over again to this site, but at present none have been caught or seen since 15 August. Most rats have been adult, but one very small one was caught. It had quite long ears, characteristic of Ship rats, but a thick short tail – characteristic of Norway rats. Advice was that it was definitely a Norway rat. These rats are breeding in small numbers out on the fairway – as well as in at least one colony on the berm. Quite large numbers of mice have been present also, after a Pindone bait station was placed there, numbers reduced. Norway rats showed little interest in the Pindone.

One rat was caught under a pylon to the west, the southernmost pink star is a location which seemed to be rarely visited by a rat, but none were caught. In this and other areas there are many more logs and piles of driftwood which could harbour rats, but Evie only rarely indicated any animals present. In a few locations she indicated, but the animals seemed to be rabbits or mice.

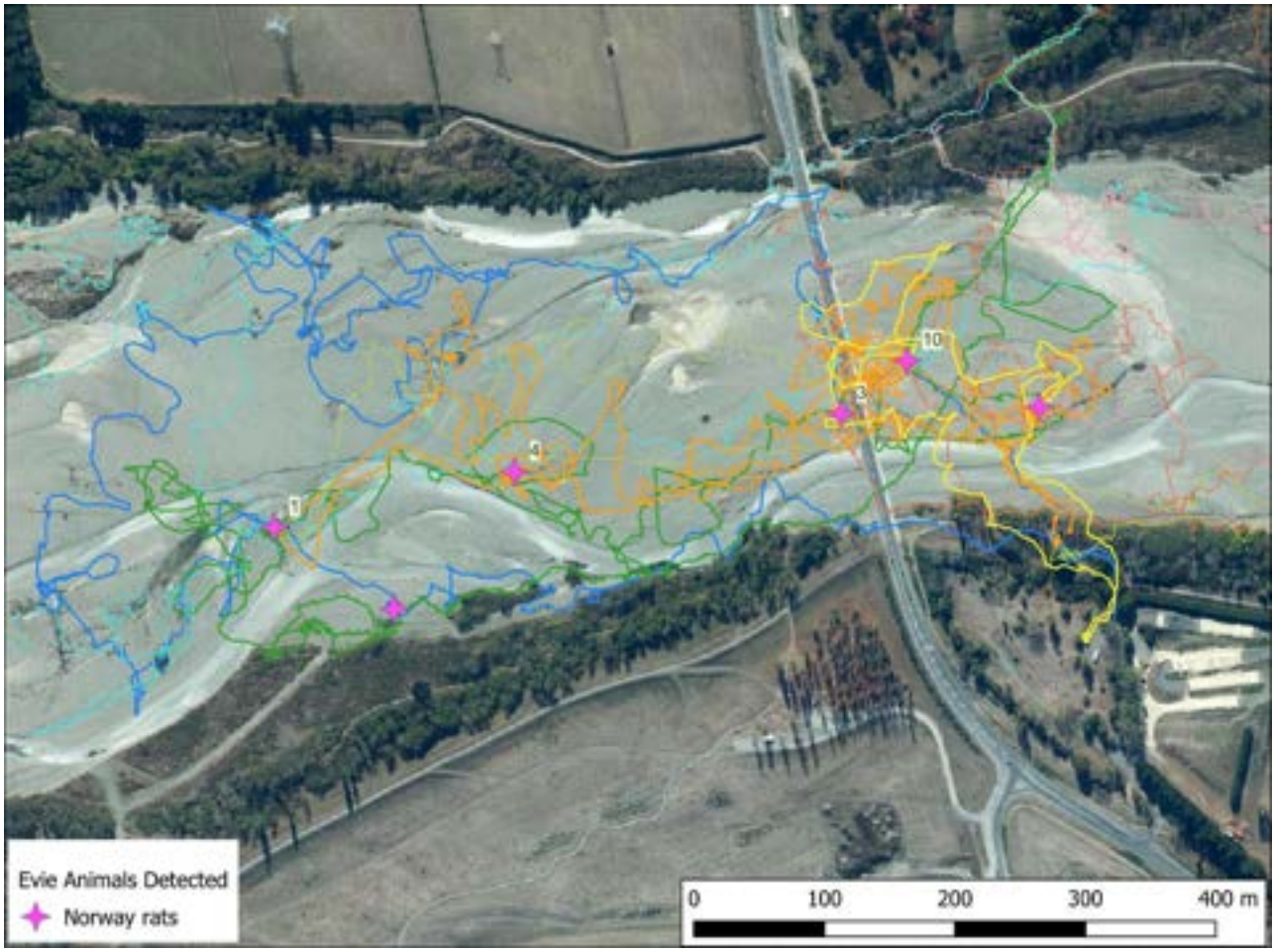


Figure 31. Dog detection activity and results - Cones Rd area

The reason for the rat problem near the bridge is almost certainly the pigeons that roost and nest under the central span of it (Figure 32). Eggs, chicks and dead birds drop off their roosting site and their droppings may also contain food. Cats and mice are also very common here. We are planning to address this problem with the most likely solution being shooting.

From previous experience, it was incorrectly thought unlikely that rats would be present on the fairway outside the nesting season. Cameras and traps are usually left at the sites of BFT colonies for weeks after the birds have left, no rats have been seen or caught in these. For example, in 2021 a Norway rat constantly visited a DOC 150 run-through trap at a BFT colony just above the bridge. It was eventually caught, but only after the birds had left – then no more signs of rats were seen.

Figure 32. Pigeons nesting and roosting under the Cones Rd bridge

Figure 33 shows rat detection tracks and the 2 sites where rats were confirmed off Groyne 2. This is an area with a very large number of willow logs, but over many visits Evie only showed interest in about 6 of these – with some having mice, others perhaps rabbits. Trail cameras and traps were placed at all these locations. Six Norway rats were caught under a log near the water in the middle of the fairway. As with the Cones Road area, rats kept returning to here until the log got flooded and was pushed into the river by the tractor when clearing weeds just before the 2024 – 2025 nesting season. Fenns and Victors were used and a bait station was emplaced at one stage. Trail cameras showed that mice, cats and a stoat (or possibly a weasel – if the latter, this would be the first one seen in the middle of the fairway) also visited.

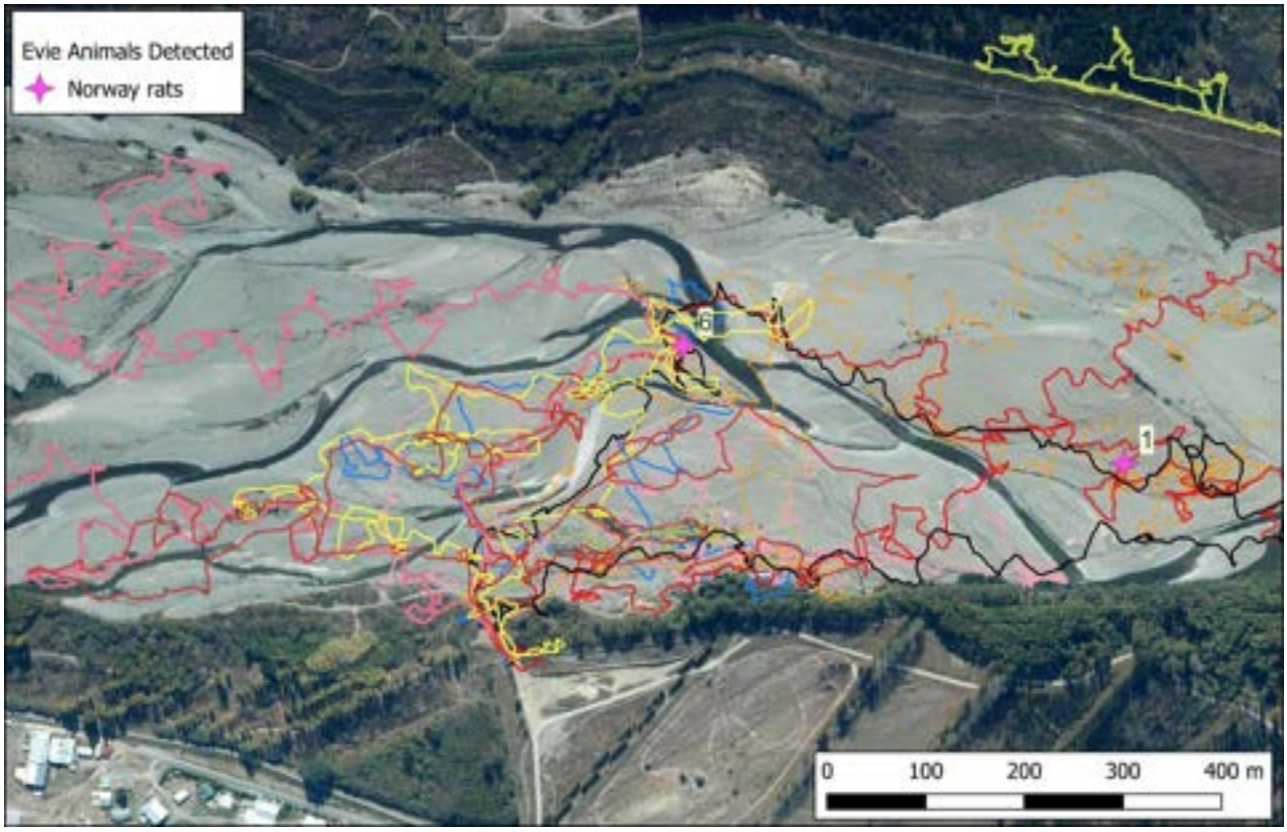


Figure 33. Detection dog tracks and results, Groyne 2 area

Figure 34 shows a Norway rat at a Victor trap inside a mesh enclosure beside a bait station. It was eventually caught – having been in the bait station without eating Pindone.

Figure 34. Norway rat at trap and bait station

Camera and trap results showed that there was only one rat at the site where one was caught.

Before the nesting season the fairway was covered between Groyne 3 and the Golf Links area (km 6 to km 12) with no further rats being found. Some work was also done off Groynes 6 and 7 where rats had been found previously.

6.1.3 Norway Rats at Carcass Dumping Areas

In May 2024 the recently dumped bodies of sheep and a butchered steer (Figure 35) were found some 240m NW of the rat colony described above. About 5m away from here, down a bank, were the older carcasses of pigs and deer and about 100m to the east the recent remains of a pig were found. Trail cameras at these sites showed harriers and a family of cats feeding on the recent carcasses. One Norway rat was photographed in a partially open burrow near the pig and deer carcasses. This burrow was largely a half burrow – running along the edge of a bank and shielded by vegetation – but in at least one location it extends directly into the bank. It will be dug out and described in more detail soon.

ECan promptly buried the recent dropped carcasses, however we were advised that this might actually encourage rats. But the one Norway rat seen was quite quickly trapped. Cameras and traps were at this site for several months but no further Norway rats were seen, just a few Ship rats and many mice. Five cats have been caught here.

Over the next few months further dead animal remains were dropped in this general area. These included pigs, deer, sheep and even fish. These occurrences were mapped (Figure 36) and trail cameras were placed at many of them. When fresh, harriers and cats were abundant, but no rats were seen. The entire area was swept with the dog with no further rats found – however she was insufficiently trained to rule out their presence.

Figure 35. Dumped carcasses and a Norway rat

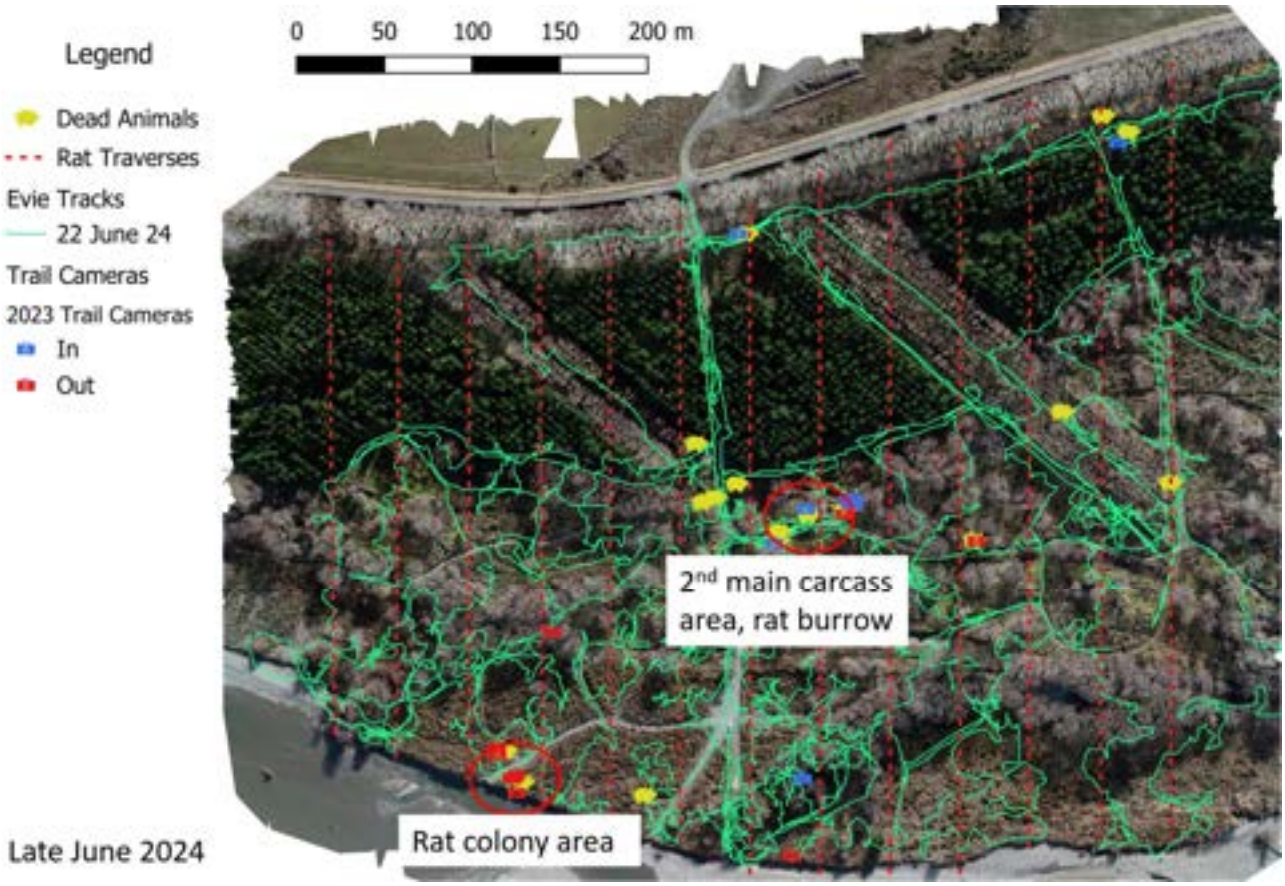


Figure 36. Animal remains, detection dog tracks and trail camera locations

Carcass dumping areas also occur on the south bank just upstream from Groyne 6 and on the north bank, accessed from Swamp Road, opposite Groyne 7. Evidence of rats (and cats) has been seen in the former area. From time to time carcasses are dropped at other places along the river, e.g. on the north bank upstream from Cones Road.

Carcasses may have been a major driver in the Norway rat infestation along the Ashley.

6.1.4 O'Hallorans Road Trapping

Some traps and trail cameras were placed on the edge of the berm on the property of an ARRG member some 5km downstream from the gorge. Access is off O'Hallorans Road. The aim was to gain information about the predator population in this area. A brief report dated 7 August 2024:

Predator trapping began at the 26 ha plot of land at 1 O'Halloran's Road, Glentui, on 27 April 2024 when Grant Davey and landowner Erick Akeley sited 6 DOC 200 traps, EA01 – EA06, at approximately 100-metre intervals along the north bank of the Ashley River. Bait consists of a combination of raw meat, peanut butter, pelleted pet food and golf balls (in imitation of birds' eggs). Additionally, motion-triggered cameras were set on traps EA02 and EA03. To date the traps have been checked by E. Akeley four times at roughly three-week intervals, with a total catch (excluding mice) of 7 weasels and 1 stoat. The cameras have captured images mice, possums, and weasel(s) as well as the neighbour's terrier and an occasional house cat (perhaps also a neighbour's). There has been no sign of rats of any species or ferrets. Plans are to continue monitoring the traps indefinitely.

Trap locations (Figure 37) are quite similar to those within the ARRG area downstream from the Okuku junction, i.e. on the edge of the berm. It is very striking that no rats of either species have been caught or seen during several months – when rats make up the bulk of the catch downstream.

Figure 37. Traps in the Glentui area

6.1.5 Comparison of Line Trapping and Targeted Trapping

Figure 38 shows Norway rat catch in the last 5 years subdivided by kill type – trap lines, traps around nests and colonies, traps at a rat colony found in October, traps where dogs indicated rat presence, and direct kill at a dog-indicated site.

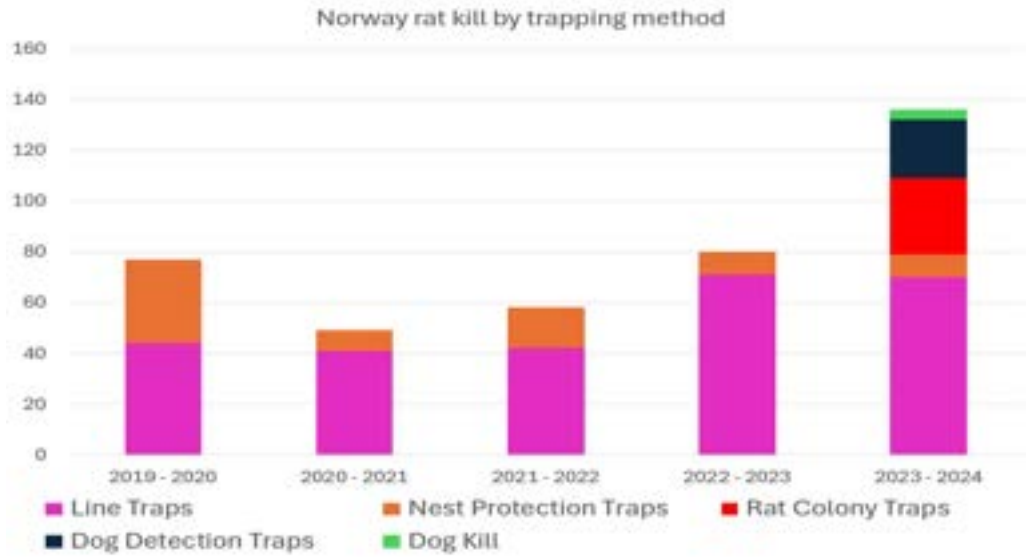


Figure 38. Results of line vs targeted trapping for Norway rats

Figure 39 shows success rates of our trap lines and of temporary traps put in other places. Targeted trapping has been between two and twelve times as effective as line traps – this points the way forward. Our rat dog, despite being barely trained and not much used, is likely to be a major weapon – especially at BFT colonies. Hopefully more rat colonies can be found – 30 rats were killed at the one downstream from Ashley Village where they were

feeding on dumped carcasses. This likely has been happening for years. No sign of Norway rats has been seen in this area for more than a month – extra traps, trail cameras, and dog detection have been used.

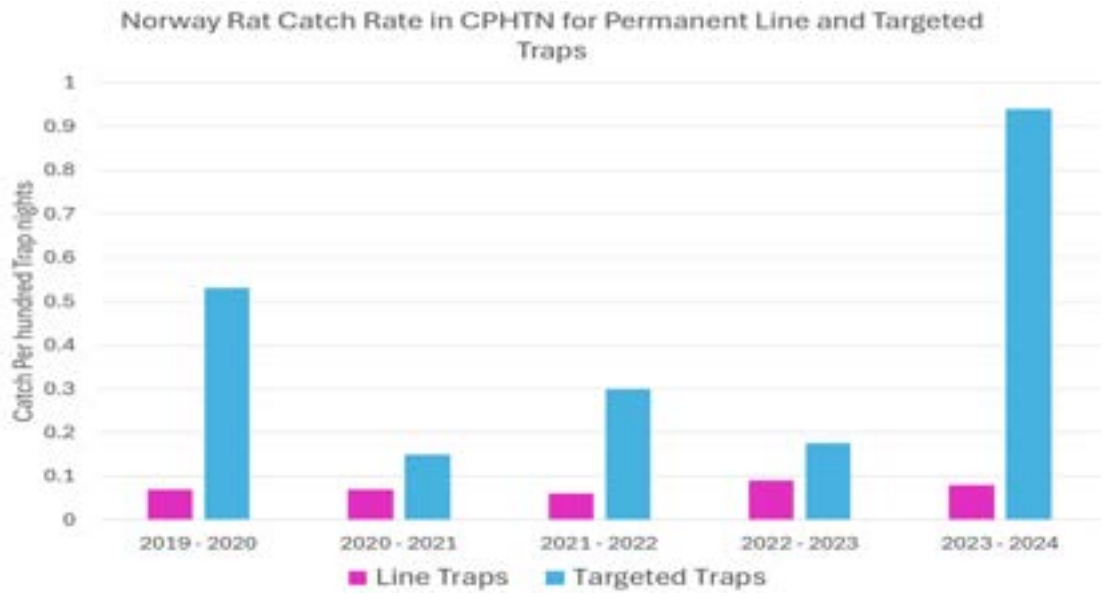


Figure 39. Norway rat catch rate in line and targeted traps

Killing rats hiding/living under logs in the fairway is problematic. During the nesting season we can't use a loader to move the logs, we are trialling smoking them out – as traps and poison can take a long time to work. Pigeons nesting under the Cones Road bridge attract Norway rats – 12 have been caught under logs/driftwood within tens of metres of the bridge. We are working out how to block off the pigeon nesting ledge.

Norway (and Ship) rats appeared in our traps in numbers only in about 2018. They are not present everywhere – for example none were seen or caught at BFT colonies 1.5km above SH1 and at the Okuku junction last season. It seems possible that we can grossly reduce their threat.

A strategy needs to be developed to handle the cat threat. There has been advocacy with WDC about cat control, but we need to do live capture of cats. This has been much more effective than the kill traps we use – only at some distance from houses. Live capture traps require daily checking and a rifle to despatch wild cats and we don't have the resources to do this. The cats we catch and see on trail camera photos are generally small and scrawny, often non-tabby, and appear to be recently released or first generation bred on the river cats. They are not classic feral cats. By DOC classification they would be stray cats. Obviously domestic cats are normally only seen near houses.

There has been some turnover of trappers. Richard Chambers is now assisting with trap line management. Six traps were recently stolen from near the airfield, and ECan has dozed several – without informing us of work in those areas.

6.1.6 Pindone Poisoning

One hundred and fifty Pied Piper bait stations with Possum-Rat Pindone bait were laid along the river in April 2024. Pindone is a first generation anti-coagulant. It requires more than one feed and is not a toxicity problem to other animals. Only rodents can access the bait. The bait stations have not drawn the attention of the public who use the area.

This was an initiative of ECan – James Schaap of the Biodiversity section - and largely paid for through a Waimakariri Zone Committee grant. The stations were laid out by Excell Biosecurity, who also installed signs at regular intervals. The poisoning was done to target Norway rats with stations at 50m intervals along trap lines mainly on the south side of the river. Bait stations were nailed to traps or staked to the ground with reinforcing rods. Locations were flagged with tape.

Advice and help from Excell, Ewan Ireland of PGG and Peter Visser of Key Industries is acknowledged. Key Industries have also donated some Pindone and Ditrac – which is a similar toxin to Pindone.

The area to receive bait stations was defined mainly on where we had caught Norway rats, but also on rat detection work done by Leona Kirk of Wildlife Protection Services. Figure 40 depicts the numbers of Norway rats caught in all traps, permanent trap lines and temporary fairway traps, since early 2019. White dots show traps where no rats were caught in this time. Most evidence for rats has been along the south bank or around BFT colonies, with the exception of the upper end of the north bank trapping (Line A), near Cones Road (Line E) and the rat colony (Line R).

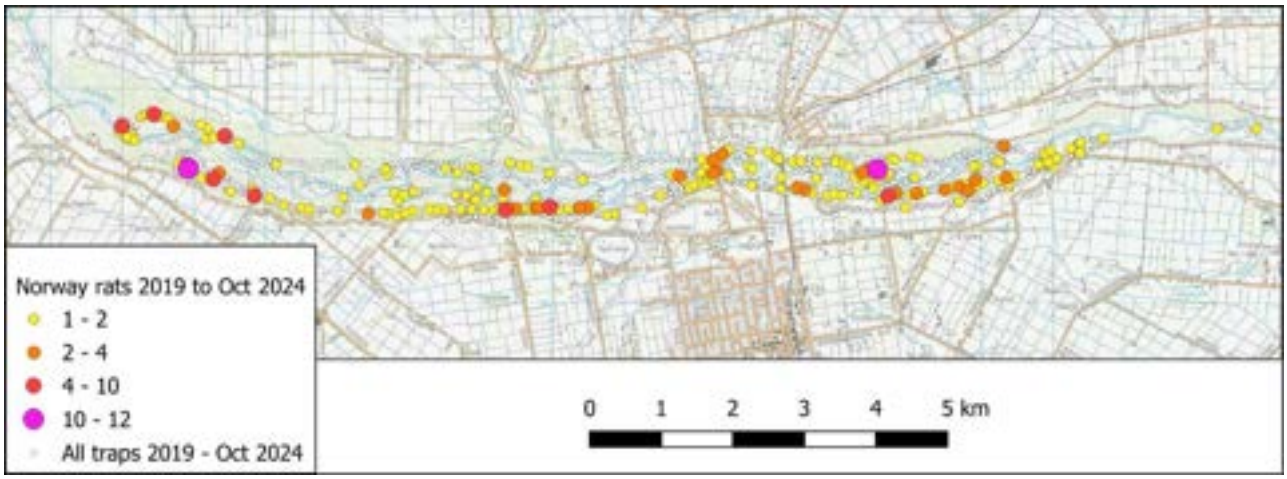


Figure 40 Norway rat catch, 2019 - 2024

Figure 41 shows bait station locations as of September 2024. Black symbols show stations which have been shifted – mainly to the road and rail bridge area. Some stations were removed from the area on the north bank and placed at known Norway rat locations either on the berm on the fairway. More movement of stations is planned.

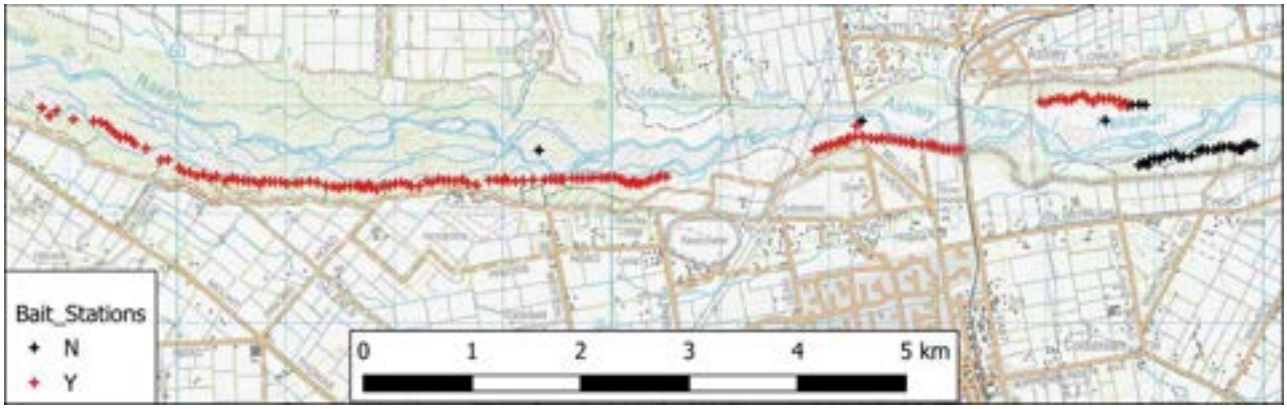


Figure 41. Pindone bait station locations

Checking and replenishment of bait has been done at approximately 3 week intervals. When checked the amount eaten from each station was estimated on a 1 – 5 basis. Five means all bait eaten, 1 none eaten. Over time the amount of bait consumed has declined (Figure 42). This could be seasonal.

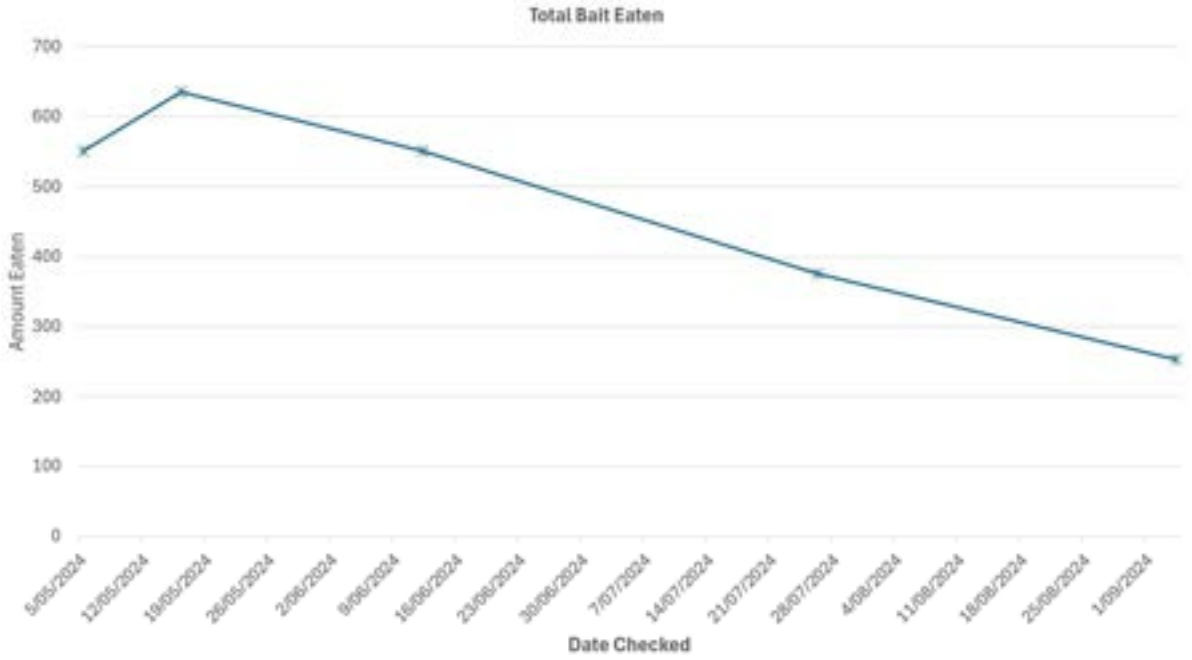


Figure 42. Pindone bait eaten

Trail cameras have been used at about 40 bait stations to see what animals have been eating bait or have been present (Figure 43 and Figure 44). Unfortunately it has been mice that have been overwhelmingly the main consumers of poison. At some stations they could be seen frantically eating night and day – sometimes 4 at a time. Norway rats have been seen only at stations placed where they were known to be present. On perhaps only one occasion was a Norway rat seen to eat the bait. Cats and to a lesser extent weasels, stoats, even an owl and a harrier have been drawn to the stations by the mice. The number of cats seen exceeds even that of Ship rats – which are normally to be seen eating the bait.

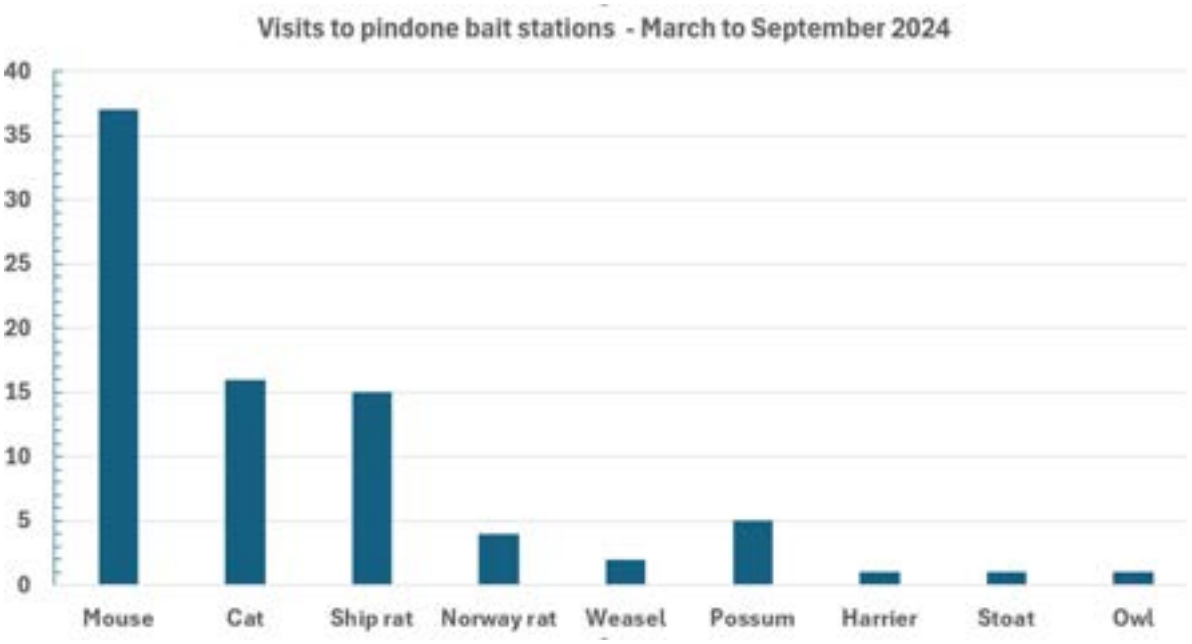


Figure 43. Visits to bait stations

Figure 44. Rats and mice at bait stations

The bait station programme is not succeeding (at least directly) in its main purpose – to reduce Norway rat numbers. If mouse numbers were to be significantly reduced, this would affect the predators further up the food chain, but it is by no means certain whether this is possible. Overall mouse catch rates in our traps (largely DOC 200s) hasn't declined, but this needs to be assessed just for the areas where bait stations have been installed. A decision whether to continue, halt, or significantly change this programme needs to be made in the next few months.

6.2 Estuary Predators and Traps

Trapping was begun in 2018 with eight trap lines, in early 2019 two more were installed down from the SH1 bridge. Later the line along the dunes north of the mouth was taken out – it was difficult to access, traps were lost in floods, and little was caught. In mid-July 2024 an extra line of 17 traps was put out, with the assistance of Pest Free Waimakariri. This extends along the south sides of Line I and C (Figure 45). In August 2024 another 4 traps were added to Line A – along the east side of the dunes. At this stage there were 149 traps installed.

Total catch (Figure 46) was significantly higher than last year, mainly due to more Ship rats. Catch rate was 0.6 per hundred trap nights. Catch rate closely mirrors total catch as trap numbers have remained similar for some time.

Norway rat catch in the months of February and April was extremely high (Figure 47), and proportionately more of this were caught at the estuary than along the river. More cats were caught along the river, but we have more cat traps there. Ferrets were more abundant at the estuary.

A key finding of Eleanor Gunby's thesis (see below and summary appended) was that cats are predating at banded dotterel nests – **this is something we must address**. We have few cat traps in the area due to proximity to houses. For this predator control programme to be meaningful, we need to keep up nesting success monitoring. Eleanor has completed her thesis, but we don't as yet have access to more than a summary of it.

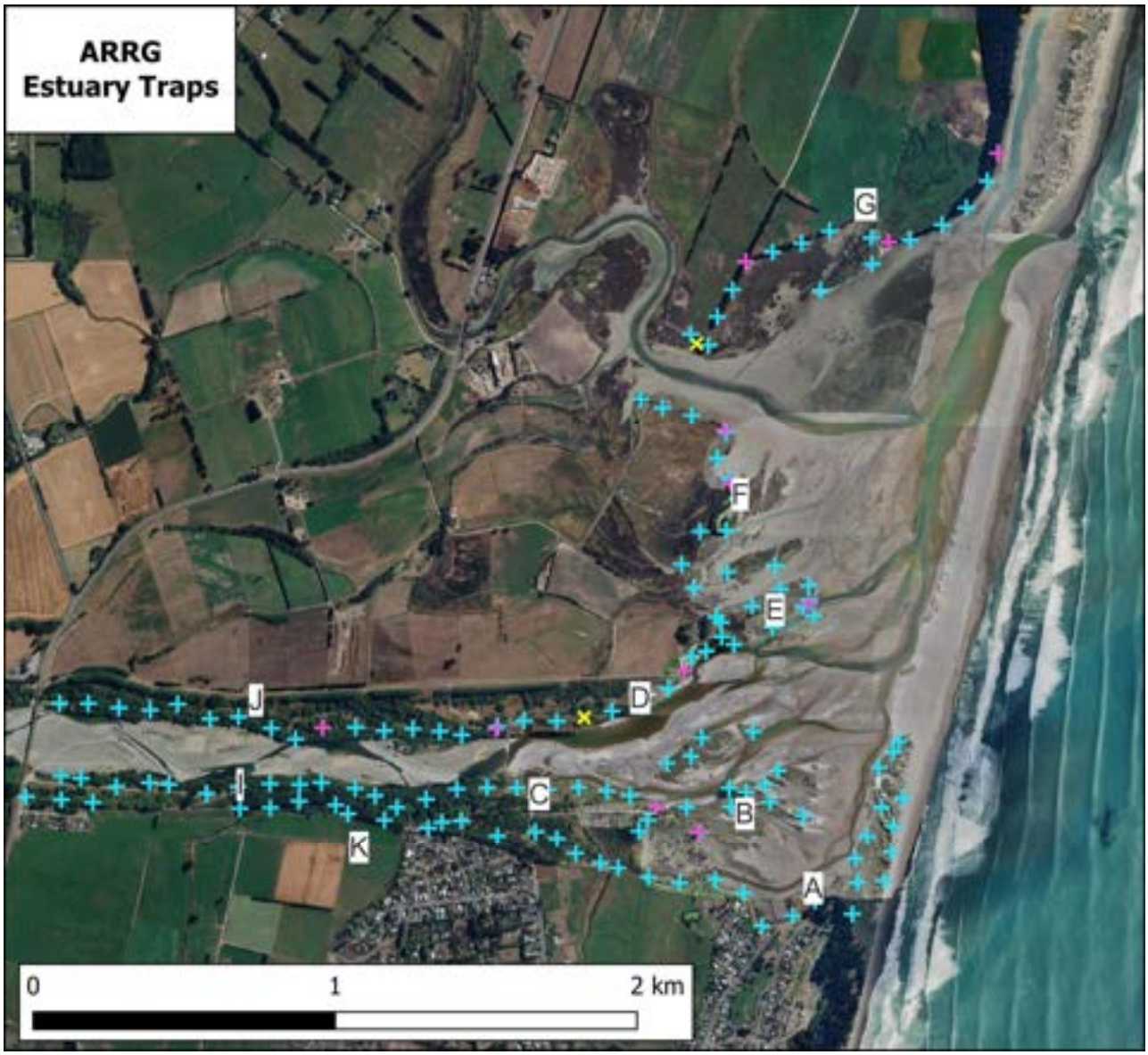


Figure 45. Estuary traps

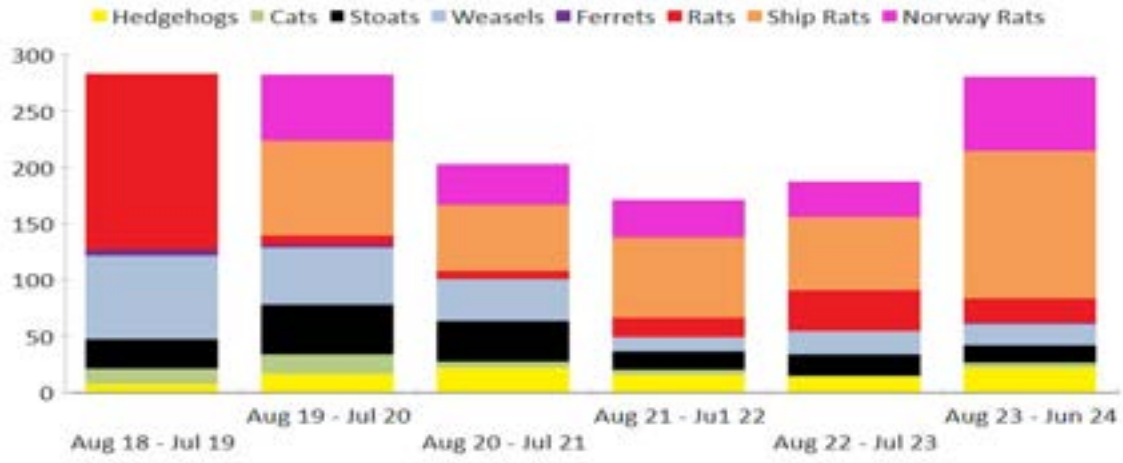


Figure 46. Estuary total predator catch

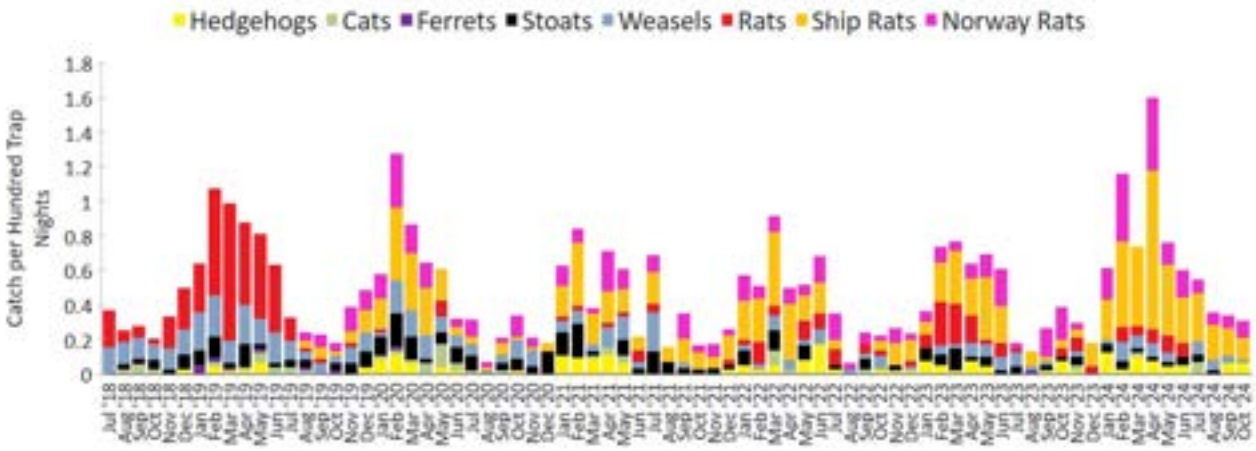


Figure 47. Estuary monthly catch rate

6.3 Predator Control Conclusions

- Catch rate both of river and estuary traps increased over last year. Clearly we aren't controlling predators – after 20 years of trapping predator numbers should be declining, not increasing.
- We need to concentrate more on targeting predators at nest sites and colonies. And to proactively hunt the main predators throughout the year where they live and feed. Our regularly spaced traps along the berm are not working.
- Significant steps have been taken against Norway rats. A large rat colony on the edge of the berm was destroyed and our rat dog has proved very good at finding rats living and breeding under driftwood and logs on the fairway. Dumped carcasses were found to be a major factor in Norway rat distribution.
- The success rate of traps placed to attack Norway rats where they live or feed was much greater than that of regularly spaced line traps. Much more emphasis needs to be placed on the former type of trapping.
- Cats were again a problem, more live capture traps are needed.
- 150 Pindone bait stations were installed along trap lines where Norway rats had been caught in the past. Trail cameras showed Norway rats to be present only in places where stations were sited in known Norway rat haunts. Mice were by far the main consumer of the Pindone and cats were very common visitors to the stations – hunting mice.

7. Human Disturbance

As per usual ARRG and ECan blocked off access at all feasible places between State Highway 1 and the Okuku junction. This was done with concrete blocks and in some cases gates. The barriers are in place between 1 September and 31 January each year.

No instances of nest loss due to vehicles were seen this year, and sighting of 4wds on the river in this section were very few. However, quadbikes and motorbikes were much more common.

Minimizing vehicular disturbance by ARRG and ECan rangers is a major success story.

On 2 December 2024 Crate Day took place between the Okuku junction and the Ashley gorge. DOC estimated that approximately 170 vehicles took part.

This area is outside the area that ARRG concentrates on, however we did some monitoring and protesting –

- Before the event BFT nests were found at two colonies just upstream from the Okuku junction. Two trail cameras were placed at nests in the upper one. There may possibly have been some nests a few kilometres downstream from the gorge – based on annual count numbers.

- Two protestors stood near the main start point of the event, spoke to many participants and directed traffic along the northern edge of the eastern colony.
- After the event nests were checked, trail cameras were downloaded and 4wd tracks were mapped in the upstream colony.

DOC had signs at all entrances to the river and near one of the colonies. They, with police and ECan rangers stopped vehicles and spoke to drivers at one of the entrances.

Without doubt the protestors had some success – they did effectively cause 4wds to skirt the northern edge of one of the colonies where small chicks were running around and one bird was on the nest. Some attitudes would have been changed.

Figure 48 shows the BFT colonies in the area, with the southeastern one being within the ARRG area.

Despite the number of vehicles the damage done was quite minor. Eggs were broken by flying stones at two nests, an egg was thrown out of another without being broken, and a distressed chick the nest of which had been straddled by 4wds, was seen wandering around. Afterwards the northwestern colony grew markedly.

The results of this sort of disturbance are quite small in comparison to those of floods and predators, but they add quite unnecessarily to the pressure the birds face.

An organizer of the event has promised to hold it after the nesting season in future, but we still expect some vehicles to be present on the first Saturday of December in the coming year.

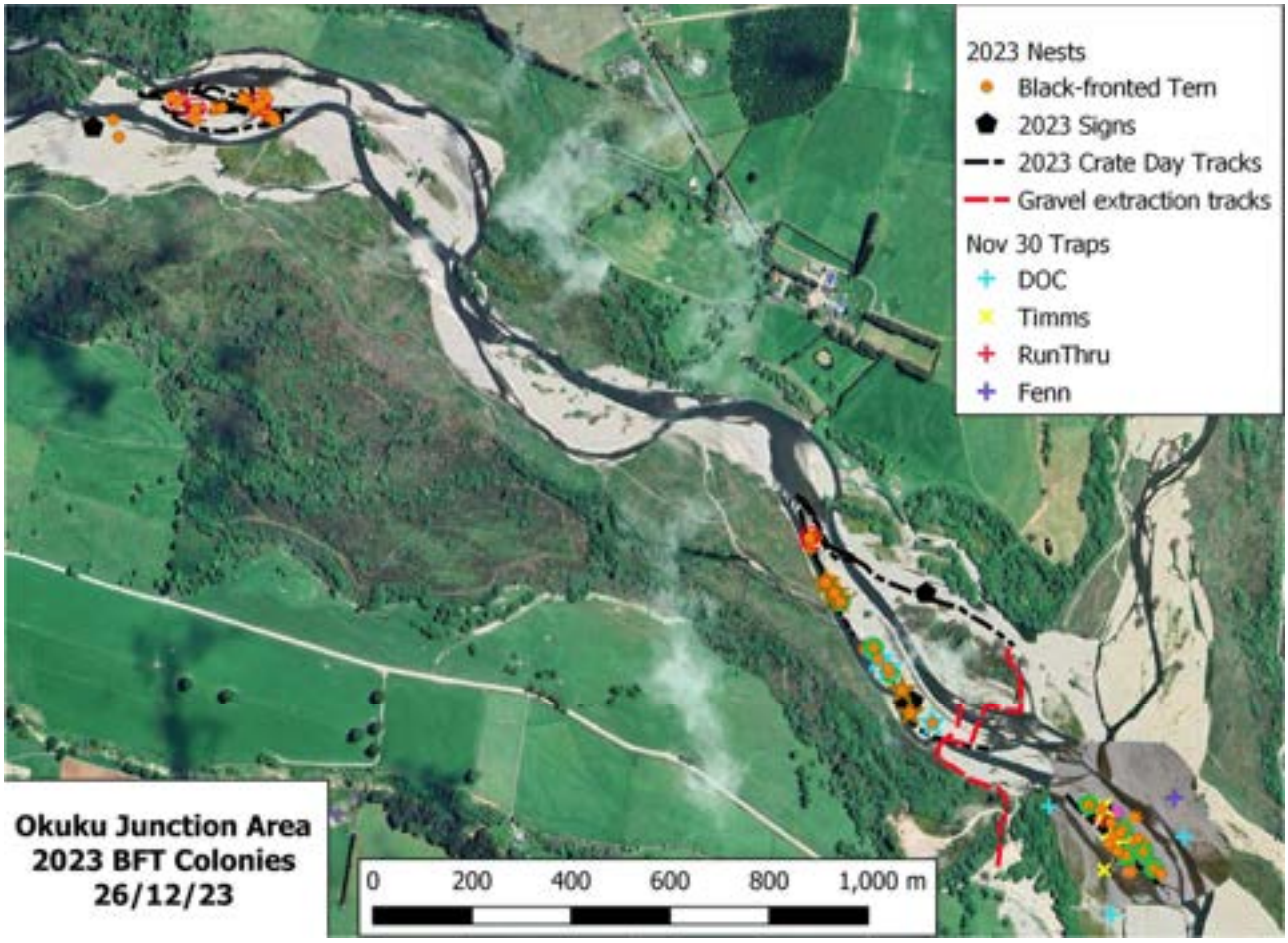


Figure 48. BFT colonies in Okuku junction area

7.1 Human Disturbance Conclusions

Given that all entrances to the river downstream from the Okuku confluence can't be blocked, the incidence of 4wd disturbance this year was low. There are problems with pedestrians, especially those with dogs, and with motorbikes and quad bikes. Efforts to warn and educate people should be maintained.

8. Gravel Extraction

Gravel extraction is of concern to ARRG for the following reasons:

- The cumulative impact of excessive gravel extraction in rivers (known internationally as instream mining) is to aid the conversion of braided rivers to single channel rivers. This has been documented in many peer-reviewed papers.
- Braided river birds on the Ashley nest preferentially on islands where they have a degree of safety from predators. High islands give some protection from floods. If the natural braided character of the river is destroyed by constriction and gravel extraction, obviously there will be no islands.
- Whilst gravel extraction often benefits the birds by removing weeds, it also often damages the nesting environment by lowering or removing islands and reducing flow around them.
- It can result in disturbance of birds, not just from mining operations, but also by improving access to the river for the public.
- These operations are often unsafe for the public and our members – especially where trucks cross stopbanks on narrow roads with no visibility.

Three extractors currently have consents on the river, and several more have been operating under authorizations downstream from the SH1 bridge. However during the report period only one consent holder has been active – Southern Screenworks (SSW).

SSW have been proactively working with ARRG to protect the birds. They have installed blown up versions of one of our signs at their crushing/stockpile area and have made two nesting islands at our (and in the case of the eastern island ECan river engineers) suggestion. After work each day they move blocks into place at the entrance to the river and try to prevent vehicle access down to the river from their stockpile area when they are not working.

Little seems to have been achieved on the issues of the gravel management strategy.

8.2 Gravel Extraction Conclusions

SSW have taken our advice fully on board and have been quite active on the river. The other two consent holders have barely operated in the year.

9. "Hedgehog" Consent

We have not been informed on progress on this consent – which would allow redirecting of flow around islands in dry periods. Hedgehogs seem to be completely averse to crossing water, and domestic cats would probably be deterred by it.

10. Braided River Revival

This ECan initiative on the Ashley seems to have stalled. However, some areas of trees and scrub on the north bank and some islands have been sprayed in an attempt to encourage the river to widen. Some dead trees have also been removed. But unless there are major floods in the next few years, this vegetation will regrow. What is required, at least in some places, is excavation to encourage the river to erode.

11. River Flow

Figure 49 shows maximum daily flow at the gorge during the year. This obviously doesn't show flow into the ARRG section of the river from the Okuku or Makerikeri etc., but it gives a good indication of flood events.

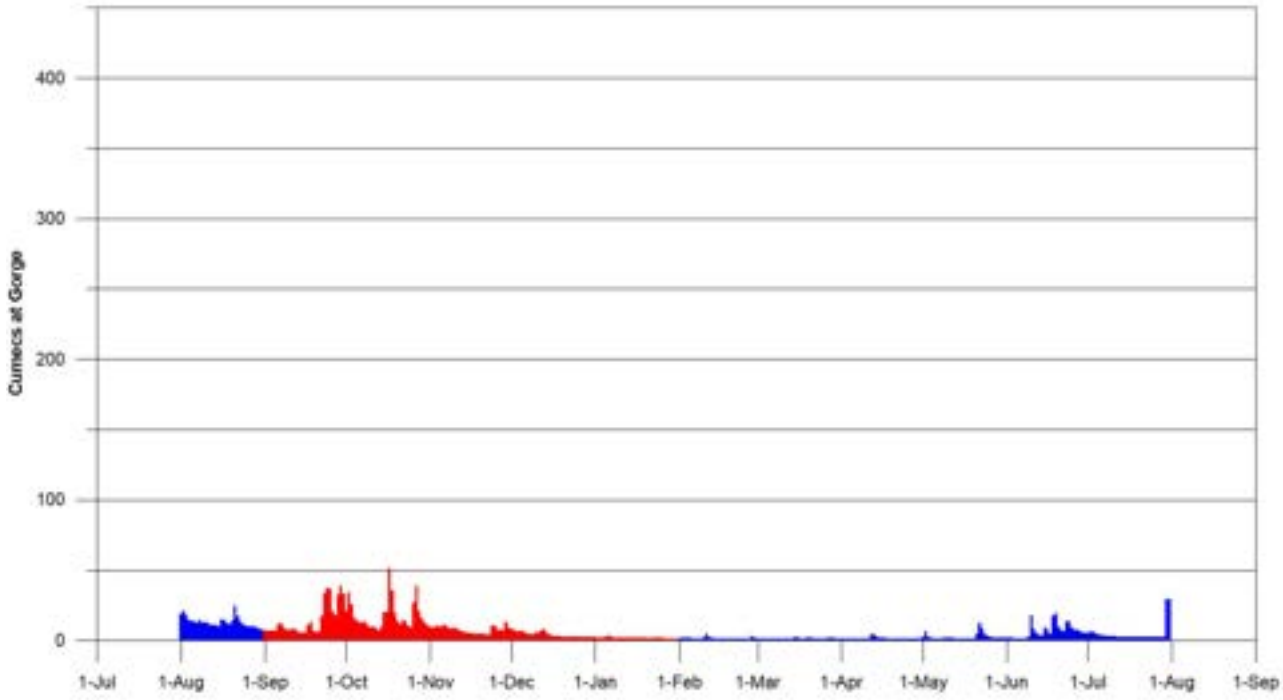


Figure 49. Annual maximum daily flow at gorge, 2023 – 2024, red shows nesting season

Figure 50 shows flow for the same period last year. Obviously 2023 – 2024 was a year of very low flow – with no events during the nesting season sufficient to significantly disturb nesting. An no events capable of changing braid layout or clearing weeds.

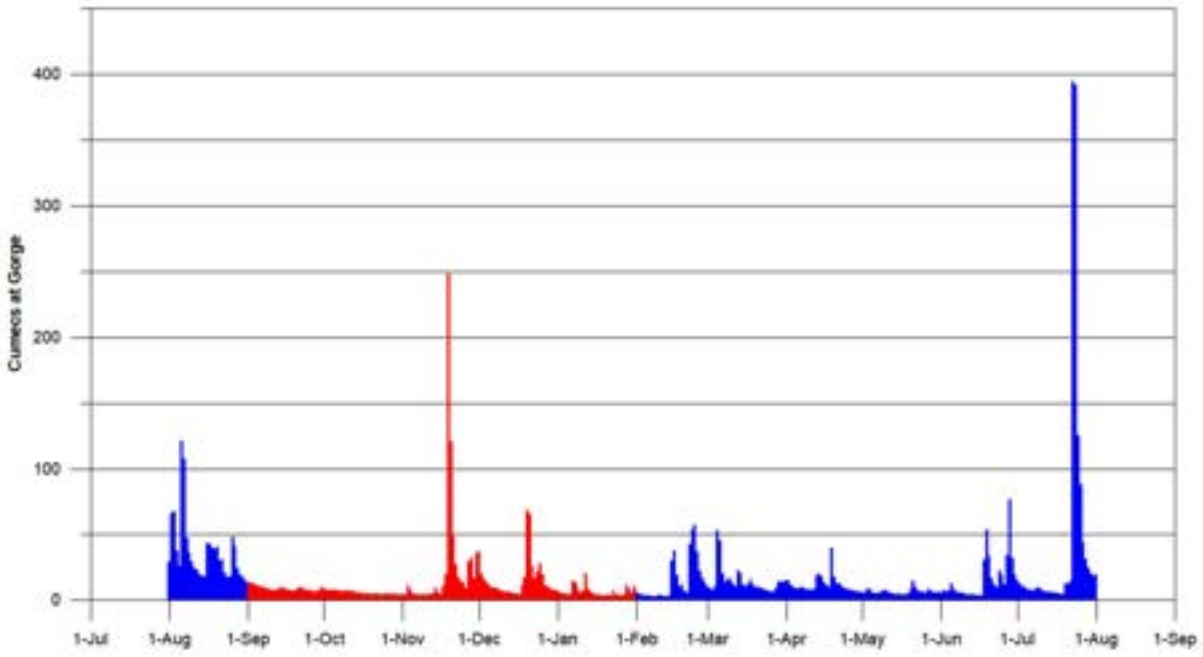


Figure 50. Maximum daily flow at gorge, red shows nesting season

When flow at the gorge is less than 1.65 cumecs, the river is typically dry at Rangiora (Farrow, 2016). Figure 51 shows these low flow events, with only flow less than 1.65 cumecs depicted. Such events happen about every 3 years and are predominantly caused by low rainfall.

The period of low flow this year was perhaps the longest since records began at the gorge – with long periods of <1.65 cumecs from late January to early June. The river was dry from just above the Cones Road bridge to Tulls

(about 6 km) for several months. This must have an impact on fish, aquatic insects etc and thus food supply for the birds.

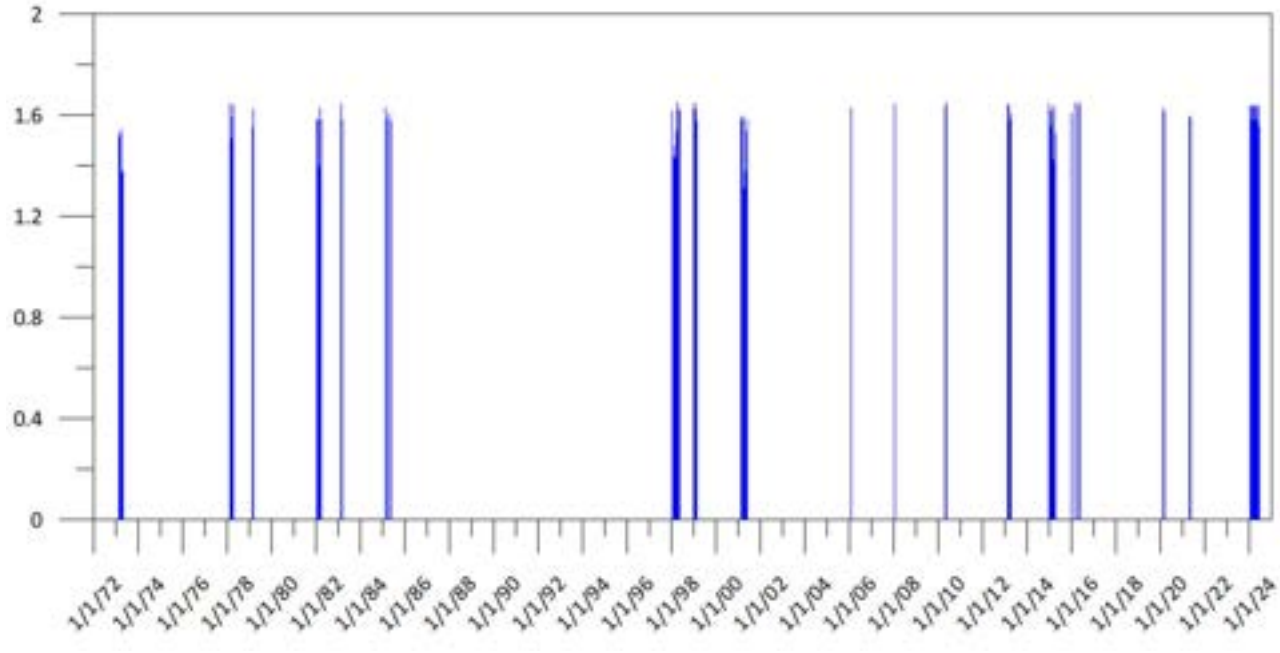


Figure 51. Periods of flow <1.65 cumecs

Fish and Game officers were seen recovering fish from a drying pond just downstream from the railway bridge on 16 January 2024 but brown trout to about 60cm length were found dead along the southern edge of the river nearby.

12. Administration

12.1 Meetings and Membership

This year four general meetings, an Annual General Meeting, and four management committee meetings were held.

Whilst 24 members attended the AGM, attendance at other meetings was slightly down this year with an average of 16 attendees and 10 apologies.

At the August 2023 AGM the existing management committee of seven members plus the Chairperson were re-elected with one member acting as minute secretary. By May 2024 we were grateful when a new treasurer volunteered, and a committee member volunteered for full secretarial duties for the upcoming year.

We invited guest speakers to each meeting hearing about the work of Richard Chambers, Pest Free Waimakariri, Jean Jack, ECan about NZ skink species, Jennifer Schori, ECan on the Tern Island project, and Grant Davey with a pictorial story of the year on our river.

We now have over 200 people on our emailing list who range from interested supporters to those who are actively involved in various aspects of our work.

12.2 Outreach

ARRG acknowledges that Ngai Tuahuriri Tangata tiaki kaitiaki rōpū hold the mana over Te Rakahuri hapu and have held a relationship with this awa and taio over the generations.

This year our group held korero with Makarini Rupene, Environment Canterbury Pou Mātai Kō in this takiwā. He shared our concerns about mahinga kai in the Rakahuri, the protection of endangered nesting birds, the threats of

predators and humans, and the ongoing health of our braided river. Makarini joined our concern that if measures are not taken against disturbances to the estuary and river birds that they will disappear.

Partnering with the Waimakariri District Council's Down the Back Paddock rural safety programme delivered to local primary schools, we educate the children on the importance of protecting our local rivers and wildlife in perpetuity. We have also accompanied two schools on field trips to the river.

We continue to liaise with the Ashley Rakahuri School instigating trapping, bird conservation, and river protection, a visit by a rat detection dog contractor, and helping students with community hours for their William Pike Challenge.

The group has partnered with the Waimakariri Youth Council and run a River Cleanup Day for public participation on the river berms. The day was well attended and resulted in many trailer-loads of rubbish being collected.

Members with our display table have attended three Waimakariri District Council run Volunteer Expos from where we gained ten new members. We have thus acquired new trappers, and participants at volunteer days and meetings.

The promotional table also attracted a lot of interest at the Rangiora A&P Show in October.

Despite promoting the Black Fronted Tern in the Forest & Bird competition for Bird of the Century our chosen bird did not gain a large number of votes.

A reference library has been established of printed and bound copies of annual reports, and other relevant reports and publications that are available for loan.

Letters were sent to MPs and the PM expressing our group's concern about the proposed 6.5% funding cut to DOC. This resulted in an invitation to meet our local MP that gave us an opportunity to update him on our group's mission and work.

Members have organised the scanning of the Te Papa Tongarewa held taxidermy wrybill, banded dotterel, and black billed gull. These scans were then 3D printed in resin and painted. These life size products are valuable additions to our promotional material to show the size relationship with our set of taxidermy predators.

The group began work on changes necessary to comply with the Incorporated Societies Act 2022 by looking at a new constitution for the group, and the requirements to re-register as an incorporated society.

12.3 Finance

The year began with a bank balance of $34,114. During the year we were grateful to receive $14,594 from ECan that has been spent on specific river projects to which we contributed $6,794 from our own funds.

We were delighted to receive a $20,000 donation from the Annie Currie Legacy Fund that is specified to be spent on something tangible to benefit members. From discussions of ideas on how best to use the funds, it was decided to explore the possibility of constructing a bird viewing platform at the Ashley Estuary where bird talk and viewing days could be held with the public.

Funding of $9,000 was gratefully received from the ECan Waimakariri Zone Committee for the 2023/24 Estuary project. We are also grateful for award-winning Karikaas Natural Dairy Products continued sponsorship of ARRG through sales of the Braided River Series of cheeses, and by promoting ARRG on their website https://www.karikaas.co.nz/shop/Karikaas+Cheese/Braid+Series.html

During the season we spent $3,474 for more monitoring trail cameras as these have a limited life span. We also spent $1,800 on a training collar for the rat detector dog that will be used as a tool to assist the Group's predator control, and the drone was repaired for $460.

Thus, over the year we spent $12,452 of our accumulated funds. Therefore, from our closing bank balance of $41,662, with $20,000 Annie Currie dedicated funds, we now have an accumulated fund reserve of $21,662.

The annual accounts have been checked by Community Capacity Accounting, Christchurch as being compliant with the Charities Act format, and that transactions have been accounted for correctly. Full accounts for the group are available online at https://register.charities.govt.nz by searching for Charity CC28335.

A group of twelve volunteer trap makers made 181 DOC200s and DOC150s during the year, of which 167 were sold. This was a marked decline in sales from 290 sold the previous year. With an increase in the price of trap mechanisms and other materials we increased all our DOC200 trap sale price to $90 and advertised this on the ARRG website

During the year the issue was raised that it is time to look for professional help to address the increasing workloads for a limited number of volunteers. This approach is being used by other established volunteer groups similar to our own. We explored how these groups employ professionals, then set up a sub-committee to discuss ARRG's long-term viability and to investigate possible funding and methods to engage a resource for field work. The sub-committee has tabled appointment options, written a draft contract for services, and researched suitable funders.

The suggestion of changing to a trust status was considered to avoid wide ranging potential liability risks for members. However, at this stage the group is choosing to re-register as an incorporated society.

12.4 Administration and Financial Conclusion and Recommendations

- Trap sales have declined with profits reduced by $5,000 compared to the previous year, so that is no longer a reliable income source.
- With our accumulated funds now at $21,662 this is not a large amount for the coming year's working funds. Therefore, ongoing funding for specific projects will be required.
- While it was heartening this year to have members fill the treasurer and secretary roles, there are still positions that require volunteers to take active roles such as supervising trappers, and promotional work. It would be heartening if from amongst our large membership, volunteers would come forward to help with these roles.
- Failing to find volunteers has necessitated the task of beginning funding applications for paid contracted entities or personnel to fill some ongoing work. This will entail seeking ongoing funding sources in an economic climate of reduced available funding.

12.5 Media Report

ARRG has a healthy relationship with the local newspaper, the North Canterbury News, and the wider circulation newspaper The Press, Stuff news and RNZ. All are receptive to reporting our news.

We have an active Facebook page which has 1746 followers with 58.8 per cent women and 41.2 per cent men. Notably there are only 1.2 percent in the 18 to 24 age bracket. Our main audience is from 34 years upwards.

The page showcases the birds through the superior photographs and reports from Operations Manager Grant Davey. Nesting season photographs of chicks are extremely popular. The site is also excellent for announcing events, such as weed clearing, rubbish clean up, the annual bird count and as an alert to problems. Significant events and stories are also placed on our website.

Local radio, CompassFM Rangiora, has long been a strong supporter of ARRG and we share what is happening on the river just after 9am on the first Friday every month.
We also feature on occasions in news from the Department of Conservation and Environment Canterbury.

News coverage has included:
June 2024: "Dumped carcasses causing rat numbers to explode" – NC News, RadioNZ.
May 2024: submission to the Northern Pegasus Bylaw Review, reported in the North Canterbury News and by Radio NZ. "Controversial estuary dog ban".
April 2024: "Evie sniffs out the river rats" got front page in the NC News.

December 2023: we were in the news for several days before and after the Crate Day drive on the river. NC News had a reporter on the spot that weekend, the Press and Stuff ran reports and we were on RadioNZ and Newshub.
September 2023: we received coverage as we campaigned for the tarapiroe (black-capped tern) in the Bird of the Century competition. “Plucky little North Canterbury battler to take centre stage” September 2023, in the North Canterbury News. We were interviewed at length on Radio NZ’s afternoon programme.
August 2023: “Bail and Katie sniff out rats”, was covered in the NC News.
Facebook: we generally get anything from 100 to 300 people engaging with our posts (Facebook says this is clicking on the post, sharing, commenting) however the Crate Day aftermath video with the words “What happened on Crate Day” registered engagement of 7675.
Many thanks to former trapper and keen supporter Sarah Lodge who assisted with posts on the Facebook page.

13. Recommendations

- Continue working with ECan on the management of the river and development of their long-term Braided River Revival plan.
- Develop with ECan an extended and improved predator control programme. Further use of poison is probably necessary.
- Take the fight to the Norway rats. Their nesting colonies must be found and dealt with. Untargeted trapping and poisoning is not likely to work – our tapping must be more targeted.
- Advocate more strongly with ECan on the bird habitat issues of the Ashley. Develop closer ties with groups such as Forest and Bird and BRaid to enhance this advocacy.
- Develop closer ties with other organizations, such as Iwi, DOC and other volunteer groups that work with braided river birds in order to improve the quality of our efforts.
- Enhance our focus on the fairway of the river and recruit more people to help with this. We need to better understand the nesting environment and the predation threats. We need more people involved in predator control and nest monitoring on the river during the season.
- Continue with the annual bird survey and, at least on a biannual basis, extend this up to the Ashley gorge.
- Continue and expand our involvement with research projects on the Ashley. Currently planned are a continuation of the insect study, an MSc study on nesting around the Ashley, involvement in radio tracking of BFT, and perhaps a thesis study on Norway rats.
- Continue with public education efforts including school visits, radio talks, newspaper articles, and Facebook and website posts.
- The group currently has adequate funding. It is more important to find ways to productively spend the funds than to find more.

14. Acknowledgements

We are particularly grateful for major past financial support from national agencies such as:
World Wildlife’s Habitat and Protection Fund
Pacific Development and Conservation Trust
New Zealand National Parks and Development Foundation
Lottery Environment and Heritage Committee of the New Zealand Lottery Grants Board

Acknowledgment for significant more recent funding is owed to the Department of Conservation, ECan and its Waimakariri Zone Committee’s Immediate Steps fund, the Waimakariri District Council, the Rata Foundation, Sargood Bequest, the Rangiora Lions Club, plus our first ‘sponsor’, Karikaas Dairy Products Ltd.

The Group is most grateful for a number of smaller donations received from a range of sources.

The Group works closely with ECan and its the Ashley-Rakahuri Regional Park staff, whose aspirations for the birds on the river mirror those of the Group.

The Group also thanks its members and their friends and families for help with bird monitoring, participation in the spring survey, advocacy, and attendance at meetings. Particular acknowledgement must go to the small band of trap-makers, and the trappers who maintain many traps over the full year.

The activities recorded in this report would not have been possible without the above support.

Appendix 1 – Survey Reach Boundaries

Ashley – Okuku to Estuary

Kilometre	East	North
0	1556736	5209752
1	1557309	5208936
2	1558164	5208422
3	1559122	5208143
4	1560025	5207718
5	1561007	5207533
6	1562006	5207536
7	1563006	5207573
8	1564004	5207537
9	1565000	5207627
10	1565980	5207817
11	1566980	5207822
12	1567979	5207780
13	1568970	5207717
14	1569947	5207931
15	1570920	5208162
16	1571876	5208441
17	1572874	5208487
18	1573871	5208409
19	1574866	5208314
20	1575862	5208240
21	1576863	5208318

Appendix 2 – Annual Count Data, 2000 to 2023

Year	BD	BFT	SIPO	PS	Wrybill	BBG	SBBG	BF Dott	Black shag	Little shag	Black stilt	SW plover	Casp Tern	WF tern	Duck	P. Duck	C Goose	WF Heron	Harrier
2000	199	74	25	229	17	314	26		18	3	0	18	0	0					
2001	130	44	22	82	7	3	0		3	6	0	0	0	0					
2002	115	165	19	70	6	5	11		0	0	0	16	0	0					
2003	169	102	22	138	16	0	10		8	4	0	13	4	0					
2004	213	28	37	140	9	10	27		7	7	2	27	0	0					
2005	245	26	22	137	7	1	3		2	6	1	149	0	0					
2006	84	180	5	68	5	213	5		2	2	1	37	1	0					
2007	237	89	26	164	9	13	12		10	4	1	116	0	0					
2008	198	81	27	131	8	16	10		9	0	1	11	0	0					
2009	233	124	32	196	13	2	19		6	17	1	39	0	0					
2010	260	192	20	233	18	41	19		2	6	0	15	0	8					
2011	250	190	35	194	15	425	2		5	13	0	89	0	77					
2012	248	200	38	209	17	202	11		6	11	0	55	0	6					
2013	301	156	23	247	19	364	17		3	19	0	65	1	2					
2014	263	263	32	230	21	23	7		4	5	0	37	0	0					
2015	276	128	24	217	19	13	13		1	6	0	9	0	0					
2016	222	128	14	95	13	9	4		5	8	0	6	0	0					
2017	167	150	14	148	9	361	1		2	3	0	32	5	0					
2018	136	172	50	83	20	16	15		5	8	0	17	0	0	17	52	0	5	2
2019	323	296	77	281	27	4097	11	1	8	17	0	98	1	4	31	54	5	8	6
2020	133	65	27	141	10	1826	14	7	4	10	0	21	0	0	29	34	0	5	24
2021	252	192	18	199	28	7	11	5	0	14	0	12	0	0	61	173	0	5	3
2022	233	214	33	146	49	179	13	4	0	16	0	204	0	0	3	48	0	13	0
2023	349	156	55	155	45	17	7	4	3	25	0	77	0	2	34	151	2	10	7

Appendix 3 – 2023 data by kilometre

Km	BD	Wrybill	BFT	SIPO	PS	BBG	SBBG	BF Dott	Blk Shag	Little Shag	SW Plover	Duck	P. Duck	Canada Goose	WF Heron	Harrier
1	17	0	19	5	2	0	0	0	1	0	5	5	9	0	0	5
2	27	2	0	0	0	0	0	0	1	0	0	0	2	0	0	0
3	20	2	2	2	8	0	0	0	0	0	1	2	7	0	0	0
4	25	6	3	9	6	0	2	0	0	0	0	0	4	0	4	0
5	11	0	0	1	4	0	0	0	0	0	1	3	5	0	2	0
6	25	4	2	11	13	0	0	0	0	0	2	0	15	0	0	0
7	39	6	21	7	1	0	0	0	0	0	25	8	6	2	1	0
8	16	2	1	3	6	0	0	0	0	0	0	0	2	0	0	0
9	15	4	2	0	7	0	0	0	0	0	0	0	0	0	0	0
10	22	3	1	2	15	0	3	0	0	0	40	2	11	0	0	0
11	17	3	1	2	9	0	2	0	0	0	2	3	6	0	2	0
12	15	2	26	3	24	15	0	0	1	1	0	0	10	0	0	0
13	23	7	4	2	18	0	0	0	0	2	0	2	27	0	1	0
14	21	0	4	3	8	0	0	2	0	2	0	4	13	0	0	0
15	19	4	2	2	0	0	0	0	0	1	0	4	2	0	0	1
16	11	0	2	1	0	0	0	0	0	6	0	1	8	0	0	0
17	13	0	10	0	9	0	0	0	0	2	0	0	16	0	0	1
18	12	0	54	0	8	2	0	0	0	4	1	0	6	0	0	0
19	1	0	2	2	17	0	0	2	0	7	0	0	2	0	0	0
Total	349	45	156	55	155	17	7	4	3	25	77	34	151	2	10	7

20	3	0	3	2	2	1	1	2	0	2	3	2	1	0	1	0
21	14	1	3	0	11	1	1	1	0	10	0	2	2	0	0	0
Total	17	1	6	2	13	2	2	3	0	12	3	4	3	0	1	0

Appendix 4. Predators caught since 2004 – river traps

Period	H Hogs	Cats	Stoats	Wsls	Frts	Rats	S Rats	N. Rats	Total Rats	Total	Trap Nights	Trap Nos	CPHTN
Aug 04 - Jul 05	46	4	4	6	0	1	0	0	1	61	4,092	42	1.49
Aug 05 - Jul 06	62	8	2	0	0	0	0	0	0	72	3,834	44	1.88
Aug 06 - Jul 07	45	3	2	1	0	1	0	0	1	52	3,445	54	1.51
Aug 07 - Jul 08	39	4	3	4	0	3	0	0	3	53	3,983	54	1.33
Aug 08 - Jul 09	17	7	5	1	0	0	0	0	0	30	3,980	54	0.75
Aug 09 - Jul 10	17	3	3	2	1	1	0	0	1	27	3,981	42	0.68
Aug 10 - Jul 11	23	3	4	2	0	0	0	0	0	32	3,732	44	0.86
Aug 11 - Jul 12	34	2	1	1	1	0	0	0	0	39	5,048	54	0.77
Aug 12 - Jul 13	36	2	3	3	1	5	0	0	5	50	6,373	59	0.78
Aug 13 - Jul 14	29	12	3	4	1	0	0	0	0	49	8,466	48	0.58
Aug 14 - Jul 15	52	14	8	4	2	0	0	0	0	80	12,037	64	0.66
Aug 15 - Jul 16	117	30	8	23	12	0	0	0	0	190	34,595	125	0.55
Aug 16 - Jul 17	110	15	22	21	7	13	0	0	13	188	38,843	149	0.48
Aug 17 - Jul 18	110	34	21	42	7	49	0	0	49	263	52,409	182	0.5
Aug 18 - Jul 19	119	35	31	80	15	146	0	0	146	426	72,116	197	0.59
Aug 19 - Jul 20	162	42	25	70	7	29	77	77	183	489	90,517	248	0.54
Aug 20 - Jul 21	190	45	25	35	3	13	82	49	144	441	86,535	237	0.51
Aug 21 - Jul 22	100	40	35	72	5	27	164	69	260	512	88,654	243	0.58
Aug 22 - Jul 23	159	33	33	88	7	54	385	83	522	842	110,116	302	0.76
Aug 23 - Jul 24	189	44	13	90	0	50	333	128	511	847	103,028	282	0.82
Total	**1656**	**380**	**251**	**549**	**69**	**392**	**1041**	**406**	**1839**	**4743**	**735,784**		

Note: rat species wasn't identified until August 2019.

Appendix 5. Predators caught since 2018 – estuary traps

Period	H. Hogs	Cats	Stoats	Wsls	Frts	Rats	S. Rats	N. Rats	Total	Trap Nights	Trap Nos.	CPHTN
Aug 18 - Jul 19	8	13	27	74	5	156	0	0	283	45,141	109	0.63
Aug 19 - Jul 20	17	17	44	51	3	8	84	58	282	49,654	135	0.54
Aug 20 - Jul 21	22	6	36	37	0	7	59	35	202	46,843	128	0.43
Aug 21 - Ju1 22	16	4	17	12	0	18	71	33	171	45,346	124	0.38
Aug 22 - Jul 23	14	1	19	21	0	36	65	31	187	45,159	124	0.41
Aug 23 - Jul 24	22	5	15	19	1	22	131	65	280	46,557	128	0.6
	99	**46**	**158**	**214**	**9**	**247**	**410**	**222**	**1405**	**278,700**		

Appendix 5. Shorebird Nest Success and the Effects of Disturbance on Estuarine Birds

Eleanor Gunby (University of Canterbury) Supervised by Professor Jim Briskie and Dr Sara Kross

Thesis Objective:

The objective of my thesis was to determine the key factors affecting the nest success, distributions, and behaviour of birds at the Ashley-Rakahuri Saltwater Creek River Estuary, New Zealand.

Nest Success:

I monitored the nests of five shorebird species across two breeding seasons between 2022-2024. I made regular visits to nests to determine whether a nest successfully hatched or failed. If it failed, I attempted to assess the cause of failure. To account for the fact that not all nests were found just after laying, I estimated daily survival rates (DSRs) and then used these values to calculate overall percent nest success. Overall, black-backed gulls were the most successful and black-fronted terns the least successful (Table 1). Causes of failure differed among species, but predation (Figure 1) and flooding were the most common.

Figure 1 – Trail camera images showing a cat in the process of, and directly after, predating a banded dotterel nest at the Ashley Estuary in October 2023

Table 1 – The likelihood of shorebird nests at the Ashley Estuary surviving to hatch and the causes of failure, with the number of nests failing due to a specific cause shown in brackets. The DSR (daily survival rate) (+/- SE) gives the probability that a nest will survive one day. The overall chance (in percent) of a nest surviving from laying to hatching a chick is also shown (including the SE range in brackets). For species where the average hatching date spans multiple days, the likelihood of hatching is shown as a range between the shortest and longest average incubation periods.

Species	N	DSR +/- SE	Chance of hatching (%), with SE range in brackets	Causes of failure
Banded dotterel	17	0.981 +/- 0.009	57.73 - 61.23 (45.10 - 76.18)	Predation (3), desertion (2)
Black-backed gull	156	0.993 +/- 0.002	83.96 – 85.67 (80.47 – 88.94)	Flooding (9), predation (3), desertion (2)
Black-fronted tern	5	0.958 +/- 0.024	34.34 (18.31 – 63.40)	Flooding (2), desertion (1)
Pied stilt	12	0.969 +/- 0.014	45.94 (32.32 - 64.99)	Predation (5)
Variable oystercatcher	11	0.989 +/- 0.008	72.85 (58.17 – 91.07)	Predation (1), burial (1)

I also monitored the colonies of black-billed gulls and white-fronted terns. In 2022/23, black-billed gulls deserted one colony of 50 nests before establishing a second colony with 373 nests, which produced at least 367 fledglings. An additional small colony of 34 nests failed for unknown reasons. Two red-billed gull pairs also nested in the black-billed gull colony and successfully hatched chicks. A white-fronted tern colony of approximately 950 birds failed (cause undetermined), but a sole white-fronted tern pair nesting near the black-billed gull colony successfully fledged one chick. In 2023/24, black-billed gulls failed to nest successfully, with a colony of 120 nests being abandoned, while white-fronted terns did not attempt to establish a colony.

Nest Microhabitats:

I evaluated the effect of habitat variables on banded dotterel and black-backed gull nest success. I measured features such as distance to the nearest patch of water, the percentage cover of different substrate types, and the distance to neighbouring nests. Black-backed gull Eleanor Gunby | Key Findings from MSc Research nest outcomes were not affected by variation in any of the measured habitat features, but earlier nests may have been more successful. Banded dotterel nests appeared more successful in the 2022/23 breeding season, mainly due to increased cat predation in 2023/24 (Figure 1). Successful banded dotterel nests were closer to water on average than failed nests, suggesting proximity to water provides some protection.

Effects of Disturbance on Bird Behaviour and Distributions:

I used scan sampling to study the distribution and behaviour of estuarine birds in response to disturbance by humans and by a native avian predator, the Australasian harrier. As the estuary area is popular with walkers, understanding the responses of estuarine birds to people is important for determining whether such disturbance may be negatively affecting the birds. Across 19 two-hour sampling occasions, 86.4% of disturbance was caused by humans and 13.6% was caused by harriers. I observed pedestrians 46 times, harriers nine times, walkers with dogs seven times (three times with leashed dogs and four times with off-leash dogs), dirt bikers twice, and paddleboarders and joggers once each. In total, 91% of disturbance events occurred only along the eastern spit, and a further 4% affected the spit alongside other areas. Human disturbance was more common during the weekend (an average of 2.77 human disturbances per hour) than weekdays (an average of 0.82 human disturbances per hour).

In response to human disturbance, waterfowl as well as all bird species combined (referred to as 'pooled' birds) decreased in the disturbed areas but began to return to their original location within 10 minutes after disturbance. Shorebirds were always more common in the undisturbed area, irrespective of the stage of human disturbance. Following harrier disturbance, pooled birds and waterfowl were less abundant in the western area of the estuary, while shorebird numbers increased overall regardless of the area, possibly due to increased flocking behaviour. In addition to their distributions, the types of behaviours exhibited by the birds may also have been affected by human disturbance. For example, the proportion of birds that were observed sleeping and preening in sectors bordering the disturbed area decreased during disturbance. Overall, these results indicate that both human and harrier disturbance can affect the distribution and behaviour of birds in estuarine environments. However, given that most of the disturbance was caused by people, it appears that human disturbance may pose a greater threat to birds at the Ashley Estuary.

Flight Initiation Distances (FIDs) and Landing Distances:

While an animal typically flees when approached by a potential predator, the distance at which it initiates this response can vary between species (Glover et al., 2011; Koch & Paton, 2014; Laursen et al., 2005; Mayer et al., 2019). The distance at which a bird begins to flee from a stimulus such as a person is referred to as the flight initiation distance (FID) and can be used to indicate how prone a species is to human disturbance (Blumstein, 2003; Glover et al., 2011). For example, species with high FIDs are considered more sensitive to disturbance and are more likely to be negative affected by frequent disturbance (Weston et al., 2012). The landing distance refers to the distance that a bird flees as a result of disturbance (e.g., how far it flies or walks) (Fernández-Juricic et al., 2004).

Given the high rates of disturbance by walkers that I observed on some days, I measured the flight initiation distances (FIDs) and landing distances of estuarine birds in response to approaches by a single pedestrian. As expected, I found there were interspecific differences in FIDs, landing distances, and the method of fleeing used (Figure 2). Both FIDs and landing distances were highest for bar-tailed godwits and lowest for wrybills (Figure 2). Birds with longer FIDs generally also had longer landing distances, and both metrics were typically longer in individuals that fled by flying, rather than walking. Based on the FIDs I measured, banded dotterels would require 66 m setback distances to minimise the effects of pedestrian disturbance, while pied stilts would require 97 m setback distances. Therefore, an overall buffer of 100 m may be required to minimise the effects of disturbance by a single pedestrian on shorebirds in estuaries.

Table 2 – Results of pedestrian approaches to nine shorebird and waterfowl species at the Ashley Estuary. The sample size (N), FID, landing distance, and FID method (flying, walking, or swimming) is given for each species, with the range of FIDs and landing distances measured in brackets. Where N >1, the standard error (SE) for FIDs and landing distances is given.

Species	N	FID (m) +/- SE	Landing Distance (m) +/-SE	Method of FID
Banded dotterel (*Charadrius bicinctus*)	11	14.73 +/- 1.48 (5 - 26)	10.45 +/- 6 (1 - 70)	Nine walked, two flew
Bar-tailed godwit (*Limosa lapponica*)	2	44 +/- 10 (34 - 54)	80 +/- 20 (60 - 100)	Flew
Black-billed gull (*Chroicocephalus bullerí*)	3	19 +/- 5.69 (11 - 30)	5.33 +/- 2.96 (1 - 11)	One flew, one swam, one walked
Mallard (*Anas platyrhynchos*)	1	16	20	Walked/swam
Paradise shelduck (*Tadorna variegata*)	2	28.5 +/- 7.5 (21 - 36)	3.5 +/- 2.5 (1 - 6)	One swam, one walked
Pied stilt (*Himantopus leucocephalus*)	10	35.4 +/- 3.15 (17 - 42)	43.6 +/- 9.56 (7 - 100)	Nine flew, one walked
Variable oystercatcher (*Haematopus unicolor*)	6	27 +/- 3.92 (11 - 39)	2.75 +/- 1.64 (1 - 11)	Walked
White-faced heron (*Egretta novaehollandiae*)	1	26	6	Walked
Wrybill (*Anarhynchus frontalis*)	4	6.75 +/- 1.55 (4 - 11)	1.5 +/- 0.5 (1 - 3)	Walked

Management Implications:

Cats were a particular threat to banded dotterels, predating two nests and visiting a third nest twice before it was deserted. While some live trapping currently occurs at the Ashley Estuary, there may be ethical concerns with increasing trapping since domestic cats are present in the area. Given I recorded all instances of cats visiting nests at night, a targeted effort to encourage local cat owners to keep their pets indoors overnight might help.

Nests were flooded either directly by rain, or because of increased Ashley River flows. While flooding may be difficult to protect against, ensuring there is sufficient high-quality nesting habitat at higher elevations (e.g., by clearing vegetation and ensuring vehicles do not drive through raised gravel/sand areas) may encourage birds to nest in areas less prone to flooding. This approach would need to be designed and tested for specific species.

Bird distributions on the eastern spit could potentially be affected by human disturbance for ≥ 30 minutes out of every hour on weekends, depending on when disturbance occurs. This could affect the rates of energy intake and energy expenditure as birds in the disturbed areas would have less time to forage and expend more energy fleeing from disturbance. Disturbance would also likely vary with the season as human activity would be expected to be higher in summer compared to autumn/winter. My observations were mostly conducted in the autumn/winter, and further work would be needed to determine how disturbance varies seasonally. In some instances, disturbance included dogs, despite them being prohibited from the Ashley Estuary under the Northern Pegasus Bay Bylaw 2016 (Waimakariri District Council, 2016). Increasing the prominence of signage at the estuary and having staff periodically present at high-disturbance times (e.g., weekends) may help to reduce dog disturbance.

Managing the effects of human disturbance is a complicated issue, since estuaries are important habitats for birds but are also popular areas for human recreation. While my research suggests that a 100 m buffer between pedestrians and estuarine birds may reduce the negative effects on birds, implementing this at the Ashley Estuary would be difficult. Because sand dunes border the estuary to the east, people walking in this area may be unable to stay 100 m away from birds. However, setback distances could still be used to provide guidance. People could also be encouraged to walk along the beach instead of the estuary, but this may be ineffective as it is likely some people enjoy walking along the estuary specifically (e.g., because of its aesthetic values or for birdwatching).

One possibility is that a walkway leading to a bird hide could be developed along the east of the estuary (e.g., through the dunes) or to the southwest to the estuary around Kings Ave. This could reduce disturbance to the birds by keeping people largely hidden but still allow people to enjoy the estuary. However, this would need to be explored in detail to determine its plausibility and the wider environmental effects (e.g., on the dune system).

Appendix 6. ARRG office bearers and management structure

Chair:	Sue Mardon (suemardon02@gmail.com)
Secretary	Robert Clark (robertclark98@hotmail.com)
Treasurer:	Sue Mardon (suemardon02@gmail.com)

Management Teams

Operations Team Leader:	Grant Davey (grdavey@yahoo.com)
Administration Team Leader:	Sue Mardon (suemardon02@gmail.com)

The Management Committee has the capacity to make decision and approve small funding values requiring immediate attention for approval at the following General Meeting.

Members elected at the AGM were Chair, Treasurer, Secretary, Bev Alexander, Grant Davey, Judith Hughey, Bob Gumbrell, Nick Ledgard, Mike and Helen Hamblin.

15. References

AECOM New Zealand Limited, 2019. Ashley River/Rakahuri Geomorphic Study. Report for Canterbury Regional Council

BirdLife International 2014. http://www.birdlife.org/datazone/species/search#

Brockie, B. 2018. https://www.stuff.co.nz/science/106328297/bob-brockie-everything-you-need-to-know-about-hedgehogs

Cromarty, P. & Scott, D.A. 1996. *A Directory of Wetlands in New Zealand*. Department of Conservation, Wellington.

Davis, M.M. 1964. Field study week-end, Canterbury 25th-28th October 1963. *Notornis 11*: 61–62.

Dowding, J.E.; Ledgard, N.J. 2005. Management and monitoring of shorebirds in the Ashley River during the 2004/05 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 20 pp.

Dowding, J.E.; Ledgard, N.J. 2006. Management and monitoring of shorebirds in the Ashley River during the 2005/06 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 20 pp.

Dowding, J.E.; Ledgard, N.J. 2007. Management and monitoring of shorebirds in the Ashley River during the 2006/07 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 22 pp

Dowding, J.E.; Ledgard, N.J. 2008. Management and monitoring of shorebirds in the Ashley River during the 2007/08 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 23 pp

Dowding, J.E.; Ledgard, N.J. 2009. Management and monitoring of shorebirds in the Ashley River during the 2008/09 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 21 pp

Dowding, J.E.; Ledgard, N.J. 2010. Management and monitoring of shorebirds in the Ashley River during the 2009/10 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 20 pp

Gaskin, Chris. 2014. New Zealand Seabirds. International Bird Association. Produced (and available from) for Royal Forest and Bird Society of New Zealand, PO Box 631, Wellington, New Zealand. 69 pp

Farrow, 2016. Ashley-Waimakariri: Major Rivers Characterisation. Aqualinc report for Environment Canterbury.

Hawkes Bay Today, 2024. Cyclone Gabrielle: Hawkes Bay Regional Council report finds weather event impact caused decline in bird species. https://www.nzherald.co.nz/hawkes-bay-today/news/cyclone-gabrielle-hawkes-bay-regional-council-report-finds-weather-event-impact-caused-decline-of-bird-species/G3NX3LY6GBBRLPIV5BO4DZRCHA/

Holly A. L. Harris, Dave Kelly, John Innes , Robert B. Allen, 2022. Invasive species and thermal squeeze: distribution of two invasive predators and drivers of ship rat (Rattus rattus) invasion in mid-elevation Fuscospora forest. Biological Invasions. https://doi.org/10.1007/s10530-022-02789-4

Kearvell, J.C., 2011. Causes of breeding failure in banded dotterel (Charadrius bicintus) breeding of Ashley Spit, North Canterbury, New Zealand. Notornis, 2011, Vol. 58: 43-45.

King, C.M., 2019 Invasive Predators in New Zealand Disaster on Four Small Paws. Otago University Press.

Ledgard, N.J., 2015. Management and monitoring of shorebirds in the Ashley River during the 2014/15 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 32 pp

Ledgard, N.J., 2016. Management and monitoring of shorebirds in the Ashley River during the 2015/16 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 35 pp

Ledgard, N.J., 2017. Management and monitoring of shorebirds in the Ashley River during the 2016/17 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 38 pp

Ledgard, N.J., 2018. Ripping to control weeds on the Ashley-Rakahuri river – a pilot trial. Unpublished report for Department of Conservation, August 2018. 5pp

Ledgard, N.J.; Dowding, J.E. 2011. Management and monitoring of shorebirds in the Ashley River during the 2010/11 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 18 pp

Ledgard, N.J.; Spurr, E.B.; Crossland, A.C. 2012. Management and monitoring of shorebirds in the Ashley River during the 2011/12 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 28 pp

Ledgard, N.J.; Mugan, N.C. 2013. Management and monitoring of shorebirds in the Ashley River during the 2012/13 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 27 pp

Ledgard, N.J.; Dowding, J.E. 2014. Management and monitoring of shorebirds in the Ashley River during the 2013/14 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 33 pp

Ledgard, N.J.; Davey, G.R. 2018. Management and monitoring of shorebirds in the Ashley River during the 2017/18 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 48 pp

Ledgard, N.J.; Davey, G.R. 2019. Management and monitoring of shorebirds in the Ashley River during the 2018/19 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 46 pp

Ledgard, N.J.; Davey, G.R. 2020. Management and monitoring of shorebirds in the Ashley River during the 2019/20 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 45 pp

Ledgard, N.J.; Davey, G.R. 2021. Management and monitoring of shorebirds in the Ashley River during the 2020/2021 season. Unpublished report, Ashley/Rakahuri Rivercare Group. 56 pp

Ledgard, N.J; Davey, G.R. 2018. Weed clearance on the Ashley-Rakahuri river; 2016 and 2017. Unpublished report supplied to ECan, May, 2017. 6 pp

Dowding, J.E.; Moore, S.J. 2006. Habitat networks of indigenous shorebirds in New Zealand. *Science for Conservation 261*. Department of Conservation, Wellington.

Hughey, K.; O'Donnell, C.; Schmeckel, F.; Grant, A. 2010. Native Birdlife: Application of the river significance assessment method to the Canterbury region. Chapter 10 in Hughey, K.F.D.; Baker, M-A. 2010. The River Values assessment System: Volume 2: Application to cultural, production and environmental values. Land Environment and People Research Report No 24. Lincoln University, Canterbury, New Zealand.

McClellan, R.K. 2009. The ecology and management of Southland's black-billed gulls. Unpublished PhD thesis, university of Otago, Dunedin, New Zealand. 264 p.

Mischler, C.P. 2018. Estimating the breeding population of black-billed gulls *Larus bulleri* in New Zealand, and methods for future count surveys. *Notornis* 65(2): 67-83.

Monks, J.M.; O'Donnell, C.F.J.; Spurr, E.B. 2013. Population trends in black-fronted tern (*Chlidonias albostriatus*) on the Ashley River, North Canterbury. *Notornis* 60(2): 171-172.

O'Donnell, C.F.J.; Moore, S.M. 1983. The wildlife and conservation of braided river systems in Canterbury. Fauna Survey Unit Report No. 33. New Zealand Wildlife Service, Department of Internal Affairs, Wellington.

O'Donnell, C.F.J.; Sanders, M.; Woolmore, C.; Maloney, R.F. 2016: Management and research priorities for conserving biodiversity on New Zealand's braided rivers. Department of Conservation, Wellington, New Zealand. 46 p.

Overmars, F.; O'Donnell, C. 1982. Wildlife survey of the upper Ashley River. Unpublished report. New Zealand Wildlife Service, Christchurch.

Riegen, A.C.; Dowding, J.E. 2003. The Wrybill *Anarhynchus frontalis*: a brief review of status, threats and work in progress. *Wader Study Group Bulletin 100*: 20–24.

Robertson, H.A.; Baird, K,; Dowding, J.E.; Elliott, G.P.; Hitchmough, R.A.; Miskelly, C.M.; McArthur, N.; O'Donnell, C.J.F.; Sagar, P.M.; Scofield, R.P.; and Taylor, G.A. 2017. Conservation status of New Zealand birds, 2016. NZ Threat Classification Series 19. Department of Conservation, Wellington. 23 pp.

Spurr, E.B.; Ledgard, N.J. 2016. Population trends of braided river birds on the Ashley River (Rakahuri), Canterbury, New Zealand, 1963-2015. *Notornis* 63(2): 73-86.

Steffens, K.E.; Sanders, M.D.; Gleeson, D.M.; Pullen, K.M.; Stowe, C.J. 2011. Identification of predators at black-fronted tern *Caledonia's albostriatus* nests, using mtDNA analysis and digital video recorders. Available on-line at: http://www.newzealandecology.org.nzje/

Swailes, G.C.; Ledgard, N.J. 2017. Ashley-Rakahuri island creation. Unpublished report supplied to ECan as part of Immediate Steps Fund Grant Agreement with Ashley-Rakahuri Rivercare Group (GRAN/PROG/IMS/434 - Sept 15, 2016). 5pp

Thompson, Courtney. 2015. Waimakariri River Regional Park 2014-2015 black-billed gull breeding season. Environment Canterbury Regional Council internal report: 22pp

Other internal reports are available on the ARRG website.