

Management and monitoring of shorebirds in the Ashley-Rakahuri River during the 2021-22 season



Norway rat taking black-fronted tern chicks

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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 17th 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. This should become the guiding document for future management.

Annual bird count. Braided river bird numbers returned to levels present between 2009 and 2015. However, this was almost certainly due to birds losing their nests in Waimakariri floods. It is uncertain how many of these displaced birds proceeded to nest on the Ashley. Just prior to the November count, bird numbers appeared to be heading toward an historic low, and an underlying downward trend seems apparent. The only obvious local reason for this is a correlation between the Norway rat invasion and the start of the decline. A count was also done for the reach of the river between the Okuku junction and the Ashley gorge. Braided river bird numbers were generally low, with banded dotterel numbers in 2021 being much lower than in the previous survey of 2011 and black-fronted tern numbers were higher.

Nesting season monitoring. Wrybill nest numbers were at an historic high, but fledgling success was lower than usual. Cats are inferred to have taken chicks from at least 3 nests, eggs from one nest were known to be taken by Norway rats. There were many more black-fronted tern colonies than usual, but hatching and fledgling success was very low. From a total of 98 nests, including at 2 colonies at the estuary, 15 fledglings were counted. The number of colonies reflects the amount of re-nesting following Norway rat predation and floods. It is interpreted that there were perhaps only about 50 nesting pairs on the river. Banded dotterel were not monitored sufficiently to determine success. However, despite several nests being run over by 4wds and at least 1 being raided by Norway rats, many chicks and fledglings were seen along the river. Black-billed gulls did not nest on the ARRG section of the river this season. But a large colony at the estuary was quite successful – we did not properly monitor this.

Weeds. The major flood (100 year recurrence interval as measured at the Ashley gorge) of 2021 cleared all but some of the most mature gorse and broom from the fairway – so no weed clearing was necessary before the nesting season. During the 2021 season weeds grew back faster than expected, but did not impact on nesting. In preparation for the 2022 season ECan has sprayed 60 ha of weeds on islands and subsequent floods have helped ensure that there is plenty of good nesting habitat.

Predator control. In the last season predation appears to have outweighed habitat as a problem during the nesting season. Along the river catch rate over time is not declining and there is no reason to believe we are having an impact on predator numbers. Norway rats are currently by far the most important predator. Cats are also interpreted to also be a major threat. Ship rats and weasels are not a threat to the birds on the river. Hedgehogs are only a threat to nests on the edge of the fairway, or on the islands if flow dries up around them.

Most birds nest on islands. Stoats occur in small numbers and evidence from the last few years is that they only predate out on the fairway when BBG colonies are present.

ECan funded a report on predators and trapping on the Ashley. Future plans have not been finalized, but ARRG anticipate that ECan will be funding an extension of our trapping network to be managed by professionals. We plan to address the Norway rat problem by trialing a rat detection dog.

The situation with the estuary trapping programme is different. Catch rate has been declining since trapping began in 2018. The most likely reason for this is that we are actually having an impact on predator numbers. Compared to further up the river, the area of prime predator habitat adjacent to water is much higher and there is an approximately three times greater density of trapping. ARRG do not monitor nesting at the estuary, so we do not know if trapping is helping with nest success. We have arranged a scholarship, with Waimakariri Zone Committee funding, to enable a MSc study on nesting around the estuary.

Human Disturbance. 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. The situation on Crate Day was different, although the Okuku to gorge reach of the river isn't within our normal focus, 150 – 200 vehicles driving through black-fronted tern colonies is not acceptable and we will continue to help with this in the future.

Gravel extraction. Without copious sediment (usually gravel) braided rivers do not exist. Bed levels in the Ashley have been declining since surveying began. After the flood of 2021, ARRG were informed that overall there was less gravel in the river than before. Yet 3 large consents have been granted to take gravel from places where levels had increased. Over time, this can lead to destruction of braiding. In the past the only requirements placed on consent and authorization holders regarding birds were on disturbance. There were no requirements to protect nesting habitat. In the past year ARRG have been consulted on applications, and progress is being made to protect and enhance nesting habitat.

Remote sensing interpretation. Satellite, air, and drone photos are being used to better understand the bird habitat along the Ashley. Among other things this helps us decide what sites should be weeded and protected for nesting.

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.

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).



Ashley-Rakahuri / Saltwater creek estuary (2018).

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), 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 2020/21 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. There doesn't appear to be any planning in place to reduce the current constriction, and indeed more tree planting on the berm is underway.
- 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 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.

Human Disturbance

• This is largely caused by four-wheel drives and motorbikes and at present isn't a major issue – due to blocking of access to the river, education and publicity. Dog walkers and other pedestrians are also a 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. Bird Surveys

Surveying is a crucial part of our management activities – it allows us to some extent to judge the success of our efforts.

Surveying this year consisted of:

- The annual survey, for the 22nd consecutive year. This used to be from the Okuku junction to State Highway One (SH1), but for the last 4 years has included the reach down to the estuary.
- The river from the gorge to the Okuku junction.
- Continuation of a monthly survey that Nick Ledgard has been doing in the Groyne 1 Groyne 2 area.
- Continuation, for a period, of an approximately weekly survey between the Cones Road bridge and SH1.

3.1 Ashley Annual Survey

This year the count was done on 20 November in fine and cool conditions with little wind. Flow was 6.1 cumecs at the gorge and 4 cumecs in the Okuku. Prior to this date flow had been very low for some time. The usual four reaches were surveyed from about 9am with 23 participants – an almost ideal number (Figure 2). 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) – for consistency with previous surveys. Birds were counted per kilometre, as is now standard in Canterbury.

Results

Numbers for the main species of interest (banded dotterel (BD), black-fronted tern (BFT) wrybill, pied oystercatcher (SIPO), and pied stilt (PS) since 2000 are shown on Figure 3 and Figure 4. Numbers of black-billed gulls are not included as they often overwhelm those of other species. Appendix 1 shows coordinates for kilometre reaches. Appendix 2 gives bird counts by kilometre for the Okuku junction to SH1 and SH1 to the estuary. Figure 5, Figure 6, Figure 7 and Figure 8 shows distribution of braided river bird species by kilometre, with that of 2020, 2019 and 2018 for comparison.



Figure 2. Bird surveying



Banded dotterel Black-fronted tern Pied Oystercatcher Pied stilt Wrybill

Figure 3. Braided river bird numbers since 2000



Figure 4. Braided river bird line graph



Figure 5. Braided river birds by kilometre, 2018



Figure 6. Braided river birds by kilometre, 2019



Figure 7. Braided river birds by kilometre, 2020



Figure 8. Braided river birds by kilometre, 2021

General Observations

Braided river bird numbers were much higher than expected. Counts between Cones Road and SH1 (see below), between Groyne 1 and Groyne 2, and spot counts elsewhere in the river prior to 20 November had been showing very low bird numbers. It appears almost certain that the high numbers in the survey were due to birds displaced from the Waimakariri by flooding. This was information about the Waimakariri from ECan a couple of years ago –

In terms of river flows to displace the birds, anything over about 2.2m at the gorge has the potential to disrupt the (protected) birds depending on where they are sitting. However we generally see the most disturbance from events where the river peaks above 2.5m at the gorge.

Figure 9 shows flow (recorded as stage) at the Waimakariri gorge 3 days before the Ashley count was greater than 2.5m.

River stage height (metres)

LAST 7 DAYS	LAST 30 DAYS
Zoom 1d 1w 1m All	From Oct 22, 2021 To Nov 22, 2021
	2.5 River stage height (metres)
24. Oct 26. Oct 28. Oct 30. Oct 1. Nov 3. Nov 5. Nov 7. Nov	9. Nov 11. Nov 13. Nov 15. Nov 17. Nov 19. Nov 21. Nov
25. Oct 1. Nov III	8. Nov 22. Nov

Figure 9. Flow in the Waimakariri during time of Ashley bird survey

It had been planned to repeat at least part of the Ashley count soon after 20 November, but for a few days flow prohibited this, then workload became too high to do it. It is uncertain how many of these displaced birds stayed on in the Ashley.

Some other observations from the 2021 count:

- Numbers of all species (other than BBG) were higher than in 2020, and approximately at the levels reached between 2009 and 2015.
- The main determinant on bird numbers prior to 2017 seemed to be the amount of bare gravel available for nesting. There was no shortage of this in 2021, and prior to the survey it was thought that perhaps the lack of birds was due to poor food recovery after the very large flood of mid-2021. However, this could perhaps be just a continuation of the overall downward trend since 2015.
- The most abundant birds were BD (252), PS (199) and BFT (192). This is very much as per usual Figure 4
- There were 3 hotspots of bird numbers between kilometres 2 and 4 (Groyne 7 to Groyne 8), kilometres 9 and 11 (near Cones Road) and 13 and 15 (Marchmont Smarts). BD, BFT and PS made up the bulk of these numbers.
- Quite high numbers of BFT, PS and BD were counted in kilometre 21 immediately above the estuary. This reflects nesting of these species in this area.

Comments on individual species seen in 2021 survey

Wrybill

This year had the second highest number of wrybill at 28, vs 27 in 2019. Ten were between kilometres 5 and 8 (Groyne 2 to Groyne 3 area) where 6 nests were found this year. Two were between kilometres 2 and 4 where no nests were found. Eleven were between kilometres 11 and 15 – 3 nests were found in the Marchmont – Smarts area between kilometres 13 and 15. Numbers of wrybill counted exceed those expected from nest numbers and it seems likely that some went back to the Waimakariri.

Banded Dotterel

BD numbers (252) were in excess of the long-term average of 210. Greatest numbers were between kilometres 3 and 4, with few above here and very few coastward of kilometre 16. Despite extra efforts, few nests were found this year. Late in the season there appeared to be quite large numbers of chicks and fledglings along the river, so it seemed to have been a reasonably successful season.

Black-fronted Tern

The 196 counted were comfortably greater than the long-term average of 136. Greatest numbers (66) were seen between kilometres 2 and 4 where two colonies had initiated in early November. Fifty-six BFT were seen between kilometres 9 and 11 (Cones Road area) – there was a small colony just below the bridge, but by this time colonies above the bridge had almost been deserted – with most eggs taken by rats. Thirty-six were counted between colonies 13 and 15 where a colony had developed in the upper part of the Marchmont area, and another had yet to start further east.

Black-billed Gull

There were no colonies in the surveyed part of the river this year, and only 7 birds were counted. There was however a colony of perhaps close to 1,000 nests in the estuary just to the east of the survey area.

Pied Stilt

The count of 199 was greater than the long-term average of 163. This species does not seem endangered along the Ashley

Pied Oystercatcher

Only 18 were counted, compared to the long-term average of 28.

Black-backed Gull

Eleven were seen, this is the long-term average. They were scattered along the river, but are usually most often seen near SH1 where they cross the river enroute between nests in the estuary and paddocks on Tulls Road.

Black-fronted Dotterel

Five were seen between kilometres 13 (Marchmont) and SH1. They are rarely seen upstream from here. No convincing evidence of nesting was noted – it seems likely they nest somewhere around the estuary.

Spur-winged Plover

Only 12 were counted, compared with the average of 41 and a maximum of 149 in 2005. Numbers of this species are highly variable, sometimes large flocks visit the river.

Suggestions for annual survey improvement

- More use of radios. This is key to a good survey and is especially important to reduce double counting. The group currently owns 12 radios, and borrows some from DOC. We need to either purchase about 12 more, which would lead to 24 radios not being used for almost 12 months, or try to hire some.
- Recording of birds could be consolidated so that the leader does this from radio reports.
- Better counting of colony birds with circling of agreed numbers to denote a colony. Noting when a colony straddles a kilometre mark.
- Noting of vehicles seen.
- More emphasis put on safety river crossings.
- People should be allowed to volunteer for which reach they work on not just be assigned.

3.1.1 Annual Survey Conclusions

Braided river bird numbers returned to levels present between 2009 and 2015. However, this was almost certainly due to birds losing their nests in Waimakariri floods. It is uncertain how many of these displaced birds nested on the Ashley. Just prior to the November count, bird numbers appeared to be heading toward an historic low, and an underlying downward trend seems apparent. The only apparent local reason for this is a correlation between the Norway rat invasion and the start of this decline.

3.2 Ashley Gorge to Okuku Confluence Survey

Environment Canterbury has been spraying weeds and clearing willows in this section of the river – this should hopefully improve bird habitat in the future. ARRG did a survey this year (9 November) to act as a baseline. Prior to that, the most recent survey of this part of the river had been done by ARRG in 2011.

Counting was done on the now standard kilometre by kilometre methodology, with two groups of two surveyors walking from the gorge to Bowicks Road (10km, Nick Ledgard and Judith Hughey) and Bowicks Road to the Okuku junction (12km, Grant Davey and Quill Yates). This was a very manageable exercise, with the number of participants being quite adequate. Flow was 4.5 cumecs at the gorge, so there was little difficulty with crossings. The river is very channelized here, so crossings at a flow rate of around 10 cumecs might be dangerous – or at least involve long time-consuming detours through berm thickets.

At the time of the survey berm weed spraying had been completed for 13km down from the gorge but willow cutting hadn't progressed much. The very large flood of late May had noticeably spread gravel around, but the river was still very channelized and in places very incised. It remains to be seen whether this work will result in more braiding. It seems likely that spraying will have to be done on a regular basis. Downstream from Bowicks Road there were several places where lupin was growing on the fairway.

Results



These are tabulated in Appendix 4 and illustrated in Figure 10, Figure 11, and Figure 12.

Figure 10. Gorge to Okuku Pie Charts



Wrybill Banded Dotterel Black-fronted Tern Pied Oystercatcher Pied Stilt

Figure 11. Gorge to Okuku braided river birds by kilometre

Braided river bird numbers were very low along the middle part of the reach – with just a few BFT patrolling for food or commuting to colonies. There were two hotspots of bird numbers – between 1 and 4km downstream of the gorge, and between the 19km mark and the Okuku junction. These locations very noticeably were the only places along the river where braiding was well developed. In the former location there were two BFT colonies found – later visits showed 10 nests in the upper one, and 7 in the lower one – but there were probably more than this. Seven fledglings were later counted at the upper colony, but the lower one was washed out by a small flood. Six nests were found in the colony upstream from the Okuku junction. Outcomes from this are uncertain, on the final visit all nests were empty and there were no chicks or fledglings seen. The most likely outcome was probably predation. The three colonies survived the 150 - 200 4wd vehicles which went through or around them on Crate Day – 3 December 2021.

The numbers of BD and PS counted near the BFT colonies almost certainly indicates they were nesting in these areas. A pair of SIPO were nesting near the upper BFT colonies.

Interestingly a black-fronted dotterel was seen not far above the Okuku confluence. They are normally only seen much lower down the river.

Figure 12 shows distribution of other water birds. Paradise ducks and duck species were the most abundant and widespread with quite large numbers of Canada Goose in the upper few kilometres and a few white-faced herons. Interestingly no shags were seen.



■ Paradise Duck ■ Duck ■ Canada Goose ■ White-faced Heron ■ Shag

Figure 12. Gorge to Okuku other water birds by kilometre

Comparison with 2011

The 2011 survey was done on 29 November, with flow being 9.1 cumecs at the gorge. The river was surveyed in four sections: Ashley Gorge to end of Glentui Bennetts Rd, end of Glentui Bennetts Rd to end of Bowicks Road, end of Bowicks Road to end of Mt Thomas Road, and end of Mt Thomas Road to the Okuku River junction. Survey participants were: Section 1, Nick Ledgard and Sarah Ensor; section 2, Geoff Swailes and Abby Hamilton; section 3 and 4, Eric Spurr and Pete Brady. Results are summarized below:

Species	Section 1	Section 2	Section 3	Section 4	Total
Black Shag	4	0	1	2	7
Little Shag	0	0	1	1	2
Canada Goose	7	0	0	0	7
Paradise Shelduck	5	1	3	0	9
Grey Duck/Mallard	2	0	0	2	4
White-faced Heron	9	2	4	1	16
SI Pied Oystercatcher	2	1	1	5	9
Pied Stilt	9	2	4	0	15
Banded Dotterel	17	4	5	3	29
Spur-winged Plover	6	0	0	12	18
Black-fronted tern	6	0	0	3	9

Figure 13 and Figure 14 show the 2011 and 2021 surveys for braided river birds graphically.

Ashley Gorge - Okuku River Annual Bird Count by Reach - 2011



Figure 13. Gorge to Okuku braided river birds by reach 2011



Ashley Gorge - Okuku River Annual Bird Count by Reach - 2021

Figure 14. . Gorge to Okuku braided river birds by reach 2021

The most obvious features of this comparison are a large reduction in BD numbers since 2011 and an unexpected increase in BFT numbers. From experience in the Opihi River, BD seem to be a species that is particularly vulnerable to habitat destruction and incursion of weeds. BFT seem more able to capitalize on small areas of suitable habitat in a generally damaged river.

Figure 15 and Figure 16 compare numbers for the other water birds of the two surveys. The most obvious differences are far more white-faced herons in 2011, more paradise ducks in 2021 and the presence of some shags in 2011 vs none in 2021.



Figure 15. Gorge to Okuku other water birds by reach 2011



Figure 16. . Gorge to Okuku other water birds by reach 2021

3.2.1 Ashley Gorge to Okuku Survey Conclusions

This reach of the river, between the gorge and the Okuku junction, has been narrowed and damaged for decades, but floods do temporarily improve habitat. Comparison of just the 2011 and 2021 survey results is not very useful in determining long-term trends. It is proposed that ARRG survey this section more regularly – perhaps on a biannual basis. However, BD numbers in 2021 were much lower than in 2011 and BFT numbers were higher.

3.3 Groyne 1 – Groyne 2 Survey

Since mid-2013 Nick Ledgard has been doing surveys along a section of the river between G1 and G2 at approximately monthly intervals. This is only possible when water levels allow. With only one person on a wide section of the river, approved counting methodology is not used, and this is a very small section of the river- so short-term fluctuations are not a reliable indicator of trends. However, over the long term this is a valuable dataset and it effectively shows the seasonal nature of the braided river bird population, which our annual counts do not.

Data for the main braided river species, other than BBG, are shown in Figure 17 . Points of interest:

- The seasonal abundance of these species is clearly illustrated with few birds present in the winter.
- A decline in the maxima of the sum of all the species seems evident especially since 2017. This correlates with the annual survey results.
- Much more thorough evaluation of these survey results is necessary. For example, it may be possible to extract useful information on such things as date of return to the river for the breeding season of each species. The main reason for including information about this survey in this report is to indicate that this data is being collected and is available for analysis.



Figure 17. G1 - G2 braided river bird survey results

Data for selected other species is shown in Figure 18





Spur-winged plovers have occurred in the greatest numbers, they are often present in large flocks. Paradise ducks are the second most abundant. Peak numbers of these birds often occur in summer, but seasonal variation is not nearly as apparent as with the braided river birds.

3.3.1 G1 – G2 Survey Conclusions

This is a survey which produces valuable long-term data and should be continued. It requires better analysis.

3.4 Cones Road to SH1 Survey

This project began in late July 2020 with the aim of doing approximately weekly surveys along this section of the river to show bird distribution over time and space. Birds were located quite accurately using a combination of GPS and recent drone photography on the QField Android app. Before the mid 2021 major flood this could be done quite adequately by one person – with in places some zigzagging and backtracking necessary. However, after this flood the fairway was too wide for one person to count accurately – at least 3 people were required. Frequency of counts tailed off after the flood, and finished on 20/11/21 - due to the large amount of work involved and the difficulty in arranging participants.

There is a lot of valuable information in this data – especially the spatial elements of it. This has yet to be properly analyzed. One of the major findings is that braided river birds are 5 - 6 times as likely to be observed on braided sections of the river compared to single channel ones.

Figure 19 is a summary of the braided river birds counted – with the final bar being from the 2021 annual survey. This very clearly shows the large and unexpected increase in bird numbers between 2 November and 20 November – the date of the annual survey.



Figure 19. Cones Rd to SH2 braided river bird numbers





Cones Road - SH One 2020 -2021 Surveys - Braided River Birds and Water Birds

Braided river birds = wrybill + black-fronted tern + banded dotterel + pied oystercatcher + pied stilt

Water birds = duck + paradise duck + shag + white-faced heron + canada goose

3.4.1 Cones Road to SH1 Survey Conclusions

Seasonal trends in braided river and other river bird numbers are very clearly shown. The correspondence between braided sections of the river and birds numbers is very strong. Other information such as distances of observed birds from vegetation and preferred feeding habitat need extraction from the data.

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 reasonably straightforward to determine – but with a lot of work. Such monitoring is barely possible for BD due to their numbers and habits.

This year 13 wrybill pairs took up territories – the previous highest being 10. Nest locations are shown on Figure 21. Fledgling numbers are uncertain, but between 6 and 8. The latter number would give a productivity of 0.62, the former 0.46. This is the most pairs recorded, but productivity was below average – last year this was 0.86 and over 15 years it was 0.8. The table below summarizes results.

No	Location	Nest found	Hatched	Fledged	Notes
1	Smarts	Y		1	Used
2	Marchmont	Y		No	Female banded KO-WO, used same nest twice
3	Golf Links	Y		No	Female banded KO-WW
4	Rossiters	Ν	Yes	No	
5	G1	Ν	Yes	1	Late nester. Fledgling seen
6	Lower G2	Y	Yes	1	Female banded KO-WY. Fledgling seen
7	G2 BW-BW (now B)	N	Yes	1	Fledgling seen
8	Upper G2	Y	No	No	Eggs predated
9	Toomebridge	Y	??	No	
10	G3	Y	Yes	1	Female banded KO-WG
11	Hillcrest	N	Yes	1	Saw flying fledgling
12	G9	N	Yes	1?	Chicks seen in area, fledging uncertain
13	G9	N	Yes	??	Chicks seen in area, fledging uncertain
				6+	



Figure 21. Wrybill nest locations, 2004 - 2021

Points of interest:

- The male BW-BW (now just B) which has nested on the river in the G2 area for a number of years produced a fledgling his 14th since he was banded in 2010.
- In the upper part of the G2 area eggs were predated from a nest by a Norway rat (Figure 22).
 Wrybill and BD nests seem to be less at risk from rats than BFT, but they are not immune to them.
- A pair of wrybill nested twice on the Marchmont Smarts island (in exactly the same spot) and both times lost their chicks. Cats seem to be the likely predator - they appeared to have gained access to the area when flow dried up along the south side of the island.
- Four female wrybill were banded by Simon Elkington of DOC – details are as follows.



Figure 22. Norway rat taking wrybill eggs

Bands	East	North	Location
KO-WO	1570054	5207971	Marchmont
KO-WW	1569292	5207749	Golf Links
KO-WY	1563405	5207588	Dunlops
KO-WG	1562176	5207596	G3

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 at least 10 locations between the Okuku junction and SH1 (Figure 23). There were also 2 where the river runs into the estuary. And as mentioned above, 3 between the Okuku and the gorge and 1 that we know about in the Okuku River within Lees Valley.



Figure 23. BFT colony locations - 2004 - 2021

Colonies were found from at least weekly inspections of the likely nesting sites – and less frequent inspections of less likely sites. 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.

Locations of nests etc. were recorded in QField and transferred into QGIS.

Trail cameras used were Moultrie M 4000-i and A-900i. These are not the best on the market, but are value for money at around \$300. Using expensive cameras would be risky in a flood-prone environment where there are many people around. 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, e.g. on a stake, but they would be much more visible. No cameras were flooded or stolen in the 2021 – 2022 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 almost certainly no colonies of significant size were missed. Fledgling counts are difficult, and those given are likely to be a little less than reality. 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. Note that some of the numbers below differ from those which were presented at the 2022 BRaid Seminar – the latter were in error.

		Total		Presume			Presume			Human	
Colony	Location	Nests	Hatched	hatched	Abd	Rat	Rat	Harrier	Flood	Disturb	Fledglings
1	G3	19	0	0	2	5	11	1			0
2	Cones	20	2	0	1	5	11	0	1		0
	Cones										
3	Downstream	6	1	3	1	1	0	0			0
4	Rossiters	5	1	0	0	2	2	0			0
4	G7-G8	13	4	5	0	0	0	0	4		5
5	Hillcrest	3	1	0	0	2	0	0			1
6	Golf Links	10	3	4	0	0	0	1	2		0
7	Dunlops	3	1	0	2	0	0	0			0
8	Marchmont	12	5	1	5	1	0	0	0		0
	Cones										
9	Downstream 2	3	0	0	3	0	0	0			0
10	Groyne 2	2	0	0	1	0	1	0			
12	Estuary 1	3	0	0	0	0	0	0		3	0
12	Estuary 2	2	2	0	0	0	0	0			2
	Marchmont										
	Swept in										7
Totals		98	19	13	12	15	25	2	7	3	15

Presented in Figure 24 is a summary of the BFT nesting season – with approximate start and end dates of the colonies. Also shown are the date of the annual count and two flood events in the season. Start dates were derived from either working back from first eggs hatched, or assuming first nests were made about 3 days before they were found. End dates are when all nests were empty. From a total of 98 nests, including at 2 colonies near the estuary, 15 fledglings were counted.



Figure 24. BFT colony timing and outcomes

Groyne 3 Colony

First nests were found here on 18 October, during repeated visits a total of 19 were found. The last nests found were the north easternmost ones on 8 November, these were likely made just prior to being found. The colony straddled several low islands, which were entirely flooded on 16 December when flow reached 125 cumecs at the gorge. This was after the BFT had left the area. The channel layout on Figure 25 is from Sentinel imagery and was reasonably accurate during nesting here. The area was dotted with willow trunks and other large driftwood – ideal sites for Norway rats to take cover.



Figure 25. G3 BFT colony

Four trail cameras were deployed, in a total of 10 locations. One was at a trap for about 2 weeks. There were traps at 14 locations, with a total of about 10 on site at a time. Two locations had rat traps, the remainder run-through DOC 150 traps. Main bait used was a mixture of peanut butter and cat biscuits.

There were no eggs hatched in this colony. One nest was taken by a harrier, eggs from 5 nests were observed being taken by Norway rats on trail camera images and 11 nests were interpreted to be taken by rats. Two nests were abandoned, rats were seen on trail cameras near them. It was initially thought that the presence of

eggshells left at a nest was an indication of harrier predation rather than rat, but later eggshells were seen at nests where rats had eaten the eggs in situ. More of the nests could possibly have been taken by harriers – but evidence elsewhere along the river is that Norway rats are much more of a threat than harriers. In the last 2 years trail cameras have only captured images of 3 nests being robbed by harriers.

Figure 26 shows one of the very rare occasions where a BFT was still on the nest when a predator was within the frame. Figure 27 shows a rat carrying an egg – they usually take them away from the nests to eat.



Figure 26. Norway rat approaching BFT on nest

The only predators caught in traps, or seen in trail camera images were Norway rats. Only four were caught, the first one being in the southwesternmost trap on 27 October, and the last near the eastern end of the colony on 5 November. The first eggs seen to be taken were on 27 October – at the western end of the colony. The last eggs taken were at the northeastern end on 8 November. It is interpreted that the rats came from the southern berm and progressed northeastward through the colony. From the quite slow destruction of the nests, it seems likely that only a small number of rats were involved –



Figure 27. Norway rat taking egg from BFT nest

perhaps as few as 6. The trail camera at a trap showed multiple visits by a rat or rats before one was caught. Then more visits by another rat or rats until the trap was cleared.

There was little sign of vehicles having gone through this colony.

Cones Road Colonies

Figure 28 shows four distinct colonies – but there was some overlap in nest timing among these. First nests of 20 at the Cones colony immediately above the bridge were found on 18 October, last nest was found on 5 November. Four of the nests were empty when found – but showed signs of occupation. This was mainly on a high island which was little affected by the 125 cumec flow of 16 December – only one nest was flooded, the eggs remained, but it was abandoned. There were many willow logs and other driftwood which would provide cover for predators. Trail cameras were put at 12 sites, and were moved as necessary. One of these was kept at a trap site for the entire life of the colony.



Figure 28. Cones Road BFT colonies

Only 2 nests were observed to hatch a total of 3 chicks, approximately on 12 and 19 November. After hatching, fewer and more cautious visits were made to the colony and little evidence of chicks was seen. However, a quite

large pre-fledgling chick was seen on 14 December. No fledglings were observed here, and there was enough monitoring done to be confident that none existed. It is possible however that chicks from here relocated to the Smarts area. Five nests were observed to be taken and 11 were interpreted to be taken by Norway rats. One of the eggs at one of these nests was taken by a dog (Figure 29), the second by a rat. One nest was abandoned and 1 nest was flooded.

Fifteen sites in the area had traps, 2 of these were Fenn traps, 2 rat traps and the remainder DOC 150 run throughs. A total of 4 Norway rats were caught, no other predators were observed.



Figure 29. Dog at BFT nest

The last rat caught was on 6 January, after all the birds had left the island. This trap had been there (beside a willow log) since 11 October, a trail camera here took nearly 3,000 photos of a rat or rats visiting the trap – and becoming more and more bold at taking bait (Figure 30). The bait mainly used was a peanut butter – cat biscuit mix, but other baits were tried. At one stage there were 2 Fenn traps under the log at this site and a rat trap on it. Rats visited these traps, but were not caught. No rats were photographed during daylight hours and it seems likely that they weren't living under this or other logs in the colony area. They showed fascination with the bait, if they were on site during the day, they would likely have visited the traps then.

Figure 29 shows a dog at a BFT nest. Before the visit there were 2 eggs, afterwards just 1. This is probably the first evidence we have of dogs interfering with nests. The Cones Road area is particularly bad for disturbance – many people walk their dogs on the riverbed from the carpark at the northern side of the bridge. There were only a few vehicle tracks through the colony, no nests seem to have been destroyed by them.

Cones Downstream 1

This was on the same island as the colony above the bridge, however this part of it was much lower lying and there were fewer willow logs or other driftwood. Due to the amount of foot traffic in the area, only 2 traps were put out and no trail cameras were used.



Figure 30. Norway rat at trap

Six nests were found, the first on 2 November. Four of

these nests were seen to produce chicks, or were interpreted to have eggs hatch. One of them had a dead chick in the nest. One nest was abandoned, 1 was interpreted to have been taken by a rat. The earliest hatching was around 24 November. BFT commonly nest in this area, often late in the season, but do not usually succeed in hatching any eggs.

No fledglings resulted at this colony, either chicks were washed away in the flood of 16 December, or they were taken by predators. Chicks may have been carried down to the Smarts area, where 7 fledglings that weren't hatched locally were seen.

One Norway rat was caught in a Fenn trap.

Rossiters

This area was upstream of the Cones colony, with 5 BFT nests present on 2 islands. First nest was found on 29 October, but one of the nests had been present for some time before this. One empty nest was found – this appeared to have been occupied and had probably been robbed by rats.

One nest hatched chicks (Figure 31), but they were taken by a rat (frontispiece). This was the only occasion this season where chicks were observed to be taken by rats – eggs were usually taken before they had a chance to hatch.

Seven sites had DOC 150 run-through traps in the area. Four of these were on site before the BFT colony developed – put around BD nests. Four Norway rats were caught, the only evidence of any other predators was a cat passing by a trail camera – this was while there



Figure 31. BFT feeding chicks

was good flow around the island. The same camera detected pedestrians walking through the area. Vehicles did not seem to constitute a problem here.

Groyne 7 – Groyne 8 Colony

This consisted of 13 nests across 2 islands (Figure 32) – only a small part of the southern island was high enough to avoid the flood of 16 December.



Figure 32. G8 BFT colony

The first nest was found on 11 November and was reported by an ARRG trapper. The last nest was found on 11 December – on the eastern island. Nests in this area did seem to be made later than on the western island.

Trail cameras were put at 4 nests and there were 8 traps installed – 4 run through, 2 Fenn and 2 rat traps.

This was the most successful colony with 9 nests observed or interpreted to have hatched. Four nests were lost to the 16 December flood. Nothing was caught in the traps and no predators were seen on trail camera images. Fledglings were seen on 8 and 12 December – with 5 on the latter day, and one which was close to fledging. No other chicks seemed to be present then.

Hillcrest

Only 3 nests (Figure 33) were found here, although on several visits the number of birds present seemed to indicate that there could have been more. The long elongate island site had willow logs (where 5 traps were installed) and, in the middle, quite a bit of weed. The first nest was found on 8 November, the last on 8 December. Two of the nests were unusually close to the river – within about 10m of it. Three trail cameras were used.



Figure 33. Hillcrest BFT colony

Eggs from two of the nests were taken by Norway rats. The other nest was shallowly flooded on 28 November, with the eggs only remaining on the nest due to large stones nearby (Figure 34). Despite the birds being off the nest for at least 6 hours (the trail camera wasn't detecting all movement) they came back and resumed sitting. On 1 December a chick hatched. A fledgling was observed nearby on 8 January – was almost certainly from this nest.



Figure 34. BFT at flooded nest

Golf Links

At this site BFT and PS colonies were intermingled – but most of the nests of the latter species were closer to water (Figure 35). Prior to their inception there had also been a wrybill nest nearby. The first of 10 BFT nests was found on 10 November, the final one on 22 December. Trail cameras were placed at 9 sites and 8 traps (4 run through, 2 rat, 1 Timms and a Fenn) were placed under or beside driftwood.



Figure 35. Golf Links BFT and PS colonies

In terms of hatching, this was a successful colony – 3 nests known to have hatched, 4 presumed hatched. There was nothing caught in the traps or observed on trail camera images. Rats did not find this colony. Two of the nests were flooded on 16 December – as were most of the PS nests. A harrier took the eggs from one of the nests that survived the flood – Figure 36.

At one nest a BFT pair hatched a PS chick. A number of trail camera images (e.g. Figure 38) show BFT interacting with this chick, and unsuccessfully trying to feed it small fish. Several images (e.g. Figure 37) show a PS closely observing the action, and a BFT chasing it away. These photos also show that lupin had grown quite thick and high by early December.



Figure 36. Harrier at BFT nest



Figure 38. BFT feeding PS chick

No fledglings were seen at this colony – despite a narrow strip along the crest of the island not being



Figure 37. PS observing BFT with PS chick

inundated. Possibly some of the chicks were washed down to the Smarts area - about 1km downstream.

Dunlops

This was a colony of just 3 nests which started in mid-December. Only one nest hatched chicks, a dead chick was seen at the nest, the other one cannot have survived.

Marchmont (Smarts)

The first of 12 BFT nests was found here on 27 December, the last on 14 January. The colony was on the eastern end of a large and quite high island stretching from the Marchmont to the Smarts entrances to the river (Figure 39), July 2021 drone imagery). Most of this island was shallowly inundated on 16 December, prior to nesting. Before the nesting season a large flock of BFT (up to 60) was often seen in this area.



Figure 39. Marchmont - Smarts colony

During BFT nesting, about 15 sites at various times had trail cameras. Earlier there were also cameras around the 2 wrybill nests in the area. Two traps had cameras for some time. During the season there were traps (mainly DOC 150 run through) at 23 locations at various times, some of these were to protect wrybill nests, some of them were put out in anticipation of BFT nesting.

Being very late in the season, heat appeared to be a major problem for the birds. At times trail cameras showed temperatures greater than 40° C and the birds were often seen panting with their beaks open (Figure 40). Several nests were in unusual positions – on sand close to



Figure 40. Heat-stressed BFT on nest

driftwood or under lupin – presumably to help avoid heat. BFT normally nest on coarse gravel and avoid vegetation.

Surprisingly, considering the conditions, 6 nests were hatched or interpreted to hatch eggs. Five were abandoned, one of these due to repeated hare disturbance, the others for reasons unknown. Nighttime disturbance of BFT nests by hares and birds such as paradise duck is quite common. However, in the great majority of cases BFT return to the nest – often after several hours. One nest was taken by a Norway rat.

During the nesting season 5 Norway rats were caught on the island, only one of these while the BFT were nesting. In this area rats seemed to be less trap-shy. Figure 41 shows a cat visiting a BFT nest. The bird escaped and the cat sniffed the eggs but didn't take them.

After hatching, visits to the colony were fewer and more careful, to avoid chick disturbance. Chicks were initially seen within the colony area, then some to the east, finally only 2 were seen on the south side of the colony, south of the remaining water.

 O
 62 °F
 CAMERA 8
 26 JAN 2022 01:05AM

Figure 41. Cat at BFT nest

From adult behaviour, there seemed no prospect of more chicks being present. By 12 February there was no further sign of chicks – they appear to have been predated, perhaps by cats. By this time flow had dried up along the southern edge of the island, with only disconnected pools remaining.

Figure 42 shows the Golf Links and Smarts colonies with chick and fledgling observations, the drone imagery was from January 2022. There were 4 wrybill nests in the area (one nest used twice), only 1 fledgling resulted. There were no fledglings produced from the BFT colony. It seem likely that cats predated all these chicks – after flow dried up around the island. Two trail cameras were placed with traps late in the season on the south side of the river to detect cats – however none were seen.



Figure 42. Golf Links and Smarts BFT colonies, chick observations

From 27 December BFT fledglings were seen at the eastern end of the island, from repeated visits a total of 7 were counted. These appear to have been washed down the river as no nesting was noted here prior to their appearance. On 13 February a flood (343 cumecs at the gorge) went bank-to-bank and no further sightings of fledglings were made.

Cones Downstream 2

In late January three newly made nests were found just downstream from the Cones Road bridge. No chicks were hatched and the nests were abandoned. These were close to the north bank – a much visited area.

Groyne 2

Two nests were found immediately out from Groyne 2 in early January. The eggs from one nest disappeared, at the other nest, on the last visit only one, probably abandoned, egg was present. Rats seem the most likely predator.

Estuary

Two small colonies were found just above where the river joins the estuary. This is outside the long-term area of ARRG and it wasn't thoroughly monitored. One of these colonies was almost immediately north of the Kings Road entrance to the river, the other 250m to the west. Two nests were found (18 October) in the former colony, and 3 in the latter (18 October and 25 November) - although there were perhaps about 6 present in both colonies. In this area, especially during the whitebait season, there are extreme human disturbance issues – with 4wds, pedestrians and dogs. ECan put up some signs, but these were driven over and a squashed egg was found in the eastern colony. Two fledglings were seen in the estuary on 19 January 2022, these were interpreted to be from the western colony. The eastern colony almost certainly did not produce fledglings.

Okuku to Gorge Reach

As mentioned in the bird count section, three BFT colonies were found upstream from the Okuku confluence. The easternmost one, 2km above the confluence, consisted of at least 6 nests. No fledglings were seen here, and predation was suspected. A colony 3.5km downstream from the gorge, consisting of at least 7 nests, was washed out in a flood. The third, 3km down from the gorge, consisted of at least 11 nests and produced at least 5 fledglings.

All these colonies were seriously endangered by 4wds, which on Crate Day (4 December 2021) involved 150 to 200 vehicles driving between the Okuku and the gorge. DOC staff were overwhelmed when trying to direct people around the easternmost colony, but no nests seemed to have been destroyed. Much better success was met with at the upper colonies (Figure43), but after DOC staff left, a few vehicles drove through the western colonies and over signs. However, it seemed that no nests were destroyed.



43. DOC staff directing 4wds around BFT colony

There was also nesting in the upper

Okuku – near where the road crosses the river. This location was only visited once with only two nests being found – despite a large number of adult BFTs present.

4.3 Banded Dotterel

Figure 44 summarizes nest locations of the 6 main species we monitor over the last three seasons – percentages on islands. BD nests seem either very easy to find, or extremely difficult. They are easy to approach in vehicles when on the nest, and rarely they quickly return after being disturbed when the observer is close by – or can even be observed leaving their nests. More often they leave their nests without being observed, then walk around for 15 or 20 minutes before flying away. For this reason, despite BD being the most abundant braided river bird species on the river (other than BBG) few nests are usually found. However enough have been found to show that they nest all over the fairway and do not preferentially nest on islands. Because of this, they are potentially much more prone to predation by predator species that don't readily swim – mainly hedgehogs and cats. Because they are generally solitary nesters, they are perhaps less prone to lose their nests or chicks to Norway rats. BD chicks leave the nest and move away quite quickly, so determining fledgling success is very difficult.



Figure 44. Locations of nests since 2019 - percent on islands

In

the 2021 – 2022 season an unsuccessful effort was found to locate more BD nests. A thermo scope was purchased to help with this – one of these instruments has been very successful in locating eggs at Kaikoura. However, on the Ashley so far it has proved less useful. Our area is much bigger and the stones the nests are made among are much larger – meaning you have to be much closer to a nest to see the eggs through the scope.

Only 8 nests were GPS located and monitored:

Location Found		Outcome		
Groyne 8 26/11		No chicks, probable vehicle disturbance		
Rossiters 12/9		No chicks, rat predation		
Rossiters	12/9	Hatched 4/10		
Rossiters	12/9	Hatched?		
Rossiters	12/9	Hatched?		
Toppings	19/10	2 eggs hatched, 1 abandoned		
SH1	8/10	Nest destroyed by 4wd		
SH1	8/10	Nest destroyed by 4wd		

Despite the very poor success rate of the above nests, the impression was that this season was quite good. During monitoring visits to the river quite large numbers of chicks and fledglings were observed and they were also often captured passing trail cameras at BFT nests. Hotspots of BD occurrence where no nests were found were

downstream from Cones Road, the Golf Links and Marchmont – Smarts areas, Groynes and 3. At least 6 nests were suspected near the Cones Road bridge.

Next season a more determined effort will be made to find nests.

4.4 Black-billed Gull

This season, for the first time since 2017, there were no BBG nests along the river. However, there was a colony at the estuary – below where the river enters it. Firstly, this was on a quite low island – in early October there were perhaps 400 there. Only a few nests were made before the colony shifted, in mid-October, to a much better site 150m southeast of the Raupo Berm camping area. Drones are prohibited at the estuary, so no attempt was made to count nests – but there were perhaps up to a thousand adults in the nesting area at times. On 18 November some chicks had hatched and on 24 December there were a few adults still on nests.

It was hoped that nests could be counted after the birds left, but the flood of 16 December took most of them away. This was after most eggs had hatched. Most chicks would have been able to move to higher ground. Several hundred fledglings were in the area in late December, so the colony seems to have been reasonably successful.

4.5 Pied Oystercatcher and Pied Stilt

Only one SIPO nest was found – at Rossiters. It is unclear whether this was successful. SIPO do not nest in large numbers along the Ashley.

Nine PS nests were found, 7 of these at Golf Links. Most of these were lost to a flood, an egg from one of these was hatched by a BFT but the chick was almost certainly lost in the flood of 16 December. A nest successfully hatched chicks just upstream from the Cones Road bridge and another was lost to a flood near Groyne 8. PS are not an endangered species, their nests tend to be quite hard to find, and we do not make a particular effort to do so.

4.6 Nesting Season Conclusions

- Wrybill nest numbers were at an historic high, but fledgling success was lower than usual. Cats are inferred to have taken chicks from at least 3 nests, eggs from one nest were known to be taken by Norway rats. More work is urgently required on these predators.
- There were many more BFT colonies than usual, but hatching and fledgling success was very low. From a total of 98 nests, including at 2 colonies at the estuary, 15 fledglings were counted. The number of colonies probably reflects the amount of re-nesting following Norway rat predation and floods. It is interpreted that there were perhaps only about 50 nesting pairs on the river.
- BD were not monitored sufficiently to determine success. However, despite several nests being run over by 4wds and at least 1 being raided by Norway rats, many chicks and fledglings were seen along the river.
- BBG did not nest on that part of the river monitored in detail by ARRG, but a large colony at the estuary seems to have been quite successful.
- Only one SIPO nest was found. PS nesting appeared to be perhaps less successful than in the previous season with a number of nests being lost to floods.

5. Weeds

Weed cover is a major influence on bird numbers along the Ashley – most braided river species will not nest among thick weeds. For a number of years a certain amount of weed removal has been done – by hand, dozer, grader, digger and specially designed tractor mounted ripper. The one in one-hundred-year flood event of May-June 2021 cleared all but the most mature and well established weed along the river. Unfortunately, by summer 2022 it had regrown quite thickly. This year it was decided with ECan (David Owen) to spray rather than mechanically remove weeds. ARRG mapped the weeds from the Okuku junction to SH1 – partly from drone photographs eastward of the railway bridge, and entirely on the ground upstream from there.

Four categories of weeds were recognized -

- 1. Island lupin this was dominantly lupin, but there was lesser young gorse and broom, California poppy, plantain and other species. These were the highest priority areas to spray as nesting was most likely and had the most chance of success on them.
- 2. Edge lupin similar weeds to the above, but on the fairway margin or too close to it to be viable nesting places.
- 3. Fairway trees, gorse and broom there are several areas of this vegetation most notably between the road and rail bridges and off the Golf Links access to the river. These weren't potential nesting areas, but need addressed.
- 4. Edge trees, gorse and broom there are several areas of this along the edge of the fairway.

ECan chose to treat just the former (Figure 45) – 65 ha were sprayed in early April with Grazon by Godfrey Pest Management. Most of the spraying was done from a boom on a small ATV. This was a very accurate and unobtrusive, some spot spraying with hose and gun was later required around areas the boom couldn't get to. Some adverse public comment was anticipated, this didn't eventuate.



Figure 45. Island weeds sprayed

Results were generally very good – perhaps 99% of lupin and other similar weeds were killed. However, gorse was commonly left yellow and perhaps still alive.

Flooding since April will have removed some more weeds – especially a 400 cumec event on 12 July. Conditions should be very good for the 2022 nesting season.

5.1 Weeds Conclusions

Due to spraying and floods, weeds should not be a significant problem in the 2022 – 2023 season.

6. Predator Control

6.1 River Traps

Traps lost in the major flood of mid 2021 were replaced by November 2021. Most of these were located further from the river to avoid additional losses. Figure 46 shows three-monthly snapshots of trap numbers, by type, since February 2019. Run through design DOC 150s are only used on the fairway during the nesting season. After advice from the DOC, since 2019 we have replaced many Timms traps with DOC 150s – this will have had an influence on what is caught. Figure 47 shows snapshots of the trap numbers under the different types of cover. Over time the number of traps under trees has increased significantly, this will also impact on the numbers and types of predators caught.

Data given below includes that from trapping around nests and colonies on the fairway described above.



Figure 46. Three monthly snapshots of trap numbers since February 2019



Figure 47. Trap numbers by cover type since February 2019

On 31 July the following traps were deployed -

Total Current Traps	252
DOC	190
Fenn	6
Timms	54
Trapinator	2

Fenn traps are being trialed on the berm and fairway as many rats are shy of the larger traps. However, they do not appear to be significantly more successful. These traps are not humanely approved for larger animals, but they seen to quickly kill rats – and there is little else on the fairway.

Several trappers have retired, and have mainly been replaced by younger people. There are currently 17 volunteer trappers working along the river. Other changes to the programme have included Line E being split in half, with the eastern part named R. Line O originally had traps at 200m intervals, this has recently been infilled to 100m spacing.

Bait used has remained similar to that in the previous few years. DOC 200 traps have salted supermarket meat and eggs as a staple, with peanut butter, cat biscuits and other trapper-specific bait used. The DOC office bait station, managed and stocked by Peter Whitehead, is operating very well. Timms traps are baited with various meat sourced from the supermarket. Run through DOC 150 and Fenn traps are normally baited with a runny peanut butter – cat biscuit mixture. Trappers are encouraged to show their initiative with bait.

Figure 48 shows monthly catch since February 2019, this includes fairway catch.



Predator Catch per Hundred Trap Nights Per Month

Figure 48. Monthly catch per hundred trap nights by predator

Catch from 1/8/21 to 31/7/22 is tabulated below.

Predator	Number
Feral Cats	40
Hedgehogs	100
Weasels	72
Stoats	35
Ferrets	5
Rats	27
Ship Rats	164
Norway Rats	69
TOTAL:	512

Figure 49 shows catch per hundred trap nights by location since February 2019. Two main points from this:

- The greatest catch rate of Norway rats has been on islands where most of the birds nest.
- Hedgehog catch on islands has only been when flow dried up around them.
- Stoats only seem to be present on islands, and in low numbers, where there are BBG colonies.
- Only 1 weasel has been caught on the fairway, they do not seem to be a threat.
- From observations, cats are much more abundant on the fairway and on islands than is shown in the trapping data.

Figure 50 shows catch per hundred trap nights by cover type since February 2019. Main points:

- Ship rats are strongly associated with trees and have not been caught on the fairway. They do not constitute a threat to braided river birds.
- Norway rats are most often caught in traps under driftwood on the fairway than under weeds although there has recently been little weed to place traps under.



Figure 49. Catch per hundred trap nights by trap location, 2019 - 2022





Figure 50. Catch per hundred trap nights by cover type

Comments on the 2021 – 2022 catch:

- Hedgehog numbers were lower than in previous years. This is probably largely due to those that were
 hibernating on the berm being drowned. But there has been a decline in hedgehogs caught for many years –
 this is probably due to disease.
- Ship rat catch is significantly higher than in previous years, this will be partly due to more traps being installed under trees there is a strong correlation between trees and ship rats caught.
- Weasel numbers are also higher probably due to the same reasons as with ship rats.
- Norway rat catch remains similar to that of the previous two years. However, there are some problems apparent with rat species identification. Some ship rats are being misidentified as Norway rats.
- Traps on the fairway before and after the nesting season over the last few years have failed to catch any Norway rats. The evidence is strongly pointing to them nesting on the berm and, some time after the inception of a colony, they detect the birds (probably by smell) and start to predate eggs and chicks. It seems highly likely that they are only on the fairway at night – no visits to traps with trail cameras have been recorded in the day. These traps are under willow logs, the only likely daytime refuges for rats. Mice are quite often seen visiting these traps during the day.
- Winter catch this year has been higher than in the past 2 years. This is likely due to warmer conditions.
- Large numbers of mice are caught in DOC 200 traps (approximately 20% of total catch in these traps) when their weight should be insufficient to trigger them. Trail cameras have been placed above traps, these show mice easily climb onto the wire holding meat, up the trap mechanisms, and even up the wooden trap walls. From these places they sometimes jump or fall onto the trap trigger. This is a significant problem – leading to triggered traps unable to catch target species, and to bait being eaten. Figure 51 shows average monthly catch per hundred trap nights since February 2019 – including that of mice.



Figure 51. Average monthly catch per hundred trap nights since February 2019

Figure 52 depicts total catch per trap line – note that catch from traps on the fairway is not included. Figure 53 shows catch per hundred trap nights per trap line.

Some comments on these figures:

- Line E, on the north bank downstream from Cones Road, had by far the greatest catch and catch rate mainly
 with ship rats and hedgehogs. Line O, immediately across the river, also had a high catch rate, with the same
 species predominant there seems to be some correlation between human habitation and catch, at least of
 ship rats and hedgehogs.
- Norway rat catch was higher on the south bank than on the north with the exception of Line A the northwesternmost trap line.
- Stoat catch seems generally higher on the south bank.



Figure 52, Catch per trap line, 2021-2022



Figure 53. Catch per hundred trap nights per line

Figure 54 and Figure 55 show that both total catch and catch per hundred trap nights is slightly, but probably not significantly, higher than it was in the two previous years. This year CPHTN was 0.58, with 0.51 and 0.54 in the previous two years. As can be readily seen on Figure 55, the decline in CPHTN since the inception of trapping has been overwhelmingly due to one species – hedgehogs.

Since 2004 we have caught 3,054 predators with an overall CPHTN of 0.58. From this evidence, there is no reason to believe that our trapping is having an effect on predator numbers along the Ashley.



Hedgehogs = Cats = Stoats = Weasels = Ferrets = Rats = Ship Rats = Norway Rats

Figure 54. Annual catch since 2004



Figure 55. Annual catch per hundred trap nights since 2004

In the past year ECan, under their Braided River Revival project, commissioned Wildlands Consultants Ltd to write a report on predators and trapping on the Ashley. Their recommendations are summarized below:

- Increased number of traps, these would incorporate ground-set Sentinels and modified Timms traps to catch cats, in addition to DOC 150 and DOC 200 traps. The proposed new trapping regime expands upon the current lines and incorporates new lines suggested by the ARRG, filling in gaps in the current regime, and running a line along the centre of the riverbed.
- Additionally, Philproof bait stations containing Double Tap (alternating with Feracol) are recommended for rat control.
- Alphachloralose poisoning, and luring and shooting operations, are recommended for controlling black-backed gull and swamp harrier.
- River diversions are a possible experimental short-term solution to help restrict the access of predators (particularly hedgehogs) to river islands.
- More targeted catch per unit effort calculations, additional camera traps, and tracking tunnels. Avian monitoring, including monitoring of avian predators, is currently sufficient.

A meeting with ECan to discuss the recommendations has yet to happen. We have made it clear that any major additional work will have to be funded and staffed by ECan.

Trap Trials and Trail Camera Monitoring

The use of Fenn traps has been mentioned above. Additionally:

 Fenn traps were put at 8 sites for about 400 trap nights (starting in April and May) alongside DOC 200 traps on Line E to compare their effectiveness. Trail cameras were installed at 6 sites. Two DOC traps had the lids removed, tall boxes placed over them, and trail cameras installed to look down and video predators.

These traps caught 3 ship rats, a feral cat and a hedgehog. The boxes had been designed to keep larger predators out, so cat and hedgehog catch was unintentional. We do not plan to use these traps on the berm in a permanent fashion – on the fairway the predation is almost entirely by Norway rats. The cat did not die quickly, but trail camera evidence at Timms traps shows very similar slow deaths. The hedgehog seemed to be quickly killed. However, at one stage 5 hedgehogs in a row on Line E were not quickly killed in DOC 200 traps. One was caught by its foot, the others were caught by spines around their necks. This is a common

occurrence, but it is often missed – if traps have trail cameras or are checked every few days, evidence of this is seen. Otherwise, it is often missed.

The most common visitors to our traps by far were mice. Cats were also very commonly seen on trail camera images – some of them obviously domestic, some appeared to be feral. There are no cat traps on this line because of proximity to houses. Live cat trapping is needed. Dogs also commonly visit the traps, some late at night – outside normal dog walking hours. This reinforces the need to ensure dogs can't get into our traps.

Ship rats were quite common visitors, it appeared that the same rat would visit the traps for several nights before getting caught. Once it was caught, there would be a long gap without visits, or sometimes no more rats would be seen. At one location where there were constant ship rat visits to a DOC 200 – Fenn pair, the Fenn was shifted about 10m away and the rat was caught the same night. This suggests that we should be slightly moving traps, or maybe just swiveling them around.

Hedgehogs seemed to be more likely to enter the DOC traps and get caught than the other predators.

Only one visit of a mustelid – a weasel – to these traps was seen. It couldn't be caught as there was a ship rat in the Fenn trap it visited.

The reason why so many mice are caught in our DOC 200 traps was discovered. Mice constantly scurry in and out of the traps, climb onto the meat wire that spans the box, up the traps, and even up the vertical wooden sides of the boxes. From there they either jump or fall onto the trap. Figure 56 shows a mouse on the wire eating meat. It got there by standing on the trigger plate, gripping the meat, and pulling itself up.

We have started using a spike for meat, either on the floor or on the wall where they are less likely to fall/jump onto the trigger plate.



Figure 56. Mouse eating meat bait

2. Seven Fenn traps were put on the Marchmont island from June and July for a total of 595 trap nights. Norway rats had been caught here in the 2021 – 2022 nesting season, the aim was to see whether any rats remained there. One trail camera was put at a trap.

Nothing was caught in these traps, but mice were constant visitors to them – from trail camera evidence (even during the day), disappearance of bait, and mouse scat. These traps were on an island which had earlier been completely inundated – mice must have swum there.

3. Two Fenns were put just above the Cones Rd bridge, again to ascertain whether Norway rats were in the area after the nesting season.

Nothing was caught, but the amount of mouse scat and disappearance of bait indicates the presence of many mice.

4. Five Fenns, and 1 trail camera, were put at the site of the G3 BFT colony for the above reason.

Again nothing was caught, but there was much evidence of mice.

5. Two Fenns were put on Line P where Norway rats are often reported in traps – this was to help determine whether this species was being correctly determined.

One ship rat was caught and other ship rats were observed caught in other Line P traps. The trapper has been informed of this.

6. Two more Fenns were put on the berm on Line G, south of the G3 BFT colony to see if a Norway rat colony might exist in this area.

One ship rat was caught.

The above exercises resulted in about 25,000 trail camera images being kept. This is on top of the work done by Quill Yates and reported on last year, earlier trail camera use (several years ago on Line E) and extensive use of cameras at nesting sites in the last two seasons – with around 300,000 images collected. The experience is that use of trail cameras at and around nests is of much more benefit than those on the berm. Our trapping and trail camera experience from the berm gives us a good understanding of the predator problem. A programme of camera traps, tracking tunnels and wax tags has been recommended. This recommendation seems to have been made with inadequate knowledge of what ARRG has been doing, and it is not clear what would be done with the results.

The lack of Norway rat catch on 2021 – 2022 nesting season islands reinforces the conclusion that they do not generally live on the islands, but sense bird presence there in the seasons.

6.1.1 River Trapping Conclusions

- Catch rate over time is not declining and there is no reason to believe we are having an impact on predator numbers. Experience at the estuary where a greater density of traps seem to have resulted in lower catch rat over time gives encouragement that planned increases in trap numbers along the river might be effective.
- As described in the nesting season monitoring section of this report, Norway rats are currently the most important predator. Cats are also interpreted to also be a major threat. Ship rats and weasels are not a threat to the birds on the river. Hedgehogs are only a threat to nests on the edge of the fairway, or on the islands if flow dries up around them. Stoats occur in small numbers and evidence from the last few years is that they only predate out on the fairway when BBG colonies are present.
- We plan to address the Norway rat problem by using a rat detection dog. Poisoning has been suggested by Wildlands, but we have already tried this without success. Our bait was mainly taken by mice. Ship rats also outnumber Norway rats, most of the bait will be taken by non-target species. Norway rats clearly are not present throughout the area, they appear to live in discrete areas.
- Several months ago it was suggested to DOC, ECan and Landcare that a thesis study on Norway rats was necessary due to lack of such studies on them in braided rivers. This was met with agreement, but so far there has been no progress. ARRG plans to offer a student scholarship to help with this.

6.2 Estuary Traps

Traps lost in the mid 2021 flood were mainly replaced within a few months – many of these were moved further from the river or shore. However, those on Line H, along the sand dunes north of the river mouth, have not been replaced. Recently the two remaining traps were lost. It is not planned to replace any traps here – catch was low, and the area is too difficult to reach. Traps present on 31 July 2022 are as follows:

Total Active Traps	125
DOC	110
Timms	2
Trapinator	13

As with the river trapping, there have been some changes in trappers during the year – there are currently 9 volunteers. Bait used has remained the same.

Figure 57 shows monthly catch per hundred trap nights since trapping began in mid 2018.





The below table shows catch during the 2021 – 2022 season.

Predator	Number
Feral Cats	4
Hedgehogs	16
Weasels	12
Stoats	17
Ferrets	0
Rats	18
Ship Rats	71
Norway Rats	33
TOTAL:	171

Comments on the 2021 – 2022 Catch

- Stoat catch was less this year with only 17 compared to 37 in the previous year. In the 2018 2019 year 74 were caught.
- There were fewer hedgehogs caught this year 16 compared to 22 the year before. This was probably due to the flood, numbers had been increasing since 2018.
- Weasel numbers declined to 12 from 37 last year and 74 in 2018 2019.
- Ship rat numbers increased to 71 from 59 and Norway rats were very similar to last year at 33. Total rat numbers, including ones where the species wasn't recognized were at 122 vs 101 in 2020 2021.
- Cats caught declined from 6 in 2020 2021 to 4 this year.

Figure 58 and Figure 59 show species catch per line. Of particular note are:

- Traps on Line G used to catch far more predators than the other lines. This is no longer the case. No stoats were caught this year when they were quite commonly caught in previous years.
- Norway rats appear to be most abundant on the lines between SH1 and the estuary proper this is similar to last year.
- Ship rat catch was high on Line A, most of these were caught close to trees, but some were in traps along the sand dunes. Rat species identification can perhaps not be entirely relied on.

Figure 60 and Figure 61 show total catch and catch per hundred trap nights over time. The decline in catch over time very likely indicates that our trapping has had an impact on predator numbers – unlike further up the river. The number of trap checks this year was 209 vs 146 last year. An alternative explanation could be that the animals

are becoming trap-shy. But at the estuary we have a greater trap density within a much narrower area of prime predator habitat – so there is more chance of impacting predator numbers.

ARRG have secured Waimakariri Zone Committee funding to help with a MSc study on bird nesting around the Ashley. One of the aims of this will be to determine the effect of predators on nests and nesting birds.



Figure 58. Estuary catch per line with trap locations





Figure 59. Estuary catch per line

Figure 60. Annual catch since 2018



Figure 61. Annual catch per hundred trap nights since 2018

6.2.1 Estuary Trapping Conclusions

Catch rate has been declining since trapping began in 2018. The most likely reason for this is that we are having an impact on predator numbers. Compared to along the river, the area of prime predator habitat adjacent to water is much higher and there is a greater density of trapping.

7. Human Disturbance

Every nesting season, from 1 September to 31 January, ARRG and ECan block off as many entrances as possible to the river between the Okuku junction and SH1. ARRG scout out places to block and inform ECan of the number of new concrete blocks required and where to drop them. ECan supplies and transports the blocks and arranges a contractor to place them. ARRG then supervises the installation – usually this is spread over 2 days. The concrete blocks are dug in with the wire rope loop downwards – only the most determined 4wders will then move them. Some of the entrances to the river have gates, on or soon after 1 September ECan staff lock these, sometimes concrete blocks have to be placed inside the gates. ARRG place signs at most blocked entrances.

In the 2022 season 17 new blocks were required. There are several entrances which are difficult to impossible to block – these include at SH1, an area upstream from Toppings Road, near the Makerikeri junction, upstream from Swamp Road and from the Okuku River.

Figure 62 and Figure 63 show entrances blocked in 2021, along with earlier places that were blocked – most of these still had blocks, gates etc. at them.



Figure 62. Entrances blocked, western half of river



Figure 63. Entrances blocked, eastern half of river

The impression this year was that fewer vehicles were out on the fairway. This could be partly due to extensive publicity about some incidents in the previous year. Two BD nests, just above SH1 were known to have been run over by a 4wd and another much higher up the river was probably run over. Trail camera images showed that 2 wrybill nests had very close calls – about 60cm and just a few centimetres (Figure 64).

A few 4wd and motorbike tracks were mapped through all the BFT colonies, but no nests were destroyed.

 Image: Constraint of the second se

Figure 64. 4wd within centimetres of wrybill nest

Dogs were often allowed to run free on the northern side of the Cones Road bridge, not all owners were cooperative when spoken to. A dog (1)

of the Cones Road bridge, not all owners were cooperative when spoken to. A dog (Labrador) seemingly took a BFT egg here. On several occasions a Pointer was seen on trail camera images in the Marchmont – Smarts area,

sniffing through the BFT colony. It wasn't seen to closely approach any nests. Pedestrians were rarely seen on trail camera images. Fishermen were observed, but they seemed to keep strictly to the waters edge.

On Crate Day between 150 and 200 4wds drove between the Okuku junction and the Ashley gorge. In the main they were successfully diverted around 3 BFT colonies, but a few vehicles deliberately drove over signs and through the colonies.

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. Perhaps the publicity gained when 4wds and motorbikes drove through a BBG colony in 2020 – 2021 helped deter people. Efforts to warn and educate people should be maintained. The situation on Crate Day was different, although the Okuku to gorge reach of the river isn't within our normal focus, we should try to help with this in future.

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.

Before the major flood of mid-2021, ECan weren't issuing gravel consents on the Ashley as bed levels were generally lower than those calculated in order to contain large floods. Some gravel authorizations were however being issued. Authorizations are issued to extractors by ECan without them having to go through the consents process, they don't have to provide an AEE (assessment of environmental effects) but do have to abide by the Gravel Extraction Code of Practice. When ECan decide there is a problem due to excess gravel at a particular area, they notify gravel extractors and it is basically a first-in first-served process. In the last few years Taggart and Southern Screenworks have been issued several authorizations for between 8,500 and 35,000 cubic metres. These were valid for short periods only.

After the 2021 flood, three extractors applied to take gravel – and had their applications accepted for consideration. These applications were made on the basis of surveying work they had done which showed bed levels in certain parts of the river to be higher than those calculated by ECan to retain floodwater. Taggart did not apply as they understood that applications would not be accepted until ECan had done Lidar surveying and had themselves determined areas which needed gravel extracted. Verbal advice from ECan engineers from the Lidar work is that following the 2021 flood, bed levels are overall lower than before, but with some areas where levels were higher.

Southern Screenworks applied for 180,000 cubic metres between the railway bridge and SH1. They outlined two areas where the bed was above the calculated levels – in the Marchmont – Smarts area, and just above SH1. They were granted a consent for 4 years from 20/12/21. They started operations in the first half of 2022. The former area includes an important nesting location, especially for BFT and wrybill.

SOL applied to take 302,000 cubic metres from two locations – between the Rangiora road and railway bridges, and an area near the airport. They were granted 152,000 cubic metres over 4 years from 3/6/22 from the latter area. Wrybill and BFT have often nested in this area in the past. Access is planned to be from the south bank. Operations have not yet begun.

Nor West Contracting Limited applied for 99,500 cubic metres from an area about 2km down from the Okuku confluence. They were granted 62,400 cubic metres on 20/7/22. Operations have yet to begin here. There has been little bird nesting in this area over the years, as the river has been mainly single channel. The nesting environment could be improved by creating new channels on the north side of the river, but Nor West plan operate from the south bank. This will be difficult as there are very few access points and the flow is mainly along the south bank.

Consents for the older and smaller operations on the river, such as by Dawes, Cameron and Hurley Excavation have expired. Considering that these areas are now covered by the new large consents, it would seem they will not be renewed. Taggart seem to be moving their extraction operations elsewhere.

In the past ARRG were not notified if consent applications had been made or authorizations planned, so had no influence on them. We were also not notified when consents or authorizations had been granted. We have had to rely on information from Taggart about their operations. As a result of advocacy work, we are now invited to comment on applications, and these comments are taken into account. We have developed indicative mining plans for the Screenworks and SOL areas to preserve nesting islands and adjust flow around them. This has been with strong support from the ECan Braided River Revival team and very good buy-in from Screenworks. SOL have also indicated support for what we are proposing. Several meetings have been held with these companies, and ongoing interaction is planned. ECan have been developing rehabilitation procedure s, and contact with ARRG is mandated in the SOL rehabilitation plan. To date we have had no contact with Nor West – but they use the same resource consent consultant as SOL.

Figure 65 shows ARRG recommendations for the Screenworks Marchmont – Smarts area. Also on this map is the area sprayed for weeds by ECan. ECan river engineers had wanted the gravel to be taken from this important nesting island. ECan is working on a consent which will allow for diversion of the river around islands. Currently this is not permitted.



Figure 65. ARRG recommendations for SSW Smarts gravel extraction

Figure 66 shows recommendations for the SOL consent area. If more room needs to be made for floodwaters, It would however be preferable to take gravel from the very wide northern berm.



Figure 66. ARRG recommendations for SOL gravel extraction

As a result of efforts over many months, the very dangerous stopbank crossing at Smarts was repaired. It is now wide enough so that trucks and other road users can see and avoid oncoming traffic. The involvement of WorkSafe was necessary to bring this about. WorkSafe are aware that gravel extraction safety is not good enough in other rivers and are calling a meeting with ECan, district councils and gravel extractors to improve it.

Gravel Extraction Conclusions

Major progress has been made with the methods of gravel extraction -2 of the 3 current consent holders seem to be cooperating with ARRG. We have yet to speak to the third.

The amount of gravel taken remains problematic. Despite there being less gravel in the river after the May 2021 flood than before (pers. comm. ECan river engineer), nearly 400,000 cubic metres has been consented. Also of concern is a large application on the Okuku where gravel was deemed available with no survey data available.

9. Tree Planting

Constriction of braided rivers causes loss of their essential character – with flood and environmental implications. There has been much publicity about giving rivers room to move, and a major conference is being held in Lower Hutt this coming November with this theme. ARRG are watching ECan tree planting efforts with interest – we have yet to see that the advice from NZ river scientists is being heeded.

10. Remote sensing image interpretation

Since about 2019 there has been an ongoing programme of using satellite and air imagery, and purpose-flown drone images, to help understand the bird habitat. Before the nesting season, and after significant floods, the area between the railway bridge and SH1 is mapped by drone and recently the Smarts gravel extraction area has been regularly flown. Above the railway bridge the drone cannot be used except with special permission due to the airport. Aims of this work include:

- Determining the effects on the bird habitat of different sized flood events.
- Determining what sized floods are required to remove gravel extraction scars.
- Mapping the locations which birds choose to nest, and those where nesting is most safe from floods.

Some preliminary findings:

- Floods to mean annual event size, and somewhat larger than this, cover most of the berm but they aren't sufficiently powerful to remove many weeds. They also drop sand and weed seed over the larger bars and islands. This deteriorates the nesting environment. Removal of weeds is almost entirely by sideways bank erosion, water running over weeds usually has little effect on them.
- Unless gravel extraction scars are close to channels and eroded from the side, a mean annual flood will probably not be enough to remove them.
- Floods of approximately 100 cumecs as measured at the gorge will take away many to most nests Figure 67. There are islands, such as at Smarts and last year immediately above Cones Road, which can be still partly exposed at this flood level. If climate change predictions that "for summer it is *likely* that there will be wetter conditions in the east of both islands" come to pass, more nests will be lost. There has been an increase in flood events on the Ashley in the last 15 years.
- Figure 68 shows flood waters covering almost the entire fairway downstream from the Marchmont Smarts island. This was at flow of about 90 cumecs at the gorge. This image shows the importance of higher islands and that we should not be encouraging birds to nest below Smarts. Anyway, this area tends not to have braided sections.



Figure 67. Maximum daily flow at gorge >50 cumecs, since 1972



Figure 68. Floodwaters on 13 July 2022

- The 100-year flood event, as measured at the gorge, cleared essentially all the lighter weeds (lupin etc) from the centre of the fairway. It left the fairway significantly wider than before, but less braided. Since then, the river seems to have become more braided this has yet to be quantified. As previously mentioned, there was less gravel on the fairway after this event than before.
- Most bird species prefer to nest on islands. BFT prefer long narrow ones of a few hectares, or the ends of larger wider islands which are quite close to the water on both sides. This information is key to deciding which islands to clear of weeds and to enhance flow around.
- Most birds choose nest sites that are sufficiently above water level to withstand up to about 50 cumec flow.
- Due to river constriction and probably gravel extraction, the fairway area is only about 57% of what it was in 1942.

Remote sensing image interpretation summary

This is aiding the understanding of the braided river bird habitat.

11. River Flow

Figure 69 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., it but gives a good indication of flood events. There were two events that were sufficiently large to disrupt nesting – one in late September before there was much nesting, and one in mid-December which was in the middle of the season. There was a much large event in mid-February – all eggs had hatched by then, but fledglings might have been badly affected. This event was easily big enough to cover the entire fairway.



Figure 69. Maximum daily flow at Ashley Gorge, 2021 - 2022. Red denotes the nesting season.

Nesting season flow statistics -

Median flow – 9.1 cumecs Average Flow – 15.6 cumecs Maximum flow – 154.9 cumecs

12. Invertebrate study

From November 2021 to February 2022 ARRG volunteers ran an invertebrate study for the Department of Conservation which had funding from Environment Canterbury.

This involved a monthly trip to the river to set up three catch sites at two locations – one off Groyne 2 and the other off Marchmont Road. Each site had a malaise set up and five pitfall traps for crawling and low flying invertebrates.

The volunteers worked for two to three hours to set up and took a similar time to remove the traps at the end of each study week. They also washed the collected samples and packaged them in preservative for their journey to the laboratory.

The study sites represented a weed cleared area of the riverbed and an area that had no weed control.

The importance of preserving the natural habit of invertebrates is especially import for ARRG as they are a main food source for the river birds. The insects identified included flies, moths/butterflies, spiders, beetles, wasps, ants, caddis flies, crickets/grasshoppers, mayflies, lacewing, harvestmen, book lice and true bugs. There have been 635 species identified from the pitfall traps in the past three years.

The scientists are trying to get an idea of what biodiversity looks like in the Ashley River (most studies on rivers just look at the 'aquatic' species) and understand the impact of weed control. This summer obviously also took advantage of the big floods and looked at how this has impacted the insects.

ARRG has been invited to take part in the study again for four months in 2022/23 and we have agreed. The project was a fund raiser for our river activities bringing in \$3000.

The head scientist running the project is Dr Tara Murray, Science Advisor, Threatened Species. She is based in Dunedin.

13. Administration

13.1 Structure and Meetings

Last year's AGM approved a change in our group structure to three working teams with leaders who each directly report to members at meetings.

The Operations Team covers river work of bird counts, habitat maintenance, monitoring, and trapping and is led by Grant Davey.

The Communications Team addresses stakeholders, media, and promotions and was led by Joan Miles until her resignation in February 2022. From this time the media portion is being maintained by Judith Hughey and Steve Atwood, while our website management is outsourced to Sonny Whitelaw.

The Administration Team is led by Sue Mardon who covers chairmanship and finance, while the secretarial work was headed by Joan Miles with assistance from Val Davey, who continued to this year temporarily fill the role. A generic email account has been set up <u>secretaryarrg@gmail.com</u> where we have 175 members.

Four General Meetings were held during the year. These were preceded the week prior by meetings of the Management Committee that is made up of officers and members who are elected at the AGM. A change to meeting format has seen general meetings open with a guest speaker. Team reports are circulated a week before meetings, with general meeting reports emailed to all members in our email group. This then invites open discussion at meetings and better use of meeting time.

13.2 Communications and Promotion

The website <u>https://www.arrg.org.nz</u> was made secure with an SSL certificate. The site is updated with reports, news items, statistics, stories, and meeting dates that are forwarded to our website manager. Over the year online advertising of traps for sale has resulted in many queries, orders and sales.

Our Facebook page <u>https://www.facebook.com/ashleyrivercare</u> continues to be administered by Steve Atwood with Judith Hughey posting new items.

Judith also maintains a roster of Management Committee members who have been interviewed monthly on the local CompassFM radio station to keep the community updated on happenings on the river. Judith also arranges guest speakers to open our general meetings.

Visits to six schools have been made where bookmarks of our birds have been given to each child. A visit was also made to a local scout group. An estuary site visit and address was made to the national BirdsNZ conference that was held in Christchurch.

An Ashley Rakahuri Regional Park interpretation sign has now been installed by ECan below the Cones Road bridge beside the public walking/cycling track. It describes the braided river ecosystem and depicts the birds in the river environment. Along with a section of pictures and descriptions of predators found on the river, also included is an outline of ARRG's history, work, and contact details to volunteer.

The local business, Karikaas Natural Dairy Products Ltd continue to sponsor and feature ARRG's work on their website https://www.karikaas.co.nz/shop/Karikaas+Cheese/Braid+Series.html

They produce a series of cheeses featuring on the packaging the iconic birds of the Ashley-Rakahuri. A portion of sales from these cheeses has been donated to ARRG.

Due to covid regulations this year fund raising and promotional sausage sizzles have not been able to proceed.

We had a request from Orana Wildlife Park for predator traps to display and on-sell in their gift shop. The ARRG display poster is promotional and some traps have been sold.

Copies of the children's book "Ria the Reckless Wrybill" continue to sell, with copies being available directly or in the Rangiora Wee Kiwi Kidz shop, as well as at the Pukorokoro Miranda Shorebird Centre gift shop.

13.3 Financial

This year resulted in an operating cash flow of \$8,760 from which we purchased the assets of a thermal imaging device and eight more trail cameras, still leaving a net profit of over \$2,000. This was due to trap sales of \$15,000, the DOC Invertebrate Monitoring project generating \$3,000, and donations of \$6,780 that included \$3,146 to replace traps lost in the May 2021 flood. Other donations included \$2,000 from Squawk Squad, a children's eco-education organisation that was disestablished; and \$1,635 from local individuals in support of our work

Our major expenses were trap construction costs of \$9,873 that included replacing flood-lost traps; predator control \$2,923 including wiring a trappers shed, and predator traps; additionally, website costs and signage were \$3,000.

During the year there have been five trap making sessions with a team of volunteers making 187 predator trap boxes with mechanisms that have all been sold. Freighting traps at the buyers own cost around the South Island has now been instigated thus extending our sales market.

14. Conclusions and Recommendations

Conclusions are given after each main section, and these are summarized at the beginning of the report.

Recommendations:

- 1. Continue working with ECan on the management of the river and development of their longterm Braided River Revival plan.
- 2. Develop with ECan an extended and improved predator control programme.
- 3. 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.
- 4. Develop closer ties with other organizations, such as DOC and other volunteer groups that work with braided river birds in order to improve the quality of our efforts.
- 5. 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.
- 6. Continue with the annual bird survey and, at least on a biannual basis, extend this up to the Ashley gorge.
- 7. 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.
- 8. Continue with public education efforts including school visits, radio talks, newspaper articles, and Facebook and website posts.
- 9. The group currently has more than ample funding. It is more important to find ways to productively spend the funds than to find more.

15. 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.

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 5207627 5207817 5207822 5207780			
9	1565000				
10	1565980				
11	1566980				
12	1567979				
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			

Ashley Gorge to Okuku confluence

Kilometre	East	North			
0	1537458	5213223			
1	1537526	5212227			
2	1538442	5211887			
3	1539430	5211930			
4	1540413	5212106			
5	1541387	5212234			
6	1542315	5211862			
7	1543188	5212155			
8	1544176	5212245			
9	1545115	5212239			
10	1546041	5211863 5211348			
11	1546896				
12	1547756	5210837			
13	1548561	5210244			
14	1549441	5209997			
15	1550402	5210271			
16	1551341	5210538			
17	1552298	5210684			
18	1553240	5210944			
19	1554223	5211036			
20	1555205	5210985			
21	1555922	5210307			
22	1556747	5209748			

								BF	Black	Little	Black	SW	Casp	WF		Ρ.	C	WF	
Year	BD	BFT	SIPO	PS	Wrybill	BBG	SBBG	Dott	shag	shag	stilt	plover	Tern	tern	Duck	Duck	Goose	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

Appendix 3 – 2021 data by kilometre

Kilometre	BD	Wrybill	BFT	SIPO	PS	BBG	SBBG	BF Dott	Black Shag	Little Shag	SW Plover	Duck	P Duck	WF Heron	Harrier
1	11	0	1	0	13	0	1	0	0	0	0	0	5	0	0
2	3	0	2	0	2	0	0	0	0	1	0	3	2	0	0
3	36	1	38	4	20	0	0	0	0	0	0	0	0	0	0
4	28	2	28	2	29	0	0	0	0	1	1	0	2	1	0
5	8	0	7	0	6	0	2	0	0	0	6	6	2	0	0
6	13	1	8	4	24	0	1	0	0	0	5	21	43	1	0
7	16	3	0	0	8	0	0	0	0	0	0	14	14	0	0
8	13	7	3	0	4	0	0	0	0	1	0	0	4	0	0
9	18	0	1	0	9	0	1	0	0	0	0	0	3	1	1
10	24	3	24	2	18	0	1	0	0	0	0	6	15	0	0
11	16	0	31	1	15	3	1	0	0	1	0	0	8	0	0
12	4	2	1	3	3	0	0	0	0	0	0	3	10	0	0
13	18	1	4	0	3	0	0	0	0	0	0	0	2	0	0
14	10	3	30	0	16	0	0	1	0	1	0	3	21	0	0
15	24	5	5	0	17	0	2	0	0	2	0	0	15	2	2
16	2	0	3	2	2	0	0	2	0	3	0	0	7	0	0
17	5	0	5	0	2	4	0	0	0	0	0	1	0	0	0
18	3	0	1	0	8	0	2	0	0	2	0	2	3	0	0
19	0	0	0	0	0	0	0	2	0	2	0	2	17	0	0
Total	252	28	192	18	199	7	11	5	0	14	12	61	173	5	3

Appendix 3 continued – SH1 to estuary

Kilometre	BD	Wrybill	BFT	SIPO	PS	BBG	SBBG	BF Dott	Black Shag	Little Shag	SW Plover	Duck	P Duck	WF Heron	Harrier
20	2	0	4	0	1	6	0	0	0	3	0	0	0	0	0
21	6	0	34	0	30	24	0	2	0	18	14	30	0	0	0
Total	8	0	38	0	31	30	0	2	0	21	14	30	0	0	0

	Banded	Black- fronted	Black- backed		Paradise	Spur- winged	Canada	Pied	Pied	White- faced		Black- fronted
	Dotterel	Tern	Gull	Duck	Duck	Plover	Goose	Oystercatcher	Stilt	Heron	Harrier	Dotterel
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	4	13	0	0	0	0	0	0	1	0	0
3	11	25	1	0	1	0	5	0	4	0	0	0
4	1	19	0	0	4	2	2	2	0	0	0	0
5	0	1	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	1	0
7	0	0	0	2	4	0	0	0	0	0	0	0
8	0	0	0	0	1	2	0	0	2	1	0	0
9	0	0	0	0	0	0	0	3	0	0	0	0
10	0	0	0	0	2	0	0	0	0	0	0	0
11	0	0	0	0	2	0	0	0	0	0	0	0
12	0	0	0	5	2	0	0	0	0	0	0	0
13	0	2	0	1	3	0	0	0	0	0	0	0
14	0	3	0	5	1	0	0	0	0	1	0	0
15	0	0	0	1	1	0	0	0	0	0	2	0
16	0	0	0	3	0	3	0	0	0	0	0	0
17	0	0	0	0	2	0	0	0	0	0	0	0
18	0	2	0	0	2	0	0	0	0	0	0	0
19	0	0	0	2	0	0	0	0	0	0	0	0
20	4	8	0	0	0	0	0	0	2	0	0	0
21	6	0	0	0	2	1	0	0	8	0	0	1
22	2	0	0	0	0	0	0	0	0	0	0	0
	24	64	14	19	27	8	7	5	16	3	3	1

Appendix 5. ARRG office bearers and management structure

Chair:	Sue Mardon (<u>suemardon02@gmail.com</u>)
Secretary	Joan Miles (since resigned)
Minute Secretary:	Val Davey (valohdavey@gmail.com)
Treasurer:	Sue Mardon (<u>suemardon02@gmail.com</u>)

Management Teams	
Operations Team Leader:	Grant Davey (grdavey@yahoo.com)
Administration Team Leader:	Sue Mardon (suemardon02@gmail.com)
Communications and Promotions:	Joan Miles (since resigned – position vacant)

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. Following the secretary's resignation, and due to the jointly held role of Chair/Treasurer, Mike and Helen Hamblin have since been elected.

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