



## Black-fronted Tern and Black-billed Gull colonies, 2019 – 2020 Season

### Summary (NL)

Two black-billed gull (BBG) and four black-fronted tern (BFT) colonies were monitored over the 2019-2020 season. Another 5 BFT colonies were located but not monitored closely. Colony locations and general outcomes are outlined in the following table:

Species	Location/name	No birds (max)	No nests (max)	No. fledged	Productivity (min)	Comment
BBG	Railway	4363	1547	700	.45	Fledglings scattered and hard to count accurately
	Toppings	1280	485	140	.32	
BFT	Railway	c. 100	48	0	0	Possibility that 1 or 2 chicks fledged
	Toppings	20	4	0	0	Monitoring infrequent
	Groyne 9	70	20	2	.10	
	Groyne 4	40	25	4	.16	
	Cones road	8	2			No proper monitoring – success unlikely
	Smarts	20	7			No proper monitoring – success unlikely
	Tulls	4	2	2	1.0	No proper monitoring – success unlikely
	Upper Toppings	30				No proper monitoring – success unlikely
	Estuary	12	3			No proper monitoring – success unlikely

The main points arising from seasonal observations are:

#### *Breeding*

- Record number of breeding BBG (1310 nests) - first time since 2000 that 2 colonies located on the river.
- Record number of breeding BFT (120 nests).
- It is likely that frequent flooding of the Waimakariri river (13km to the south) contributed to the increase in BBG numbers, and possibly the same with BFT.
- Despite clearance of weeds from almost 20ha (machine and hand pulling) prior to the season, only one such site (Railway) hosted a gull or tern colony.
- Productivity (number of chicks fledged) of both species was poorer than usual.
- It appears that predation could have been a major cause of low productivity.

#### *Predation*

- In addition to the normal all-year-round berm trapping, a total of 48 additional traps were located close to the two BBG colonies and four main BFT colonies during the season.
- Norway rats appeared to be the most important land-based predator. At the Railway site, >100 BBG chicks were killed and over 20 BFT nests robbed of eggs (and probably chicks). Norway rats were also the dominant trap-catch within the Groyne 9 BFT colony.
- Nine hedgehogs were trapped in a weed-infested area alongside the Groyne 9 colony, but were not caught where there was a water barrier.

- Predation did not appear to be a major issue at the Toppings and Groyne 4 colonies.
- Harrier hawks accounted for the loss of 116 BBG chicks at the Railway colony.
- 20 BBG were found dead under powerlines, which they presumably had hit during flight.
- The remains of 91 BBG chicks, which most likely died from natural causes, were found within the Railway colony.

### Conclusions

- Numbers of breeding BBG and BFT were at record levels, but productivity was average (BBG) or poor (BFT).
- Rats and harrier hawks were the main predation dangers, but weed invasion is considered to remain as the biggest long-term threat.

### Recommendations

- Maintain weed control at the most attractive sites, making use of gravel extraction operations where possible.
- Record egg hatch success of BBG and BFT, and Improve techniques for counting chicks.
- Initiate predator control earlier at potential colony sites – particularly targeting rats.
- Install more trail cameras at colonies, and improve design of run-through traps.
- Experiment with harrier hawk deterrents – e.g., strategic use of scarecrows.
- Regularly patrol under powerlines to record bird losses to aerial hits.

## 1. Introduction

This season two black-billed gull (BBG) and four black-fronted tern (BFT) colonies in a total of four locations were monitored and surrounded by predator traps (Figure 1).



Figure 1. BBG and BFT colony locations

Monitoring of these colonies was done at irregular intervals of between a few days and about a week. This was volunteer work.

For the first time since records began in 2000 there were two BBG colonies on the river - and the total number of nests in the year was much greater than previously recorded (Figure 2). The graph shows total nest numbers only – not successful ones, on occasions the nests were abandoned or washed away. If a second colony was formed by the same birds, as in 2018, this is the one shown. In 2016 the colony was in a dairy farm paddock, a few hundred metres south of the river.

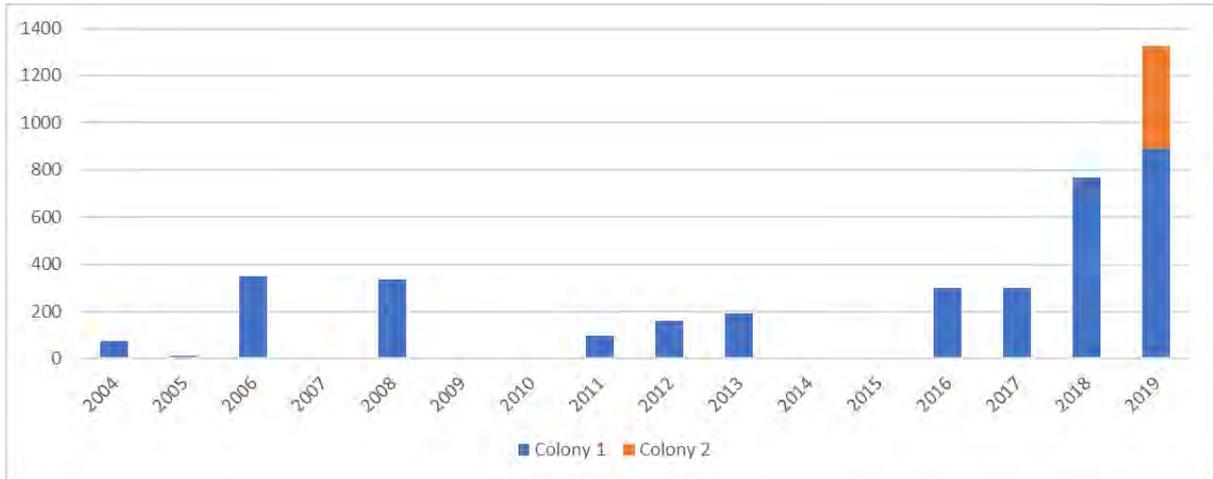


Figure 2. BBG nest numbers

Similarly, there were more BFT nests in 2019 than previously recorded (Figure 3). These numbers are estimates only – it is not feasible for volunteers to locate each nest along the Ashley River. In 2019 93 nests were found and GPS located – this was done systematically at only one colony. It is estimated that the total number of nests was approximately 120.

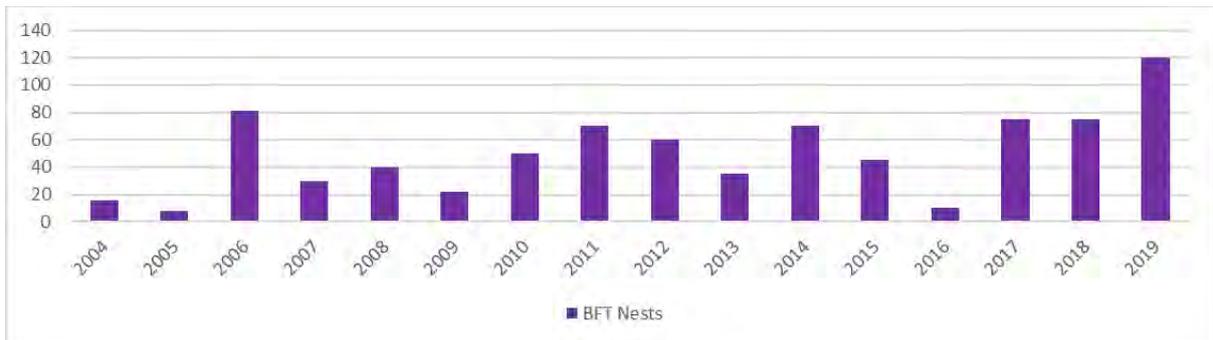


Figure 3. BFT nest numbers

## 2. Railway Black-billed Gull and Black-fronted Tern Colonies

### 2.1 Black-billed Gull Colony

#### 2.1.1 Colony Description and History

Gulls started to gather on the river, in the Marchmont - Smarts area 1.8km downstream from the Railway colony, in August. On 21 August there was a group of 25, on 29 August there was up to 150, these were continuously coming from the south and leaving in that direction. By 21 September the gulls had shifted to just under a kilometre upstream from the Cones Road bridge, between the pylon lines, and numbers had built up to 300 – 400. At this stage mating was happening, but nests had not been built. The gulls were present at this site for quite some time without nest building. By 19 October numbers were probably well in excess of 1,000 and there were a few hundred nests. These sites were on very low islands at most a few tens of centimetres above water level. A small fresh on 19 October wiped out the nests and caused the entire flock to eventually move off the site. For some time birds

remained on nests with water lapping around them and some were bringing in material to raise the nests above water level (Figure 4, Figure 5).



*Figure 4. Nests on very low island, 19/10/19*



*Figure 5. Shoring up nests against rising river, 19/10/19*

Whilst the river was rising hundreds of birds were flying to upstream of the nests and floating downstream – then flying up again forming a conveyor-belt effect. They did not appear to be feeding. Similar behaviour was seen during a small fresh at the Railway colony on 18 December – but the birds were very actively feeding on something small floating in the water. In a similar flooding situation in 2018 the gulls in a colony swam for some time above where there flooded nests were.

By 20 October all the gulls had left and on 21 October they were found at the Railway site. This was an ideal location – an island about 680m long by up to about 150m wide (Figure 6). During most of the life of the colony water was at least shin deep and quite fast flowing. In the last days of the colony, when chicks were at fledgling stage, the river dried out. Most of the colony would have been approximately 1.5m above the level of the closest water and at no times was it threatened by flood waters. This island was already occupied by breeding black-fronted terns.

The great majority of nests were made on an area which had been mechanically cleared of weeds by ARRG in mid-July 2019. Weeds, mainly lupin, were not thick on this island but they were ripped based on previous experience of birds nesting in this area, and on the positive characteristics of the island. In total 0.85ha had been ripped on this island. The remainder of it was essentially weed-free.

This island has not been in existence long, in early 2017 part of it was still in the northern berm of the river. In this area the river has been rapidly eroding northward.

Nests were almost immediately being made at the new site and many were present by 25 October. They were still being made on 31 October - all on quite coarse gravel.

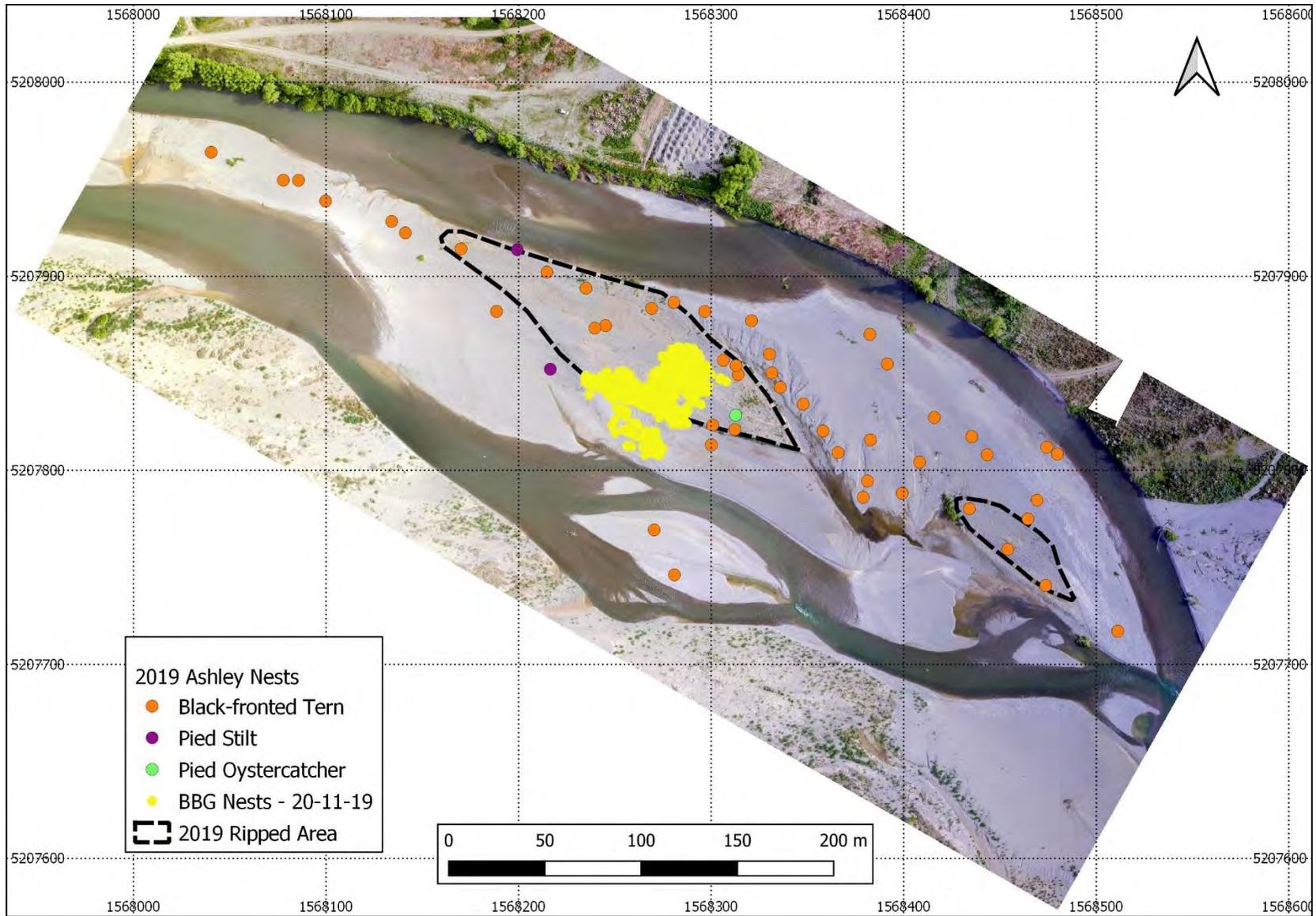


Figure 6. Railway island, nests and ripped areas

Gulls were counted from drone photographs until it became impossible to distinguish adults from juveniles. This was done with the following tools and methodology:

- Phantom 3 Standard drone, 12.3 MP camera.
- Photographs taken from 50 elevation at 25m intervals on lines 40m apart – using Litchi drone controlling software. Flight path set up with QGIS. The gulls and other bird species did not show any interest in the drone.
- Images were stitched together with Microsoft Image Composite Editor.
- The composite images were georeferenced with QGIS from GPS-located fluorescent paint-marked stones on the ground. Later images were georeferenced with the addition of coordinates from logs, weeds etc that were visible on earlier images.
- Counting was done by making a new shape file layer and putting a dot on each bird. The number could then be read from the .shp file.

Results of the adult gull counting are shown in Figure 7. This shows the 2019 Railway colony in grey, but also numbers from the 2019 Toppings colony and 2018 colony. A consistent picture is emerging for gull numbers in colonies on the Ashley. In the early days of the colony it seems that both of each pair are there most of the time, also there appear to be a number of non-breeding gulls or gulls that eventually decide to nest elsewhere. Numbers then tail away until there is only about one adult per nest.

At Railway this year the initial count was 2,200 on 22 October, this built up to 4,363 on 31 October then rapidly fell to 1,292 on 7 November. After this there seemed to be a large influx of new arrivals, perhaps in response to Waimakariri River flooding, with numbers building up to 2,585 on 20 November. Numbers then ebbed away as they had done in 2018, but there was perhaps a small influx around 7 December.

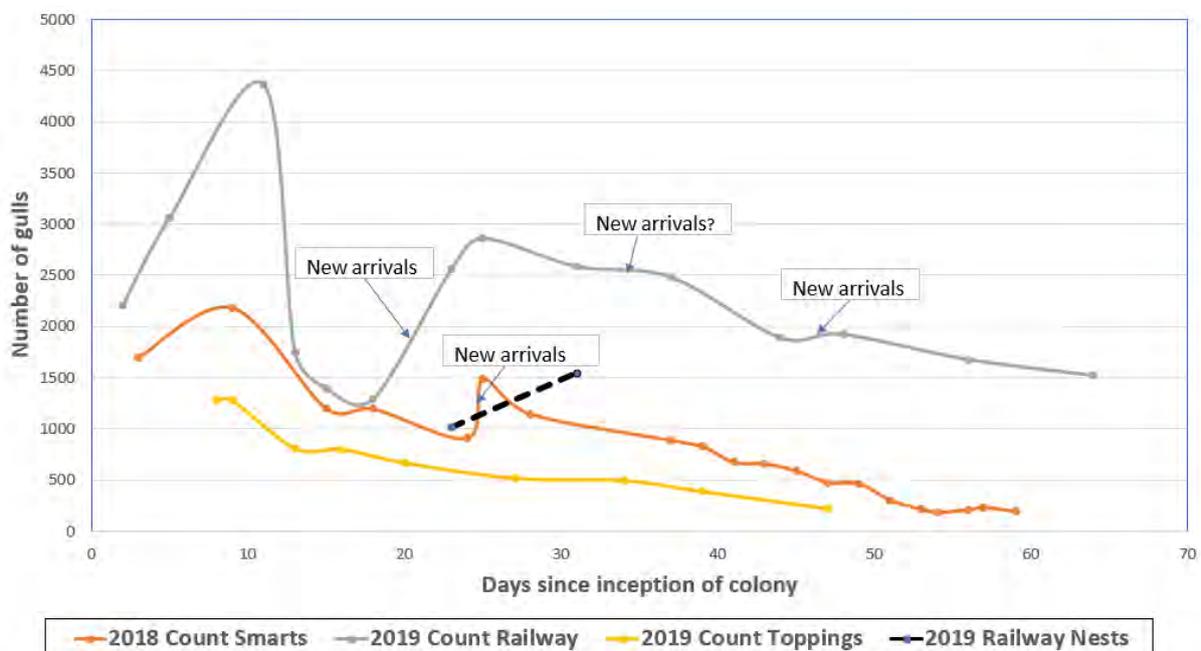


Figure 7. Adult gull numbers at colonies, 2018 and 2019

On 12 November nests were counted from drone photographs taken at 25m above the colony – with 1,015 resulting. From this height nest material can usually be seen beneath birds, and the posture of nesting birds can be recognised (Figure 8). However, such counts are almost certainly under-estimates.

Some birds have very little nesting material and some are hidden beneath vegetation. In 2018 counting of nests from 12m elevation photographs underestimated them by about 10% - compared with careful ground counting. Also, despite careful counting, revisiting an image always seems to result in more nests seen. Even from 25m height there is some blurring of images. The birds were not at all disturbed by the drone operating so low above them, however close attention must be paid as if they were panicked by something, e.g. a harrier, the drone would need to be moved out of the way very quickly.



Figure 8. Gulls on nests from 25m height, 14/12/19

On 20 November nests were again counted from 25m – with 1,547 resulting. These counts are also shown on Figure 7. The increase in birds and nests in this period is almost certainly due to a flood event on the Waimakariri – maximum stage on 8 November was 4.301m. This from Courtney Popenhagen of ECan - *In terms of river flows to displace the birds, anything over about 2.2m at the Waimakariri 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.* The small influx of birds around 7 December, mentioned above, may also have led to more nests – from 5 December there were levels of above 2m for 3 days with a maximum of 2.28. A group of at least 100 gulls was seen near the Ashley Cones Road bridge at about this time, probably en route to the Railway colony.

When all the gulls had moved off the Railway island the colony area was flown at 12m height in an attempt to count the empty nests. But probably more than 95% of the nests had been destroyed and were unrecognisable, this seems to be due to the area being occupied for an unusually long time before the birds left.

Digitizing the nests as described above allows coordinates for each one to be derived. A programme written in MS Access was used to count nests per square metre – shown in Figure 9 for 20/11/19. The greatest density (maximum of 6 per square metre) was close to a 0.5m drop-off along the edge of the ripped area – and quite close to lupin which could not be accessed by the ripper. Other densely nested areas included close to logs. The newcomer gulls nested among and closely adjacent to the earlier nesters.

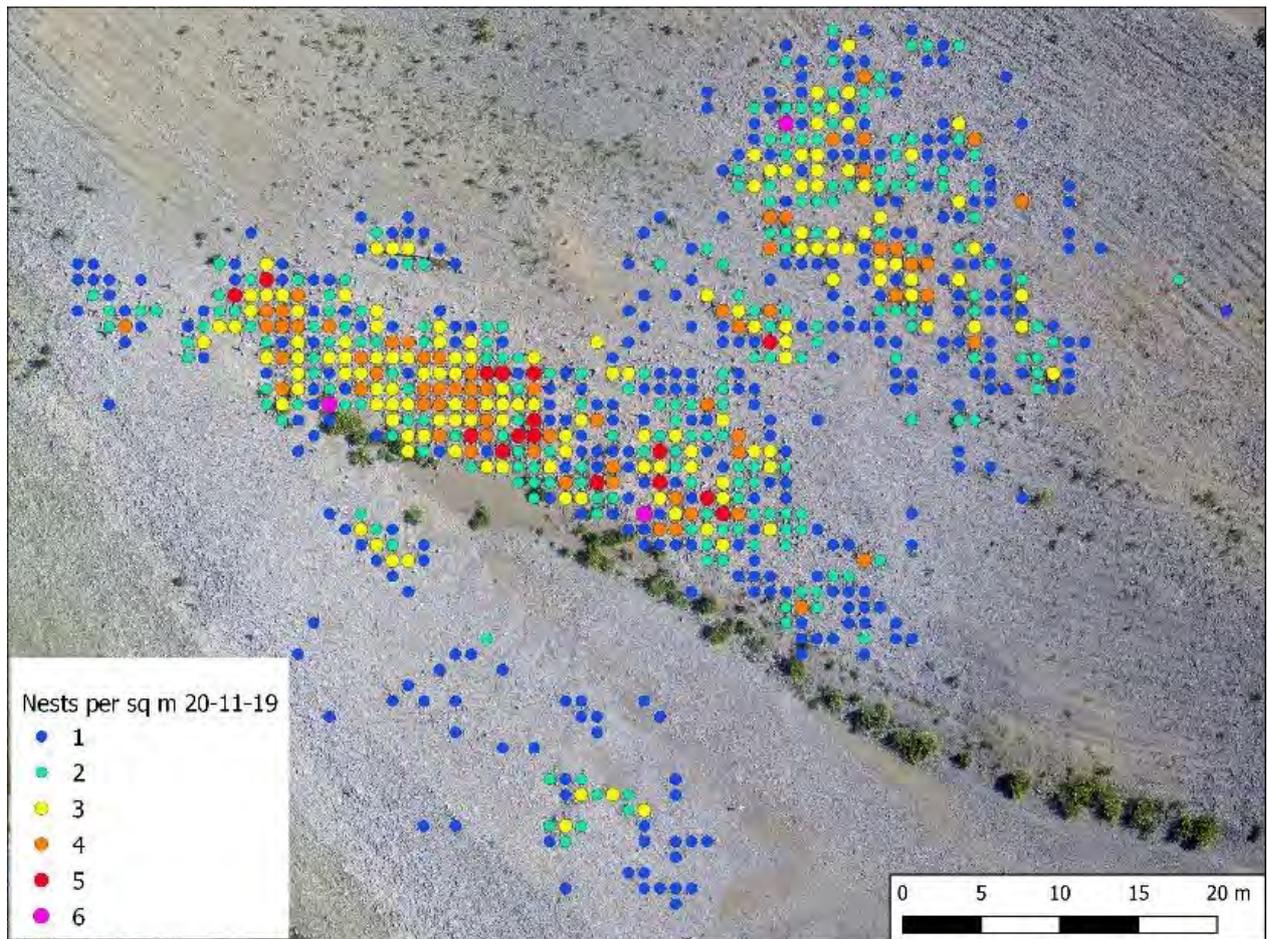


Figure 9. Nest density 20-11-19

The first chicks were seen on 22 November 33 days after the colony started. Some were probably present before then as the minimum incubation time for this species is 20 days – observation was done from some distance outside the colony perimeter. It had been noticed that the gulls had become more aggressive around 22 November, perhaps also indicating the presence of chicks. Later on chicks of quite different ages were very noticeable – from just hatched to near-fledgling stage (Figure 10). Gulls were still seen on nests on 21 December – when some fledglings were present. Black-billed gulls are generally thought to breed with high synchronicity, this is not necessarily the case on the Ashley which can receive birds that have been flooded out from the Waimakariri and come here for a second attempt.



*Figure 10. Recently hatched chicks (foreground and right) and near-fledgling (centre)*

Because of the unusual nature of this colony it wasn't possible to accurately count fledglings. To complicate matters further there was very active predation going on of small chicks and fledglings by land and airborne predators until all birds left the colony – see below.

By 2 January a creche of mainly fledglings (at least 320 chicks on 6 January) had formed about 120m upstream from the colony – where the remaining chicks were spread out and impossible to count. Chicks remained on the colony site to at least 16 January, even though many were at fledgling stage. Here they sporadically formed small creches. By 16 January the river was dry around the island, disappearing just upstream from it. On 23 January there were up to 400 gulls, the great majority of them fledglings, about 340m downstream from the colony and the first creche was still there. By 25 January the upstream creche had gone and by the afternoon of 27 January there were only 4 fledgling gulls in the area.

Some fledgling gulls were seen in irrigated paddocks to the south of the river in late January and there 35 BBG counted on the river on 31 January between the Okuku junction and the estuary. The great majority of these were juveniles – some still under the protection of adults.

Chicks were being fed worms and as well as unidentifiable food (Figure 11, Figure 12).



Figure 11. Chick being fed worms



Figure 12. Chick being fed fish?

## 2.1.2 Trapping and Predator Evidence

### Trapping

Trap lines, with DOC 200 and Timms traps, have been in place for several years along the riverbank to the north and south of the colony area (Figure 13). The ones to the north were generally some distance from the water's edge because of rapid erosion here, and due to ECan flood protection measures. One trap had been lost to erosion, one to earthmoving machinery.

On 29 October several DOC 150 and Timms traps were placed around the Railway BBG and BFT colonies. These were added to on 2 November bringing the total number of colony area traps to 24 – 7 Timms and 17 DOC 150. The ARRG hasn't previously trapped colonies to this extent.

The DOC 150s were in purpose-built boxes made from coreflute and were run-through in design (Figure 14). Trap mechanisms were screwed to a plank and the Coreflute made with a hatch over the trap for access – attached with a screw or with 11velcro. A hole was made over the trap so bait could be easily put in. Bait used was cat biscuits, either put in from the ends or from above, and peanut butter. The main advantages of these traps over conventional wooden boxes are expense and weight. It is quite easily possible to carry 6 of them. Bait used in Timms traps was cheerios, sausages and other meat donated by a local supermarket. A serious drawback of these traps is that hedgehogs are often not killed outright – they are pushed outward against the buckling Coreflute and not properly crushed.

Most of the traps were placed on the island itself, with 2 Timms and 3 DOCs along the northern edge of a lupin-covered gravel bar south of the island. All these traps were at risk from being washed away by a moderate flood – which did not eventuate. Traps on the island were put in 3 distinct types of location –

- Around the edge of the machine-cleared area where most of the gulls nested. These were within a thin line of lupins on and below a 0.5m drop-off. These lupins lead into the colony and from experience last year, would provide cover for predators to approach.
- Beside alive and dead willow logs along the water's edge – these seemed to be good places to trap Norway rats given their affinity with water.
- Under lupin close to the gull colony and elsewhere on the island.

Figure 15 shows predator catch from when the colony traps were installed until all the gulls left the area. The smallest dot/pie chart represents 1 predator caught, the largest represents 4.



Figure 13. Traps, on drone composite and Google Earth base



Figure 14. Coreflute DOC 150 trap

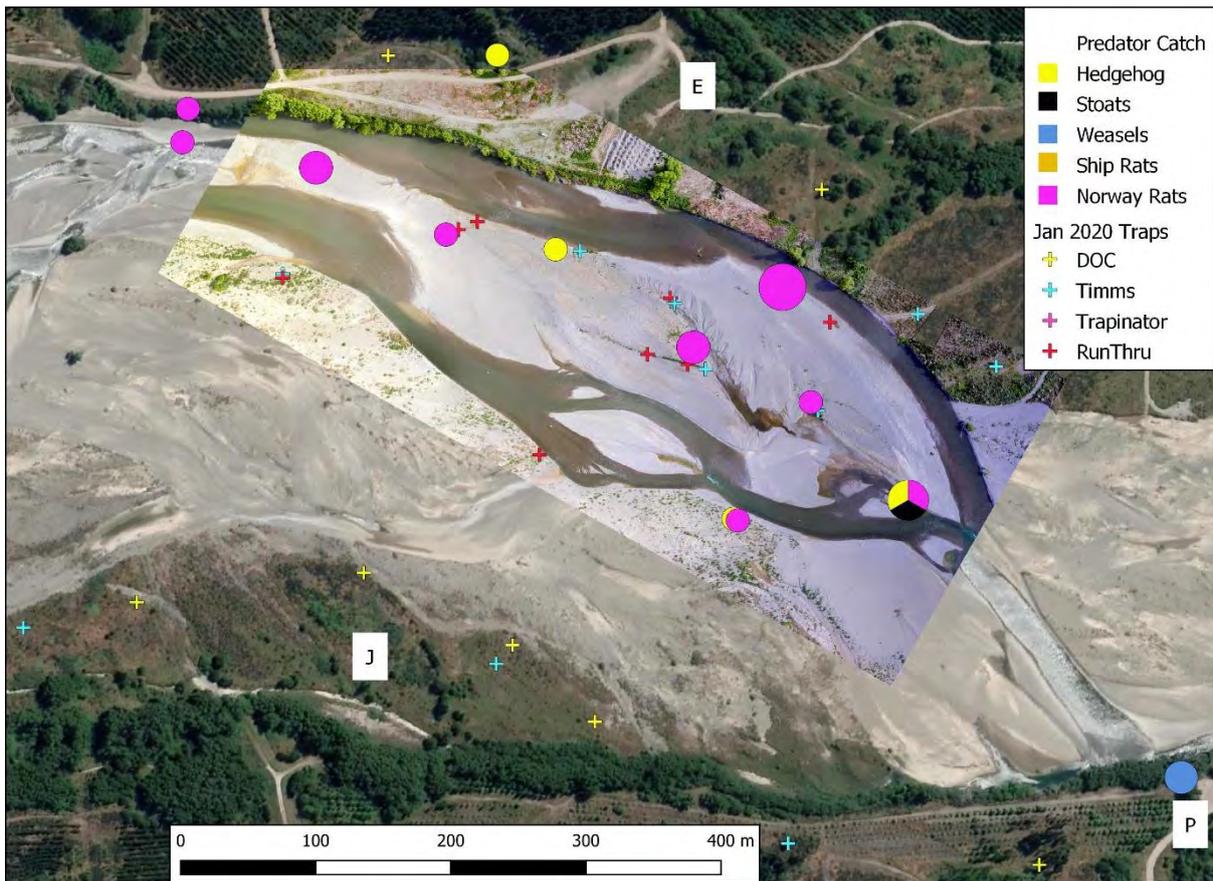


Figure 15. Predator catch 1 November 2019 – 27 January 2020

The following points are apparent:

- There was very little catch on the permanent trap lines adjacent to the colony – only a weasel on Line P and a hedgehog and a Norway rat (immediately adjacent to the river) on Line E.
- The colony traps to the south of the island only caught a Norway rat and a hedgehog – the latter in a Timms trap. This was the only trap of this type to catch anything in this period.
- By far the greatest catch was of Norway rats and on the island itself. Twelve were caught here, 4 of these in trap 19222 which was at a fallen willow tree that was still alive immediately adjacent to flowing water. From this evidence the Norway rats are to a very large extent living on the fairway of the river, at least in the nesting season, and traps on the berms will be ineffective.
- A total of 2 Norway rats were caught in lupin adjacent to the colony. None were caught where the traps were in the line of lupin which lead into the colony itself – along the south side of the island.
- One stoat was caught, also in a trap at a willow that was still alive. This was on 6 January, fairly late in the history of the colony and when water around the island was shallow. There is not much evidence of stoats being on the island, they probably didn't need to as there has been a rabbit boom on the berm. After the river had dried up, 2 rabbits were even caught in DOC 150 traps on the island.
- Only two hedgehogs were caught on the island – both on 27 January, the date the last gulls left the area. It appears that they had no impact on the birds and probably were deterred by water.

## Predator Evidence

Despite the not inconsiderable catch, trapping failed to prevent a lot of predation. Figure 16 shows a young gull inspecting a predated one just off the northern edge of the colony.



*Figure 16. Juvenile BBG with partially eaten juvenile*

After the gulls had left, evidence of the predation that had taken place could be gathered. Partially eaten chicks and piles of feathers on the island are interpreted to be mainly from rat predation. The same on the riverbanks are interpreted to be from harriers. Rat predation is interpreted from the following evidence:

- The preponderance of rats caught in the traps compared to anything else.
- The fact that most of the chick remains were within or very close to the colony perimeter. From experience it seems that other predators – cats or mustelids – carry their prey away to eat under cover.
- The partially eaten, gnawed appearance of many of the chicks – other predators seem to generally eat the entire body, leaving only feathers or sometimes wings.

One hundred and fourteen remnants of predated chicks were found, 106 interpreted to have been killed and eaten by rats (Figure 17, Figure 18, Figure 19 and Figure 20). These range from probably a few days old to fledgling or near-fledgling age. The others may have been eaten by the stoat which was caught in a trap 230m east of the colony area. Feathers found near this trap and under a willow tree look likely to have been from its kills. Figure 21 shows that most of the interpreted rat kill was within the colony area – immediately adjacent to the maximum nest density. We were not aware that this was happening until after the colony was abandoned.

Each chick remains, or group of remains, was mapped and photographed using QField – Android version of QGIS. The Samsung tablet GPS or an external Bluetooth GPS was used.



*Figure 17. Probable rat kill, meat eaten off bones*



*Figure 18. Probable rat kill, holes gnawed in body and head*



*Figure 19. Remnants of several chicks probably eaten by rats*

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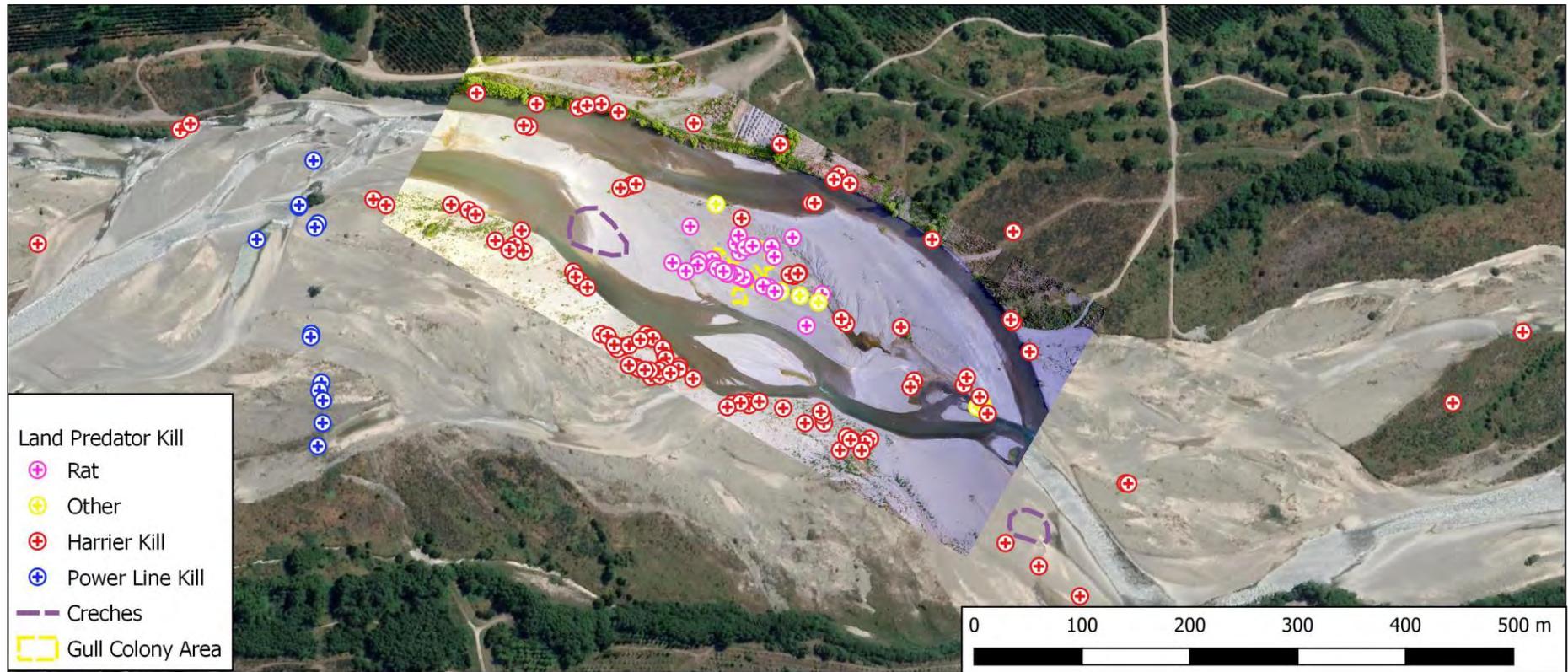


Figure 20. Evidence of dead gulls – land and air predation and power line strike

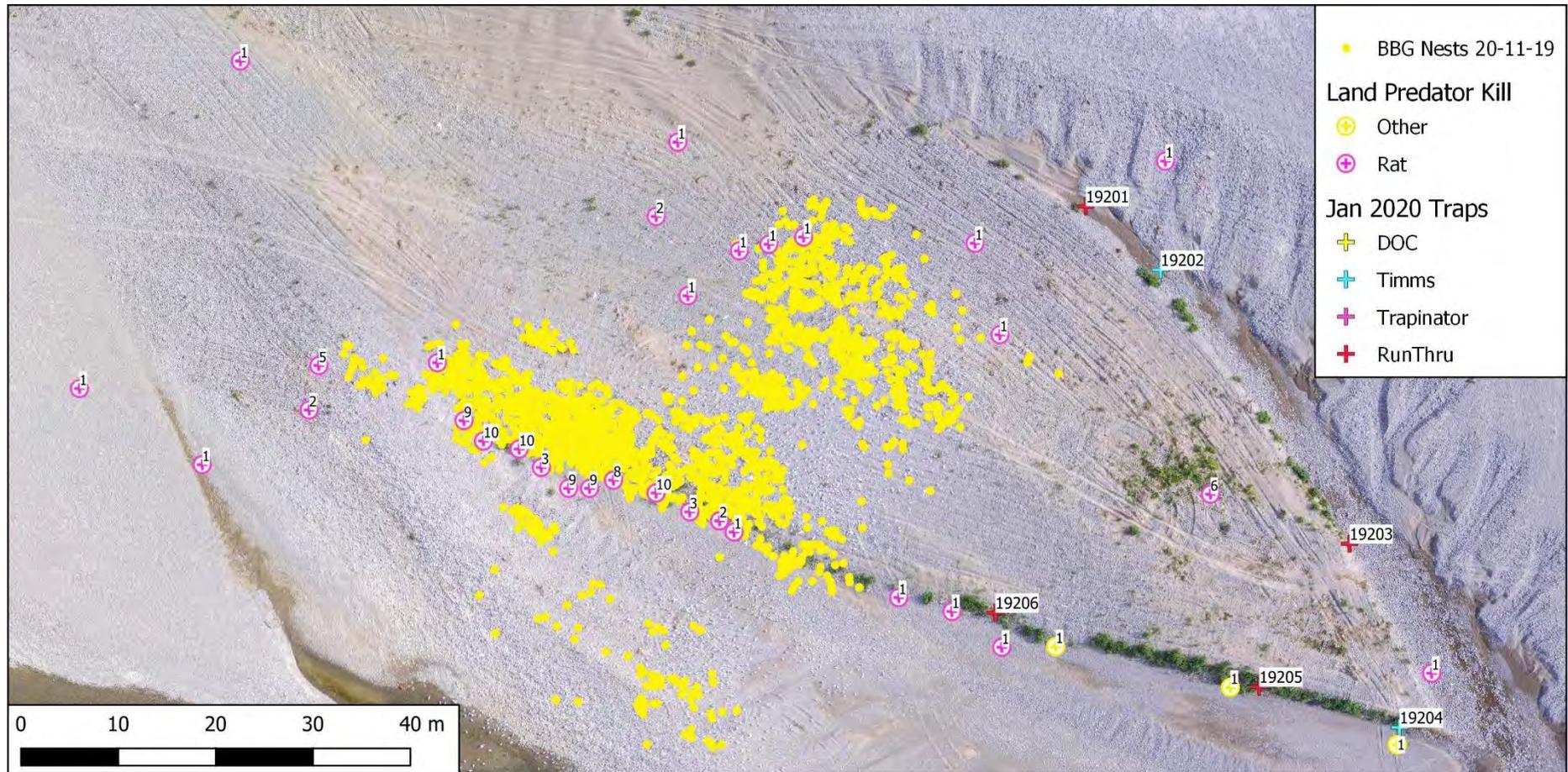
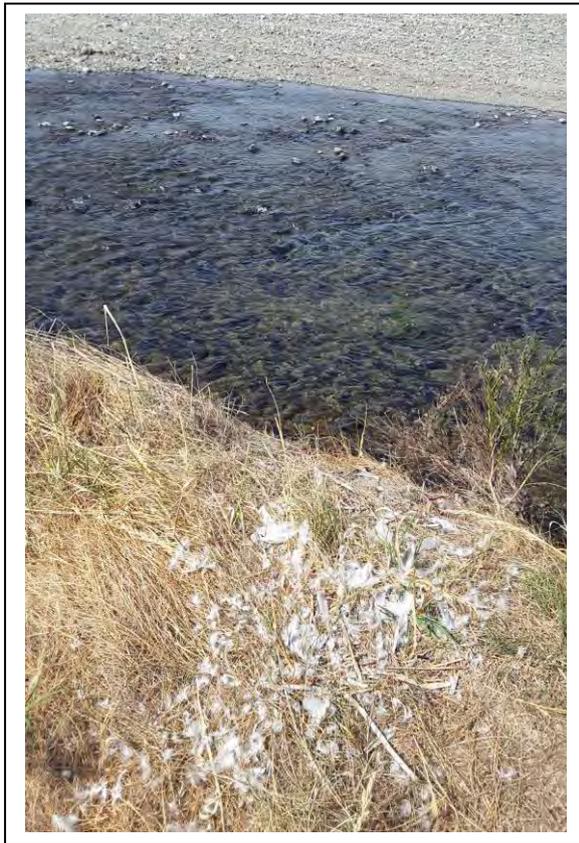


Figure 21. Enlargement of previous figure

The typical evidence for harrier predation is piles of gull feathers on riverbanks (Figure 23), but this year many of the gulls were only partially eaten (Figure 22). About two thirds of the chick remnants were feathers only, 19% included wings and about 14% a considerable amount of the body. One hundred and sixteen chicks appear to have been taken and eaten by harriers – these are of fledgling to near fledgling age, most seem to be taken when there are fewer adults around to protect them and when they start spreading out away from the nesting area. At the end of December only about 20 chicks had been taken. The only other possible explanation of these gull remnants away from the colony would be from black-backed gulls – however these were not seen in the colony area. A trail camera captured an image of a harrier carrying what is presumably a juvenile gull, with adult gulls chasing it (Figure 24).



*Figure 23. Completely eaten gull chick*



*Figure 22. Partly eaten gull chick*

Most of the chicks were taken to within 200m of the colony, but some were more than 700m away – however these could have been from a creche east of the colony area.

Harriers were not often seen at the colony; they seem to be very wary of people. Twice a hide was set up in an attempt to get photographs of harriers in action, one was seen in trees about 200m away watching the hide, but none came close.



*Figure 24. Harrier carrying gull, shadows of pursuing adult BBG*

### **Other Mortality**

The remains of 12 adult and 1 fledgling BBG were found beneath power lines about 400m west of the colony area (Figure 20). Clearly, they had hit the lines when leaving from or returning to the colony. The death of each adult would probably have led to starvation of a chick or maybe two.

Not shown on Figure 20 is another set of power lines about 850m upstream from the colony under which the remains of 7 BBG were found. These were mainly juveniles, some had been partly eaten, but perhaps by rats. It seems very unlikely that harriers would preferentially have taken the birds to eat under the power lines and so far away.

The remains of 91 chicks that appear to have died naturally and not been scavenged were found within the colony area. These chicks varied in age from probably just out of the egg to fledgling stage.



*Figure 26. Newly hatched chick*



*Figure 25. Near fledgling*

## 2.2 Black-fronted Tern Colony

Forty-eight black-fronted tern nests were found in the same area as the Railway gull colony – 46 on the same island, 2 on a small island to the south (Figure 6). This is a large colony, larger ones have been reported, but BFT colonies are usually no bigger.

Most of these nests appear to have been already in place when the black-billed gulls moved to this site on 21 October – 2 had been found on 16 October. It seems possible that some terns may have been displaced by the gulls, but some remained on their nests as close as 10m from BBG nests (Figure 27).



*Figure 27. Tern on nest, at left, in front of BBG colony*

Each nest was GPS located and photographed (Figure 28, Figure 29) through QField and the nest photo can be inspected in QGIS. Most of the nests were found by methodologically walking N-S aligned 5m spaced lines set up in QGIS and displaying on a tablet with QField. This was done over several days, ending on 4 November, to ensure birds weren't off nests for too long. No significant disturbance seems to have resulted. No chicks were seen when nests were being located.

Fifteen BFT nests were within the area which had been ripped of weeds in July. All nests were in quite coarse gravel within 40m of water (as close as 5m in one location), most would have been 0.5 to 1m above water level. The nests stretched along 532m of the riverbed. Distance from a nest to the closest next nest averaged 20m with a minimum distance of 7m and maximum of 44m. This is about 0.2 nests per 100m<sup>2</sup>. GPS accuracy on the riverbed was around

2 – 3m. More work is planned on the nest locations favoured by BFT (and other species) on the Ashley River. This will be done by inspecting photographs of each nest and mapping the gravel from drone photographs and in the field.

Two nests were found empty, 9 had 1 egg, 36 had 2 eggs and 1 had 3. When later revisited, at least one of the 1 egg nests had a second egg and at least 1 nest with 1 egg only hatched one chick. To avoid disturbance, no attempt was made to systematically revisit nests, but some were visited whilst checking traps.



*Figure 28. Tern nest*



*Figure 29. Tern nest*

On 4 November the tern colony seemed to be progressing well, with BFT adults reacting aggressively all over the area. On 8 November when traps were being checked, almost the entire eastern part of the colony was quiet. Only 1 nest east of the BBG colony was being defended. Several nests were checked and found to be empty. Trap 19222, on the water's edge in the eastern part of the area had a Norway rat. It is interpreted that rats had reached the colony between the above dates and eaten the eggs at approximately 30 nests. It is not feasible for these eggs to have hatched and the chicks to have moved off the island in such a short period of time. See trapping section above for details of catch.

Another Norway rat was found in a trap (19211) near the western end of the colony on 8 November – but little or no damage appeared to have been done to the nests in this area. BFT adults were still behaving aggressively, some of the nests checked had eggs and one had a very recently hatched chick in it and another slightly older chick was nearby (Figure 30, Figure 31). These were the first BFT chicks seen.



*Figure 31. Newly hatched BFT*



*Figure 30. Young BFT chick*

Whilst checking traps a few chicks were seen near the western nests until 28 November – on this date one swam off downriver and may have left the island – this was despite efforts to avoid disturbing it. There seemed to be only 3 pairs of adult terns acting aggressively on the island on this date. On 3 December there were still a few BFT adults on the western side of the island but by 8 December they were absent.



*Figure 33. BFT chick entering river*



*Figure 32. BFT chick swimming away*

The success rate of this BFT colony appears to have been very low. Eggs from at least 63% of the nests seem to have been raided by rats. Several chicks were successfully hatched from the western part of the colony, but they were either predated or left the colony very early. The chick in the above figures was the largest one seen on or adjacent to the colony at any stage. There was no direct evidence of predation of chicks – no remains were found – but it seems quite possible that a number were eaten by rats. Unfortunately, not enough effort was put into searching the area downstream from the colony for chicks. BFT chick behaviour must make them vulnerable to harriers – they often sit in the open with little protection from adults begging the sky for food (Figure 34).



*Figure 34. BFT fledgling, upstream from Cones Road.*

### **2.3 Other Species**

In addition to the BBG and BFT, 2 pied stilt nests and 1 pied oystercatcher (SIPO) nest were found on the island. The latter was identified from the presence of a pair of SIPO close to the nest and the slight difference in speckling of the eggs – SIPO and BFT eggs and nests are very similar. From the behaviour of the stilts after their nests were empty (1 seen empty on 12 November), eggs had successfully hatched and, although not seen, their chicks were probably raised. Two pairs of adult stilts were showing defensive behaviour for weeks after their nests were empty. It is unclear if the SIPO successfully hatched or raised chicks, no chicks were seen but adults were still seen there on 27 November.



*Figure 35. BBG on nest with SIPO near nest in background*

Pairs of banded dotterels were commonly seen on the island; they may have hatched chicks there before the BBG colony started – but none were seen.

There didn't appear to be any significant human disturbance of the nesting birds on the island – although on 3 December recent 4wd and motorbike tracks were seen within 20m of the gull colony. On or about the time of Guy Fawkes night fireworks had been set off just north of the gull colony.

### **3. Toppings Black-billed Gull and Black-fronted Tern Colonies**

#### **3.1 Black-billed Gull Colony**

This area is located about 500m downstream of where Toppings Road intersects the north bank of the river and about 1km upstream from State Highway 1.

A gull colony was found here on 13 November, but it likely started several days prior to this. The 30 x 15m site was on a gravel bar which was bounded to the north by fast-flowing knee deep water and to the south by a shallow spring-fed stream that dried up during the time the gulls were there (Figure 36). This wasn't an island, there was a 60m wide isthmus about 170m northwest of the colony. The colony was on coarse generally weed-free gravel – although there were some scattered large lupin

plants. West of the colony quite thick vegetation, mainly lupin, grew on a raised gravel bar. To the south of the colony was clean gravel, then willows with water running just north of them

Gulls were counted at quite regular intervals, as was done with the Railway colony. The initial count on 14 November was 1,280. The numbers are shown on Figure 7, an estimate of the inception date of the colony was made for this graph. Numbers dropped rapidly away as with other colonies on the Ashley. Nesting here appears to have been synchronous.

Nests were counted on 10 December from 25m height drone photos – with about 438 occupied and 72 empty ones resulting. On 16 January 2020 a total of 485 nests were counted from photographs taken from 12m altitude. Unlike the situation at the Railway colony, nests had not been destroyed and were clearly visible on the photographs (Figure 37). Nest density was up to 6 per square metre – Figure 38.

The first BBG chicks were seen on 5 December. By 23 December all were off the nesting area and were loosely creched just to the north – with a number of adults. The chicks appeared to be of very much the same age. On 13 January the gulls had shifted to 100m downstream from the State Highway 1 bridge. Juveniles outnumbered adults here. Just a few of the juveniles would not have been capable of flight, so it appears that at least some of them swam down the river to the new site. Counting was difficult, but there were approximately 125 – 150 juveniles present. On 28 January a group of approximately 125 fledgling BBG, with some adults still feeding them, were seen at the estuary. These were almost certainly the Toppings birds.

Seven traps were placed around the BBG and BFT colonies on 18 November – these consisted of 5 Coreflute boxes with DOC 150 traps and 2 Timms traps (Figure 36). During the time the gulls were in the area, there was no catch. If there had been any, more traps would have been installed. A few days after the birds had left, a Norway rat was caught in trap 19301. These traps had similar locations with respect to the colonies and vegetation to those at Railway. A close inspection of the colony area showed no evidence of ground predation.

Evidence of harrier predation was sought along the river fairway and banks for several hundred metres upstream and downstream of the BBG colony. Only 3 piles of feathers were found among willows about 140m north of the colony.

Thirty-one dead chicks were found within the colony area – most of these very small. Three fledglings were found dead in the creche area near the edge of the water, north of the colony. These appeared to be natural deaths. This area was at risk from vehicles as they can go up the river from the highway bridge – unimpeded apart from water. There was also an access point from the north bank about 250m downstream. From tracks, vehicles quite often crossed the river north of trap 19301 and drove through the BFT colony. However, they do not appear to have impacted the BBG colony. When the gulls were near the highway, there was however an incident of a vehicle driving through them killing at least 1 young gull.

### **3.2 Black-fronted Tern Colony**

Four two-egg BFT nests were found 190 to 235m northwest of the BBG colony (Figure 36) on 18 and 26 November. The area was not systematically searched for nests, and from the number of flying birds present there could perhaps have been up to 2 more nests.

Soon after the nests were found a trail camera was placed near the easternmost nest, this was stolen before the photos could be downloaded. The eggs at this nest remained for some time but were absent on 3 December. On 8 December the other nests were still intact and on 12 December there

were still 5 adults defending nests or chicks – 1 chick was seen. On 23 December 3 adults were still defending the area, but no chicks were seen. The last visit was made on 16 January with no terns present. Some chicks were hatched at this small colony, no fledglings were seen' but monitoring wasn't sufficient to rule them out.

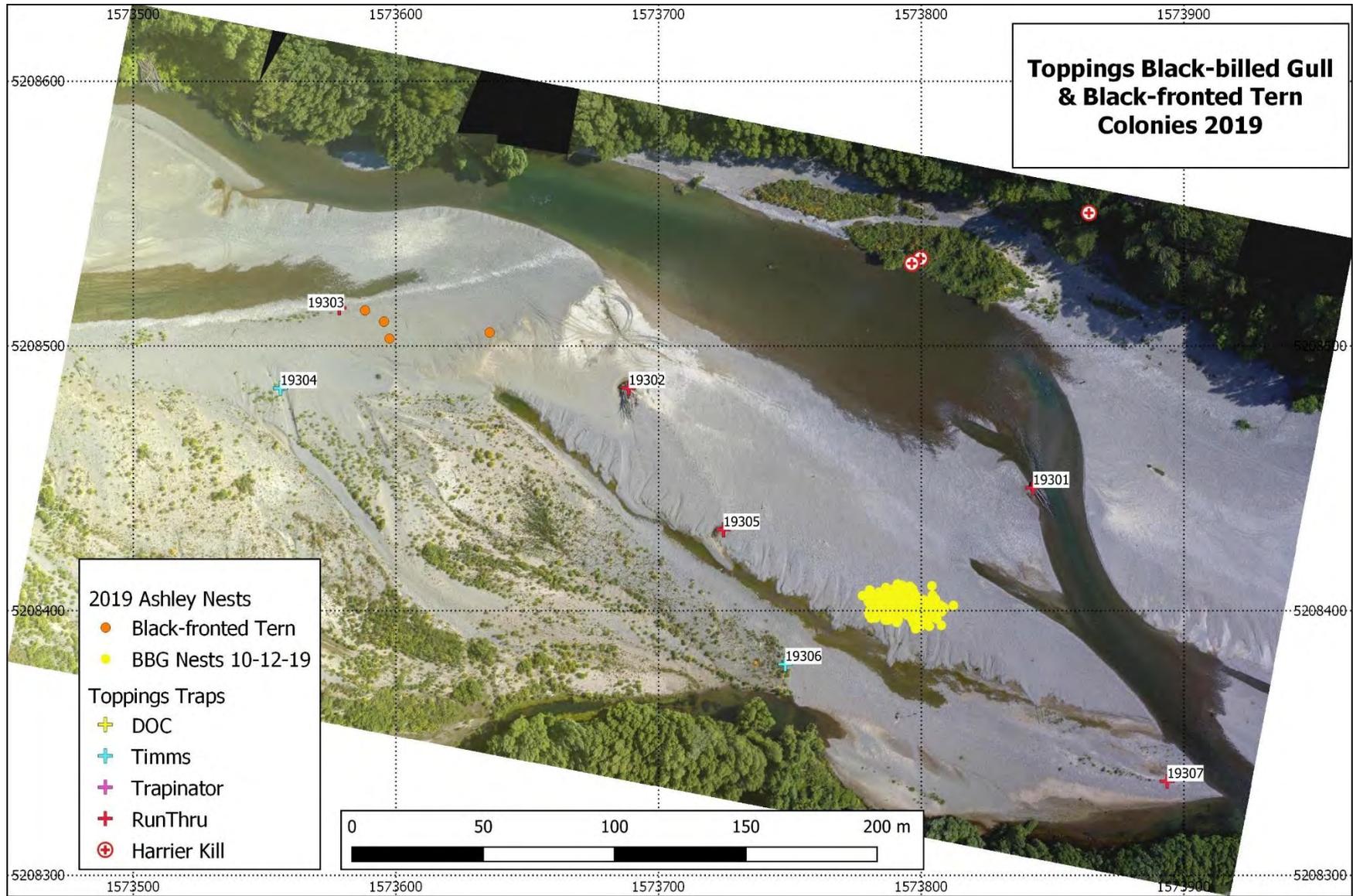


Figure 36. Toppings BBG and BFT colonies, image 14/11/19

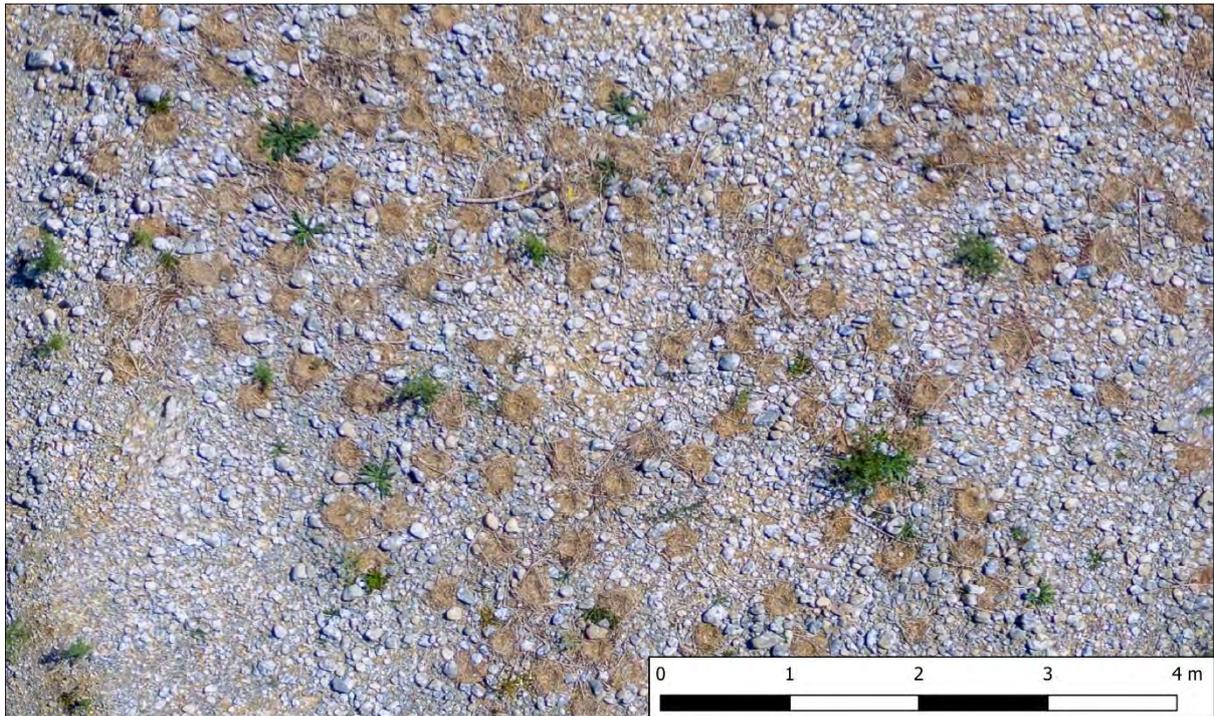


Figure 37. Nests on drone photo-composite taken from 12m altitude

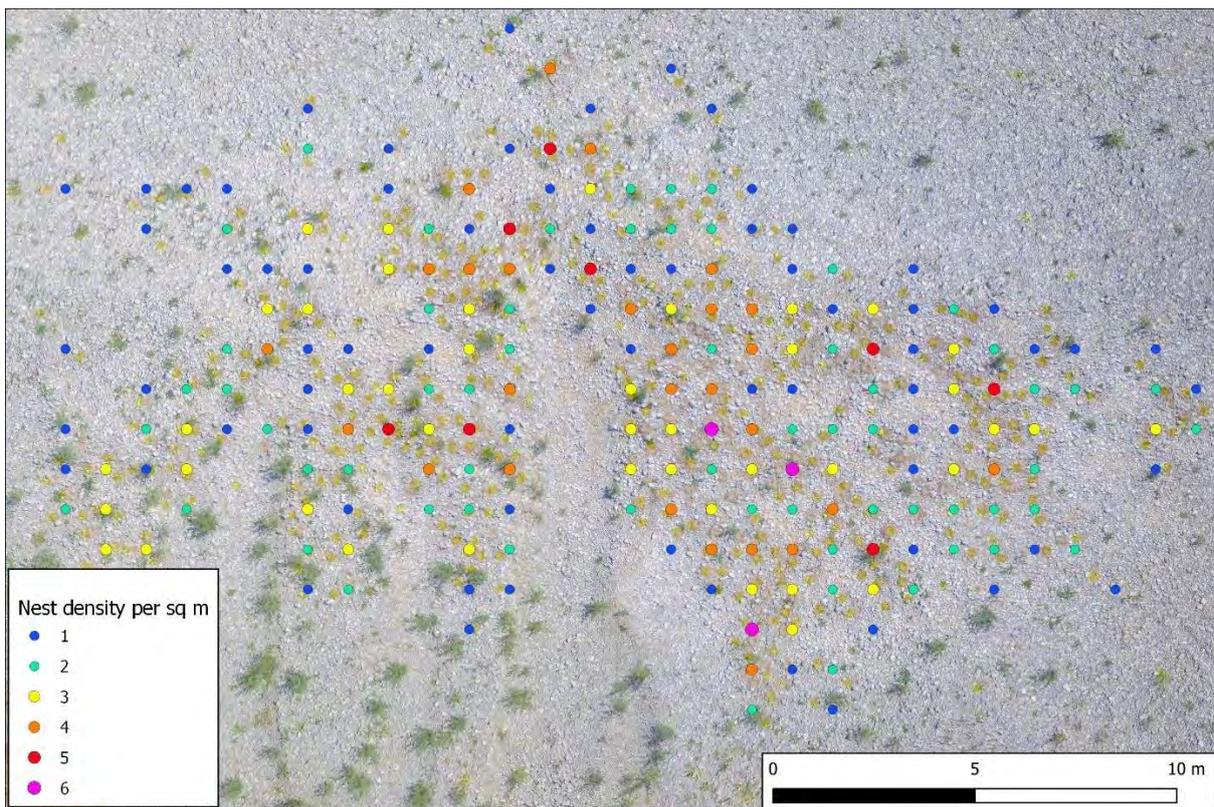


Figure 38. BBG nest density

#### 4. Groyne Nine Black-fronted Tern Colony

This area was almost identical in character with the Toppings colony site – bounded to the north by a quite deep fast-moving river and to the south by a spring-fed stream (Figure 39). There was also a narrow (40m wide) isthmus at the north-western end. West and southwest of the colony area was a raised gravel bar with quite thick lupin and rapidly growing broom and gorse. The colony area itself was almost weed-free but there was some driftwood and willow logs to provide cover for predators. There didn't seem to be any human disturbance of this colony.

Terns were gathering at the area by early October with at least 70 seen on the 4<sup>th</sup>. At this stage nests had not been made. The first nest was located on 6 November and new nests were discovered until 29 November. The latest laid eggs seemed to be in the south-eastern part of the area. This colony was not systematically searched for nests, on each visit birds rising from the gravel were noted and their nests found. A total of 13 nests were found, but there could have been 20 or more present. There could also have been BFT nests to the north of the active river channel.

There was a wrybill nest found in the area – the banded pair successfully hatched chicks. From their behaviour, several stilts were nesting nearby. A few banded dotterel pairs were commonly seen in the area, and later on, there were chicks.

BFT nest spacing varied from 9m to 62m (average 30m) with the closest nest to water being about 10m away, the furthest about 35m – however not all nests were found. Nests were in coarse gravel.

Despite Norway rats being present in this colony (see below), there did not appear to be widespread loss of eggs as happened at the Railway colony. During the nesting period there were adult terns defending nests or chicks over most of the area and, when nests were checked, they did not seem to be prematurely empty.

On visits of 16 and 19 November there were 46 and 50 adult BFT seen. This dropped to about 20 from 25 November and to about a dozen from 8 December. By 7 January 2020 no terns were in the area. A very few small chicks were seen from 16 November until 13 December and several times from 13 December a maximum of 2 fledglings were seen. The area upstream and downstream was probably not thoroughly enough checked for fledgling terns, but it appeared that fledgling success was low.

Eleven traps (9 DOC 150 in Coreflute boxes and 2 Timms) were put out on 22 October – these were mainly in the vegetated area to the west of the colony with only 1 on the gravel near the colony (Figure 39). On 9 and 12 November a further 7 traps (5 DOC 150 and 2 Timms) were installed. This was after a Norway rat was found in a trap at willow logs on the edge of the river. Most of the new traps were put in driftwood or logs close to nests. There were no permanent traps in this general area, the closest on the north bank was about 200m downstream, on the south bank about 650m downstream.

Figure 40 shows the catch from 1 November 2019 to late January 2020 – the largest dots/pies represent 4 predators per trap, the smallest 1 per trap. During this time the only catch out on the bare gravel in the colony area was Norway rats. Hedgehogs were most commonly caught to the west, but 4 Norway rats were also caught – mainly in traps close to the water. Two stoats were also caught. After late January a hedgehog was caught in trap 19112 – out on the bare gravel in the colony area – and Norway rats were still being caught in this area.

The apparent low success rate of this colony can be perhaps attributed to rat predation – however no remains of predated BFT chicks were found.

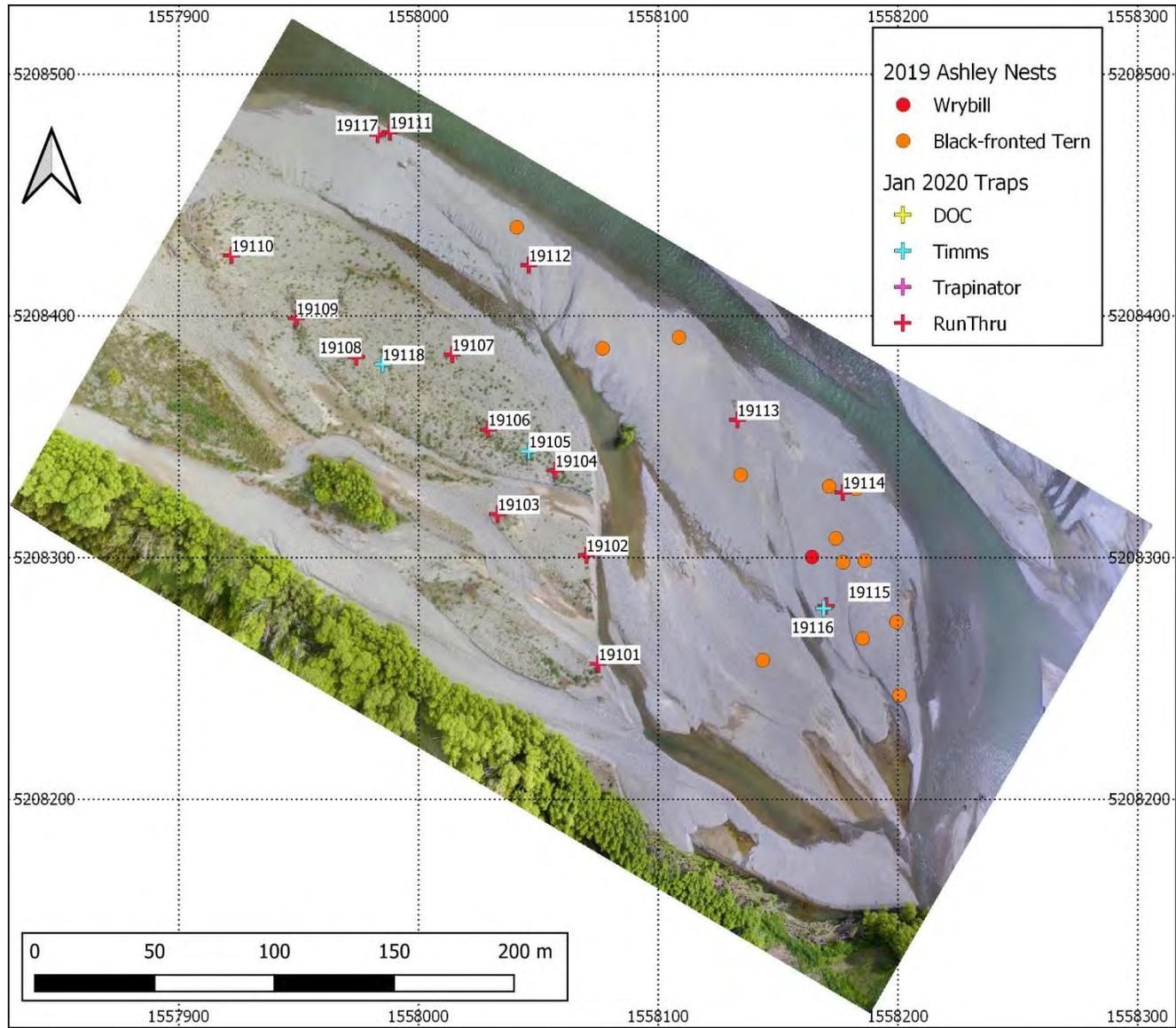


Figure 39. Groyne 4 BFT colony and traps

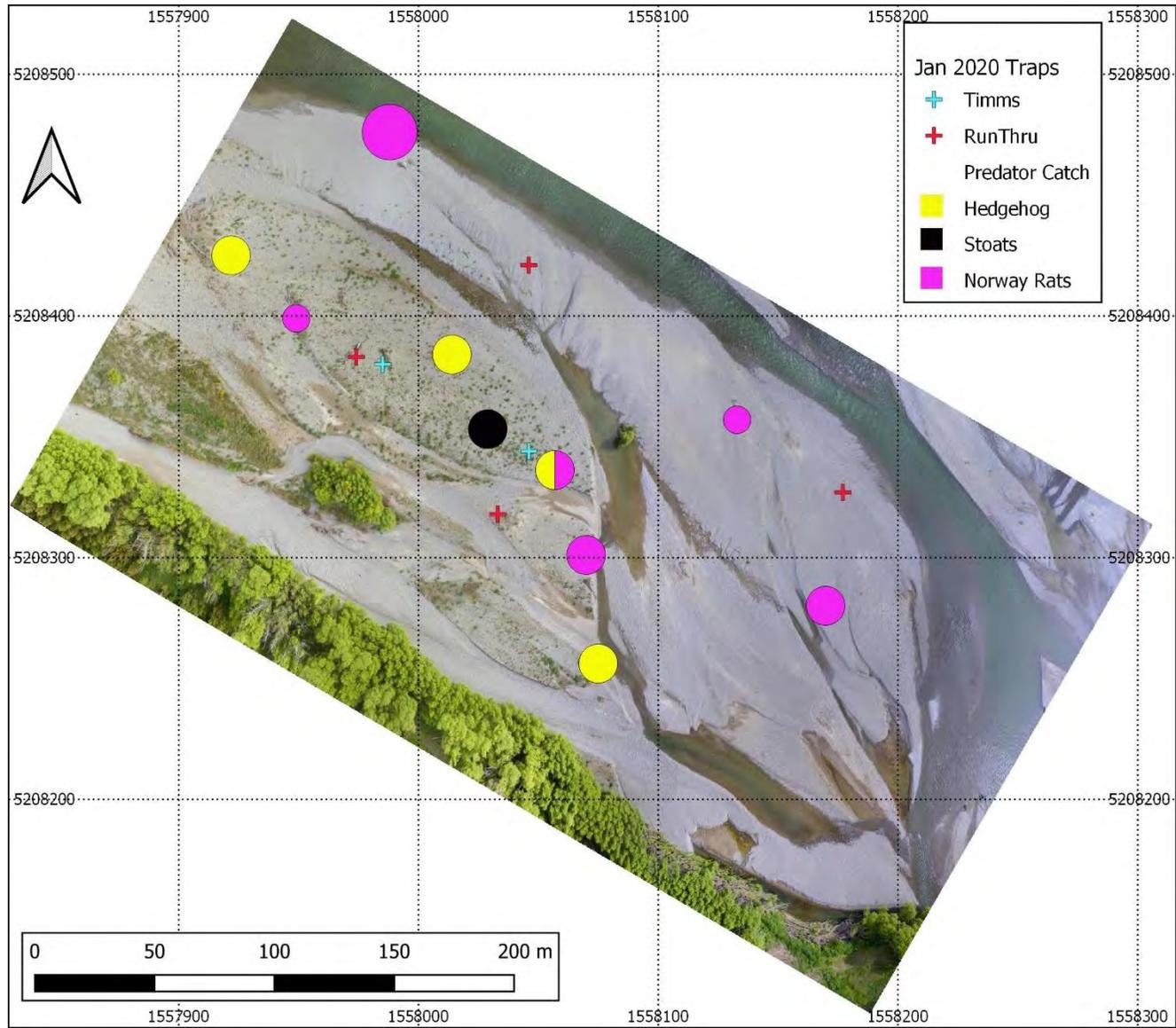


Figure 40. Predator catch 1 November 2019 – 27 January 2020

## 5. Groyne Four Black-fronted Tern Colony

This was located 1km upstream from the airport on the western end of a very large nearly 1km long by 300m wide island (Figure 41). Figure 41 is on an August 2018 Google Earth image, the layout of the river was similar in the 2019 nesting season, but the southern channel was further south than in 2018. In the area of the nests there was little or no weed, toward the eastern end of the island there is extensive weed cover, including gorse and broom. This area saw quite considerable vehicle traffic during the nesting season, with beaten tracks through the middle of it and to the north.

The first 2 BFT nests were found here during the annual bird survey on 16 November. At this stage there were about 15 terns in the area and the colony seemed fairly new. One of these nests still had eggs on 29 November. Nests were not systematically located in this area, but 15 were found over about 200m of riverbed whilst monitoring the colony and checking traps – the last one was found on 10 December.

Nest spacing varied from 13 to 73m with an average of 31m – but not all nests were found. It seems likely that there were approximately 10 that weren't located. All nests were surrounded by coarse gravel, but were sometimes on a sandy pebbly base.

The number of adult terns increased to a maximum of about 40 on 13 December, then dropped away. First chicks were seen on 13 December with 2 fledglings seen on 24 December. Chicks gathered upstream of the colony area and on 7 January 4 fledglings and at least 4 small chicks were present here. There could have been considerably more small chicks than this – they hide very effectively and tend to panic and run if you get too close – so the area was observed from some distance. On 31 January there were no terns in the area.

Two pied stilt nests were found, but from the number of adult stilts in the area, there could easily have been another 6 present. In January there were several pied stilt juveniles in the area. Pairs of banded dotterel were commonly seen, and likely nested in the area prior to discovery of the tern colony.

On 19 November 4 traps – 2 Timms and 2 Coreflute DOC 150 – were installed. On 10 December 2 more traps were put in – a Coreflute DOC 150 and a standard plastic rat trap in a Coreflute box. All traps were put next to driftwood or willow logs. Trap 19406 was burnt when the driftwood it was in was set alight. The only predators caught in these traps were a hedgehog – found on 16 January, probably after it would have been a danger to nests or chicks – and 2 Norway rats on 28 February. There were permanent trap lines on the north and south banks, during the nesting season none of the traps adjacent to the colony caught anything. On 28 February 2 fledgling tern wings were found in the colony area. These were from different birds in locations tens of metres apart.

This appeared to be the most successful BFT colony in the 2019 – 2020 nesting season, seemingly due to low numbers of predators.

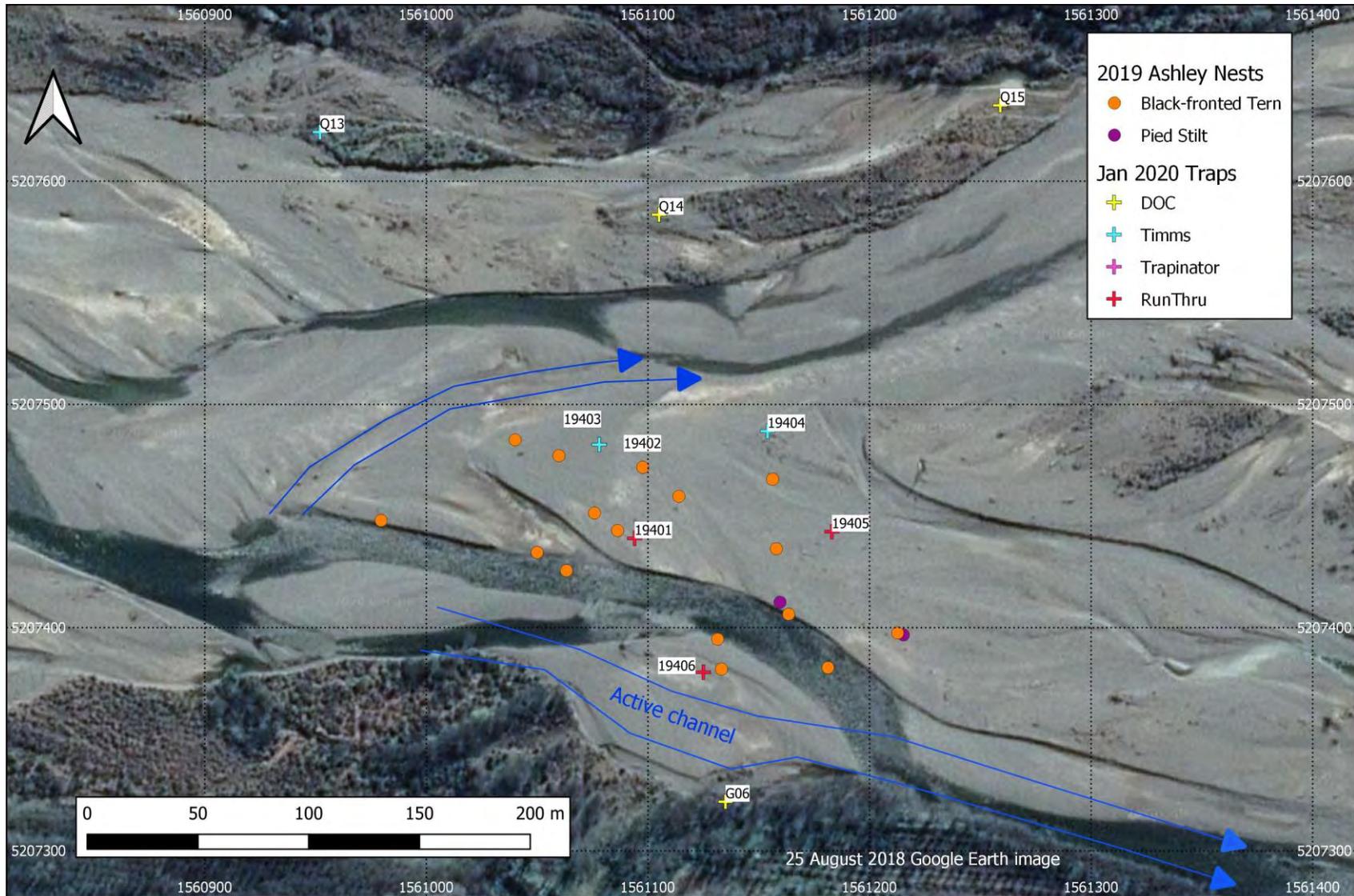


Figure 41. Groyne 4 black-fronted tern colony

## **6. Other Black-fronted Tern Colonies**

Terns were known to nest in 4 locations (Figure 1) other than those detailed above.

### Cones Road

This site was 300m downstream from the Cones Road bridge. On 20 December 8 BFT were in the area and appeared to be protecting nests. One 2-egg nest was found, but by 6 January it was empty and there was another empty nest nearby – with no terns protecting the area. This small colony seems to have been unsuccessful. On 31 January there were 18 terns just below the bridge, including 3 juveniles, but they were probably from elsewhere.

This is an area with high human disturbance – including vehicles and dog walkers.

### Marchmont – Smarts

Seven nests in 2 clusters were found between 4 and 6 January along 200m of riverbed between the Marchmont and Smarts entrances to the river. At this time there were about 20 adults present. There could possibly have been several more nests in the area. On 19 January two of these nests still had eggs and a third had an egg and a chick. On 28 January there were about 30 terns here, but by 31 January there were none left in the area – this colony seems to have been unsuccessful.

Quite large numbers of terns had been seen in this area, up to 26, between August and December.

### Tulls

On 31 January 2 adults were seen protecting 2 very young flying fledglings. It seems likely they were from a nest or nests nearby.

### Toppings Upstream

On 12 December there were about 30 adult BFT on the riverbed about 500m upstream from the Toppings entrance. One small chick was seen – perhaps several days old. The terns did not appear to have nests – after flushing them up, they did not settle on nests and few showed threatening behaviour. This seems to have been a small colony, the success of it is uncertain as the site wasn't revisited.

### Estuary

On 13 December there were 12 BFT on an island just above where the river enters the estuary – not shown on location map. One two-egg nest was found, but probably others were present. There had also been 12 BFT seen in this area during the annual bird survey on 16 November. On 31 January no terns were present here. This area is subject to very high human disturbance, especially during the whitebait season – when in addition to terns, pied stilts and banded dotterels nest here. The tern colony wasn't properly monitored, but it seems unlikely that it was successful.

## **7. Conclusions**

Two of the 4 monitored colony locations (Groyne 9 and Toppings) were in remarkably similar situations – on a point bar at a south bend in the river with the bar almost cut off by a spring-fed stream. A third (Railway) was also similar – at a south bend in the river, but on a braid bar/island. The fourth was on the upstream end of a large channel bar/island. These observations are likely coincidences, but they are worthy of follow up.

All nests were in coarse gravel – generally of 10 – 20cm maximum size. Sometimes quite sparse large pebbles were on a sandy base.

BFT nests were in weed-free gravel – with closest lupins generally 10m or more away. A few nests were within 3m of large lupin plants. BBG were more tolerant of weeds with many nesting within a few metres of lupins and some beneath large plants. They also favoured close to logs as nest sites.

This year there was little correspondence of colonies with gravel extraction areas – but at least 1 pair of BFT perhaps nested in a recent extraction area at Tulls. There was no colony nesting at the large Swamp Road extraction site which was active in 2018. Presumably the general lack of weeds on the river was the reason for this. In rivers with thick weeds a high correlation between gravel extraction and nesting has been observed.

At Railway predators probably approached the BBG colony along a line of lupins left around the edge of a cleared area. Last year predators also seemed to approach a BBG colony along a similar line of lupins.

The only area ripped of weeds that was used for a colony was at Railway where 82% of the BBG nests and 31% of the BFT nests were within it. However, this area did not have thick weed cover prior to ripping and may have been used even if it hadn't been ripped. The only other birds known to nest in ripped areas were a few banded dotterel and 2 pairs of SIPO. Much of the ripped area was probably too sandy for BBG, BFT and wrybill to nest. A total of 15.5ha of weedy islands had been machine ripped in mid-2019.

It seems clear that one of the main reasons for the large increase in nesting BBG this year was flooding in the Waimakariri River. It is unknown whether the BFT increase could have a similar cause. The continued large amount of bare gravel/small area of weeds is no doubt a major factor in the increase in bird numbers.

Norway rats are interpreted to have been by far the most important land-based predator this year – with over a hundred BBG chicks killed at Railway and more than half of the BFT nests robbed prior to hatching. Rats may have also killed BFT chicks at Railway and Groyne 9. Norway rats seem to have been present in high abundance at Groyne 9 and Railway but absent at Groyne 4 and Toppings. At least in the nesting season, they seem to be living in the fairway of the river with nests very close to water. This makes them very hard to kill as traps are too much at risk of floods in these locations. They also seemed to have a strong preference for live chicks and eggs over cat biscuits and peanut butter in traps.

At Groyne 9 hedgehogs were abundant on a high weed-infested gravel bar adjacent to the BFT colony, but they were not caught in the weed-free colony. Perhaps the lack of cover deterred them, but also the colony area was partly surrounded by water. After the river dried up hedgehogs were present in the colony area at Railway.

Other predators such as stoats, cats and ferrets seem to have had a minimal effect. It seems likely that they had no need to go to the colonies (at Railway swimming would have been necessary) as there were an unusual number of rabbits, mice and rats on the berms.

Harriers were a major predator of BBG chicks at Railway with 116 chick remnants attributed to them. In 2018 there was evidence of only 25 chicks having been predated by harriers from a large BBG colony just over 2km downstream from Railway, and at Toppings this year only 3 chicks appear to have been killed. Many of the chicks this year were only partly eaten whereas last year only piles of feathers were left. At Railway this year the harrier activity cannot be called normal and natural and must be regarded as dangerous. Harriers could also have robbed BFT nests and taken chicks.

Power lines caused deaths of BBG adults near the Railway colony.

At Railway 91 dead chicks were found in the colony area from 1547 nests – 6%. These probably died of starvation or other natural causes. At Toppings it was 31 from 438 occupied nests – 7%. In 2018 it was 3%. These numbers are no doubt under-estimates. It doesn't seem that these dead chicks are attractive to harriers or black-backed gulls.

Human disturbance had very little impact on the colonies this year. It was very noticeable that much more traffic of 4wds and motorbikes happened after the concrete blocks were removed from access ways following the end of the breeding season.

The number of fledgling BBG produced from the Toppings colony is estimated at about 140 or 32%. However, if 2 chicks were produced from each nest, 31 lost to starvation and only 3 lost to harriers – there is a large discrepancy of unknown cause.

At Railway, counting BBG fledglings with any degree of accuracy was impossible. But the best estimate is 700 – or 45% per nest. Given the amount of predation at Railway compared with Toppings, this does not seem reasonable.

BFT fledgling success seemed to be very low from observations at each colony – with only 2 seen at Groyne 9, 4 at Groyne 4 (although there could have been significantly more than this) and none at all at Railway. However, some chicks may have left the colony and been undetected. On a bird count from the Okuku to the estuary on 31 January 23 fledgling BFT were seen. There were also “a dozen or so” fledglings where the river meets the estuary on 11 January. It is possible that some of the fledglings seen were from a known colony in the Okuku River above the gorge or from other unknown Okuku River or upstream Ashley River colonies. It is also perhaps possible that the fledglings near the estuary were from nests on the beach or even from the Waimakariri River. The most optimistic scenario is 46 fledglings from the estimated 120 nests on the Ashley – or 38%.

Breeding results are summarized below:

Species	Location	Nests	Fledgling Success	Comments
Black-billed gull	Railway	1547	45%	Inaccurate fledgling count
"	Toppings	438	32%	Quite accurate count, discrepancy between nest numbers and lack of predation not understood
Black-fronted tern	Railway	48	0?	Monitoring of fledglings insufficient
"	Groyne 9	13+	10%	"
"	Groyne 4	15+	20%	"
"	Toppings	4+	0?	"
"	Cones Rd	2+	0	"
"	Marchmont – Smarts	7	0	"
"	Tulls	2?	100%	"
"	Toppings upstream	?	?	"
"	Estuary	1+	?	"
<b>Black-fronted tern</b>	<b>All locations</b>	<b>120</b>	<b>19%</b>	<b>Total nests include estimates in colonies where all nests weren't located. Fledgling numbers used are those counted on the river on 31 January</b>

Predation of black-billed gulls is summarized below. There was not enough evidence of predation of black-fronted terns to quantify.

Location	Predator/Cause	Predated
Railway	Rat	106
"	Stoat	8
"	Harrier	116
"	Natural	91
Toppings	Harrier	3
"	Land predator	0
"	Natural	31

## 8. Recommendations

This year ground and air predators – rats and harriers – were the main danger to colonies. However, weeds remain the biggest long-term threat – if weed cover returns to 2014 levels nesting habitat and feeding habitat will be markedly reduced and there will be more access for predators to approach the colonies. The following are recommended:

- Work to try and determine the best sites to clear weeds – most species appear to favour coarse gravel to nest on whilst many of the higher islands which otherwise appear to be good sites are sandy. There may also be sites which are more favourable on a geographic basis. These include wider areas of the river where floods don't go bank to bank, sites distant from power lines, perhaps particular gravel bar geometries, and stable areas where islands are not being very actively eroded.
- Raise funds to clear as many favourable sites as possible for next year's nesting season – with ripping and hand clearing. Some of the islands that were cleared in 2018 but did not attract nesting birds will have to be cleared again to help study the long-term effect on weeds.
- Try to influence Environment Canterbury to point gravel extractors toward some of the high sandy islands. Clearing weeds from these may not be of use, the sand probably needs to be moved off them.

The following are recommended with respect to predators:

- Hand clear any weeds immediately adjacent to colonies to provide less cover.
- Monitor more closely what is happening within the confines of colonies – this year rats appear to have been very active at Railway without us knowing.
- Put out more colony traps as early as possible. Also use bait in bait stations securely tied to logs or vegetation.
- Trial the use of "fences" made from lupin etc to direct predators to traps.
- Try to understand more about the Norway rat population and where they live during the year. In the nesting season they seem to be confined mainly to the fairway of the river, and to live very close to water – but only in some locations. We could perhaps increase the density of our permanent traps and baits around these areas.
- Alter the design of the run through colony traps so they effectively kill hedgehogs.
- Install trail cameras at all colonies to provide proof of predator activity. This year the rat predation was interpreted not proven, and the full impact of harriers is not known.
- If harriers appear to be a problem, we should try scarecrows. Shooting or trapping them doesn't seem an option in this area.

Blocking access to the river was successful this year. Next year hopefully access at Cones Road can be blocked off earlier. There needs to be more signage at one of the other main access points – that from State Highway 1.

Monitoring needs to be improved –

- More traversing of the riverbed is needed to locate colonies. We should also try to find and monitor some banded dotterel nests.
- More emphasis should be put on counting BFT and BBG fledglings.
- Powerlines should be checked at least fortnightly during the nesting season to properly quantify the number of birds killed by collision with them.

Grant Davey

28/2/20