

# Upper Rakaia Trapping Project

Annual Report 2019-2020

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**Black fronted tern chick and egg. Photo: Rob Carson-Iles**



Department of  
Conservation  
*Te Papa Atawhai*

New Zealand Government

## SUMMARY

- This is the third season of predator control in the Upper Rakaia. We report on the results of the predator trapping operation, residual pest monitoring and outcome monitoring.
- There were 150 DOC150 double-sets, 108 DOC250 single-sets, 40 SA2 Kat traps and 41 Timms traps deployed.
- A total of 15 cats, 45 mustelids, 27 possums, 145 hedgehogs, 42 rats and 0 harriers were caught in all trap types combined during the 2019/20 season.
- A total of 535 black-backed gulls were culled in the alpha-chloralose operation in February.
- 27 wrybill nests were monitored in the Upper Rakaia. Hatching success was 0.52 and fledging success was 0.29-0.36.
- Black-fronted tern nests were monitored inside the predator control area. 11 of 30 nests monitored with known outcome hatched at least one egg (hatching success 0.37), however no chicks were known to fledge as all nests were lost to a flood event.
- No black-fronted tern colonies or wrybill nests were successfully found or monitored for outcome in the Rakaia River outside of the treatment area.
- Significant flooding events in November and December negatively impacted on wrybill and black-fronted tern productivity in all rivers where outcome monitoring was undertaken.

## INTRODUCTION

This was the third season of the Upper Rakaia Predator Control Project which commenced in 2017/18 and is currently scheduled to continue until 2023. The project is testing whether, in addition to control of avian predators such as black-backed gulls, mammalian predator control on the southern side of the river, that utilizes the main channels of the river as a barrier to mammalian predators approaching from the northern side, can adequately protect threatened and declining river bird species. Outcome monitoring is focused on the recovery of two key threatened species: wrybill/ngutuparore (*Anarhynchus frontalis*: nationally vulnerable) and black-fronted tern/tarapirohe (*Chlidonias albobriatus*: nationally endangered), but additional bird and reptile species are expected to benefit. The project is funded by ECan, DOC, the Rakaia Environment Enhancement Society and the Coleridge Habitat Enhancement Trust. Further information regarding the background of the project is available in previous annual reports.

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The predator control project is run in conjunction with a large scale weed control program funded by ECan, LINZ, DOC and the Rakaia Environment Enhancement Society that helps provide suitable breeding and feeding habitat for braided river bird species

This report covers the methodology and results of predator control and outcome (wrybill and black-fronted tern) monitoring for the 2019/20 season (1 March 2019 – 28 Feb 2020).

*Project staff*

The predator trapping network and the black-backed gull control, are carried out by a combination of contractors and DOC staff. Project outcome monitoring is carried out by DOC staff.

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## PREDATOR CONTROL

### Methods

#### Trap locations

The project area is centered around three sites on the true right of the Rakaia River above the gorge. Each site consists of a large area of bare shingle and gravel riverbed protected within a high-flow bend in the river. Traplines have been established on the adjoining river bank (Fig. 1) with the kind permission of the landowners.

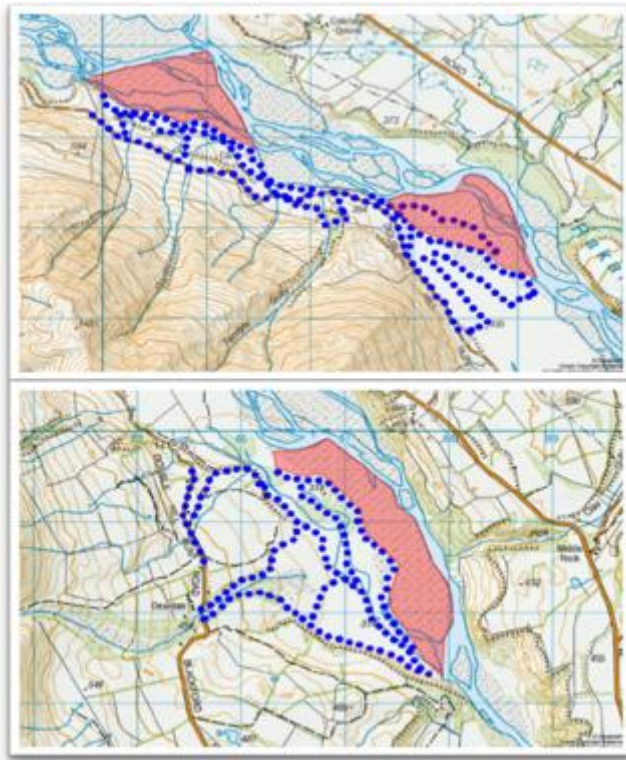


Fig 1. Location of traps in the Upper Rakaia. Red shaded areas show the approximate position of the areas targeted for protection through predator control.

#### Trap type and bait

All kill traps are scheduled to be opened in July, closed in February and checked monthly during that period. They are baited with fresh rabbit, except during November and December when high ambient temperatures cause rapid deterioration of the fresh rabbit bait, and Erayz<sup>TM</sup> bait is used.

Table 1. Trap numbers and type in the Upper Rakaia in 2019/2020.

	Trap numbers
DOC150 double-set	150
DOC250 single-set	108
Steve Allan SA2 cat trap	40
Timms traps	74

### Black-backed gull control

As in the previous year weather systems played a significant role. Although pre-feeding of colonies began in December 2019, high water levels impeded access and broke up colonies. In February three colonies (at Montrose and Cleardale) were identified with an estimated total of 660 adult birds. An alpha-chloralose operation was carried out in mid-February targeting all colonies.

## Results

### Kill traps

Traps were armed and checked monthly from August to January (inclusive). In December 2018, 72 (17%) of kill traps were lost in a flood event. Due to the lost traps being located in areas at risk of flooding, they were not replaced for the 2019/2020 season. As it transpired this was a good decision due to repeated floods events in November and December 2019. A total of 372 traps of all types were used in the 2019/2020 season.

Table 2. Number and proportion of species caught in kill traps in the Upper Rakaia from the 2017/18 season and 2019/20 season.

	2017/2018	2018/2019	2019/2020
Cat	15	33	15
Ferret	1	3	4
Stoat	14	36	24
Weasel	23	34	17
Possum	21	27	27
Hedgehog	234	228	145

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Rat	24	77	42
Harrier hawk	0	0	0
<b>TOTAL PREDATORS</b>	<b>332</b>	<b>438</b>	<b>274</b>
Rabbit/Hare	4	6	15
Mouse	40	48	28
Exotic bird	0	21	0
<b>TOTAL OTHER</b>	<b>44</b>	<b>75</b>	<b>43</b>
<b>Total kill traps</b>	636	636	372
<b>Total trap nights</b>	96,672	116,388	102,846
<b>(Captures per 100 trap nights)</b>	(0.34)	(0.38)	(0.27)
<b>Adjusted trap nights</b>	<b>91,031</b>	<b>108,708</b>	<b>63,321</b>
<b>(Captures per 100 adjusted trap nights)</b>	<b>(0.36)</b>	<b>(0.40)</b>	<b>(0.43)</b>

#### Live capture traps

Due to DOC staffing resources and a lack of contractor availability, no leghold trapping was carried out in the 2019/2020 season. If Covid-19 restrictions are lifted, live capture trapping will resume in the Upper Rakaia in late autumn 2020.

#### Black-backed gull control

In the Upper Rakaia, 535 adult gulls were culled in an alpha-chloralose operation on 11 February 2020. As many affected individuals were collected (and euthanased if not already dead) and disposed of as possible, although it is likely that some birds were not recovered. Prior to the operation there were an estimated 660 adult birds spread over three colonies Montrose and Cleardale (Bromwich and Fraser, 2020)



Figure 2: Contractor feeding out bread for the alpha-chloralose operation

Overall control summary

Table 4. The total number of animals destroyed in the Upper Rakaia for the 2019/20 season.

	Upper Rakaia
Cat	15
Ferret	4
Stoat	24
Weasel	17
Possum	27
Hedgehog	145
Rat	42
Black-backed gull	535
Harrier hawk	0
<b>TOTAL PREDATORS</b>	<b>852</b>
Rabbit/Hare	15
Mouse	28
Exotic bird	0

<b>TOTAL OTHER</b>	<b>43</b>
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The figures below show the numbers of key predators (cats, ferrets, stoats, weasels and hedgehogs) destroyed in all trap types for the duration of the Upper Rakaia predator control project.

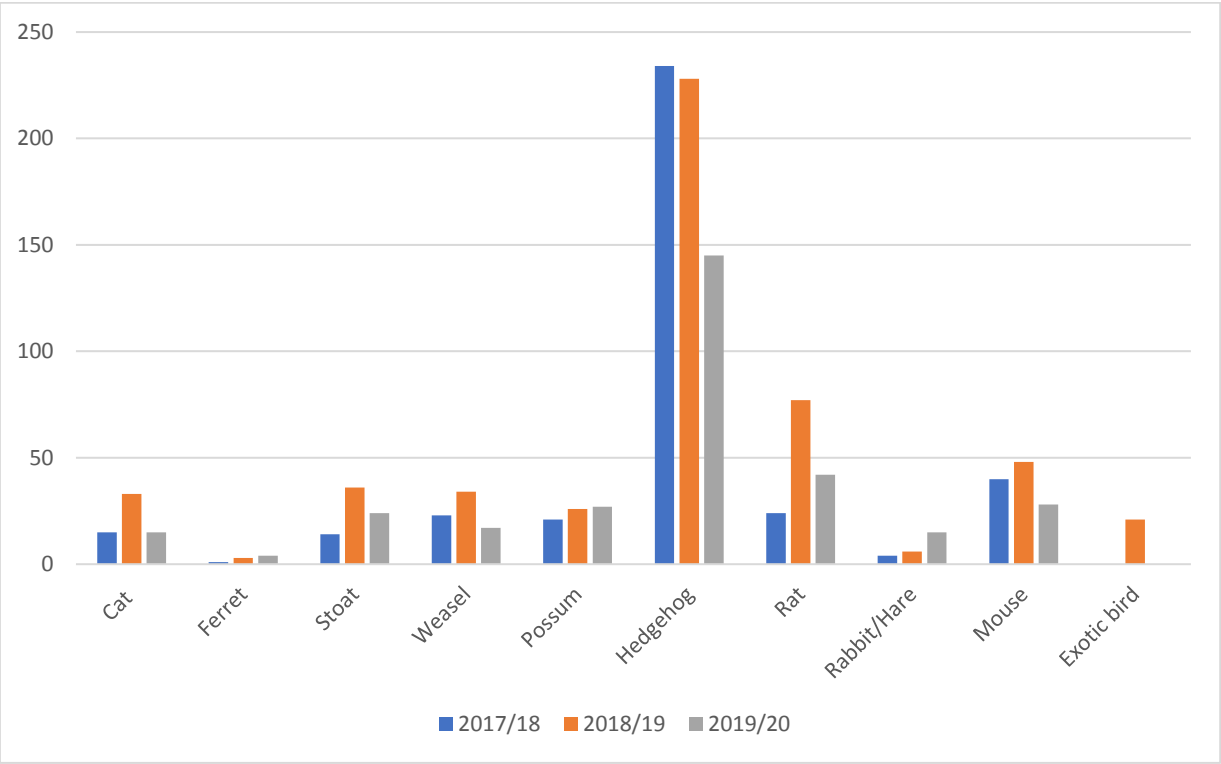


Fig 3. Number of animals destroyed in the Upper Rakaia by season (2017/18 – 2019/20).

## OUTCOME MONITORING

### Introduction

Wrybills and black-fronted terns are the focal species for this project, and their productivity is monitored closely. In addition to this, walk-through river surveys of the Rakaia and Rangitata rivers provide data on numbers of wrybills, black-fronted terns and other native bird species – especially wading birds.

### Methods

#### Breeding success of river birds

##### *Wrybills*

Protocols for finding and monitoring nests and chicks generally followed Leseberg et al. (2005). Survey and monitoring was carried out by Marcia Kimber, Ethan Taswell, Kate Morrison, Anna Aichele, Clare Halpine, Nancy Collis, Graeme Ure and Brad Edwards, from the Geraldine DOC office and walking surveys for nesting wrybill and black-fronted tern pairs began in September 2019.

Nests are checked every 3-7 days, as river conditions permit, until they have either hatched or failed. Empty nests are closely inspected for very small shell fragments (1-3mm), which indicate hatching. If there is no evidence of chicks, or small egg fragments indicating that eggs have hatched successfully, and the nest has not been destroyed by flooding, then the eggs are assumed to have been preyed upon as both black-backed gulls and stoats will remove whole eggs without breaking them (Steffens, 2010). Camera footage from tern nests on the Hakatere/Ashburton and Rakaia rivers during the 2017-2018 and 2018-2019 seasons also showed that harriers can remove whole eggs from nests without breaking them (Buchholz and Edwards, *unpublished data*).

Nesting pairs with chicks are re-visited every approximately every seven days to determine chick survival rates. Chicks are counted as fledged when they can fly, or 40 days (Dowding 2013) from the last possible date of hatching based on the date at which chicks were first observed in the nest. If chicks are last observed seven days or less prior to last possible fledge

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date (i.e. the last possible hatch date plus 40 days), and no birds (adults or chicks) are observed in subsequent visits to the site, then the chick (or chicks) are considered as 'probably fledged' - and included in the upper range of the recorded number of fledglings. Due to their precocial nature, the cause of death or disappearance of wrybill chicks cannot usually be determined, however details are recorded if the likely cause (e.g. flooding) is known.

A sample of GPS tracking data recorded by staff undertaking outcome monitoring is provided in Appendix 1.

Trail cameras (Ltl Acorn 5310) were used to help determine the cause of nest failure (where applicable). Nine wrybill nests were monitored with cameras in the Rakaia.

#### *Black-fronted terns*

In the Upper Rakaia, nests were monitored both inside and outside the predator control area to provide a comparison of nesting success in the two areas.

Monitoring protocols were as described in Leseberg et al. (2005). Nest checks were carried out every 2-5 days, and hatched chicks were monitored up to fledging age to determine their survival.

In the Rakaia, trail cameras (Ltl Acorn 5310) were used to help determine the cause of nest failure (where applicable). Three black-fronted tern nests were monitored with cameras in the Rakaia.



Fig 4. A pair of Wrybill eggs (photo: Rob Carson-Iles)



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Fig 5. A harrier depredating a pair of wrybill eggs.

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For both wrybill and black-fronted tern, the following breeding parameters were determined:

- a) Hatching success (probability of at least one egg, in a nest with known outcome, hatching)
- b) Egg success (probability of an egg hatching in a nest if it survives),
- c) Fledging success (probability of a chick fledging once it hatches),
- d) Breeding success (probability that an egg will successfully survive, hatch and fledge).

### *Distribution and abundance of river birds*

#### *River survey*

In previous years a walk through survey was carried out on the Rakaia River in accordance with the methodology described in Leseberg et. al. 2005. In spring 2019 season repeated flood events prevented any survey from being carried out.

## Results

### *Breeding success of river birds*

#### *Wrybill – Upper Rakaia*

This breeding season 27 wrybill nests were monitored in the Upper Rakaia. The first nest was found on 1 October, and the last nest on 4 November.

The outcome was known for 22 of the wrybill nests, with an overall hatching success rate for nests of 0.45 (Table 5). Twelve nests failed to hatch any eggs this season; nine nests were lost to predation and three nests were lost in floods. Wrybills laid 54 eggs in the 27 nests, and 17 eggs were known to hatch. Of the 37 eggs that failed to hatch, 17 were preyed on, six were lost to floods and two eggs were abandoned.

Table 5: Summary of nests, and hatching and egg success rates for wrybill in the Upper Rakaia River 2017/18 – 2019/20.

	2017/2018	2018/2019	2019/2020
Total no. of nests	12	33	27
No. of nests with known outcome (A)	11	33	22

No. nests that hatch one egg or more (B)	9	14	10
No. of nests that failed	2	19	12
Total no. eggs laid	21	63	54
<i>Of the nests in A:</i>			
No. of eggs laid where fate known (C)	19	63	44
No. of eggs laid where fate unknown	2	0	4
<i>Of the eggs in (C):</i>			
No. of eggs infertile or died in incubation (D)	0	4	0
No. of eggs that failed - other causes	4	35	27
Total no. of eggs that hatched (E)	17	24	17
<b>Hatching success (F)=B/A</b>	0.82	0.42	0.45
<b>Egg success (G)=(C-D)/C</b>	1	0.92	1

Table 6: Causes of nest failures and egg loss of wrybill in the Upper Rakaia (treatment area): 2017/18 – 2019/20.

<b>Causes of nest failure</b>	2017/2018	2018/2019	2019/2020
Total no. of nests that failed	2	19	12
<i>Nest failure due to:</i>			
Predation	0	15	9
Flooding	1	3	3
Abandoned	0	0	0
Died during incubation/infertile	0	0	0
Vehicle	0	0	0
Mixed (one predation, one abandoned)	0	1	0
Failed - cause unknown	1*	0	0
<b>Causes of egg failure</b>			
Total no. of eggs that failed	4	39	27
<i>Egg failure due to:</i>			
Predation	0	28	17
Flooding	2	6	6
Abandoned	0	1	2
Died during incubation/infertile	0	4	0
Vehicle	0	0	0
Failed - cause unknown	2*	0	12

\*evidence at nest suggests disturbance by a dog and its owner

The fledging success rate for wrybills was 0.24 to 0.29, with 4 - 5 of the 17 hatched chicks fledging (Table 7). The overall probability of a wrybill egg surviving to fledge (breeding success) was 0.11 to 0.13.

Table 7: Number of chicks fledged, and fledging and breeding success rates of wrybill in the Upper Rakaia: 2017/18 – 2019/20.

	2017/18	2018/19	2019/2020
Total number of nests monitored (H)	11	32	27
No. of nests that hatched at least one egg	9	14	10
No. of nests that fledged at least one chick	0	2	4
No. of nests lost all chicks	2	0	0
No. of nests with unknown fledgling outcome	9	9	7
No. of chicks fledged as min-max (I)	0	4 to 8	4 to 5
<b>Fledgling success as min-max (J) = I/E</b>	0	0.17 to 0.33	0.24 to 0.29
<b>Breeding success as min-max (FxGxJ)</b>	0	0.07 to 0.12	0.11 to 0.13
Hatching success per nest (E/H)	1.55	0.75	0.63
Fledgling success per nest as min-max (I/H)	0	0.13 to 0.25	0.15 to 0.18

*Black-fronted terns – inside predator control (treatment) area*

In the Upper Rakaia river, a total of 30 nests containing 59 eggs were monitored. Eleven eggs were known to have hatched from eight nests by 5 November, after which time significant flooding events occurred - initially peaking on 8 November at 849 cumecs (Figure 7). Nest monitoring was not possible again until 21 November, by which time all eggs and chicks had been lost – presumably to flooding.

For the purposes of analysis, and the results presented in Table 8, we have assumed that no further chicks hatched after the check on 5 November, and that all remaining nests (and eggs) were destroyed by flooding. Consequently, hatching success is calculated to be 0.26. If the nineteen nests that were lost to flooding are excluded from the analysis (because it is not known if they successfully hatched chicks before all chicks (and eggs) were lost), then the calculated nesting success would be 1.

Because of the flood event fledgling success per female was zero.

It is not possible to estimate metrics like egg success, as eggs were still hatching at the time of the flood events. There were no recorded incidences of predation.

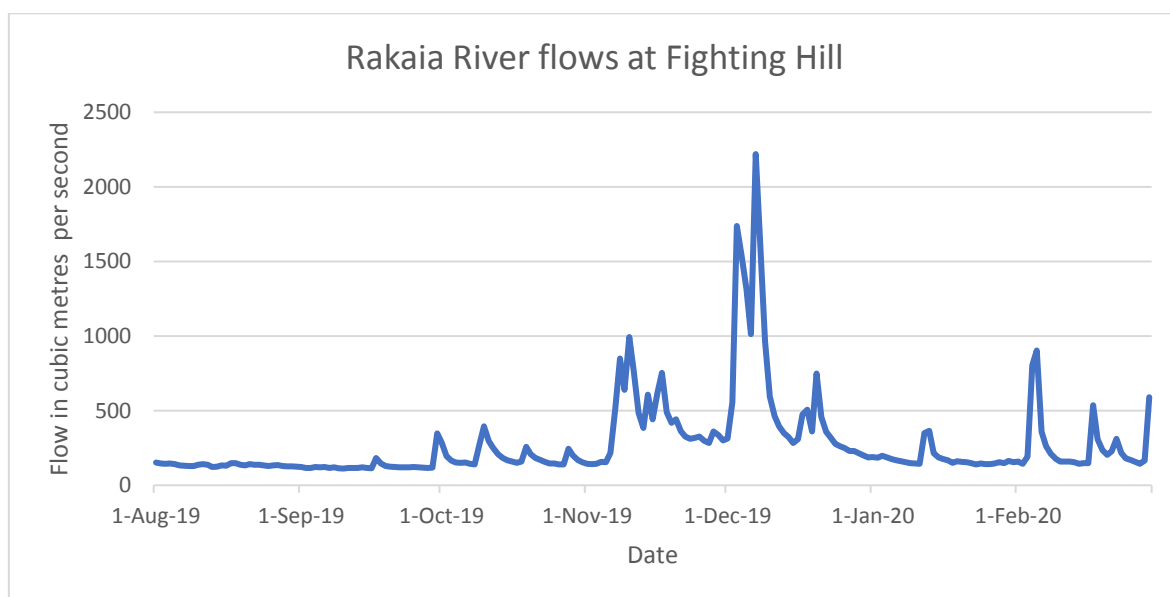


Fig 6: Flows in the Rakaia River over the breeding season.

*Black-fronted terns – Upper Rakaia outside predator control (non-treatment) area*

Despite staff effort, no Black-fronted tern nests were able to be located outside of the predator control area on the Upper Rakaia.

Table 8: Number of nests, hatching and egg success rates for black-fronted tern in the Upper Rakaia: 2017/18 – 2019/20.

	2017/18 Non- treatment	2017/18 Treatment	2018/19 Non- treatment	2018/19 Treatment	2019/2020 Treatment
Total no. of nests	8	21	29	34	30
No. of nests with known outcome (A)	3	20	23	34	30
No. nests that hatch one egg or more (B)	3	5	7	7	8
No. of nests that failed	0	15	16	27	22
Total no. eggs laid	5	41	57	66	59
<i>Of the nests in A:</i>					
No. of eggs laid where fate known (C)	5	39	46	66	59
No. of eggs laid where fate unknown	0	2	11	0	0
<i>Of the eggs in (C):</i>					
No. of eggs infertile or died in incubation (D)	0	1	4	1	0
No. of eggs that failed - other causes	0	30	31	51	48
Total no. of eggs that hatched (E)	5	8	11	14	11
<b>Hatching success (F)=B/A</b>	1.00	0.25	0.30	0.21	0.26
<b>Egg success (G)=(C-D)/C</b>	1.00	0.97	0.91	0.98	1*
*Interpret with caution due to flood event					

Table 9: Causes of nest failures and egg loss in black-fronted terns in the Upper Rakaia 2017/18 – 2019/20.

	2017/18 Non- treatment	2017/18 Treatment	2018/19 Non- treatment	2018/19 Treatment	2019/2020 Treatment
<b>Causes of nest failure</b>					
Total no. of nests that failed	0	14	16	27	22
<i>Nest failure due to:</i>					
Predation	0	3	11	3	0
Flooding	0	11	4	23	22
Died during incubation/infertile	0	0	0	1	0
Mixed (one predation, one abandoned)	0	0	1	0	0
Failed - cause unknown	0	0	0	0	0
<b>Causes of egg failure</b>					0
Total no. of eggs that failed	0	31	35	52	48
<i>Egg failure due to:</i>					
Predation	0	6	22	6	0
Flooding	0	24	9	45	48
Abandoned	0	0	1	0	0
Died during incubation/infertile	0	1	3	1	0

Table 10: Number of chicks fledged, and fledging and breeding success rates of black-fronted terns in the Upper Rakaia 2017/18 – 2019/20.

	2017/18 Non- treatment	2017/18 Treatment	2018/19 Non- treatment	2018/19 Treatment	2019/2020 Treatment
Total number of females that attempted to breed (H)	8	21	29	34	30
No. of nests that hatched at least one egg	3	5	7	7	8
No. of nests that fledged at least one chick	0	0	0	0	0
No. of nests lost all chicks	0	5	7	7	8
No. of nests with unknown fledgling outcome	3	0	0	0	0
No. of chicks fledged as min-max (I)	0	0	0	0	0
Fledgling success as min-max (J) = I/E	0	0	0	0	0
Breeding success as min-max (FxGxJ)	0	0	0	0	0
Hatching success per female (E/H)	0.63	0.38	0.38	0.41	0.37
Fledgling success per female as min-max (I/H)	0	0	0	0	0



Fig 7. Black-fronted tern defending nest (photo: Rob Carson-Iles)

## Discussion

### *Predator control*

Trapping results this season were on average lower than the previous year with most predator species catch results down. This is likely due to lower trap numbers overall with the non-replacement of the flood vulnerable traps and with the omission of leg-hold trapping. Hedgehog captures were down this year in both the Rakaia and Rangitata suggesting that they have had a poor season. Black-backed gull control was very successful with the 81% estimated gull numbers pre operation culled. It will be interesting to see what gull numbers are in the 2020/2021 season and their associated impacts on black-fronted tern predation.

The failure to carry out leg hold trapping in late summer is not thought to have had a significant impact on predation rates in the Upper Rakaia as the outcome of all monitored wrybill and black-fronted tern nests had been determined before that operation was scheduled to occur.

### *Outcome monitoring*

Wrybill on the Rakaia had a season that was quite similar to the previous. Predation as a cause of nest failure for wrybill was slightly lower this season than last, however the number of eggs that failed for an unknown reason was higher (12 eggs this season compared with none the previous season) and this may contribute to lower known predation rates. The loss of nests to flooding was unchanged from the previous year remaining at three nests. Fledgling success this season was 0.24 to 0.29 compared with 0.17 to 0.33 the previous season.

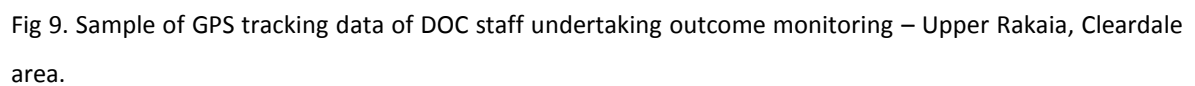
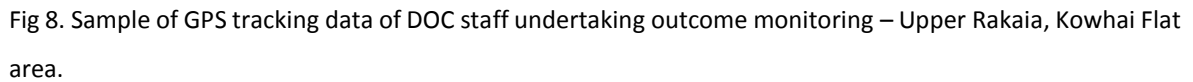
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Last season there was concern that placing trail cameras watching wrybill nests made them vulnerable to predation by harriers (or an individual harrier) that may have learned to associate trail cameras with wrybill nests. This season five of the nine wrybill nests that had cameras placed on them were preyed upon by harriers. Of the remaining four nests with trail cameras, one failed for an unknown reason, one had an unknown outcome, one was lost to a flood and the other was a possible fledging.

Once again the black-fronted terns had a poor nesting season, being the third in a row on the Rakaia that they failed to fledge any chicks. Repeated and high flood events occurred in the river for both November and December, preventing any re-nesting of the terns at the trapping site. A minor positive is that no incidences of predation were recorded.

Hatching and fledgling success, and the reasons for unsuccessful breeding attempts for both wrybills and black-fronted terns in both the Rakaia and Rangitata river systems, vary considerably from year to year. Consequently, further seasons of monitoring will be required before there is confidence that the level of predator control provided by the current trapping regime provides adequate protection for wrybills and/or black-fronted terns to allow for populations of those species to recover.

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## References

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