Upper Ashburton/Hakatere River outcome monitoring report 2023/2024

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Introduction

The south branch of the Upper Ashburton/Hakatere River is home to a number of threatened species which breed exclusively on the braided river networks. Species of importance which come to breed here each year include wrybill (ngutu pere, *Anarhynchus frontalis)* and black-fronted tern (tarapirohe, C*hilidonias albostriatus).* Threats to both species include flooding, habitat destruction through weed infestation, human interference and predation. Previous years of monitoring on the South Ashburton/Hakatere river have seen predation of nests by cats, stoats, and harrier hawks (Buchholz & Edwards, 2018, Fraser *et al.,* 2019 and Liddell, 2022). Wrybill are currently classified as Nationally Increasing and black-fronted terns are Nationally Endangered.

Environment Canterbury (ECan) has been funding predator trapping along the South Ashburton/Hakatere river since 2003 over an area covering ~800 hectares from upstream of Buicks Bridge to Hakatere corner. The network consists of 317 traps.

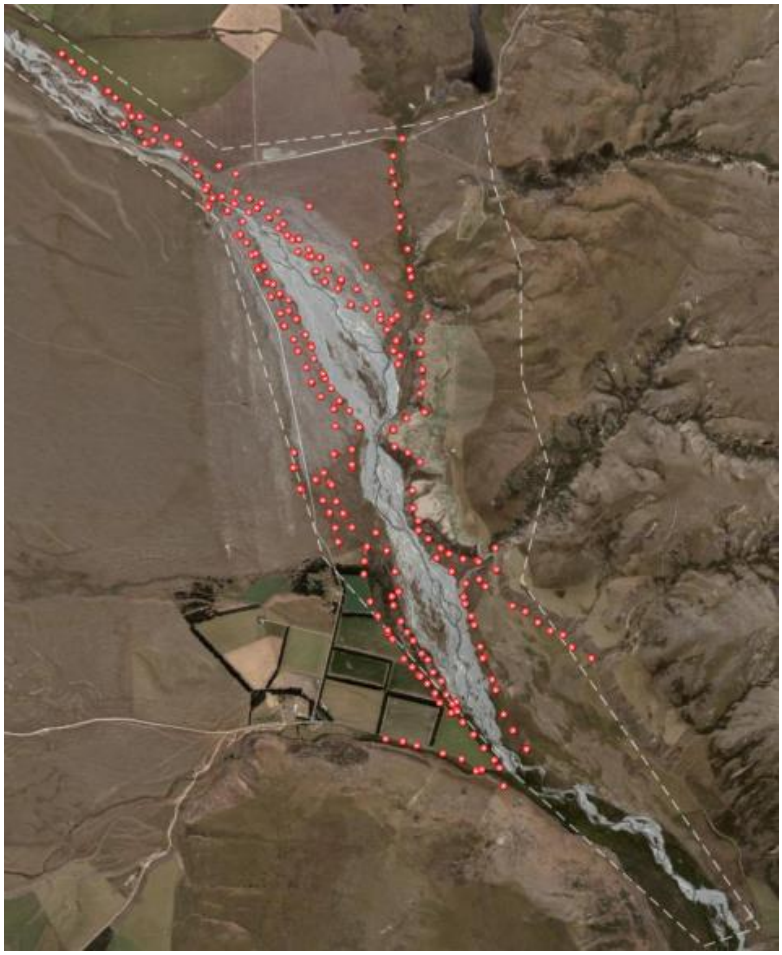

Figure 1: Map of ECan traplines along the South Ashburton/Hakatere river

Land information New Zealand (LINZ) has also provided funding for >100ha of weed control for the past three years.

Staff from the local Raukapuka/Geraldine Department of Conservation (DOC) office undertook the outcome monitoring of the black-fronted tern and wrybill during the breeding season.

This report contains the methodology and outcomes from the 2023-2024 season.

METHOD

Wrybill

Walk through surveys for nesting wrybill pairs began in early October, covering the riverbed between Buicks bridge and Hakatere corner. Survey and monitoring were primarily carried out by Wako Tanaka and Daisy Sharp of the Raukapuka/Geraldine DOC Office, with help from other members of the team when necessary.

Protocols for finding and monitoring nests, determining hatch success/failure, banding, and monitoring chicks are as outlined in Leseburg *et al*. (2005) pp. 19 – 31. When a nest is found:

- It is assigned a number;
- A small cairn is built ~1m upstream of nest, with the nest number marked on a rock
- The nest co-ordinates are recorded in a GPS, and
- the adult birds are checked for bands.

Nests were checked twice a week until they have either hatched or failed. Empty nests are closely inspected for very small shell fragments (1-3mm), which indicate hatching. A trail camera (Ltl Acorn 5310WA) was also set at some of the nests to help identify causes of failure if nests failed to hatch. If neither parent is banded, and the pair are located in an area close to other wrybill, an attempt will be made to catch at least one adult bird at the nest and band it to aid in following chicks from that nest through to fledgling.

In the absence of any shell fragments or evidence indicating the nest had been flooded, nests are assumed to have been depredated as Steffens (2010) observed that both black-backed gulls and stoats will remove whole eggs from nests without breaking the eggs (ie without leaving any material evidence of predation). Chicks are counted as fledged when they can fly or 40 days after hatch date (Dowding 2020). Chick/s are considered a 'probable fledge' if they are observed up until a week before last possible fledge date (i.e hatch date or last possible hatch date plus 40 days) but are not observed in subsequent visits.

Black-fronted terns

All BFT colonies that are found within the treatment/trapped area are monitored. Once a colony is located staff walk through, count and record waypoints for each nest. A subset of approximately 30 nests are monitored within each colony to determine nesting success rates and causes of loss where possible. Nests were checked twice per week, weather and river levels permitting and revisited until the eggs hatched or the nest failed. However, unlike wrybill no banding was undertaken. Chicks are not individually followed once they moved off the nest as is it not possible to identify individual chicks once they leave the nest as they are not individually identified (banded) and as BFT chicks usually form creches. However, a colony count of mobile chicks and of fledglings was conducted each time the colony was monitored. The number of chicks present in these creches sometimes has to be estimated by the number of adults returning to the site when the creches are hidden by heavy vegetation cover. In addition, trail cameras were installed at some of nests to help establish cause of nest failure and to identify predators within the colony if possible.

Breeding Success Parameters

For wrybills, the following breeding parameters were determined:

a) Hatching success (probability of at least one egg, in a nest with known outcome, hatching from the subset of nests)
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).

For black-fronted terns, as not all nests are monitored and chicks cannot be associated with a particular nest, hatching success and egg success are calculated as for wrybill, but from the sample of approximately 30 nests. Fledglings per female is calculated based on the maximum fledging count recorded ands the maximum nest count recorded while the colony is being established. This methodology is different from that used in 2019/20 – 2020/21.

Results

Wrybill

This year three wrybill nests were located on the Hakatere river. The first nest was located on 9 September. An ECan-led walk-through survey took place on 4 November 2023 which covered the area between Buicks bridge and Blowing Point bridge and a further two nests were found in this survey. Following the outlined protocol a trail camera was set to gather further information on the nests progress and capture footage of potential predators.

One nest was unsuccessful with one egg lost due to an unknown cause and the second egg abandoned/died during incubation (Table 1).

The other two nests were located during the ECan walk-through survey. Both nests successfully hatched both eggs. With one nest successfully fledging one chick and the other nest fledging two chicks (Tables 1 & 3).

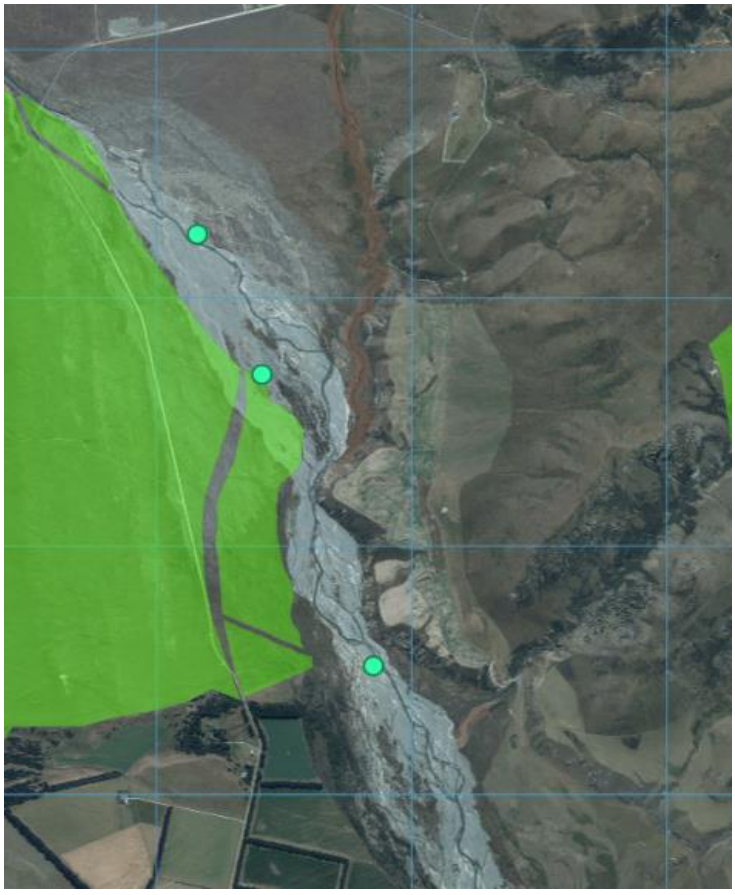

Figure 2: Map of wrybill nests on the South Ashburton/Hakatere River

Table 1: Hatching and egg success for wrybill 2020/2021- 2023/2024

	2020/2021	2021/2022	2022/2023	2023/2024
Total no. of nests	3	1	0	3
No. of nests with known outcome (A)	2	1	NA	3
No. of nests that hatch one egg or more (B)	1	1	NA	2
No. of nests that failed (i.e zero eggs hatched)	2	0	NA	1
Total no. of eggs laid	6	2	NA	6
	Of the nests in (A)			
No. of eggs laid where fate known (C)	3	2	NA	5
No. of eggs laid where fate unknown	3	0	NA	1
	Of the eggs in (C)			
No. of eggs infertile or died in incubation	0	0	NA	1

(D)				
No. of eggs that failed -other causes	3	0	NA	1
Total no. of eggs that hatched (E)	1	2	NA	4
Hatching success (F)=B/A	**0.33**	**1**	NA	**0.67**
Egg success (G)=(C-D)/C	**1**	**1**	NA	**0.8**

Table 2: Causes of nest and egg failure for wrybill 2020/2021 – 2023/2024

Causes of nest failure	2020/2021	2021/2022	2022/2023	2023/2024
Total no. of nests that failed	2	0	NA	1
Nest failure due to:				
Predation	1	0	NA	0
Flooding	0	0	NA	0
Abandoned	0	0	NA	0
Died during incubation/infertile	0	0	NA	0
Mixed	0	0	NA	1
Failed - cause unknown	1	0	NA	0
Causes of egg failure				
Total no. of eggs that failed	5	0	NA	2
Egg failure due to:				
Predation	2	0	NA	0
Flooding	0	0	NA	0
Abandoned	0	0	NA	0
Died during incubation/infertile	0	0	NA	1
Failed - cause unknown	3	0	NA	1

Table 3: Fledging and breeding success rates for wrybill 2020/2021-2023/2024

	2020/2021	2021/2022	2022/23	2023/2024
Total number of females that attempted to breed (H)	3	1	0	3
No. of nests that hatched at least one egg	1	1	NA	2
No. of nests that fledged at least one chick	0	1	NA	2
No. of nests lost all chicks	1	0	NA	0
No. of nests with unknown	0	0	NA	0

fledging outcome				
No. of chicks fledged as min-max (I)	0	1	NA	3
Fledging success as min-max (J) = I/E	0	0.5	NA	0.75
Breeding success as min-max (FxGxJ)	0	0.5	NA	0.40
Hatching success per female (E/H)	**0.33**	**2**	NA	**1.3**
Fledging success per female as min-max (I/H)	**0**	**1**	NA	**1**

Black-fronted terns

The first nest of the season was located on 3 November 2023. This season the BFT colony had moved ~1.8km further downstream from previous years (Figure 3). The BTF colony this season was comparable in size to last season (40-50 pairs). There were a total of 34 nests monitored within the colony. Of the monitored nests, 22 nests successfully hatched at least one egg, and nine nests failed. Failure of nests was due to depredation (seven), infertile (one) and mixed causes (one). Three nests had an unknown outcome (Tables 4 & 5). Overall, the hatching success for the colony was 0.71. Fledgling success per female for the colony as whole was estimated to be 0.3-0.45 based on a maximum number of 36 nests (females) recorded, with 12 confirmed fledglings and a further six probable fledglings (Table 6).

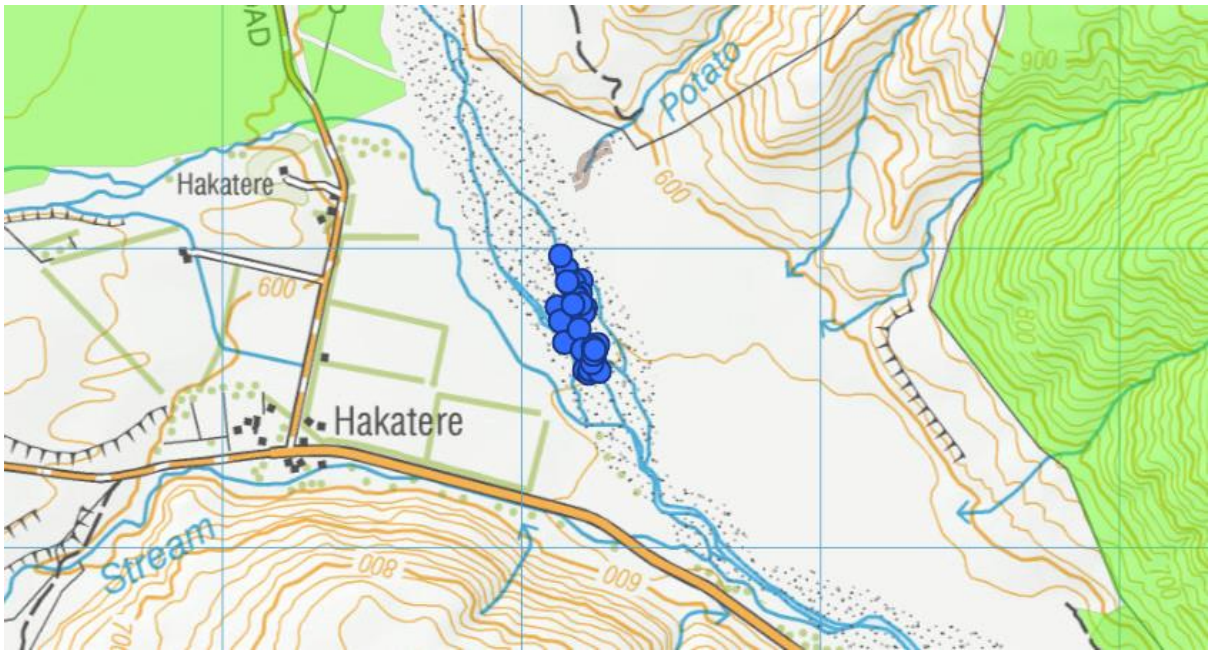

Figure 3. Map of black-fronted tern nests 2023-2024

Table 4: Hatching and eggs success for BFT 2019/2020 – 2023/2024

	2019/2020	2020/2021	2021/2022	2022/2023	2023/2024
Total no. of nests monitored	61	40	31	31	34
No. of nests with known outcome (A)	42	31	28	31	31
No. nests that hatch one egg or more (B)	12	25	23	3	22
No. of nests that failed	30	6	8	28	9
Total no. eggs laid	80	79	62	57	66
Of the nests in A:					
No. of eggs laid where fate known (C)	74	58	52	56	58
No. of eggs laid where fate unknown	6	21	10	1	3
Of the eggs in (C):					
No. of eggs infertile or died in incubation (D)	4	1	5	8	3
No . of eggs that failed - other causes	53	12	6	43	14
Total no. of eggs that hatched (E)	17	45	41	5	41
Hatching success (F)=B/A	**0.29**	**0.81**	**0.82**	**0.10**	**0.71**
Egg success (G)=(C-D)/C	**0.95**	**0.98**	**0.90**	**0.86**	**0.95**

Table 5: Causes of nest and egg failure for BFT 2019/2020 – 2023/2024

Causes of nest failure at egg stage	2019/2020	2020/2021	2021/2022	2022/2023	2023/2024
Total no. of nests that failed	30	6	8	28	14
Nest failure due to:					
Predation	4	4	1	19	7
Flooding	15	0	2	0	0
Abandoned	10	0	0	5	0
Died during incubation/infertile	2	0	2	0	1
Mixed	0	1	3	2	2
Failed - cause unknown	0	1	0	0	3
Causes of egg failure					
Total no. of eggs that failed	57	13	22	52	25

Egg failure due to:					
Predation	8	10	2	40	14
Flooding	28	0	4	0	0
Abandoned	17	0	0	11	1
Died during incubation/infertile	4	1	5	0	2
Failed - cause unknown	0	2	11	1	8

Table 6: Hatching and fledgling success for BFT 2022/23– 2023/2024

	2022/2023	2023/2024
Estimated number of females attempting to breed (maximum number of nests recorded)(H).	1	40
No. of chicks fledged from colony as min-max (I)	0	12-18
Fledgling success per female as min-max (J) = I/H	**0**	**0.3-0.45**

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Discussion

The black-fronted terns had a relatively good season on the South Ashburton/Hakatere this year. Overall, fledging success per female was estimated to be of **0.3-0.45** from the colony with 12 chicks successfully fledging and a further six probable fledglings. No fledglings were recorded last season, or in the 2019/20 and 2020/21 seasons. In the 2020/21 season at least 20 fledglings were recorded, but methodology changes mean that direct comparison of fledgling rate per female are not possible.

The increase to the trapping network by ECan for the 2023/2024 season potentially helped to reduce the number of nests which were preyed (seven) upon compared to the previous season (14). The trail cameras deployed on the BFT colony did not identify the species of predator responsible, however three nests were found to have been recently depredated on the 4 November monitoring trip suggesting that one predator may have preyed upon multiple nests either on one night or return trips in quick succession.

Unlike previous years the river levels remained stable throughout this breeding season with no nests lost to flooding.

The new colony location this season may have helped contribute to the success of the colony. The majority of nests were on two islands situated between larger water channels which may have conferred some protection from terrestrial predators. The colony also occupied a smaller area than last year and the higher density of adults may have helped them better defend themselves and their nests and chicks against predators.

Wrybill are still very rare in this stretch of river. This season a total of three wrybill nests were found and monitored. No more than three pairs of wrybill have been recorded here in recent years, however the results show that wrybill have had their most successful season so far on the South Ashburton/Hakatere with a fledging success of 1.5 per female and three chicks fledging.

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