

Waimakariri River Regional Park Braided River Bird Management 2016-2017 Season



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Introduction

The Waimakariri River Regional Park (WRRP) consists of Environment Canterbury (ECan) owned land between the stopbanks from the river mouth to the Waimakariri Gorge, also including McLeans Island. The WRRP is managed primarily by the ECan Parks team, who oversee a variety of recreation and biodiversity projects within the park.

The Waimakariri River is home to some very rare and unique braided river bird species. The Department of Conservation (DoC) is the lead agency for protection of native species in New Zealand, however DoC have limited involvement in the lower Waimakariri River. ECan Parks has actively engaged in braided river bird management and monitoring in the WRRP for the past eight seasons as a concerned landowner with some limited resources available to assist DoC.

ECan Parks' main priority for involvement with braided river birds is helping Black-billed Gulls (*Chroicocephalus bulleri*) breed successfully in the lower Waimakariri River. Black-billed Gulls are a critically endangered native species that breed in dense colonies, meaning ECan Parks has been able to target their limited resources to a few specific areas of the river where Black-billed Gulls are breeding. ECan Parks also recognise that targeting resources at Black-billed Gull colonies also has some limited flow on benefits for other native bird species breeding in and around the periphery of these Black-billed Gull colonies.

Management Strategies

The main strategies used to improve bird breeding success in the lower Waimakariri River this season were:

- use of a contract ornithologist to monitor and report on the nesting locations and breeding status of the birds,
- some mammalian predator trapping next to main breeding colonies,
- trialling of man-made raised island sites (above the mean flood mark) and use of decoys to attract Black-billed gulls to the islands,
- control of Southern Black Backed Gull (SBBG) numbers in the lower Waimakariri (one of the main identified predators of our Braided River Birds),
- on-going promotion of public awareness primarily through Ranger Patrols and handing out awareness stickers on the more threatened bird species (Appendix 1, Figure 1),
- on-going interactions to improve relationships with local gravel extractors working in the river.

Contract Ornithologist

ECan Parks typically engage an ornithologist early in the breeding season to monitor and report back on the location and nesting status of Black-billed Gulls and some other species in the WRRP. Keystone Ecology was engaged as our contract ornithologist for this season. The ornithologist maintains this reporting work throughout the breeding season and also makes

suggestions on management options such as blocking vehicle or public access in certain locations, or on placement of mammalian predator traps. ECan Parks seeks ornithologist advice before undertaking any SBBG control throughout the lower Waimakariri River.

The ornithologist typically undertakes mammalian predator trapping adjacent to the main Black-billed Gull and some larger Black-fronted Tern (*Chlidonias albostratus*) colonies. Keystone Ecology did undertake some mammalian predator control for ECan Parks this season, although the main Black-billed Gull colonies towards the end of the season were separated from the river bank by relatively large flowing channels which helped to naturally reduce the threat from mammalian predators.

Public Awareness

ECan Parks have tried several strategies in previous seasons to improve public awareness around Braided River Birds, with varying degrees of success. Options have ranged from YouTube videos and promotions to improve public awareness through to signage, pamphlets and educational stickers.

Public awareness was less of a focus this management season simply due to funds being channelled more towards pest control, particularly for Southern Black Backed Gulls (SBBG). However, ECan Parks still provided a base Ranger service talking to people and monitoring public behaviour around known braided river bird colonies where possible. Patrols often included handing out Braided River Bird awareness stickers and informative pamphlets.

Increasing public awareness of our endangered native birds is still seen as a valuable method of contributing to the birds' long term success. Many people remain unaware of the endangered species living in the Waimakariri River and so don't understand the impact they can have upon those species.

Southern Black Backed Gull Control

Reducing Southern Black Backed Gull (*Larus dominicanus*) numbers is becoming an increasingly obvious need for the breeding success of other braided river bird species in the Waimakariri River. Southern Black Backed Gulls (SBBG) are found throughout the lower Waimakariri in very high numbers and are dispersed across many of the river islands, displacing other native bird species from the more favourable habitat (ie higher islands with less weeds present). SBBG are also predatory birds that put direct pressure on native species by scavenging eggs and eating chicks of other species. SBBG have been observed by our ornithologist and Rangers preying on Black-billed Gull eggs and chicks and in the 2015-2016 season, were believed to have caused the collapse of at least one Black-billed Gull colony through continual harassment (Keystone Ecology, 2016).

ECan Parks are increasingly working with Christchurch International Airport Limited (CIAL) to implement a SBBG control program in the lower Waimakariri River. Both parties have spent several seasons to date targeting SBBG numbers for reduction in the lower Waimakariri River. CIAL have a vested interest in reducing SBBG in the lower Waimakariri River as the birds pose a risk of bird strike to CIAL air traffic. For the previous four seasons, an agreement has been reached whereby ECan Parks control SBBG numbers within two kilometres of a Black-billed Gull colony, while CIAL have conducted more wide spread SBBG control to encourage a general reduction of SBBG numbers throughout the riverbed.

This season, CIAL and ECan agreed on shared contributions to overall SBBG reduction in the lower Waimakariri River, with CIAL agreeing to ECan Parks overseeing the expenditure in order to produce a more cohesive approach to SBBG control. The long term goal is to produce an agreement between both parties to further facilitate a collaborative approach to SBBG control within the WRRP, to remove the maximum number of birds and benefit both CIAL and ECan Parks.

SBBG are primarily targeted for reduction through Alpha-chloralose poisoning according to a best practice technical standard agreed between ECan and CIAL (*Appendix 2*). An issue arose with SBBG control this season as many of the birds in the lower half of the river did not respond to initial baiting attempts. Pre-feeds of plain bread were not readily eaten by the targeted SBBG, so poisoning could not proceed according to the technical standard.

There may be several reasons for this aversion to baiting this season. One theory is that because of the unusually warm, wet season, there may have been an abundance of other food on surrounding land and the birds were simply not interested in the bread. Another theory is that because SBBG have been targeted in the lower half of the Waimakariri River for several seasons now, the birds may have become “bait-shy” and wary of the hand laid bread. The initial failure of SBBG poisoning could be a combination of any number of factors, but the above mentioned two are important to consider for control attempts in future seasons.

ECan Parks liaised with Keystone Ecology as the poison control operator for this season and decided on conducting one large control operation in the upper half of the WRRP. This control was targeted at a large colony below the Waimakariri Gorge as these birds had not been heavily controlled in the past and were less likely to show bait-shyness. The poison control was conducted in early January and successfully removed approximately 2000 SBBG from the Waimakariri River. Although these birds were not putting immediate pressure on Black-billed Gull colonies, there was a noticeable reduction in SBBG numbers especially in the upper half of the WRRP following this control.

The success of this operation in the upper half of the WRRP re-enforces the theory that the birds in the lower section of the river may be becoming bait shy. Any SBBG colonies in the upper

half of the WRRP next season will be a priority for control, while those in the lower section may be left for at least another season to reduce bait shyness behaviour. Shot-gunning, egg pricking or other direct control measures may still be considered for SBBG in the lower reaches as back up options to poisoning if those birds are seen to be directly harming a native breeding colony and need to be removed.

Island Creation

River islands are the preferred breeding habitat of most of our braided river bird species. While islands occur naturally throughout braided river systems, many are overgrown with weeds or are too low and flood out easily. Also, many of the better island sites especially in the Waimakariri River are occupied by the larger and stronger SBBG, pushing the smaller native birds out. The idea of creating man-made river islands has been trialled in different areas previously and has been suggested as a management option for ECan Parks. The idea of a man-made island in the river is to build up an area of shingle above the mean flood level, remove weed plants and predators and create an area that would provide more promising breeding habitat for native bird species.

ECan Parks has not been able to construct islands in the past due to limited funding and questions around how to actually attract birds to the sites once they are built. However this season we were able to trial two island sites thanks to Fulton Hogan kindly agreeing to donate machinery time to build up the island areas near one of their gravel extraction sites at Groyne 16 (*Figure 1*). To support the island creation, ECan Parks had ten lifelike Black-billed Gull decoys created in an attempt to encourage their real life counterparts to use the site.

Fulton Hogan created the two island sites in early September 2016. The sites adjacent to The Sanctuary wetland (*Figure 1*) were chosen as native birds have nested here for several previous seasons. The islands were built up to the same level as the adjacent river bank, above the lower lying surrounding riverbed area (*Figures 2 and 3*). Once the islands were completed, all of the decoys were placed on Island 1 (*Figure 4*). Lime granules were also scattered about amongst the decoys in an attempt to replicate the visual effect of bird faeces throughout a colony. Island 2 was left untouched as a control measure for the decoys and lime.

In late September, two medium sized freshes came through the river equalling a 2.8 metre rise in water level at the Waimakariri Gorge. While no birds had nested on the artificial islands yet, it was interesting to note that the relatively minimal increase in island height was enough to withstand the moderate flood water levels (*Figures 5 and 6*). We also noted that several birds were observed resting on the raised island sites during the high water levels. The islands remained relatively intact after the water levels dropped, although the resting birds did not remain.

Following the freshes, a small group of approximately 60 Black-billed Gulls and a few Black-fronted Terns were observed holding ground near Island 1. The signs were promising that these birds might make use of the islands, but by mid-October the birds had gone for no obvious reason. The Island sites proved unsuccessful for the remainder of the season and were eventually washed out by a large one in fifteen year flood event in early 2017 (more than a 4 metre rise in water level at the Waimakariri Gorge).

We can't tell for certain why the island sites and decoy attempts to attract Black-billed Gulls were unsuccessful. The area adjacent to The Sanctuary has proved a successful breeding site for Black-billed Gulls and other species for several previous seasons. The large size of the Waimakariri River and area of space available for birds to choose from may make it especially difficult to attract the birds to one specific site. It is worth noting that both Island 1 with decoys and the control Island without decoys were both unsuccessful. For next season ECan Parks may trial placing decoys on an existing suitable island in the riverbed as a follow up attempt to try and lure Black-billed gulls to better habitat.

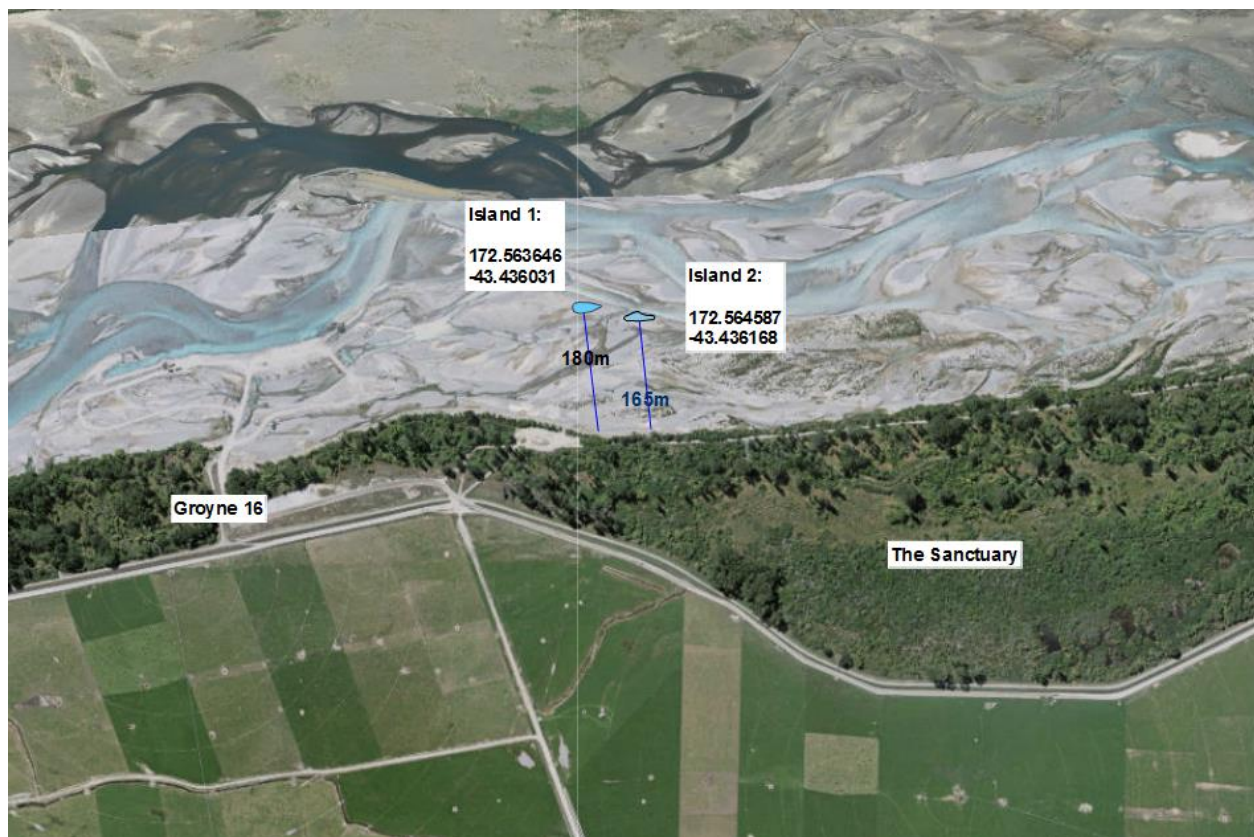


Figure 1: The two man-made island sites adjacent to The Sanctuary Wetland



Figure 2: Island 1 after completion, facing north east.



Figure 3: Island 2 site before being built up to a higher level.



Figure 4: Black-billed Gull decoys placed on Island 1.



Figure 5: Island 1 during a 2.8 metre fresh event



Figure 6: Island 2 during a 2.8 metre fresh event

Season Summary

August and September 2016 were unusually warm and some birds were observed nesting quite early on, including a small Black-billed Gull colony. However in September and October there were several freshes through the river, which washed out any birds attempting to establish early in the season.

In October 2016 a group of approximately 300 Black-billed Gull pairs attempted to form a colony behind McLeans Island. Shortly after establishing, a small fresh saw this colony split in to three groups by new water channels. While it looked like this group of birds might hold on to their spot, another small rise in the river level saw the birds washed out from this location completely by the end of October.

Around this same time at the end of October, a new colony of Black-billed Gulls were observed forming out from Dixons Bay further upstream from the previous colony location, followed shortly after by a second colony gathering downstream near Haul Road. Both of these colonies looked to be holding their territory throughout November and both survived a small fresh in the middle of the month, with the Haul Road colony swelling to close to 1000 adult pairs.

December saw the Haul Road colony numbers drop to roughly half for unknown reasons. Approximately 500 pairs of Black-billed Gulls remained at this location, while a second colony of close to 500 pairs was found to be starting to nest near the end of Courtenay Road.

In January, there were three main colonies of Black-billed Gulls in the lower Waimakariri River; one at Reids Reserve, one at Haul Road and one at Courtenay Road (*Appendix 3*). All three colonies looked to have selected reasonably good island sites out in the river and were breeding successfully. There was one incident with the Haul Road colony in January with a 4WD vehicle spotted driving around and possibly through this colony. Our ornithologist reported tyre tracks through the colony so it seems likely this vehicle had been in and done some damage, although we were not able to follow up the incident. Despite this incident all three colonies had a good number of chicks on the ground and most chicks managed to fledge before the large flood event that came through in late January, effectively ending the breeding season (*Appendix 4*).

Season Timeline

August 2016:

- Groyne 44 (North Bank) - Black-billed Gulls appear to be gathering and beginning to nest early, possibly due to unseasonably warm weather.

September 2016:

- Black-billed Gulls have abandoned site at Groyne 44.
- Moderate flood, trigger level 2.8 metres at the Waimakariri Gorge,
- Man-made islands remain above water level during 2.8 metre flood,
- 62 Black-billed Gull pairs appear to be holding ground near the man-made islands at The Sanctuary,
- Some Black-billed Gulls noted gathering out from Dixons Bay,

October 2016:

- Gull decoys placed on Island 1 at The Sanctuary in early October,
- By late October the 62 Black-billed Gulls that looked to be holding near The Sanctuary have left the site for unknown reasons,
- Several hundred Black-billed Gulls now noted to be gathering out from Dixons Bay.

November 2016:

- Around 300 adult Black-billed Gull pairs had gathered adjacent to McLeans Island, but were split in to three smaller groups by a slight water rise and then completely washed out by another water rise (2.5 metres at the gorge) a short time later.
- Black-billed Gull decoys retrieved from the man-made island due to limited success and warning of floods likely to top the islands,

- 300 adult Black-billed Gull pairs found holding territory at Reid's Reserve, above the motorway bridges,
- 600 adult Black-billed Gulls holding territory near Haul Road,
- Some Black-billed Gulls observed gathering in the riverbed near Courtenay Road.

December 2016:

- Three main Black-billed gull colonies remain:
 - 300 adult pairs at Reids Reserve,
 - 400 adult pairs at Haul Road,
 - 420 adult pairs at Courtenay Road,

January 2017

- Three colonies at Reids Reserve, Haul Road and Courtenay Road all have chicks on the ground close to fledging,
- A large flood came through the Waimakariri River on 19th January topping 4.2 metres at the gorge. This water level equated to approximately 2000 cubic metres per second at the Waimakariri Old Highway Bridge, well above the annual average of 1500 cubic metres per second. This above average flood event meant covered most river islands in the lower Waimakariri River. Most of the chicks from the three colonies managed to fledge before the sites were washed out.

Season Results

| <i>Colony Location</i> | <i>Number of Adult Pairs</i> | <i>Estimated Chicks Successfully Fledged</i> | <i>Success Rate (chicks/pair)</i> |
|------------------------|------------------------------|--|---------------------------------------|
| Reid's Reserve | 300 | 200 | 0.6 |
| Haul Road | 400 | 335 | 0.8 |
| Courtenay Road | 420 | 203 | 0.5 |

Discussion

Overall the Black-billed Gulls had one of their best breeding seasons in recent years in terms of both success rate and number of chicks fledged. The Black-billed Gulls managed to breed on island sites able to withstand smaller flood events throughout the season and had fledged a high number of chicks before the large flood event in January that topped most river islands.

Comparison of Chicks Fledged and Success Rates for Previous Four Seasons

| <i>Season</i> | <i>Recorded Adult Breeding Pairs</i> | <i>Number of Chicks Fledged</i> | <i>Success Rate</i> |
|--------------------|--------------------------------------|---------------------------------|---------------------|
| 2016 - 2017 | 1120 | 738 | 0.66 |
| 2015 - 2016 | 804 | 339 | 0.42 |
| 2014 - 2015 | 1143 | 1550 | 1.1 |
| 2013 - 2014 | 243 | 121 | 0.5 |

The islands were a useful trial this season, despite not successfully hosting any birds. We were able to observe that a relatively small increase in island height could help an area withstand moderate flood events. Our trials with the decoys and attempting to attract Black-billed Gulls to more favourable habitat will continue next season. As we now have the decoys, cost will be minimal to continue these trials using existing suitable sites. Black-billed Gulls have nested at several locations near Haul Road and Courtenay Road for the past few seasons. If trials continue with using the decoys to attract the gulls to more favourable habitat next season, focussing on these locations may improve the chance of success.

Other than natural flooding and fresh events, one of the main pressures on Braided river birds continues to come from Southern Black Backed Gulls. SBBG are an increasingly prevalent pest species throughout the Waimakariri River and cause direct and indirect harm to almost all of the other bird species in the riverbed. ECan Parks believes that targeting this pest species for reduction in conjunction with CIAL should have some of the highest benefits for most of the other birds species in the Waimakariri River, so this work will become a priority next season.

Targeted SBBG pest control could have a higher positive impact for other braided river birds, as compared with other more ad hoc management options. If funds are targeted in a coherent way at SBBG control, it is feasible that a very high number of these birds could be removed from the WRRP over a period of years, having high pay offs for the other native species. Reducing SBBG will decrease the direct predation pressure, but will also free up better habitat space for other braided river species throughout the riverbed.

One beneficial factor especially to the Reid's Reserve and Courtenay Road colonies this season was that they chose island sites with a reasonable flowing channel separating them from the

river's edge. Not only does this reduce mammalian predation, it also reduces the chance of human disturbance for the colony. The Haul Road colony had also chosen a reasonably good site, but a 4WD vehicle was still able to reach the location and arguably cause some harm to the colony, although that level of harm is unknown.

Another change next season may be around how we collect data on other notable bird species in the lower Waimakariri River, other than our primary focus on Black-billed Gulls. Currently our contracted ornithologist surveys the river regularly throughout the breeding season to report back on location and breeding stage of Black-billed Gulls, but also collects some limited data (primarily location) of other species noted nearby while out in the river. The other species captured include:

- Banded Dotterel,
- Black Shag,
- Black Backed Gulls,
- Black stilt,
- Black-fronted Tern,
- Caspian tern,
- New Zealand pied Oyster catcher,
- "not specified" (a catch all type category for anything deemed worth recording),
- White-fronted tern,
- Wrybill

Collecting information on other bird species near Black-billed Gull colonies has been interesting for noting other species that may also be benefiting from nearby mammalian predator trapping, targeted SBBG control or blocked vehicle access where applicable, but this data is not consistent over time or location. While this information is interesting, it does not give a consistent picture of some the other bird species present throughout the lower Waimakariri River over a given breeding season.

Our suggestion for next season is that it may be more beneficial to conduct a seasonal bird count through the entire lower Waimakariri River, similar to what is currently conducted about the gorge by a separate group. These surveys are conducted by a group of people walking the length of the river and recording all bird species present at that time. If these surveys were conducted over a period of years, it would help build up a bigger picture of what is present throughout the lower Waimakariri and whether there are increasing or decreasing trends over the years.

We may still gather information on other bird species near targeted Black-billed Gull colonies, but the extent of this data collection will be determined prior to next season.

Conclusion

Avoiding flood events still seems to be the main contributing factor to Black-billed Gulls having a successful breeding season in the WRRP. There were moderate flood events early on in this season and then a significant flood event later in the season, but the period in between was enough that Black-billed Gulls could successfully produce and fledge chicks in that time without being washed out. The large end of season flood was big enough to top most river islands including the man-made ones and, had it come a week or two earlier, could have washed out most of the chicks for this season.

The other main obvious factor to breeding success is lack of disturbance to breeding colonies from external parties, whether they are human or animal pest species. SBBG are emerging as a main factor continuing to negatively impact on Black-billed Gull breeding success. Continued future focus on reducing SBBG numbers, while also trying to keep people from disturbing Black-billed Gull colonies is likely to have some of the highest pay offs for breeding success in future seasons.

We have been able to take a number of learnings from this breeding season that will guide our management options for next year.

References

Thierry, A., Dutton, P. and Popenhagen, C. 2016. Waimakariri River Regional Park Black-billed Gull Management 2015-2016 Breeding Season. Unpublished report, Keystone Ecology and Environment Canterbury Report.

Popenhagen, C. 2015. Waimakariri River Regional Park 2014-2015 Black-billed Gull Breeding Season. Unpublished report, Environment Canterbury.

Appendix 1 – Braided River Bird Educational Stickers



Appendix 2

SOUTHERN BLACK-BACKED GULL CONTROL

Technical Standard

Objective:

The objective of control is to reduce Black-backed Gull numbers as effectively and humanely as possible, without compromising the safety of other protected species.

NOTIFICATION

- Any party wishing to undertake control of Black-backed Gulls should ensure they have agreement from the relevant land owner or controlling authority before proceeding.

TECHNIQUE

Timing of Operation

- Alpha-Chloralose poisoning targeted at nesting colonies is the preferred control method. Control should be timed for the height of egg-laying, before large numbers of chicks are present.
 - *To ensure the maximum number of adult birds are present, but there are not a large number of chicks which will need to be humanely despatched.*
- Toxic baits should be laid during calm weather.
 - *In windy conditions poisoned birds can be blown long distances before dying making recovery of carcasses difficult.*
- If Black-backed Gull control needs to occur outside of breeding season, or harm to non-target species is likely, Alpha-Chloralose poisoning is not accepted to be the most effective method.
 - Shotgun control, egg oiling etc may be more effective in these situations as Black-backed gulls can be targeted without harm to other species. An ornithologist should be consulted on the best method and the land owner should agree.

Bait application

1. An ornithologist should undertake a bird survey within a 100 metre radius around the Black-backed Gull colony that is to be targeted prior to any control work starting. Any protected bird species present should be recorded on a map that can be presented to the pest control operator. The pest control operator must take all reasonable steps to avoid harm to these species, especially when driving in the riverbed.
2. To ensure sufficient bait is used, visual surveys must be undertaken prior to the control operation to estimate the number of birds present. It is better to overestimate than underestimate numbers to ensure sufficient bait is used. This survey could be completed at the same time as the bird survey.
3. A minimum of 4 pre-feeds should be undertaken, initially 2 days apart, then daily. Pre-feeding should occur in late afternoon. During the last 2 prefeeds, the birds should exhibit a feeding frenzy and rapidly settle to feed on baits (i.e. within approximately 5 minutes of leaving the site).
 - a. *Pre-feeding is crucial to acclimatise birds to both the feed and humans walking around site. Onset of alphachloralose poisoning symptoms are rapid, and 'slow feeders' will avoid the toxic baits once other birds start to exhibit poisoning symptoms.*
4. An ornithologist should be present during all pre-feed and toxic baiting to monitor bird behaviour (ie Black-backed Gulls are displaying appropriate feeding frenzy behaviour and are acclimatised to human presence) and to ensure no non-target species are also taking part in the pre-feeding. The ornithologist may recommend more pre-feeds, postponing the poisoning, or requiring a different control method.
5. Pre-feed at a rate of 5-6 baits per bird, halving the amount for the final pre-feed.
 - a. *Halving amount of bait used for the final pre-feed ensures birds are not overfed prior to the toxic bait being laid.*
6. Toxic bait should be laid in the evening the day after the final pre-feed, as close to dusk as possible. Remove any uneaten pre-feed prior to laying the toxic bait.
 - a. *Alpha-chloralose works best at lower temperatures which are more likely in the evening/overnight. In the evening the maximum number of birds will be present at the site. Removing uneaten pre-feed ensures birds only eat toxic baits.*
7. Apply toxic bait at a rate of 5-6 baits per bird. Correct application rates can be confirmed using the Department of Conservation Alpha-Chloralose calculator.
 - a. *If a second toxic feed is required this should be undertaken in the evening the day after the first toxic feed. The amount of bait applied should be adjusted according to how many birds are still alive at the site.*
8. A team of more than one person will be required to place the bait throughout the colony. The team should walk calmly through the colony following transect lines to evenly place bait throughout the "core" of the colony. The core is where nests are more densely spaced, ie

nest spacing is 5 metres or less. People laying the bait should walk as quickly as possible while attempting to scatter the bait evenly along their transect line.

- a. *Scattering extra baits ensures sub-dominant and non-breeding birds have access to baits.*
 - b. *Focussing bait laying on the core of the colony helps ensure non-target species that may be around the edge of the colony are more likely to be excluded from the central feeding.*
9. Bait needs to be laid quickly as poison is fast acting and as the first birds to eat the bait become drowsy, unaffected birds may become aware of what is happening and avoid the feed. Where the core of the colony cannot be covered quickly by a team of up to five people laying the bait, a quad bike or similar may be used to spread the bait more quickly.
10. The ornithologist will observe the bait laying and may signal for the operators to return and pick up all of the baits immediately if non-target species are observed to be also feeding.
11. Early in the morning after toxic baiting, return to site and kill all surviving poisoned birds and chicks with a sharp blow to the head or neck dislocation. All eggs present in nests where the adults have been poisoned must be pricked or smashed. Any remaining toxic bait must be removed. Carcasses should be disposed of at a registered landfill.
 - a. *Pricking or smashing eggs is more humane and ensures no eggs make it to hatching.*

EQUIPMENT

Bait preparation

12. Use the "[Alphachloralose calculator](#)" (docdm-1088863) to determine how much bread, alphachloralose powder and margarine will be required.
13. Spread approximately 8 grams (1.5 teaspoons) of the alphachloralose /margarine mixture (~100g alphachloralose /kg) onto slices of plain bread and then sandwich two slices together. Cut each sandwich into 12 'bite sized' baits.
14. Non-toxic pre-feed baits should be the same as toxic baits except not contain toxin (i.e. only use margarine).

Sowing equipment

15. Baits should be spread by hand from a pail or bag.

SKILLS REQUIRED

16. A consistently high standard of field work is essential.

17. Operators need:

- Calm nature while moving through colonies
- Quad licence and any other applicable licences for any equipment used on site
- Appropriate licences for poison handling

REFERENCES

- ^{1.} Caithness, T. A. 1968. Poisoning gulls with alphachloralose near a New Zealand airfield. *Journal of Wildlife Management* 32(2):279 - 286.
- ^{2.} Fairweather, A. A. C. 2008. *Animal Pest Field Trial Report on the Control of Black-backed Gulls (Larus dominicanus) using 100g/kg Alpha-chloralose Bread baits*. Unpublished report docdm-243954, R, D & I, Department of Conservation, Hamilton.

Appendix 3: Three Main Black-billed Gull Breeding Colonies in the Lower Waimakariri River



Figure 1: Black-billed Gull colony adjacent to Reid's Reserve, north bank Waimakariri River.



Figure 2: Black-billed Gull colony near Haul Road, south bank Waimakariri River.



Figure 3: Black-billed Gull colony out from the end of Courtenay Road, south bank Waimakariri River.

Appendix 4: Flood Data for Waimakariri River, November 2016 – April 2017

