

**CANTERBURY BLACK-BILLED GULL (*Larus bulleri*)
AERIAL SURVEY 2015-16**



Canterbury Black-billed Gull (*Larus bulleri*) Aerial Survey 2015-16

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EXECUTIVE SUMMARY

This is the second year of carrying out aerial surveys of black-billed gull colonies in Canterbury. All braided sections of rivers within the region were flown with a fixed-wing aircraft over the period of 22-23 November 2015 to locate breeding colonies. High resolution photographs were taken, and the number of individual gulls counted. A total of 17 rivers were flown, and 11 breeding colonies found with one non-breeding group. The count, including the non-breeding group, totalled 23,454 individuals compared to 18,519 counted on 24-25 November 2014. An additional 1,155 individuals were counted in five breeding colonies located throughout the Mackenzie District, but these were ground counts and not done by aerial surveys. Opportunistic sightings of breeding colonies were reported by other observers, totalling roughly 4,191 individuals. Movement of breeding colonies between rivers was noticeable, and it is recommended that another year of surveys takes place, emphasizing the importance of consistent methods throughout Canterbury. We also strongly recommend that breeding colonies and non-breeding groups are differentiated. Developing an updated correction factor for Canterbury to compare to one calculated from Southland colonies in 2004-06 is also recommended as this can then be applied to determine the number of breeding pairs from the number of individuals counted on photographs.

Key words: black-billed gull, *Larus bulleri*, Canterbury, aerial photography, aerial survey

1. INTRODUCTION

The black-billed gull (*Larus bulleri*) is endemic to New Zealand, and is listed as Threatened, Nationally Critical by the New Zealand Threat Classification System (Robertson et al 2013). This is the most serious threat classification before Extinct. They mostly nest in dense colonies on braided rivers, but are also found breeding on sandspits, shellbanks, and margins of lakes (Taylor 2000). It is estimated that 70% of the population breed in Southland, 25% in Canterbury, Tasman, and Marlborough, and 5% in the North Island (Powlesland 1998). National declines are estimated to be 78% over 30 years (McClellan 2008). Very little is known about this species, and this makes any conservation work difficult.

The last national breeding census was carried out by the Ornithological Society of New Zealand (now called Birds New Zealand) over the summers of 1995/96 to 1997/98 (Powlesland 1998). These surveys resulted in an overall population estimate of 48,000 breeding pairs. No national count has been done since then. As outlined by McClellan (2015), there have been numerous counts completed in Canterbury and Southland between the national census and last year's survey. Additionally, counts of all breeding colonies in Marlborough and Tasman have been done since 2011, with ground-truthed aerial photographs taken during 2014-15 and 2015-16. This was expanded to include the entirety of the West Coast region in 2015-16, where counts were also ground-truthed (C. Mischler and M. Bell, unpublished).

Wildlife Management International Ltd (WMIL) received a funding grant from Environment Canterbury to carry out the second year of the black-billed gull surveys in Canterbury. This survey was carried out using McClellan's (2015) methods so that comparisons between years could be made. The main aim of this report is to summarize data of breeding colony and non-breeding group locations and sizes, to make comparisons between 2014-15 and 2015-16, and to make recommendations for future work.

2. METHODS

The main survey was a continuation from what was undertaken by McClellan (2015) during the summer of 2014-15, and methods were replicated as best as possible to allow for comparisons. It should be noted that McClellan (2015) counted all individuals in a congregation, regardless of whether or not it was a breeding colony or a non-breeding group. In this report, we have clearly differentiated which congregations were breeding colonies and which were a non-breeding group. Only one flight of each river was carried out as opposed to six repeat flights of four river sections done the previous year. The Godley and Dobson Rivers in the Mackenzie District were flown last year. This is different to this year's methods where the rivers in the Mackenzie District were not flown because almost all of the rivers in this district are covered via ground surveys carried out under the Project River Recovery and the Kaki Recovery Team. All additional sightings of breeding colonies that were reported by various independent observers are also included in the report; however, these were opportunistic sightings with no specific methods applied.

2.1 Method 1

All braided sections of all rivers in Canterbury were surveyed as had been done by McClellan (2015). A Cessna 180 was used, and was flown at 500 feet above ground level at an approximate speed of 80 knots. Particularly wide areas of river where the width of the riverbed was not visible in one sweep were divided into sections and were flown up and down several times to ensure no colonies were missed. Once a breeding colony or large group of gulls was visible, the plane decreased its speed as much as possible and circled around the congregation several times until the photographer was sure that enough clear pictures had been taken. The same photographer was used throughout the survey, and photos were taken with a Canon EOS 40D digital camera, 18-200mm focal length. Pictures were

taken from the front seat, and one additional observer helped to locate colonies from the back seat. Both the observer and photographer were on the same side of the plane with the pilot flying slightly off to one side of the river to provide the observer and photographer with the best view. A Garmin GPS was used to track the flight paths as well as for marking each individual congregation.

Seventeen rivers were flown over the course of 22-23 November 2015. This timing was chosen based on ground checks reported by observers about the nesting status of birds. This coincided as best as possible with peak incubation thereby accounting for the highest number of breeding birds. It was also consistent with McClellan's (2015) methods. No repeat surveys were carried out this year. Flights started as early as possible in the morning once the light was adequate and no fog was present but before the wind increased. They continued throughout the day until the observers become too tired or maximum flying hours permitted by the pilot was reached.

Photos were sorted based on zoom and clarity. The best ones were chosen for counting. No stitching of photos was necessary. Each image was opened in Windows Paint, set at 100% on a large computer screen, and every individual bird was marked with a coloured dot and counted. All birds in the photographs, including birds in the water or in flight, were counted. Any visible chicks were not counted. A second count of the same image was completed of apparently occupied nests (AON) defined as birds sitting on substantial nests or standing within touching distance of a nest (Simeone et al 2003), or sitting in incubation posture. Each of these nests was considered to be equivalent to one breeding pair (Raven & Coulson 1997). This latter count was based on extensive field experience working around gull breeding colonies, and having a useful understanding of behaviour, nest building, nest densities, etc. This count was then compared to the correction calculations made by McClellan (2015) where it was assumed that there are 0.56 nests for every gull in a photograph (based on findings from Southland colonies during 2004-06, outlined in McClellan 2008). These calculations were done to estimate the number of breeding pairs.

2.2 Method 2

Project River Recovery and the Kaki Recovery Team carried out the surveys in the Mackenzie District. No flights were done for the rivers within this district, and hence methods do not follow those completed by McClellan (2015). Breeding colonies were located opportunistically or while doing whole river bird surveys. Almost all rivers in the district are covered while searching for kaki. Counts of individual birds and/or nests were reported as estimates, not exact counts, with the exception of one breeding colony where photos were taken from the ground and counted in detail. No correction calculations were made.

2.3 Method 3

Several reports of breeding colonies in Canterbury were received from independent observers. There are no systematic methods associated with these sightings. They were sent by keen birders, people who work on rivers (carrying out weed work, for example), and by volunteers helping with the Birds New Zealand red-billed gull (*Larus novaehollandiae*) census who opportunistically located black-billed gull breeding colonies. Counts of individual birds and/or nests were reported as estimates, not exact counts. No correction calculations were made.

3. RESULTS

Results of the different methods outlined above are shown separately due to the inconsistencies of how numbers of individual gulls and/or nests were obtained. All results, however, show a useful overall estimate of numbers as well as breeding colony locations throughout Canterbury (Fig. 1). GPS coordinates of each breeding colony are outlined in Table 5 in the Appendix.

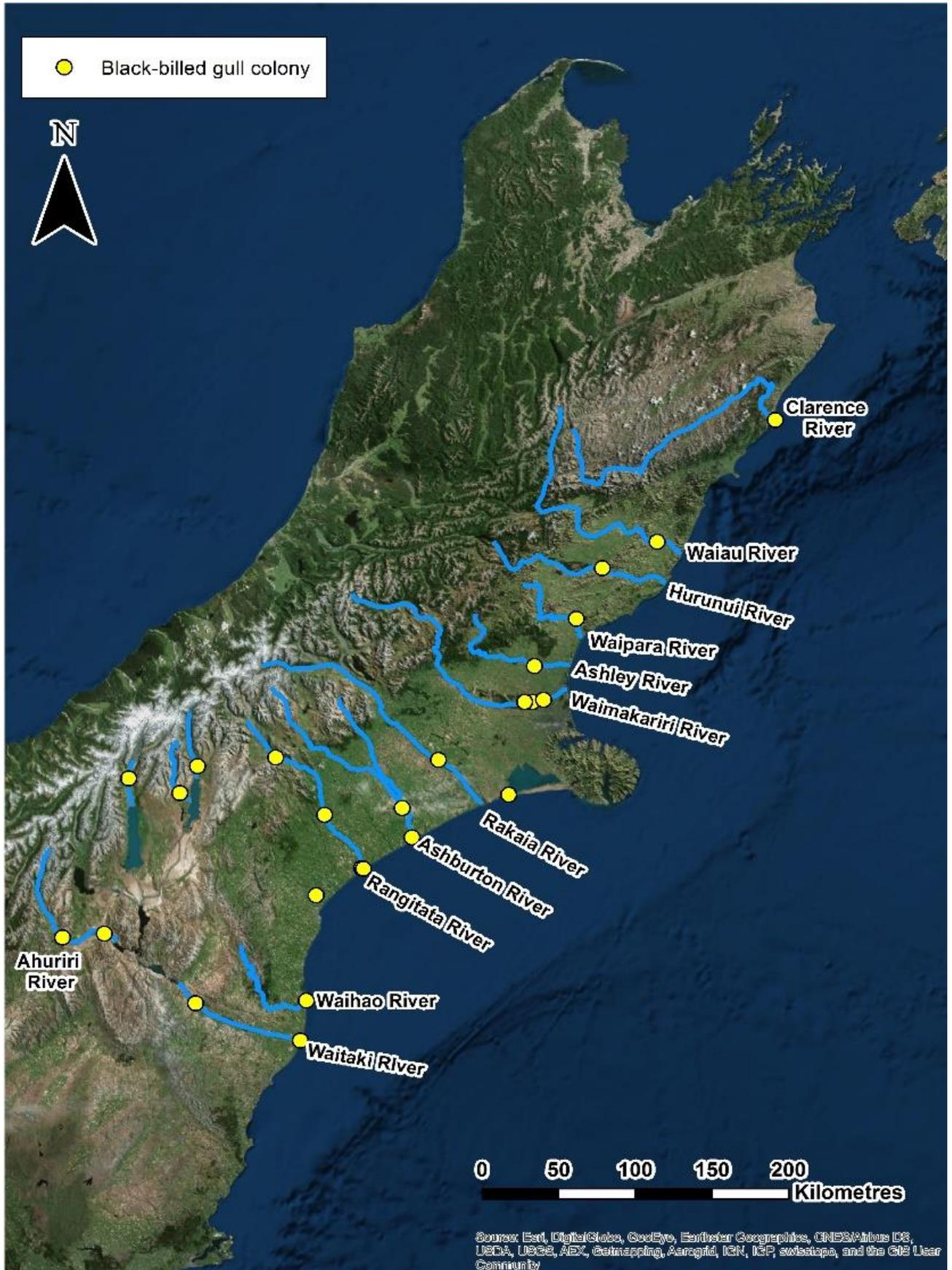


Figure 1. Map showing all known black-billed gull breeding colonies in Canterbury during summer 2015-16. The blue lines highlight the river systems.

3.1 Results 1

A total of 17 rivers were flown over the course of the survey (Fig. 2). All rivers surveyed were the same as what was carried out by McClellan (2015) with minor exceptions. Lake Stream (over Lake Heron and Maori Lakes) and the Ashburton North Branch to the gorge were flown last year. However, they were partially done this year as they did not seem braided enough to provide nesting habitat. The Dobson and Hopkins Rivers were surveyed in 2014-15 but not this year. This was based on McClellan's (2015) recommendation as well as Project River Recovery staff and Kaki Recovery Team's certainty that it would be unlikely for colonies to be present.

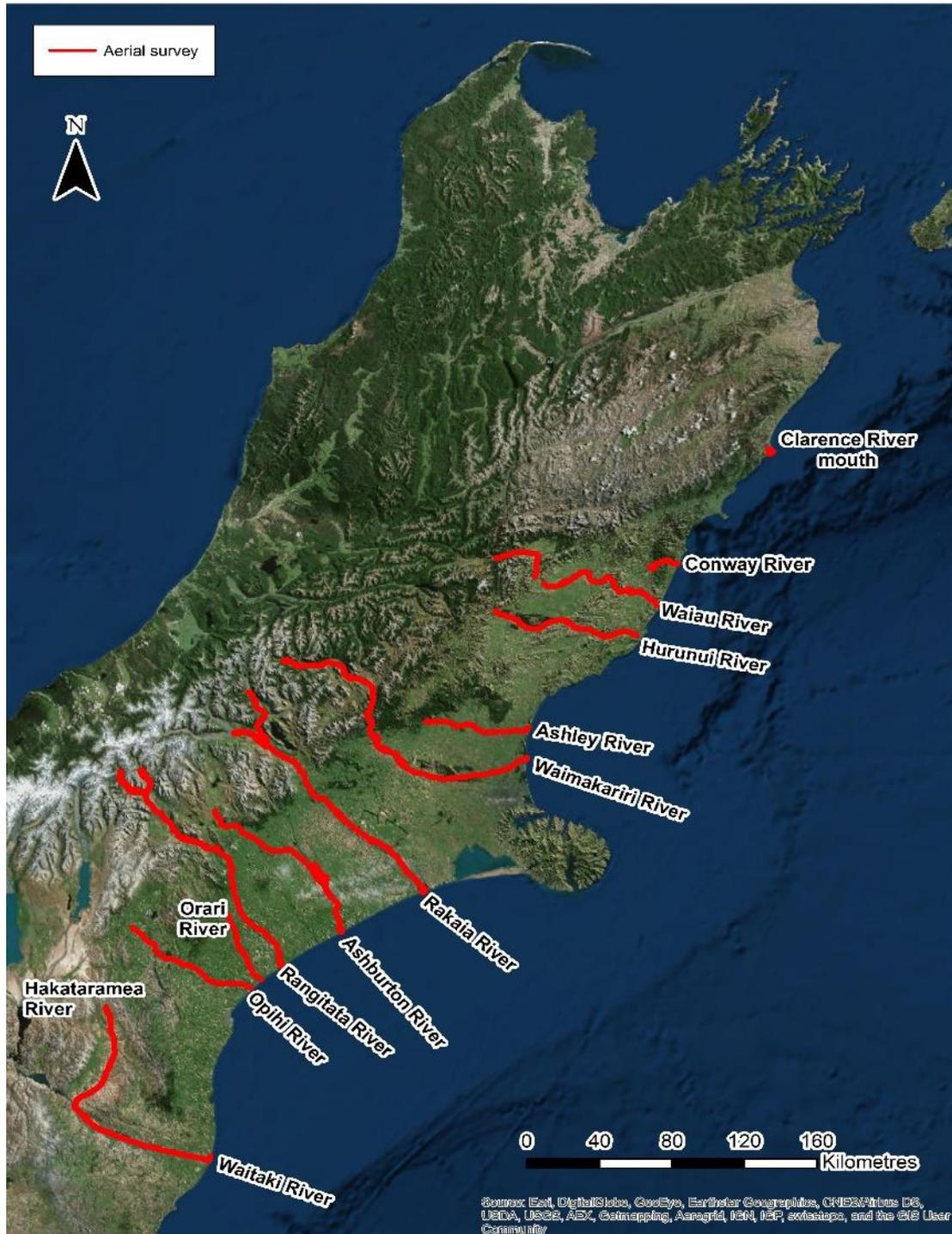


Figure 2. Map outlining all sections of rivers in Canterbury which were flown on 22-23 November 2015.

A total of 11 breeding colonies and one non-breeding group were found and photographed (Fig. 3). Sizes varied from 21 individuals to 7,667 (Table 1). The Rangitata River mouth breeding colonies were both reported to contain nesting red-billed gulls; however, due to the large size of these colonies and the inability to see the nesting area from all directions, no precise count was done to determine the ratio of black-billed gulls to red-billed gulls. One report of 48 adult red-billed gulls seen on 15 December 2015 was provided. Unfortunately, it was not possible to distinguish between the two species in the aerial photographs taken. Consequently, numbers shown are the maximum number of individual black-billed gulls that could have been present. The same situation applies to the Waitaki River mouth, where a report on 21 January 2016 mentioned “a small number of red-billed gulls with chicks” present amongst the black-bills. The Waihao River mouth was unfortunately never checked on the ground, and since it is a coastal location, it is possible that red-bills were mixed in with the black-bills.

Table 1. Number of individual black-billed gulls and apparently occupied nests (AON) in breeding colonies counted from aerial photographs taken on 22-23 November 2015. Correction factor used was 0.56 nests per individual gull (as determined by McClellan 2008). The actual difference and percent difference between the counted number of AON and the correction calculation are shown. Rivers are listed from north to south.

Colony	Number of birds	Number of AON	Correction	Difference	% Difference
Waiau	1,756	1,493	983	510	41%
Hurunui	3,015	1,745	1,688	57	3%
Rakaia	455	257	255	2	1%
Rakaia, non-breeding	801 ^a	-	-	-	-
Ashburton Bridge	1,198	773	671	102	14%
Ashburton River mouth	208	63	116	-53	59%
Rangitata Upper	21	18	12	6	40%
Rangitata River mouth 1	3,638 ^b	3,157	2,037	1,120	43%
Rangitata River mouth 2	7,667 ^b	6,779	4,294	2,485	45%
Waihao	763 ^c	381	427	-46	45%
Waitaki Upper	3,426	2,980	1,919	1,061	43%
Waitaki River mouth	506 ^b	337	283	54	17%
Total	23,454	17,983	13,134	-	-

^a Not a breeding colony, but is included in the total count in order to maintain consistency between 2014-15 and 2015-16

^b Count is of all birds present in photograph and may include red-billed gulls which were reported to be nesting in the same area

^c Count may include red-billed gulls; however, no ground check was done to confirm

Number of AON counted from photos are very different from the correction factor used by McClellan (2008) (Table 1). Most of the time, the correction factor calculates a much lower AON than a count from photographs, and the percent difference is generally around 40%.

It should be noted that the lower section of the Waimakariri is within the restricted fly zone of the Christchurch Airport due to arriving and departing aircrafts. Slow flying by the survey plane was therefore not permitted. This resulted in a rushed and high flight above that section of river, thereby missing two breeding colonies. Luckily, these are being monitored by Environment Canterbury staff (Courtney Thompson) who was kind enough to share her information. We also received information

from a flight done on 24 November 2015 by the Airport Co.'s ornithologist, Peter Harper. Since the two breeding colonies were missed on our survey, they are included in Results 3.

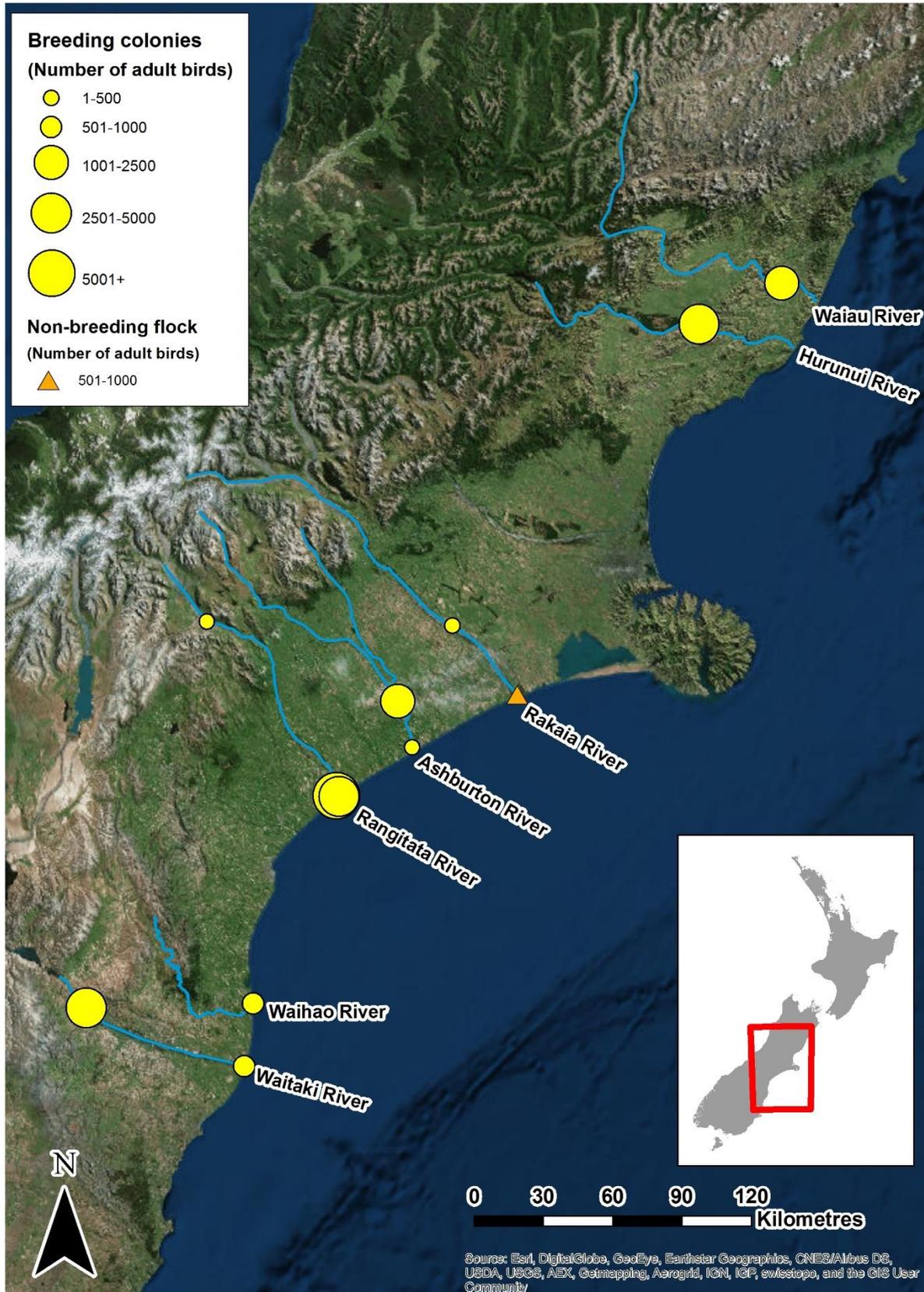


Figure 3. Map showing size and location of breeding colonies and one non-breeding group found during the flight on 22-23 November 2015. Size determined from aerial photograph counts.

A comparison of number of individual gulls between the 2014-15 survey and the 2015-16 survey are shown in Table 2. The total number of individuals is slightly higher in the second survey than in the first. There is also a clear shift in the location of colonies between rivers. For example, the Ashburton held half of the total number of gulls found in 2014-15 whereas the Rangitata was the strong hold of gulls this summer. None of the rivers appeared consistent in numbers over the course of the two surveys.

Table 2. Number of individual black-billed gulls counted from aerial photographs taken on 24-25 November 2014 (adapted from McClellan 2015) and 22-23 November 2015. Numbers are combined per river, with the exception of the Rakaia River which distinguishes between a breeding colony and a non-breeding group. Rivers are listed from north to south.

Colony	Number of birds	
	2014-15	2015-16
Waiau	0	1,729
Hurunui	1,154	2,184
Waimakariri	2,931	- ^a
Rakaia	2,540	439
Rakaia, non-breeding	-	801
Ashburton	9,545	1,164
Rangitata	957	11,112
Opihi	707	0
Waihao	0	722
Waitaki	685	3,795
Total	18,519	23,454

^a Count not included because colony was not photographed

3.2 Results 2

Surveys done by Project River Recovery and the Kaki Recovery Team in the Mackenzie District covered a number of additional rivers which were not flown in 2014-15. For example, the Ahuriri, Tasman, and Cass were not surveyed last year. The reason why is unknown. The Macauley River was also done this year but not last year; however it contained no breeding colony. The Tekapo River was not surveyed in either year; however, staff of Project River Recovery and the Kaki Recovery Team carrying out other bird species work were asked to report any black-billed gull colonies during this summer. The Dobson and Hopkins Rivers were surveyed in 2014-15 but not this year. This was based on McClellan's (2015) recommendation as well as Project River Recovery staff and the Kaki Recovery Team's certainty that it would be unlikely for colonies to be present (Fig. 4).

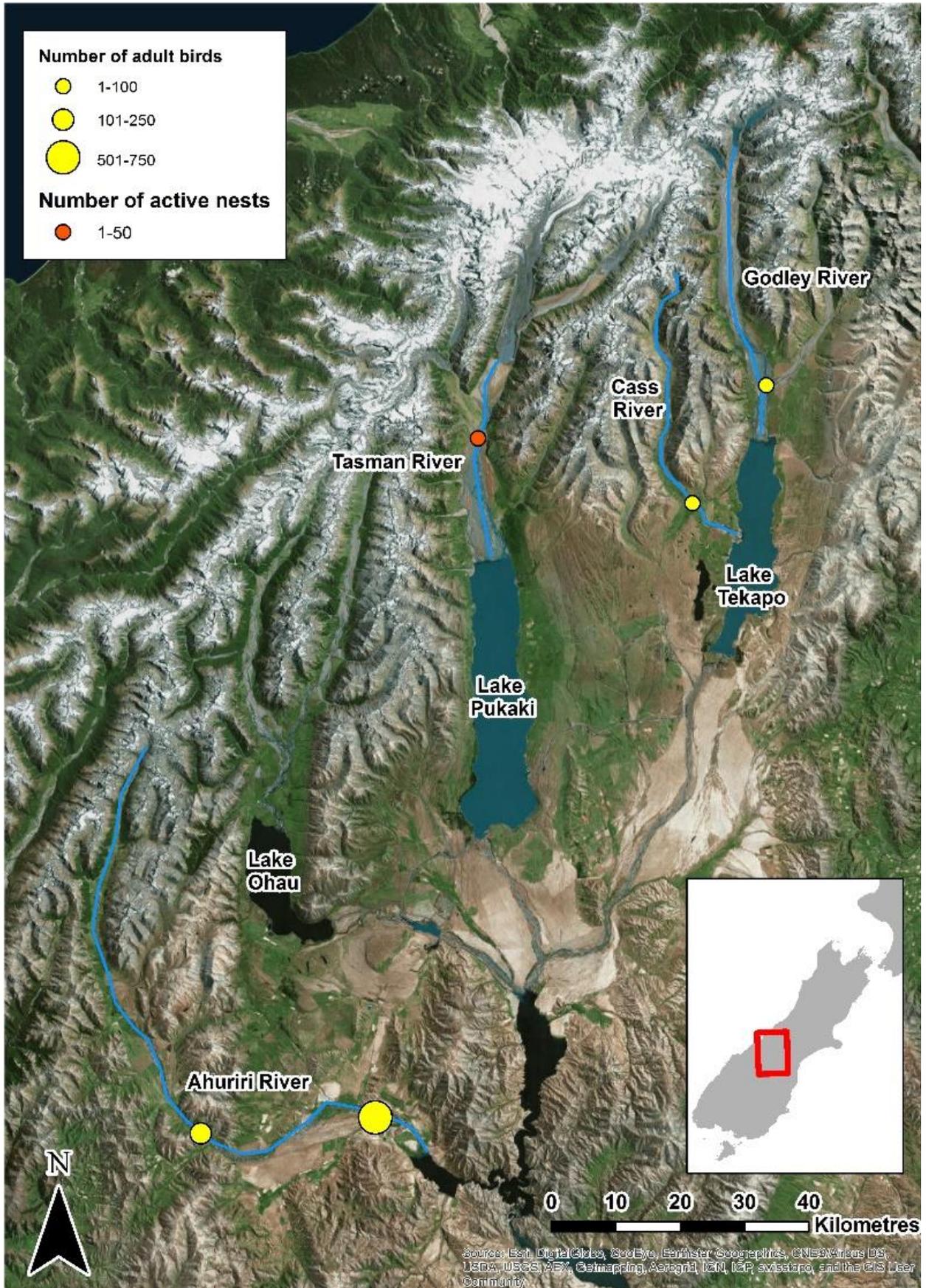


Figure 4. Map showing size and location of black-billed gull breeding colonies reported from ground surveys in the Mackenzie District.

Despite the Mackenzie District being a fairly alpine area, there are a large number of gulls present (Table 3). Although the area of the district is quite small compared to the rest of Canterbury, the survey done this year shows a different picture in terms of number of individuals compared to the survey done during 2014-15 where three key rivers, mainly the Tasman, Ahuriri, and Cass Rivers, were excluded. However, due to all the discrepancies listed above, no suitable comparisons can be made between years. Additionally, the variability in dates as well as the use of ground counts makes comparisons difficult.

Table 3. Number of individual black-billed gulls and apparently occupied nests (AON) in breeding colonies counted from ground surveys on the day shown. Rivers are listed from north to south.

Colony	Number of birds	Number of AON	Date counted
Godley	91 ^a	50-60 ^b	19-Nov 2015
Cass	79 ^a	50-60 ^b	18-Nov 2015
Tasman	-	41	8-Dec 2015
Lower Ahuriri	735	610	20-Nov 2015
Upper Ahuriri	250 ^b	-	12-Dec 2015
Total	1,155	761	-

^a Count shown is for the number of birds seen on the entire river on the day it was surveyed

^b Count shown is an approximation

3.3 Results 3

Various other reports of gull breeding colonies were submitted by observers (Table 4). These were opportunistic sightings, with the exception of the Clarence River breeding colony which has been actively monitored since 2012, but provide valuable information. As mentioned above, the Waimakariri breeding colonies were missed during the main flight survey. It is interesting to note that these sightings are spread out throughout Canterbury (Fig. 5). The breeding colony on the Kaitorete Spit was mixed in with a large number of white-fronted terns (*Sterna striata*), and the breeding colony on the Clarence is a mixed colony with red-billed gulls and white-fronted terns (hence why a ground count was done and not an aerial photograph count).

Table 4. Number of individual black-billed gulls and apparently occupied nests (AON) in breeding colonies counted from ground surveys on the day shown. Locations shown from north to south.

Colony	Number of birds	Number of AON	Date counted
Clarence	-	139	4-Dec 2015
Waipara	10 ⁺ ^a	-	30-Oct 2015
Ashley	25	3	7-Dec 2015
Waimakariri, Haul Road	-	1,371	24-Nov 2015
Waimakariri, Sanctuary	-	469	24-Nov 2015
Waimakariri, McLeans	1,500 ^a	-	~10-Oct 2015
Kaitorete Spit	116	-	28-Nov 2015
Rangitata, Arundel	2,000 ^a	-	17-Jan 2016
Timaru Golf Course	540	-	18-Jan 2016
Total	4,191	1,982	-

^a Count shown is an approximation

However, due to all the discrepancies listed in Results 2, no suitable comparisons can be made between years. Additionally, the variability in dates as well as the use of ground counts makes comparisons difficult. The Clarence and the Waimakariri breeding colonies are exceptions to this. Details on the Waimakariri results will be reported on by Courtney Thompson (ECan), and the Clarence will be included in a report covering Marlborough (by C. Mischler and M. Bell, in progress).

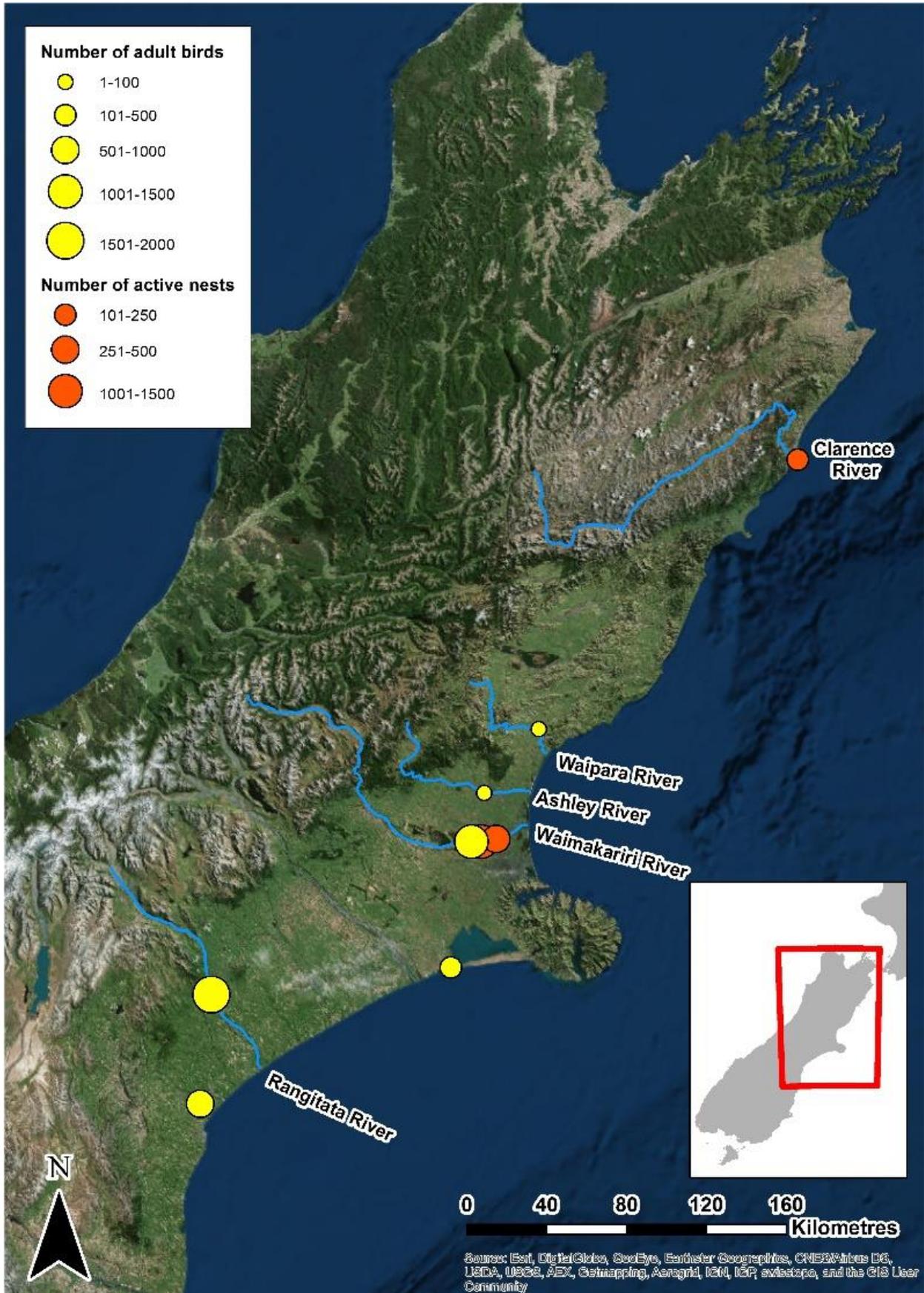


Figure 5. Map showing size and location of other black-billed gull breeding colonies randomly reported by independent observers from ground surveys in Canterbury.

4. DISCUSSION

Particular emphasis was put on the timing of flights during this survey. McClellan (2015) carried out repeat surveys of four rivers throughout October to December 2014 without knowing the time at which the birds were nesting. The main survey done last year was meant to coincide with peak laying, and the timing was based on peak laying recorded previously in Southland colonies, ground observations, and the repeat surveys (McClellan 2015). Since only one survey was being done this summer, the timing was aimed at peak incubation in the attempt to capture the highest number of breeding birds. Several observers throughout Canterbury monitored the gulls on the ground and reported breeding activity. Breeding attempts seemed to be slightly later this year compared to past years. This was also noticed in Marlborough and Tasman breeding colonies which have been monitored intensively since 2011 where they were approximately two weeks late (C. Mischler, pers. obs.). The nesting period throughout the river catchments in Canterbury is not synchronous; consequently, some of the colonies such as the Waiau, Upper Waitaki, and Ashburton Bridge already had chicks present when the flights were carried out. This, however, is not uncommon while other birds are still incubating (C. Mischler, pers. obs.).

As mentioned by McClellan (2015), the survey provides information about the number of gulls present at colonies on that particular day. It cannot, however, be applied to a long period of time due to the variability and fluctuations in numbers and hence surveys on different days can provide a drastically different result. For a dynamic and complex species like the black-billed gull, this method is the best that is available at present, and it does provide useful insight. More information is needed about movement of birds throughout the day as well as fluctuations in numbers throughout the breeding season. In Marlborough and Tasman, there appears to be a pattern of large numbers of birds being present just before dawn and during the late afternoon and evening, with mostly incubating birds present during the middle of day, perhaps when it is the hottest. A large influx of non-breeders seemed to occur around hatching, and very few birds are present once the chicks start moving around in a crèche. All these observations are our personal ones from intensively monitoring breeding colonies since 2011. However, these may not be applicable in Canterbury where colonies are much larger than in Marlborough.

Only one observer counted all photographs. This was due to experience as well as attempting to keep counts consistent between colonies. We felt that photographs were usually clear enough to be able to see nests and hence counted AON in addition to number of birds. This was not done last year. The Ashburton River mouth and Hurunui breeding colony photographs were not as clear as the rest, and hence it was difficult to count AON. However, there does not appear to be a substantial difference between our AON counts and the correction calculations applied as suggested by McClellan (2008) between these two colonies and the rest of the colonies. Dolbeer et al (1997) used photographs to count the number of nests of Laughing gulls (*Larus atricilla*), and Witteveen (2015) did the same with Kelp gulls (*Larus dominicanus vetula*). However, both studies ground truthed their counts with marked plots. Antolos & Roby (2004) applied the same methodology as outlined by McClellan (2008) where a ratio of incubating terns to total number of terns was applied to determine the number of breeding pairs from a count of all Caspian terns (*Sterna caspia*) present in an aerial photograph. However, ratios were determined on the day of the survey and plots were used. It may be beneficial to carry out similar methods as was done by the above-mentioned studies during any future survey flights. This will reduce the error in estimates of breeding pairs, which will be very useful in providing a long term population estimate.

Shifts in breeding colony locations are very noticeable. There was a clear movement of birds south from the Ashburton during the 2014-15 survey to the Rangitata this year. There was also a shift south from the birds on the Opihi to Waihao. This could be due to a number of explanations, such as intermixing between river catchments which results in genetic variability. This has been observed annually in Marlborough and Tasman breeding colonies by using colour banded birds (C. Mischler and

M. Bell, unpublished). It may also be due to a shift in food source in the sea or in adjacent paddocks. Black-billed gulls do not appear to rely on rivers for feeding but will travel to the coast or forage in paddocks (C. Mischler, pers. obs.). It may also be as a result of less winter flooding and an increase in weed growth reducing available nesting sites, or disturbance and/or predation. Not enough is known about this species, and therefore concrete conclusions are difficult.

In the northern part of Canterbury, however, there were more birds on the Hurunui as well as an additional breeding colony on the Waiau this summer as compared to last. A possible explanation for this could be that mixing of birds along the coast during the winter (again, as observed by colour banded birds) resulted in some birds moving north, or perhaps these birds simply did not breed or were missed during the summer of 2014-15. Overall, these shifts in breeding colony locations emphasize the need to continue to survey all braided sections of rivers throughout Canterbury, including the Mackenzie District which has shown to contain a large number of individual gulls and breeding colonies.

The rivers in the Mackenzie District provide excellent nesting habitat for the gulls due to very low weed coverage (C. Mischler, pers. obs.). Since these rivers have a mountain source of flow, they have very frequent high flow (Beca 2008) which could therefore compromise nest success due to regular flooding. However, birds may also be benefiting from predator trapping done for black stilts, like on the Tasman River for example.

It is clear that some colonies were missed during the aerial survey on 22-23 November 2015, as mentioned above in regards to the colonies on the Waimakariri. Background substrate and light conditions could also make detection more difficult in some areas than others. The breeding colony on the Kaitorete Spit was reported on 28-November 2015 and therefore must have been present and ongoing during the flight but may have been missed due to its unusual location away from any river mouth. The same reasoning applies to the breeding colony in the Timaru Golf Course – this was reported on 18-January 2016 with chicks and would not have been detected as it was nowhere near a river. The Waipara River breeding colony was reported on 30-October 2015 and had likely failed by the time the flight was done. The Rangitata/Arundel breeding colony was reported on 17-January 2016 with chicks and was probably simply missed or this may have been birds that re-nested from elsewhere and were not yet present during the flight. It may also be beneficial to reduce daily search times as observer fatigue may result in colonies being missed. These reports, however, show the importance of having observers on the ground as no aerial survey will ever be perfect. McClellan (2015) also discusses this point, and suggests carrying out ground surveys at the same time as aerial surveys. However, this would be an enormous task surveying incredibly long stretches of river. It may be possible if combined with another project, for example the student genetics project that is planned for 2016-17. Or this type of survey may be more feasible to carry out in a smaller region such as Marlborough, or the West Coast where braided sections of rivers are not as extensive as in Canterbury.

Based on the available information and known fluctuations in numbers of individuals, we do not feel confident to expand this survey's data to national population estimates. A much wider survey including data from colonies located outside of Canterbury is needed. A summary of breeding colony sizes and location from the North Island, Marlborough, Tasman, and the West Coast in addition to the Canterbury data is in the process of being completed (C. Mischler and M. Bell, in progress). This summary will also include a correction factor calculated from two years of ground truthing aerial photography counts in Marlborough and Tasman, as well as one year's worth of data from the West Coast.

We recommend that another year of aerial surveys in Canterbury, including the Mackenzie District, is carried out to account for annual variations in numbers of individuals as well as breeding attempts. We also strongly recommend distinguishing between breeding colonies and non-breeding groups. This will provide a useful picture of changes in numbers as well as breeding locations. We also recommend ground-truthing counts, and checking colonies along the coast to determine whether birds breeding

are red-billed gulls and/or black-billed gulls. Consistency of methods between all contributors should be ensured to allow for comparisons. We found that with our network of on-the-ground observers and our own work in Marlborough/Tasman means we can track birds well and have a good sense of timing of nesting. Consequently, we feel that one flight per summer is enough, and that repeat flights are not necessary. Combined with other regions of the North and South Island, this data can provide a powerful means to determine an up-to-date national population estimate.

5. ACKNOWLEDGMENTS

Thank you to Environment Canterbury for providing the funding to carry out these surveys, and for the support of Frances Schmechel. We are also thankful to Heather Davies for helping to carry out the flights, and are immensely grateful to the pilot (who wishes to remain anonymous) for offering the time to fly these rivers for running costs only. It would not have been possible without this generosity! Thank you also to Aalbert Rebergen, the Project River Recovery team, and the Kaki Recovery Team for providing data on the Mackenzie District, and for the support from Richard Maloney. A huge thank you also goes out to all the people who helped on the ground and provided us with regular updates, mainly Edith Smith, Courtney Thompson, Ann Schlesselmann, Jan Walker, Sonny Whitelaw, Nick Ledgard, Peter Harper, Peter Howden, Niall Muga. Our apologies to anyone we may have missed. A big thank you to Rachel McClellan (Wildland Consultants) for providing guidance on the methods of the survey. Last but not least, thank you to Nikki McArthur for creating the maps.

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7. APPENDIX

Table 5. Table showing coordinates of all known breeding colonies and non-breeding groups in Canterbury during summer 2015-16. Coordinates are in NZTM (New Zealand Transverse Mercator).

Colony	Easting	Northing
Ashburton Bridge	1499011	5136578
Ashburton River mouth	1503800	5122148
Hurunui River	1593011	5256404
Rakaia River	1515807	5160519
Raikaia River, non-breeding	1536246	5138787
Rangitata River mouth 1	1481250	5106453
Rangitata River mouth 2	1480405	5106693
Rangitata River (upper)	1438924	5160345
Waiau River	1619231	5269527
Waihao River	1455943	5041656
Waitaki River mouth	1453645	5022323
Waitaki River (upper)	1404666	5038975
Lower Ahuriri River	1361175	5071390
Upper Ahuriri River	1341850	5068837
Tasman River	1369790	5148020
Cass River	1394240	5141500
Godley River	1402060	5155000
Timaru Golf Course	1459423	5093050
Kaitorete Spit, Tuamutu	1548944	5143709
Waimakariri River (Haul Road)	1559861	5189609
Waimakariri River (Sanctuary)	1565243	5190645
Waimakariri River (McLeans)	1556205	5189604

Canterbury Black-billed Gull Survey 2015-16

Rangitata River (Arundel)	1462576	5132623
Waipara River	1580581	5231045
Ashley River	1560766	5207471
Clarence River	1676553	5330474