



Chatham Island shag census 2014-2016



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EXECUTIVE SUMMARY

Annual aerial surveys to count the breeding population of Chatham Island shags were carried out during the 2014, 2015 and 2016 breeding seasons. Each season two aerial surveys of all colonies were undertaken, with an additional early flight in 2016 to count the colonies in Te Whanga Lagoon.

The number of Chatham Island shags was estimated at 856 breeding pairs, found in 13 breeding colonies.

This result is very similar to that recorded in 1997 (842 pairs) but significantly higher than counts from 2003 and 2011. Methodology was the same in the 1997 and 2014-2016 counts and suggest the Chatham Island shag population has been stable for the last 20 years.

Aerial surveys are an effective method at counting Chatham Island shags, and this method is recommended for ongoing monitoring of this species. The use of multiple flights is highly recommended to get accurate results.

1. INTRODUCTION

Chatham Island shag (*Leucoccarbo onslowi*) is endemic to the Chatham Islands (Checklist committee 2010). With birds breeding on Chatham Island, Pitt Island, Rabbit Island, the Star Keys and the North East Reef (Bell and Bell 2000).

The breeding season is poorly known but laying mostly occurs from August-December, although there is some variation both between and within colonies (Heather and Robertson 2005, Debski *et. al.* 2012).

The first full census of Chatham Island shags was carried out in the 1997/98 breeding season and estimated the breeding population at 842 pairs (Bell and Bell 2000).

A second census was carried out in 2003/2004 but only found 271 breeding pairs (Bester and Charteris 2004)

A third census was carried out in 2011 and recorded 355 breeding pairs (Debski *et. al.* 2012).

The resulting observed population decline of up to 58% led to the species being listed as Critically Endangered (Robertson *et. al.* 2015).

The Chatham Island Taiko Trust undertook aerial surveys of Chatham Island shag colonies in 2014 and 2015 with funding from the Department of Conservation Community Conservation Fund. In 2016 Wildlife Management International Limited was contracted by the Department of Conservation Marine Threats Team to undertake a census of Chatham Island shags. This report combines and reports on the results of all three years of aerial surveys carried out to census the Chatham Island shag breeding population.

2. METHODS

Aerial surveys of all known Chatham Island shag colonies were carried out using Air Chatham's Cessna 206 aircraft. Each colony was circled at a height of approximately 100m, with the aircraft flying as slow as possible (approximately 60 knots). Photos were taken out of an open window using either a Cannon ED50 or Canon EOS1D MKiii Digital SLR camera with a 100-400mm zoom lens. Each colony was circled until the photographer was confident that good images had been taken, usually needing 2-3 passes over each colony.

Each breeding season two sets of aerial photos were taken, one timed for early in the breeding season, and the second for mid-way through, although the timing of surveys was often dictated by the weather and aircraft availability.

In 2016, following the discovery of a second colony in Te Whanga Lagoon, an additional early flight was undertaken to census the colonies in Te Whanga Lagoon, as previous research had indicated the lagoon colonies breed considerably earlier than other sites. In 2014 a count of the Shag Rock colony (off Motuhinahina Island) was carried out from a boat in July. This count is included here as it provides a more accurate population estimate than the aerial surveys as most chicks had already fledged by the time of the first flights.

The small colony at Ke Oreao Point was missed, despite being looked for, on most of the surveys. It was re-found during a boat-based survey for Pitt Shags on 22 Oct 2016 but proved impossible to census aurally due to the position of the rock stack in relation to the cliffs creating too much turbulence to make it safe to try and take photos.

Photos were selected from the first flight that showed all breeding sites at each colony and all nests were numbered, using Adobe Photoshop CS5, and, wherever possible, nest contents were recorded. Photos from the second flight were then compared those from the first flight with each nest given the same number. New nests were numbered, and again, where possible the contents of all nests were

recorded. The number of breeding attempts at each colony is the total number of nests recorded in both surveys. Hence if 50 active nests were recorded in the first flight, but by the second 10 had disappeared but there were 20 new nests the total would be 70 pairs. We assumed that new nests are from new pairs laying, not the same birds relaying as it is unlikely that a pair would have time to relay between surveys.

A breeding pair was defined as

- An adult bird apparently incubating
- An adult bird, or birds, guarding a chick
- A chick, or chicks on a nest site
- An adult bird, or birds, at a suitable site showing signs of nest building
- A pair of adult birds together at a suitable nest site

3. RESULTS

During the 2014-2016 breeding season's seven flights to take photos of Chatham Island shag colonies were carried out (Table 1). In 2015 poor weather and aircraft unavailability meant that there was a delay in undertaking the early season survey, but in the other years flights were carried out within a few days of the targeted date.

In all surveys excellent photographs of the Chatham Island shag colonies were taken and the Air Chatham's Cessna 206 proved to be a good platform to undertake aerial surveys (Figure 1). No disturbance of birds at any colonies was recorded in any flights.

Table 1. Timing of aerial surveys of Chatham Island shag colonies.

Survey timing	2014	2015	2016
Te Whanga Lagoon	27 July*		22 Sept
Early-season	9 Sept	22 Oct	14 Oct
Mid-season	28 Nov	2 Dec	23 Nov

*boat count

Figure 1. Sample aerial photos of Chatham Island Shag colonies; Upper photo Cape Fournier, Lower photo The Star Keys.



Chatham Island shags were recorded breeding at 13 locations throughout the islands, including a new breeding colony in Te Whanga Lagoon at Waikato Point (Figure 2).

The number of Chatham Island shags recorded each season was between 777-832 breeding pairs. Using a mean of early counts for colonies within Te Whanga Lagoon, combined with a mean for all other colonies from the main surveys, the breeding population of Chatham Island shags in 2014-2016 is estimated at 856 breeding pairs (Table 2).

Figure 2. Breeding distribution of Chatham Island shag.

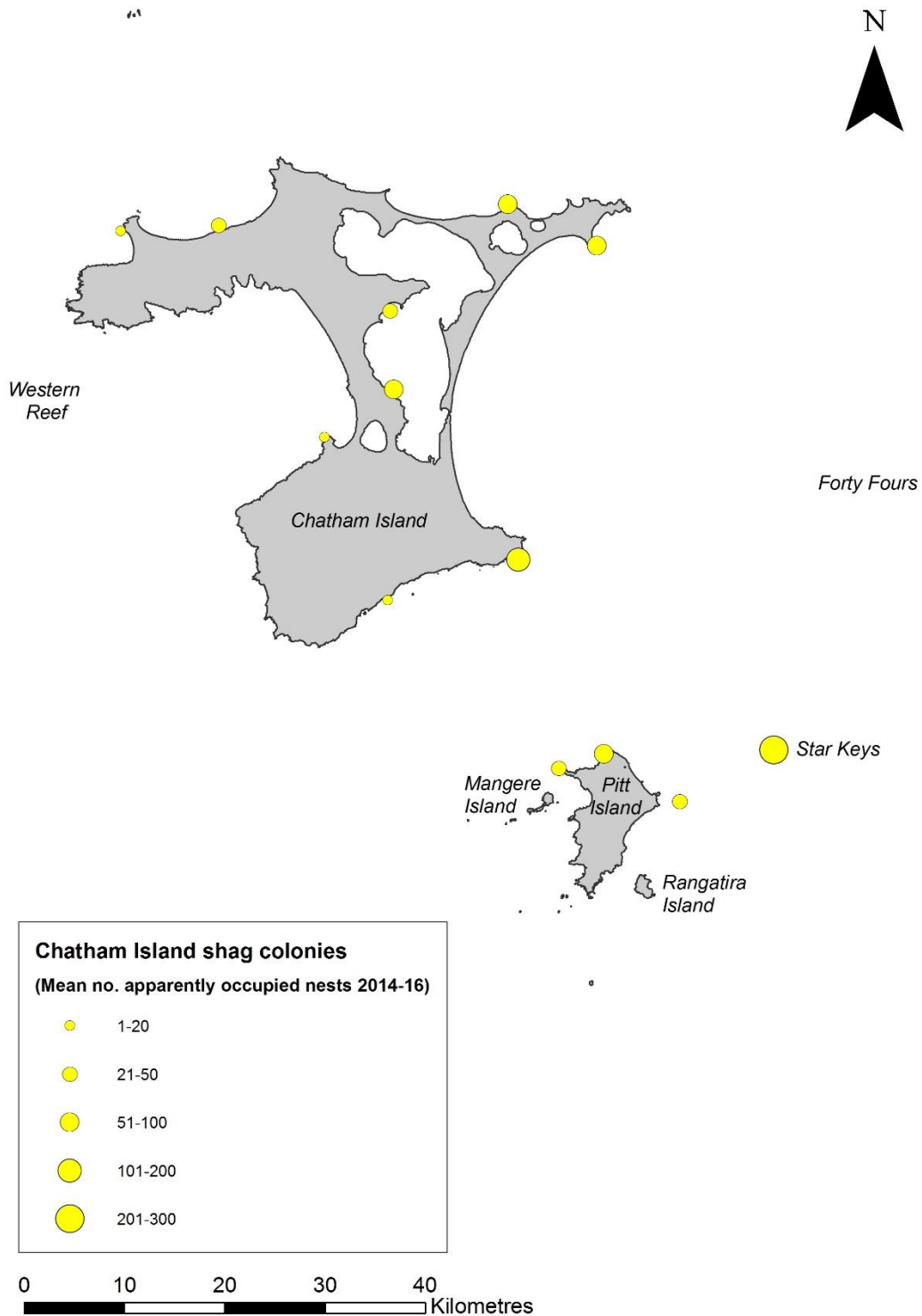


Table 2. Location and numbers of breeding pairs of Chatham Island shag 2014-2016.

	2014	2015	2016	Mean
Cape Pattison	13	16	17	15
Ngatikitiki Rocks	20	45	42	36
Matarkau	44	56	62	54
Okawa Point	92	99	96	96
Cape Fournier	93	91	105	96
Ke Oreao Point*	-	-	6	6
Point Weeding	14	14	19	16
Shag Rock	56*	5	54	55^
Waikato Bay		8	44	44^
Rabbit Island	24	30	31	28
Motutapu Point	139	84	79	101
North East Reef	42	30	37	36
Star Keys	295	299	225	273
TOTAL	832	777	817	856

*boat count

^mean of early counts only

4. DISCUSSION

Aerial surveys have proven to be an effective method to census Chatham Island shags. With the Air Chatham's Cessna 206 providing a suitable platform, enabling good photos of the colonies to be taken from which accurate counts can be achieved. In addition, as found by Schuckard *et. al.* (2015) with King shags, aerial censuses also enable all colonies to be surveyed in a short time frame (1.5-2 hours), removing issues of birds shifting between colonies using traditional ground and sea based surveys, which usually take several weeks.

The estimated number of breeding Chatham Island shags (856 pairs) is very similar to those recorded in 1997 (842 pairs) and significantly higher than those recorded in 2003 (271 pairs) and 2011 (355) (Bell and Bell 2000, Bester and Charteris 2004, Debski *et. al.* 2012). In particular the counts at many of the long term colonies are very similar between 1997 and 2014-2016 (Table 3).

Table 3. Variation in the number of breeding pairs of Chatham Island shag recorded at all colonies 1997-2016. 1997 data from Bell and Bell 2000, 2003 data from Bester and Charteris 2004, and 2011 data from Debski et. al. 2012.

	1997	2003	2011	2014-16 (mean)
Cape Pattison	0	11	5	15
Ngatikitiki Rocks	38	4	13	36
Cape Young	0	1	0	0
Matarkau	53	35	27	54
Kaingaroa	0	1	0	0
Okawa Point	114	47	42	96
Cape Fournier	115	0	51	96
The Pinnacles	0	30	0	0
Ke Oreao Point	7	4	3	6
Point Weeding	6	5	19	16
Shag Rock	68	0	72	55
Waikato Bay	0	0	0	44
Rabbit Island	83	20	18	28
Motutapu Point	0	0	6	101
Kokepa Rock	0	15	0	0
NE Reef	19	17	11	36
Star Keys	339	81	88	273
Total	842	271	355	856

The similarity of breeding numbers recorded in 1997 and 2014-2016 suggests the population has been stable throughout this period and the low counts recorded in 2003 and 2011 are likely to be down to different census methods and/or poor breeding years rather than population changes.

By undertaking an early count of the Te Whanga Lagoon colonies and then two counts covering the early and mid-breeding season periods most of the breeding population should have been counted. There is a risk, however, that the large increases in some colonies between the first and second counts might not have finished and a further later count, at least at some colonies, might show the population is actually higher than realised.

There is considerable variation in the timing of breeding of Chatham Island shags, both between, and within colonies. In particular colonies within Te Whanga Lagoon lay significantly earlier than the others, and it is appears that the colonies at Cape Fournier and the Star Keys are later. In addition there appears to be some inter-annual variation in the timing of the commencing of breeding each season (Table 4). This suggests that each season there needs to be some flexibility in survey timing to ensure accurate population estimates are achieved.

Table 4. Comparison between early and mid-season counts at each colony 2014-2016.

	2014	2015	2016	Comments
Cape Pattison	No change	No change	No change	
Ngatikitiki Rocks	?	No change	No change	
Matarakau	No change	No change	No change	
Okawa Point	Little bit late	Too late	Little bit late	Fairly early colony
Cape Fournier	3-fold increase	Twice as many	No change	Late colony
Point Weeding	Too late, big chicks on first count	Little bit late	Too late, big chicks on first count	Fairly early colony
Shag Rock	Large chicks on first count, gone by second	All finished by first count	All finished by third count	Early colony
Waikato Bay			All finished by third count	Early colony
Rabbit Island	No change	More than double	No change	
Motutapu Point	Nearly 20 times increase!	Double	No change	Late colony
NE Reef	No change	Double	No change	
Star Keys	Large increase	Large increase	No change	Late colony

The lower numbers recorded in both the 2003 and 2011 censuses (Bester and Charteris 2004, Debski *et. al.* 2012) are likely to be a result of timing; both of the survey and the breeding season. Both these surveys used single counts except at two colonies, and as such are likely to have underestimated numbers due to missing peak breeding at most colonies.

These results highlight that it is critically to ensure the correct timing of an aerial survey to achieve an accurate population estimate, and that multiple counts in a season is highly recommended.

5. ACKNOWLEDGMENTS

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