

Alderney's Northern Gannet *Morus bassanus* population; Counts on Les Etacs and Ortac

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Abstract

A population assessment of the Northern Gannet *Morus bassanus* on Alderney, Channel Islands, in June 2015 estimated a total of 8,737 Apparently Occupied Sites (AOS), split between the two gannetries with 5,960 AOS on Les Etacs and 2,777 AOS on Ortac. This was an annual increase of 2.3% and 0.9% for Les Etacs and Ortac respectively over the decade since the last count in 2005. However, both growth rates were below the average rate experienced by other UK Northern Gannet colonies during this same time period. Results show the reduced growth rates of the colonies may be due to them reaching carrying capacity with little room for further expansion.

Introduction

The islets of Les Etacs (49°42'N, 2°14'W) and Ortac (49°43'N, 2°17'W), located approximately 0.35 km west and 4.5 km northwest of Alderney respectively, support two of the most southerly Northern Gannet *Morus bassanus* (hereafter 'Gannet') breeding colonies. Les Etacs covers an area of 1.2 ha and is comprised of a series of rocks and outer stacks rising steeply from the sea to a maximum height of 37 m. Ortac is an isolated rock 4.2 km northwest of Les Etacs with an approximate area of 0.3 ha, rising to 22 m above sea level with steep sides and a relatively shallow sloped top. Ortac is regularly topped by waves in severe weather conditions. Both islets are within Alderney's Ramsar site.

Gannets have a large breeding range extending north from Brittany in France to Norway in the east Atlantic, westward through Iceland to Labrador in northwest Canada. Despite the large range, there are in fact relatively few breeding colonies; as of 2010, there were just 20 gannetries in the British Isles (JNCC 2016). Breeding Gannets were first recorded in Alderney in 1940. A single pair incubating an egg was observed on Ortac during a trip to monitor the Black-legged Kittiwake *Rissa tridactyla* colony (Lockley 1948). In the years following, there were no recordings of Gannets due to the evacuation of Alderney during the Second World War. However, upon returning to the island in 1945, a fisherman described the eastern side of Ortac as covered in Gannets and noticed another smaller colony on Les Etacs. The exact number was unknown until 1946 when a survey counted 250 pairs on Ortac and 200 on Les Etacs (Dobson & Lockley 1946). Since these first

observations, the number of breeding Gannets on Les Etacs and Ortac has increased, following global population trends. Gannets are one of only a few seabird species experiencing population increases (BirdLife International 2016), unlike the majority of seabird species which have shown drastic population declines in recent years (Paleczny *et al.* 2015).

Regular monitoring is important as, similar to other seabird colonies, Alderney's Gannets may face increasing pressure from anthropogenic activities, particularly changes in fisheries practice and offshore wind farms (Croxall *et al.* 2012). Tracking studies have shown that Alderney's Gannets forage in two main areas. The first is an area northwest from the colonies to the south coast of the UK, between Devon and Hampshire. The second is an area to the east, from the northern tip of the Normandy peninsula to Le Havre, France. In these areas, there are a number of proposals for offshore wind farm developments, of which when built, Gannets may come into contact with the turbines (Warwick-Evans *et al.* 2015a, 2016a, 2016b), resulting in low levels of mortality, likely to increase as wind farm area increases (Warwick-Evans *et al.* 2018). Alderney's Gannets have been regularly monitored since they were first recorded in 1940 (Table 1) including during the four Britain and Ireland Gannet censuses: Operation Seafarer, the Seabird Colony Register, Seabird 2000 and the most recent census in 2005 (Cramp *et al.* 1974; Hill 1989; Sanders & Harris 2005; Wanless *et al.* 2005). Subsequent aerial population counts have been, and are planned to be, carried out every five years as part of the management of Alderney's Ramsar site, with the most recent count undertaken in 2011.

The aerial counts on Alderney have been complemented with annual productivity counts (Alderney Wildlife Trust 2016) and the mass-ringing of chicks (Veron & Lawlor 2009) to measure annual survival and gain insight into the

Table 1. Previous counts of Alderney's Northern Gannet *Morus bassanus* colonies with the Apparently Occupied Sites (AOS) at Les Etacs and Ortac. Superscript numbers indicate the Britain and Ireland gannet census in which the data were published: ¹Operation Seafarer, ²the Seabird Colony Register, ³Seabird 2000, ⁴the most recent published count.

| Year | Les Etacs | Ortac | Total | Source |
|------|-----------|-------|-------|---|
| 1940 | 0 | 1 | 1 | Lockley 1948 |
| 1946 | 200 | 250 | 450 | Dobson & Lockley 1946 |
| 1950 | 615 | 570 | 1,185 | Fisher & Vevers 1951 |
| 1960 | 1,036 | 925 | 1,961 | Cramp <i>et al.</i> 1974 |
| 1969 | 1,000 | 1,000 | 2,000 | Cramp <i>et al.</i> 1974 ¹ |
| 1979 | 1,978 | 1,787 | 3,765 | Hill 1989 |
| 1984 | 2,325 | 2,062 | 4,387 | Hill 1989 |
| 1987 | 2,536 | 2,211 | 4,747 | Hill 1989 ² |
| 1989 | 2,810 | 2,106 | 4,916 | Hill 1989 |
| 1994 | 3,380 | 2,098 | 5,478 | Sanders & Harries 2005 |
| 1999 | 3,450 | 2,500 | 5,950 | Wanless <i>et al.</i> 2005 ³ |
| 2005 | 4,862 | 2,547 | 7,409 | Sanders & Harris 2005 ⁴ |
| 2011 | 5,765 | 2,120 | 7,885 | Alderney Wildlife Trust 2016 |

distribution of these birds during the non-breeding season. Both juvenile and adult survival rates have increased over time, most likely due to their use of discards from fishing vessels (Votier *et al.* 2013; Warwick-Evans *et al.* 2016b). With changing climate combined with the changes to the fisheries policy, which will ban the discard of unwanted fish (European Union Parliament and Council 2013), Alderney's Gannet population may be particularly vulnerable due to its position near the southern limit of the species' range. It is essential that regular monitoring of these Gannet colonies continues in order to monitor population trends, given the declines in other seabird populations.

The last published census of Alderney's Gannet population was in 2005 (Sanders & Harris 2005) and the last census of all UK Gannet colonies was carried out in 2004 (Wanless *et al.* 2005). During these studies, Alderney's Gannet population was estimated at 4,862 Apparently Occupied Sites (AOS) on Les Etacs and 2,547 AOS on Ortac. Sanders & Harris (2005) estimated that since 1979, the total population had grown at an average rate of 2.8% per annum (p.a.), with a growth rate of 3.3% p.a. on Les Etacs and 1.2% p.a. on Ortac. This was greater than the average rate of increase of the total British and Irish population which was only 1.2% p.a. over the same time period. This study provides a decadal update on the estimated number of pairs of Gannets breeding on Alderney.

Methods

The monitoring methodology for this survey was the same as the previous 2011 survey to allow consistency and comparable results. The aerial surveys of the populations of Gannet breeding on Les Etacs and Ortac were carried out at 10.00 hours on 4 June 2015. Visibility was excellent; light winds, no turbulence and moderate cloud cover ensured little glare on the gannetries. The survey was timed to occur during the period when birds were incubating or had small chicks, to ensure that all breeders were counted. A Piper Seneca light aircraft was used as a platform to photograph both gannetries; initially wide circles of Les Etacs were flown at an altitude of 700 m. This allowed the photographer to take a series of photographs capturing 100% coverage of the complex rocks, ensuring all possible nest sites were observed. Les Etacs lies directly under the flight path of planes both landing and taking off from Alderney's only airport, therefore the Gannets were undisturbed by the presence of the plane. The same method was used for Ortac but at a lower altitude (400 m) allowing for more detailed photographs. This lower altitude was not possible around Les Etacs where there are a series of cliffs approximately 250 m to the east. All pictures were taken with a Canon EOS 5D Mark III camera using an EF 100–400 mm lens at various focal lengths, which produced high resolution (5760 × 3840 pixels) images (Figures 1 and 2).

After the aerial surveys, pictures were assessed for suitability; a total of 14 images were selected and boundaries between sections were marked on each picture. Images were distributed to four experienced counters and the number of Gannets were counted as apparently occupied sites (AOS). This is defined as when one or two Gannets are present on a site, irrespective of whether nests or nest material



Figure 1. An aerial image of the Les Etacs colony used for the population count.



Figure 2. An aerial image of the Ortac colony used for the population count.

can be seen. Sites with unattended chicks were included in the count and club sites were excluded through careful inspection of magnified images, coupled with subsequent boat-based observations by Alderney Wildlife Trust staff. Counts were performed using either Photoshop or Paint Shop Pro software which allowed the images to be viewed at different magnifications and each AOS marked with a coloured dot. Colour was changed after every 100 AOS which enabled the counter to distinguish counted and non-counted AOS with ease and allowed for an accurate running score. The four counters had no prior knowledge of counts from previous years, or of counts made by the other counters, in order to avoid bias.

Results

The four independent counts ranged between 8,322 AOS and 9,083 AOS for both of Alderney's gannetries, with a mean of 8,737 AOS (Table 2). This was an 11% increase in AOS since the last, unpublished, count in 2011 (Alderney Wildlife Trust 2016, Figure 3), and equates to an average annual population growth rate of 2.75% (years = 4, n = 2 counts). Furthermore, since the last full British and Irish Northern Gannet census in 2005, the Alderney population has increased by 18% from 7,409 AOS. This equates to an average population growth rate of 1.8% p.a., with 2.3% p.a. on Les Etacs and 0.9% p.a. on Ortac (n years = 10, n = 3 counts). Since colonisation in 1940 the annual population growth rates of Les Etacs and Ortac were similar until 1987, when the population on Les Etacs began to increase at a greater rate than Ortac (Table 1). Since 1987, the population on Les Etacs has increased to 5,960 pairs in 2015, with an average growth rate of 4.8% per annum (years = 28, $r^2 = 93.6\%$, n = 7 counts). The population on Ortac has increased linearly to 2,777 AOS, with a lower rate of 0.9% per annum (years = 28, $r^2 = 94\%$, n = 7 counts).

Table 2. 2015 survey counts of Northern Gannet *Morus bassanus* Apparently Occupied Sites (AOS) on Les Etacs, Ortac and the total for the 4 individual counters. Mean and standard error (SE) \pm for each counter are also included.

| Count | Les Etacs | Ortac | Total |
|----------|-----------|-------|-------|
| Count 1 | 5,726 | 2,906 | 8,632 |
| Count 2 | 5,704 | 2,618 | 8,322 |
| Count 3 | 6,139 | 2,944 | 9,083 |
| Count 4 | 6,269 | 2,639 | 8,908 |
| Mean | 5,960 | 2,777 | 8,737 |
| SE \pm | 144 | 86 | 166 |

Discussion

The population of Northern Gannets on Les Etacs and Ortac has been steadily increasing since the islets were first colonised in 1945 and 1940. In 2015 a total of 5,960 AOS were recorded on Les Etacs and 2,777 AOS on Ortac, equating to 3% of the UK population (293,161 AOS, JNCC 2016), 1.3% of the European population (683,000 AOS, BirdLife international 2015), and between 0.9% and 1.2% of the world population (750,000 to 900,000 AOS, BirdLife International 2016). The increase in Alderney's Gannet population was slightly less than the 2.8% average

annual growth rate experienced by all of the UK's 20 Gannet colonies for the same period; growth rate ranged from -0.2% per year at Sule Stack, Orkney, to 48.9% at Noup Head, Orkney. Compared to the other 18 UK Gannet colonies, Les Etacs and Ortac are ranked 12th and 16th respectively, in terms of average annual growth rate between 2005 and 2015 (JNCC 2016).

The lower than average population growth rate experienced on Alderney's gannetries could be explained by several factors. Firstly, whilst smaller Gannet colonies may grow at faster rates than large colonies (Moss *et al.* 2002), Alderney's colonies, both classified as small, do not follow this trend. Of the 20 recognised Gannet colonies in the British Isles, Les Etacs and Ortac are ranked 10th and 14th by population size and both fall below the average UK colony size (15,037 AOS). The below average population growth rate observed in this study could indicate that both gannetries are heading towards their carrying capacity, particularly on Ortac where population growth has been considerably lower than Les Etacs since 1987 (Figure 3) and there was a fall in population from 2,547 AOS to 2,120 between 2005 and 2011 (Alderney Wildlife Trust 2016).

The population dynamics exhibited here are typical of a population experiencing buffer effects; where poor-quality sites experience large fluctuations in population size, which 'buffer' the good sites in the centre of the colony from such changes (Brown 1969; Gill *et al.* 2001). As the population density on Ortac has increased, Gannets may have been displaced into lower quality sites, which may lead to a decrease in productivity (Kokko *et al.* 2004). This is the second potential reason for the low population growth rate on Alderney's gannetries. Productivity has

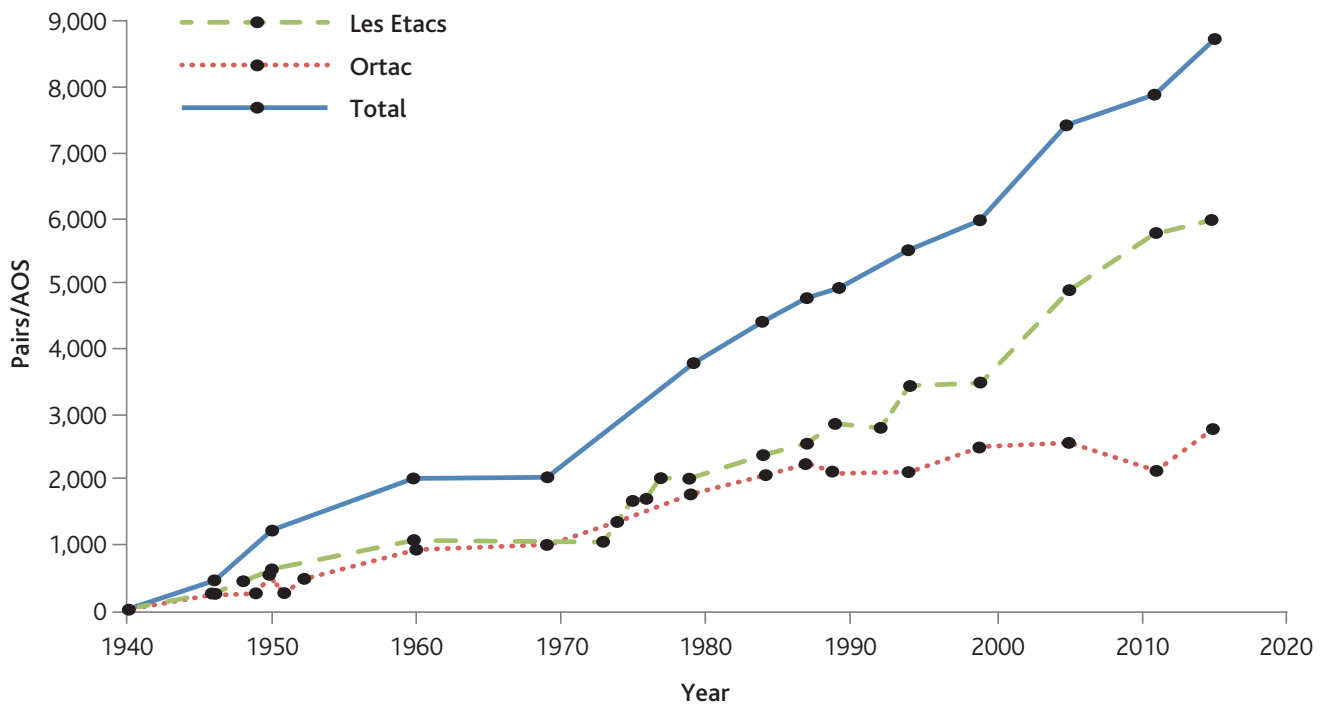


Figure 3. Counts of Apparently Occupied Sites (AOS) of Northern Gannets *Morus bassanus* on Les Etacs and Ortac from 1940 to 2015.

decreased from 80% in 2007 to 48% in 2015 (Alderney Wildlife Trust 2016), although productivity has only been monitored on Les Etacs and not on Ortac. Productivity was considerably lower in 2015 than other years and was most likely a result of low foraging success that year (Warwick-Evans *et al.* 2015). Despite the variability in productivity, the general trend on Les Etacs has shown a decrease in Gannet productivity over time (Alderney Wildlife Trust 2016 2018).

Observations recorded by the Alderney Wildlife Trust identify Gannets visiting other rocky islets near to Les Etacs and Ortac. However, there is no clear evidence to identify whether these birds are immature Gannets prospecting for new breeding sites or simply birds resting in the vicinity of the main colony. A number of the rocks observed with Gannets on do not appear high enough and would most likely be submerged during a high spring tide. However, there may be the potential for further expansion to the islets of Coque Lihou, situated c.2 km to the south east of Les Etacs, or Casquets situated c.5 km west of Ortac. Gannets may begin prospecting on these islets once Les Etacs and Ortac have reached their carrying capacity, but this may not happen for a number of years as the population is still growing at a sizeable rate in line with global Gannet population trends (BirdLife International 2016).

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References

- Alderney Wildlife Trust. 2016.** *Annual Ramsar Project Review 2015*. (www.alderney-wildlife.org/sites/default/files/2015_ramsar_project_report_0.pdf) Alderney Wildlife Trust report, Alderney, Guernsey. Accessed 11 December 2018.
- Alderney Wildlife Trust. 2018.** *Annual Ramsar Project Review 2017*. Unpublished Alderney Wildlife Trust report, Alderney, Guernsey.
- BirdLife International. 2016.** *Morus bassanus*. The IUCN Red List of Threatened Species 2016. (<http://www.iucnredlist.org/details/22696657/0>) Accessed 11 December 2017.
- BirdLife International. 2015.** *European Red List of Birds*. Office for Official Publications of the European Communities, Luxembourg.
- Brown, J. L. 1969.** The buffer effect and productivity in tit populations. *American Naturalist* 103: 347–354.
- European Union Parliament and Council. 2013.** *Council Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC*. (<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1380&from=EN>) Accessed 11 December 2018.
- Cramp, S., Bourne, W. R. P. & Saunders, D. 1974.** *The Seabirds of Britain and Ireland*. Collins, London.

- Croxall, J., Butchart, S., Lascelles, B., Stattersfield, A., Sullivan, B., Symes, A. & Taylor, P. 2012.** Seabird conservation status, threats and priority actions: A global assessment. *Bird Conservation International* 22: 1–34.
- Dobson, R. & Lockley, R. M. 1946.** Gannets breeding in the Channel Islands. *British Birds* 39: 309–321.
- Fisher, J. & Vevers, H. G. 1951.** The present population of the North Atlantic Gannet (*Sula bassana*). *Proceedings of the International Ornithological Congress* 10: 463–467.
- Gill, J. A., Norris, K., Potts, P. M., Gunnarsson, T. G., Atkinson, P. W. & Sutherland, W. J. 2001.** The buffer effect and large-scale population regulation in migratory birds. *Nature* 412: 436.
- Hill, M. G. 1989.** The Alderney gannetries - photographic counts of Ortac and Les Etacs, Channel Islands, 1979–1989. *Seabird* 12: 45–52.
- JNCC. 2016.** Northern Gannet *Morus bassanus*. (<http://jncc.defra.gov.uk/page-2875>) Accessed 10 January 2018.
- Kokko, H., Harris, M. P. & Wanless, S. 2004.** Competition for breeding sites and site-dependent population regulation in a highly colonial seabird, the common guillemot *Uria aalge*. *Journal of Animal Ecology* 73: 367–376.
- Lockley, R. M. 1948.** First breeding of Gannets in the Channel Islands. *British Birds* 41: 216.
- Lloyd, C., Tasker, M. L. & Partridge, K. 2010.** *The Status of Seabirds in Britain and Ireland*. T & A.D. Poyser, London.
- Moss, R., Wanless, S. & Harris, M.P. 2002.** How small northern gannet colonies grow faster than big ones. *Waterbirds* 25: 442–448.
- Paleczny, M., Hammill, E., Karpouzi, V. & Pauly, D. 2015.** Population trend of the world's monitored seabirds, 1950–2010. *PLoS ONE* 10: e0129342.
- Sanders, J. G. & Harris, M. P. 2005.** The Alderney Northern Gannetries - photographic counts of Ortac and Les Etacs, Channel Islands in 2005. *Atlantic Seabirds* 7: 75–82.
- Veron, P. K. & Lawlor, M. P. 2009.** The dispersal and migration of the Northern Gannet *Morus bassanus* from Channel Islands breeding colonies. *Seabird* 22: 37–47.
- Votier, S. C., Bicknell, A., Cox, S. L., Scales, K. L. & Patrick, S. C. 2013.** A bird's eye view of discard reforms: bird-borne cameras reveal seabird/fishery interactions. *PLoS ONE* 8: e57376.
- Wanless, S., Murray, S. & Harris, M. P. 2005.** The status of northern gannet in Britain and Ireland in 2003/04. *British Birds* 98: 280–294.
- Warwick-Evans, V., Atkinson, P. W., Arnould, J. P. Y., Gauvain, R., Soanes, L., Robinson, L., & Green J. A. 2016a.** Changes in behaviour drive inter-annual variability in the at-sea distribution of northern gannets. *Marine Biology* 163: 156.
- Warwick-Evans, V., Atkinson, P. W., Gauvain, R. D., Robinson, L. A., Arnould, J. P. Y. & Green, J. A. 2015.** Time-in-area represents foraging activity in a wide-ranging pelagic forager. *Marine Ecology Progress Series* 527: 233–246.
- Warwick-Evans, V., Atkinson, P. W., Walkington, I. & Green, J. A. 2018.** Predicting the impacts of wind farms on seabirds: An individual-based model. *Journal of Applied Ecology* 55: 503–515.
- Warwick-Evans, V., Green, J. A. & Atkinson, P. W. 2016b.** Survival estimates of Northern gannets *Morus bassanus* in Alderney: Big data but low confidence. *Bird Study* 63: 380–386.