

Informing marine spatial planning by tracking of seabirds

Gannet Studies in Alderney

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Introduction

The marine environment is constantly changing and, in global terms, the seabird populations are the most significant part of the Channel Islands avifauna. Being such a high conservation priority, the Alderney Wildlife Trust (AWT) has put in place a long-term program of work to monitor and conserve them (as part of the management of the Alderney West Coast and Burhou Islands Ramsar Site on behalf of the States of Alderney). Seabirds are sentinels of environmental change and, being long-lived birds (some living up to 50 years old), it is important to not only monitor changes in numbers but also survival and productivity. In poor conditions, seabirds will always prioritise themselves over their chicks and, whilst adult survival may not be affected, the impacts of low productivity will not be reflected in the population for many years. This has been observed in many seabird populations, notably the Arctic Tern population in Scotland. In the 1980s and 1990s, decades of low or no productivity due to overfishing of sand eels were observed. This meant that the population was ageing and susceptible to a large crash, which inevitably did happen. Similar stories can be told of other seabird populations, the Arctic Skua being the latest.

Changes to fishing practice, oil spills, offshore renewable energy, pollution incidents e.t.c have all impacted seabirds in the past. The Torrey Canyon in 1967 was the last major oil spill to impact the Channel Islands but wind farms, changes to fishing practice and pollution (eg Polychlorinated biphenyls, PCBs) all have 'invisible' effects on seabirds. One of the challenges of managing the marine environment without harming marine and coastal wildlife is that the animals using this environment are out of sight for much of the time so determining the extent of the impacts is difficult. This is the same for potentially positive measures (eg where do you site Marine Protected Areas to best protect seabirds?) to those that may be damaging (eg changing fishing practices, placing wind turbines etc).

With the advent of small GPS tracking devices, the world that seabirds experience has been opened up to researchers. Coupled with traditional techniques to measure productivity and survival (observational surveys and ringing/colour ringing), GPS tracking has allowed us to know for the first time how birds interact with their food supply and potentially negative actions such as fishing activity and renewable energy.

Why are we doing this and why are we carrying across multiple years?

Since 2011, small numbers of Gannets (c. 10-30 of the 17,500 breeding individuals or 8,737 breeding pairs) have been tracked using GPS tags to look at the potential impact of renewable energy on the Gannets and determine whether they are likely to impact on the local population. Wind turbines can affect birds in two ways – direct mortality through collision and, if birds avoid the surrounding area, they can cause a displacement effect meaning that birds may have to travel further to find sufficient food. This causes increased energy expenditure and could impact on mortality of the chick or adult.

The Gannet tracking project has, for the first time, provided concrete evidence of the range of foraging areas. This is new and extremely important information. Fishermen have obviously seen foraging Gannets at sea but there is no way of telling whether they come from French, Channel Islands or English colonies. We have now documented the main foraging areas of the Alderney colonies and also placed them in the context of the French colony on Sept Isles. There is little overlap in the foraging area between French and Alderney colonies and Alderney, together with BTO and the University of Liverpool has been leading the way in developing methods to look at the cumulative impacts of multiple offshore windfarms on Gannet populations.

This is a very real issue. Currently there are 6 active applications for renewable energy sites within the identified foraging area of Alderney's Gannets. There are a total of five windfarms, one of which one is under construction <https://www.4coffshore.com/offshorewind/> and one tidal turbine site situated less than 30km from the Alderney Ramsar site. This tidal site is scheduled for initial development between 2019 and 2021 <https://simecatlantis.com/2018/11/21/french-tidal-power-one-step-closer-to-commercialisation-as-simec-atlantis-spearheads-normandie-hydrolienne-iv/>. Data from the Alderney Gannet GPS tracking work was used in the assessment of the initial stages of this project by the Agence Aires Marines Protégées in

France <http://www.aires-marines.fr/Documentation/L-aire-marine2/Aire-marine-n-29> and was specifically used to flag up potential weakness in the developers impact assessment.

Crucial to note is the research has established that foraging behaviour *changes between years* in relation to environmental change. Understanding how birds respond to this change is crucial to better conserving them and to establishing potential human impact. In poor years, birds change behaviour and forage further and longer than in good years. It is important to build up long-term datasets if we are to understand how birds react to change in the environment. This is especially true in the case of renewable developers and the poor GPS tracking results in 2017 due to poor weather and subsequent failure to deploy in 2018 has significantly impacted on this objective. We also need to look in more detail exactly where they are foraging and can, using smart tags, determine where birds are plunge diving, rather than commuting between foraging sites.

The Alderney data has been used widely for conservation and research purposes and particularly for looking at the impacts of offshore wind turbines on seabirds. These data have fed into a larger data archive www.seabirdtracking.org which is an international database and the data are freely available for use by other researchers as well and we have contributed to at least two studies that have looked at seabird foraging across much larger spatial scales. Two Masters and one PhD project has been undertaken with AWT, BTO and the University of Liverpool. In terms of scientific papers, there have been 6 published in the last 5 years, with one in press and one in an advanced draft.

Scientific papers arising from the project:

Copping, J.P., Gauvain, R.D., Atkinson, P.W. and Godber, J. (in press) Alderney's Northern Gannet (*Morus bassanus*) Population; Counts on Les Etacs and Ortac in 2015. *Atlantic Seabirds*

Warwick-Evans, V., Atkinson, P.W., Walkington, Green, J.A. (2018) Predicting the impacts of wind farms on seabirds: An individual-based model. *J. Applied Ecology* 55: 503-515.

Warwick-Evans, V., Atkinson, P.W., Arnould, J.P.Y., Gauvain, R., Soanes, L., Robinson, L., Green J.A. 2016. 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. Robinson, L.A. & Green, J.A. 2016. Predictive modelling to identify near-shore, fine-scale seabird distributions during the breeding season. *PLOS ONE* 11 (3): e0150592. doi:10.1371/journal.pone.0150592.

Warwick-Evans, V., Green, J.A. & Atkinson, P.W. 2016. Survival estimates of Northern gannets *Morus bassanus* in Alderney: Big data but low confidence. *Bird Study* 63:3.

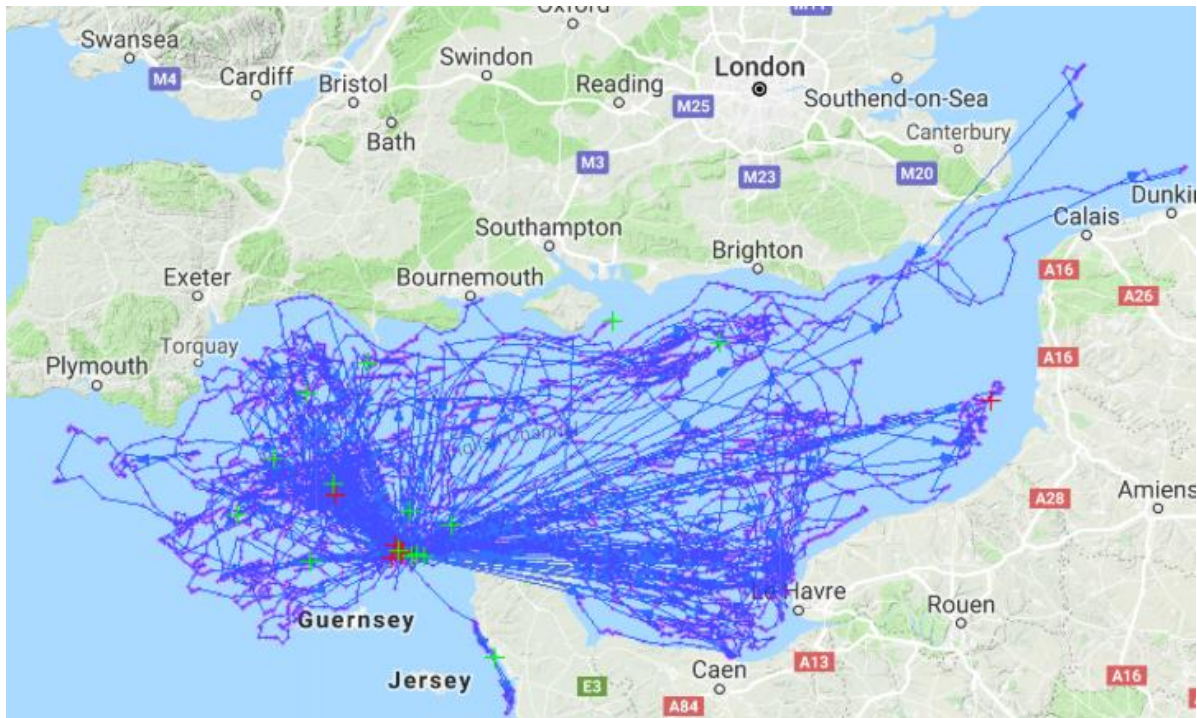
Warwick-Evans, V., Atkinson, P.W., Gauvain, R.D., Robinson, L.A., Arnould, J.P.Y. & Green, J.A. 2015. Time-in-area represents foraging activity in a wide-ranging pelagic forager. *Marine Ecology Progress Series* 527: 233-246.

Soanes, L.M., Atkinson, P.W., Gauvain, R.D., Green, J.A., (2013) Individual consistency in the foraging behaviour of Northern Gannets: Implications for interactions with offshore renewable energy developments. *Marine Policy* 38: 507–514.

Methods for tracking gannets and dealing with ethical concerns

Short term attachments are generally preferred, especially in studies of foraging as in the case of the Gannets. We do not harness Gannets due to the nature of their feeding method and body shape. Instead tags are taped on using Tesa Extra Power tape onto the central tail feathers. These feathers are strong and

stiff and when the Gannet dives, it sweeps back its wings over the tail and so the tag does not increase drag. The weight of the tags themselves are c.18g and the weight of an adult Gannet is 3,000g so well under 1% of body weight (the British Trust for Ornithology's ethical committee, the *Special Marks Technical Panel* considers application where the weight is >3%). This is a standard tagging method for seabirds as the birds are long lived and the attachment lasts at most 4-6 weeks, so birds are only temporarily carrying tags. The Tesa tape is used because it is waterproof but does come unstuck over time without leaving any residue. Many different species (e.g. Guillemot, Razorbills, Cormorant, Shag, Kittiwake, larger gulls have all been tagged using this method. RSPB's FAME project tagged 500-600 birds in the UK alone (it was part of a wider EU project) with this method. It provides excellent information on foraging areas.



Example of the types of results obtained from the tracking of Gannets from Alderney colonies (2015 data)

Visiting the colonies and ringing and fitting devices to birds

AWT and the Alderney Bird Observatory Ltd have a policy regarding visiting the colonies that ensures both ringers' and the birds' welfare. Timing, numbers of visits and ways of operating are detailed. We have reduced the number of visits to the Gannet colony by using tags that transmit the data via the mobile phone network, so we do not need repeated visits to remove tags of birds. These are solar powered and will transmit data remotely until they fall off the bird. To reduce disturbance on the rock, the tagging should be undertaken on a separate trip from the routine metal-ringing of chicks. Past experience of having a mobile chick-ringing team and a tagging team on the same trip indicated it caused more disturbance to the birds and we recommend separating the trips on welfare grounds. The tagging team operates in a small team of 3-4 individuals who stick very closely together. Gannets are reluctant to move from their nests and disturbance in terms of birds moving away from the team is generally only 1 nest away. In most cases, the neighbouring adults will sit tight and watch what the team is doing. Birds are caught using a short noose pole and the bird controlled and held securely by one member of the team. A second member will fit the device and the third will be the person recording data, handing tape etc to the tag fitter and overseeing the process. The process is quick and the bird is placed on the ground when finished. The individual leading the team is always an experienced seabird worker. The disturbance caused by tagging is kept to a real minimum and the ways of working have developed over many years of working in Alderney's Gannet colonies so that only a tiny proportion of the colony is affected at any one time.