



Berwick Bank Wind Farm

Additional Environmental Information (AEI) Submission

**AEI02: Addendum to the Derogation Case
Section 2 Gannet Compensation (without
prejudice)**

Revision Information

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Acronyms

Acronym	Description
AEI	Additional Environmental Information
AEOSI	Adverse Effect on Site Integrity
NNR	National Nature Reserve
RIAA	Report to Inform Appropriate Assessment
SPA	Special Protection Area

1. Reduction of Gannet Cull at Sula Sgeir

1.1. Basis of inclusion of without prejudice compensatory measure for Gannet

The Report to Inform Appropriate Assessment (RIAA) submitted by the Applicant concluded no adverse effect on site integrity (no AEOSI) for gannet, either alone or in-combination for all eight SPAs where gannet is included as a feature. This conclusion was irrespective of whether the ‘Developer Approach’ or either of ‘Scoping Approach A’ or ‘Scoping Approach B’ mortality figures were applied. As such, no compensation measures for gannet were proposed in the Applicant’s derogation case.

Consultation comments received from NatureScot and the RSPB have disagreed with the Applicant’s conclusion, with NatureScot either concluding AEOSI, or being unable to conclude No AEOSI, either alone or in-combination, for gannet designated at the following SPAs:

Table 1: SPAs with gannet as a qualifying feature where NatureScot are unable to conclude No AEOSI. Mortality figures combine Project Alone displacement and collision values. Figures taken from EIA Apportioning Technical Report, Appendix 11.5, Annex D

SPA	Site Condition	Breeding Adults	Apportioning Value	Developer Approach	Scoping A	Scoping B
Forth Islands SPA	Favourable maintained	150,518	0.971	154.8	183	245.2
Hermaness, Saxa Vord and Valla Field SPA	Favourable maintained	51,160	0.005	2.2	2.6	4.1
Outer Firth of Forth and St Andrews Bay Complex SPA*	Favourable	As per Forth Islands SPA	As per Forth Islands SPA	As per Forth Islands SPA	As per Forth Islands SPA	As per Forth Islands SPA

* No site-reference population is set for gannet at the Outer Firth of Forth and St Andrews Bay Complex SPA due to the turnover of gannet within the foraging area. For breeding gannet, when assessing plans or projects, the population impact should be considered in relation to the site reference populations for the Forth Islands SPA (NatureScot and JNCC 2022).

The impact on gannet (both from displacement and collision) apportioned to the SPAs above therefore ranges from 154.8 (developer approach) to 245.2 (Scoping Approach B) birds per year. Including the Hemaness, Saxa Vord and Valla Field SPA increases the total adult mortality from 157 (developer approach) to 249.3 (Scoping B).

New NatureScot Guidance (2023) released after the submission of the application provides new guidance on collision avoidance rates. If applied, these new collision avoidance rates would result in an annual reduction in mortality of 41 for the developer approach and 52 for both Scoping A and Scoping B.

Therefore, assuming that the Hemaness, Saxa Vord and Valla Field SPA are included and the new NatureScot guidance is applied then the impact on Gannet apportioned to SPAs above ranges from 116 (Developer Approach) to 197.3 (Scoping B)

Full details of the impact of the new NatureScot Guidance is shown in the AEI Submission Supplementary Information – NatureScot RIAA Conclusions

A relevant potential measure that was considered during pre-application – Reduction of gannet harvest at Sula Sgeir – was not included in the proposed derogation package given the Applicant's conclusion of no AEOSI for gannet at any Special Protection Area (SPA). In this section, the Applicant outlines a 'without prejudice' case for gannet compensation, should the Scottish Ministers conclude gannet compensation is required.

1.2. Background

The Gannet population in the UK has risen by 34% between surveys carried out in 1969/70 and in 2013–15 (JNCC, 2021). This increase is attributed to the cessation of hunting dating from the end of the 19th century (Nelson, 2002). However, Gannet is classified as being of 'Amber' conservation concern because the UK contains an internationally important breeding population (at least 20% of the European population) and has at least 50% of breeding birds present in 10 or fewer colonies (Eaton *et al.*, 2015).

Bass Rock supports the largest UK colony and is also the largest gannetry in the world supporting 14.3% of the world population (Murray *et al.*, 2014). The population numbered just 8,077 pairs in 1968 and increased by 832% to reach 75,259 pairs in 2014. The rate of increase at 4.4% per annum (from 2003/4) has been higher at Bass Rock than is typical at around 2% per year (JNCC, 2021).

All Gannet SPA breeding populations are in Favourable conservation status which is in marked contrast to the situation for many other seabird populations (Murray *et al.*, 2014). The Outer Firth of Forth and St Andrews Bay Complex SPA was recently classified (December 2020) with breeding Gannet as a breeding season feature (as was The Seas off St Kilda SPA), which effectively recognises the area as of importance for foraging Gannet, mainly originating from Bass Rock. No offshore sites were listed as being designated for non-breeding Gannet in the 3rd UKSPA review (Stroud *et al.* 2016).

Prior to avian influenza, Gannet productivity has been very stable over time (JNCC, 2021) suggesting that the population is generally not limited by prey shortages due to their adaptability and ability to forage over great distances (typically up to 700 km) from their nest (Hamer *et al.* 2000). This conclusion also logically accords to steadily increasing populations in the UK. However, extended foraging range is also a response to reduced prey availability perhaps as a result of intense competition for resource around large colonies in particular. Thus, Gannets from Bass Rock travel as far as the Bergen/Viking Bank near the Norwegian coast to find food, a round trip of up to 1,291 km (Hamer *et al.*, 2007). Usually, one parent will stay with a chick whilst the other forages, though if left for long enough it will eventually leave to find food. This leaves the chick vulnerable to attack, mainly from other Gannets seeking prime nesting space. Impacts upon breeding success are anticipated if reduced prey availability promotes any further increases in trip duration or foraging effort.

Fisheries-based measures to reduce or remove sandeel fishing pressure in SA4 will be of benefit to Gannet, as they forage on sandeels as well as larger fish such as Atlantic Mackerel *Scomber scombrus*, gadoids and clupeids. A study of 266 regurgitate samples from Gannets at Bass Rock showed that the main prey items in terms of frequency of occurrence were Mackerel, sandeels (mainly 0-group), Sprat and Herring. In terms of biomass, sandeel accounted for 17.9% of diet (Hamer *et al.*, 2000).

The possibility of compensating for Gannet within the area in proximity to Berwick Bank was assessed in ECON & ABPmer (2021a). Although Gannets are not limited by prey, they are limited by habitat availability at Bass Rock as the colony is virtually at full capacity. Under these conditions, it is likely that many chicks (perhaps even several thousand per year) will be lost falling from cliffs due to competition for space with other Gannets. A 3-year study at Ailsa Craig, a colony where, unusually, any falling gannets can be retrieved from scree underneath the cliffs, recorded between 445–461 dead or injured gannet chicks over the course of a breeding season, accounting for about 6% of the chicks hatched (Wanless, 1983). The

author postulates that this number may be reduced at sites where birds fall into the sea, as some fledged birds may survive the fall. However, even taking this into account the losses are likely to be substantial. The possibility of establishing another gannetry was discussed with stakeholders but was felt to be problematic due to lack of other suitable nesting cliffs within the Forth coupled with the natural expansion of birds into St Abbs National Nature Reserve (NNR), where a few pairs have started nesting on one of the stacks in recent years.

Reducing the impacts of predation and human disturbance on Gannet were also considered. Whilst a few Great Black-backed Gulls are known to take Gannet eggs at Bass Rock, the size of the gannetry is such that this is not a significant problem. However, at other sites such Sule Skerry, which in 2003 was a start-up colony of 15 nests, 30% of nests were predated by Great Black-backed Gull. However, even under these relatively difficult conditions this colony continued to increase year on year and by 2015 held 1,870 nests (Mavor *et al.* 2004). Since most gannetries are in remote locations, often on inaccessible cliff faces, Gannets were in general felt to be less impacted by human disturbance than other species. Although individual nests at Bass Rock near the path may be disturbed by visitors, the benefits of limiting disturbance are considered likely to be minor.

Measures to reduce bycatch of Gannet were also evaluated. In summary, Gannet has been identified as one of the seabird species most at risk of bycatch during the breeding season and in the inshore waters of Scotland (Bradbury *et al.*, 2017), with most of the deaths attributable to offshore static net fisheries and longline fisheries (Northridge *et al.*, 2020). In the Forth and Tay area specifically, there is no evidence of significant long-line and gillnet fishing effort that may be impacting local breeding birds. Where longlining does take place it is mainly a more artisanal fishery using feathers rather than baited hooks. Furthermore, the UK Plan of Action on Seabird Bycatch is already collaborating with multiple stakeholders to identify priority measures to reduce or eliminate incidental bycatch. This may translate into feasible pathways that could constitute compensation for wind farm development in the future.

There is also considerable albeit largely unquantified bycatch of Gannet when overwintering along the Atlantic Iberian coast including Portugal (Oliveira *et al.* 2015, Calado *et al.* 2020) and into West Africa (Grémillet *et al.* 2015, 2020). Gannet is taken especially by longlines, including in artisanal fisheries but also in purse-seines, and generally appears to be the most frequent seabird captured. Bycatch has led to a precipitous decline in the number of tagged birds returning to a colony in Brittany, northern France (Grémillet *et al.* 2020). Losses due to bycatch from fisheries in these locations will also invariably affect UK SPA populations although the scale of the impact is currently unknown. As a result, the benefit of implementing measures to reduce bycatch of wintering birds to benefit UK SPAs cannot currently be quantified. Implementation would also require significant international cooperation and would be challenging given the lack Scottish and UK Government regulatory control of fisheries in these areas.

By contrast, human predation, in the form of the traditional licenced summer harvest of Gannet at Sula Sgeir results in up to 2,000 fully-grown chicks (known as guga) taken annually. Reported numbers are also close to this limit, with an average of 1,917 taken per year from 2004 to 2014 (Trinder, 2016). The disturbance to the whole colony during this process is also significant. Although simple population modelling indicates that the harvest is sustainable, the harvest has reduced the rate of population growth at Sula Sgeir relative to other colonies (Trinder, 2016). It also may be the case that harvest affects the growth rate of other Gannet colonies in the region due to natal emigration between colonies. The Sula Sgeir population may therefore act as a sink for emigrant Gannets from other colonies and ending the hunt could lead to increased growth of the surrounding colonies.

For this reason, reduction of the annual Gannet hunt has been identified as being the most feasible mechanism to compensate for potential losses of Gannet. Due to the highly mobile nature of Gannets, it is anticipated that there would be connectivity between the Bass Rock population (located in proximity to Berwick Bank) and the Sula Sgeir colony. Even though, like most seabirds, the majority of Gannets are thought to return to their natal colony to breed, there is evidence that birds move between colonies as

shown by a chick from Eldey (Iceland) that was subsequently found breeding on Bass Rock (Wernham *et al.*, 2002).

1.3. Overview of measure

This measure involves a reduction of 50% (1000) in the number of chicks culled as part of the annual licenced summer harvest of gannet chicks at Sula Sgeir, a small, uninhabited Scottish island in the North Atlantic. Sula Sgeir is designated as part of the North Rona and Sula Sgeir SPA, of which gannet is a qualifying feature.

The traditional summer harvest of gannet at Sula Sgeir results in up to 2,000 fully-grown chicks (known as guga) taken annually. Reported numbers are also close to this limit, with an average of 1,917 taken per year from 2004 to 2014 (Trinder 2016). Table 2 below presents an annual record of guga harvested per year between 2011 and 2022. The table below shows that the harvest is an annual occurrence and that the number of guga harvested is regularly close to the maximum allowance of 2000.

Table 2: Numbers of guga harvested 2011-2022 (Source: Data provided by NatureScot)

Year	Number of guga harvested
2011	2000
2012	0
2013	2000
2014	1723
2015	2000
2016	2000
2017	1900
2018	1791
2019	1987
2020	0
2021	1900
2022	0

The licence has been gradually reduced from around 3,500 guga to 2,500 and is now set at 2,000. Return rates (supplied by NatureScot) indicate that numbers of chicks taken over the past decade ranges between 1,723-2,000. In a statement released by the Men of Ness, they confirmed that they had decided not to apply for a licence for the hunt in 2022 because of the outbreak of Avian Flu. This seems to be due to the low risk to human health, rather than the potential impact on the Gannet population. The Men of Ness intend to resume the hunt in 2023. (welovestornoway.com)

There are no other plans to reduce or cease the hunt that the Applicant is aware of.

1.4. Quantification of Benefit

Wanless *et al.* (2004) shows that the rate of increase in colony size in relation to breeding numbers in 1969 demonstrates that the rate of growth at Sula Sgeir is far below the expected rate, whereas by contrast Bass Rock, now the largest Gannet Colony in the UK lies well above the expected rate (Figure 1). Wanless *et al.* (2004) also point out that in 1969 Sula Sgeir and Bass Rock were of similar size (differing only by 13 AON), but in 2004 Bass Rock contained 5 times as many birds.

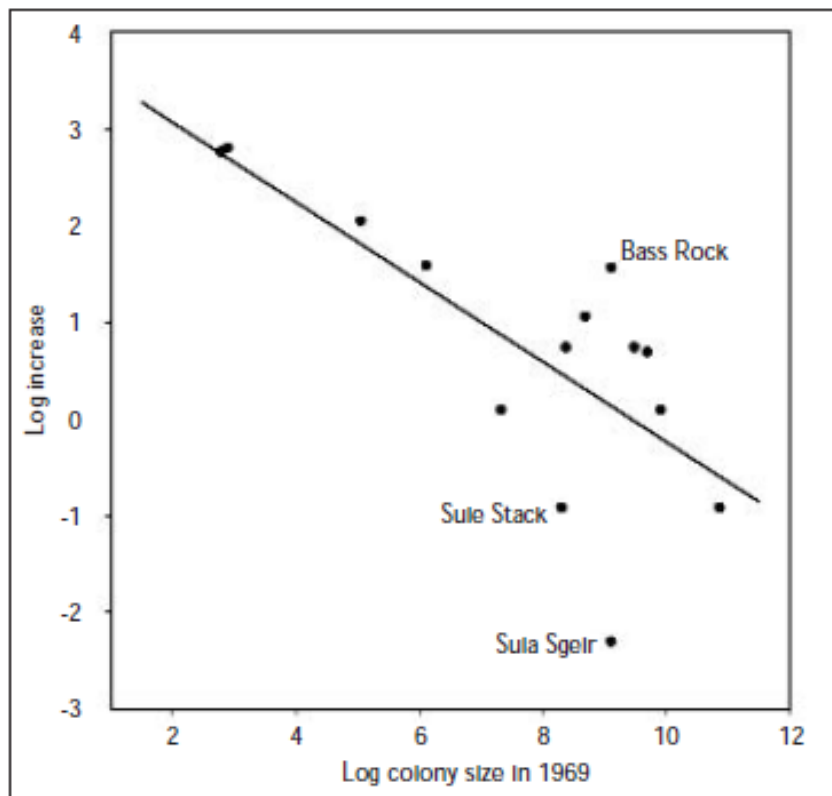


Figure 1: Rate of increase of Gannet colony sizes in recent decades in relation to breeding numbers in 1969 (both axes plotted on log scales). The plot shows the colony at Sula Sgeir to be far below the expected rate of population growth compared to other colonies.

This data supports the hypothesis that Gannet numbers on Sula Sgeir have increased less than at other colonies, indicating that the harvest has affected the rate of colony growth. The harvest of 2,000 chicks per year is also likely to affect the productivity of unharvested nests through the human disturbance involved. Reducing the harvest is considered highly likely to result in the growth of the colony and other colonies in the northeast Atlantic metapopulation of Gannet.

Halving the quota to 1000 gannet chicks would result in the addition of 258 adult birds to the population per annum (based on the mean survival rates presented in Horswill & Robinson 2015). These survival rates have been used in the ornithology assessment to calculate the impact on Gannet and are therefore a robust and reasonable approach to undertake this analysis. Furthermore, the discussion above highlighted the extensive foraging ranges of gannet and the ability to eat a wide range of prey. Lack of prey is unlikely to be restricting the growth of the colony. This provides confidence that an additional 1000 chicks per annum will stand a good chance of survival and will reach maturity as predicted by the parameters used.

Gannets take five years reach sexual maturity Horswill and Robinson, (2015) and there will be a time delay to compensate fully for the increase in adult mortality predicted. However, this assumes that the impact from the windfarm starts, to the extent predicted, at the start of the construction period. However, this will not be the case as the impacts are associated with operational effects from the windfarm, which will be built out over several years, with grid connection not planned until 2027 and 2029. However, to mitigate for the possible time delay in achieving full compensation the Applicant will implement the reduction in the gannet cull as soon as is feasible for the purpose of providing compensatory benefit for the project.

The table below demonstrates that a 50% reduction in the annual gannet cull would compensate for the modelled impacts of Berwick Bank. The modelled impacts of the project using the original parameters (SNCB, 2014) for collision avoidance rates are shown alongside the modelled impacts if new NatureScot guidance (NatureScot, 2023) are used.

Table 3: Impact and benefits from 50% reduction in Gannet Cull with parameters used in the original submission and new NatureScot Guidance.

Scenario	Impact	Benefit	Net Benefit	Compensation Ratio
Developer Approach (SNCB 2014)	155	258	103	1.66
Developer Approach (NatureScot 2023)	116	258	142	2.22
Scoping B (SNCB 2014)	246	258	12	1.04
Scoping B (NatureScot 2023)	198	258	60	1.3

1.5. Implementation

The Applicant will actively engage with the Men of Ness to facilitate a negotiated agreement to reduce cull numbers and consider additional benefits that could be provided. If this is unsuccessful the measure can be secured by NatureScot via the mechanism of reducing the cull in the annual licence granted for as long as compensation is required to offset impacts from Berwick Bank.

1.6. Monitoring, Reporting and Adaptive Management

A monitoring and adaptive management plan will be developed and agreed with key stakeholders before the implementation of the measure. It will detail the approach to monitoring and adaptive management, acknowledging the remoteness of Sula Sgeir and the difficulty accessing the island to undertake seabird counts. The monitoring plan and adaptive management plan will agree the following key elements.

1.7. Progress Indicators

Progress indicators will be finalised in the monitoring and adaptive management plan, they are likely to be:

- Year 1 to Year 5 – Number of Juvenile and Immature gannet at the colony. This would be expected to increase in line with the survival rates provided in Horswill and Robinson (2015)
- Year 5 to as needed – Number of adult birds at the colony. After year 5 the number of adult birds is predicted to have increased by 258.

Further details are provided in the section on implementation, monitoring and adaptive management in the additional environmental information provided by the Applicant.

1.8. Reporting

The monitoring reports and data collected would be shared with key stakeholders including NatureScot and RSPB. The results of the monitoring report would be used to update the Monitoring Plan if required. Additional management actions are unlikely to be required given the benefit to the colony that 50% reduction in the cull will provide, the available nesting space and the ability of gannet to forage over wide areas on a range of prey species.

1.9. Adaptive Management

The success of the compensatory measure will be monitored on a bi-annual basis using the progress indicators described above. Monitoring these progress indicators will provide early indications of the success of the measure. For example, at the first monitoring point it is expected the number of juvenile birds will have increased in line with the survival rates provided in Horswill and Robinson (2015). By year 5 it is expected that there will be an additional 258 adult birds at the colony.

If at any of these monitoring points there are indications that the measure is not being successful then the cull can be further reduced or halted completely to increase the benefit, via a negotiated agreement to reduce cull numbers or a change in the licence granted by NatureScot.

1.10. Conclusion

The Applicant maintains the position that an AEOSI for gannet at all SPAs can be ruled out beyond scientific doubt. This position is supported by new NatureScot (2023) guidance that reduces the predicted impacts by **21%** for Scope A, **26%** for the Developer Approach and **28%** for Scope B. This assessment of no AEOSI is further re-enforced by the information provided in the background section above. This shows the historic growth in gannet numbers and describes the capacity of gannet to forage over wide areas for a range of prey species.

The proposed compensatory measures to reduce the gannet cull at Sula Sgeir is therefore provided on a without prejudice basis. Evidence and information have been provided to quantify the benefit and how the measure can be implemented. Proposals for a monitoring, reporting and adaptive management plan provide evidence to demonstrate that Scottish Ministers can rely on this measure to compensate for gannet if needed.

Finally, as with the other compensation measures provided by the Applicant, a full feasibility assessment of the measures is provided below.

1.11. Feasibility Assessment

The Applicant has completed a detailed feasibility assessment out to demonstrate that the proposed measure meets the key criteria for compensation. The list of key criteria was developed from the suite of guidance documents available on compensation (see section 2.2 of the Derogation Case Document). The assessment is presented below and demonstrates to Scottish Ministers that each of the chosen measures is feasible in respect of all criteria assessed.

Feasibility Assessment	Y/N?	Explanation
Is the measure technically feasible?	YES	Since the gannet harvest is controlled by humans and licenced by NatureScot, there is high degree of certainty in the technical feasibility of this measure.
Is the measure financially feasible?	YES	The Applicant will actively engage with the Men of Ness to facilitate a negotiated agreement to reduce cull numbers and consider additional benefits that could be provided. Alternatively, the reduction in the gannet harvest can be implemented by NatureScot.
Is the measure legally feasible?	YES	The gannet harvest is licensed by NatureScot and a reduction can be implemented legally via a negotiated agreement or licence reduction.
Is the measure deliverable?	YES	The measure can either be delivered by the Applicant via negotiated agreement or changes to the annual licence issued by NatureScot.
Is the measure ecologically effective (i.e. sufficient)?	YES	This compensatory measure fully provides the necessary compensation for the worst-case predicted impacts on gannet for all SPAs where NatureScot have concluded that AEOSI cannot be ruled out. An increase in the number of chicks will lead to an increase to the number of Adult Birds. This has been estimated at 258 adult birds per annum using survival rates in Horswill and Robinson (2015)
Will the measure be effective before adverse effects arise?	YES	Implementation of the measure would occur as soon as feasible post-consent and an increase in juvenile birds would be seen immediately. Gannet take five years to reach sexual maturity and there would be a delay before the benefits of this measure would compensate for the worst-case impacts predicted. However, the impacts are very unlikely to occur immediately due the length of the construction period and timing of grid connection.
Can be measure be secured?	YES	The applicant will actively engage with the Men of Ness to facilitate a negotiated agreement to reduce cull numbers and consider additional benefits that could be provided. NatureScot

Feasibility Assessment	Y/N?	Explanation
		can secure the measure by amending the annual licence for the gannet cull.
Can success of the measure be monitored?	YES	Yes, proposals for monitoring and adaptive management have been provided. This includes the identification of progress indicators, decision points and additional management actions
How have uncertainties been addressed?	YES	<p>There is little uncertainty that the measure will be ecological effective and sufficient because the measure will increase the chick population by 1000no per annum. Modelling completed for NatureScot demonstrates the impact that a reduction in the cull will have on the growth of the colony Trinder (2016).</p> <p>Any remaining uncertainty has been addressed by setting out a monitoring, reporting and adaptive management process. Progress indicators have been provided and additional management action is possible – further reduction of the harvest or complete cessation of the hunt.</p>
Is the measure additional?	YES	There is no evidence of any action currently underway to stop the hunt, and there are no known plans to stop the guga hunt for conservation (or any other) purposes.

References

- Bradbury, G., Shackshaft, M., Scott-Hayward, L., Rextad, E., Miller, D. & Edwards, D. (2017). *Risk assessment of seabird bycatch in UK waters*. Report to Defra. Defra Project: MB0126.
- Calado, J., Ramos, J., Almeida, A., Oliveira, N. & Paiva, V. (2020). Seabird-fishery interactions and bycatch at multiple gears in the Atlantic Iberian coast. *Ocean & Coastal Management* 200:105306 doi:10.1016/j.ocecoaman.2020.105306.
- Eaton M.A., Aebischer N.J., Brown A.F., Hearn R.D., Lock L., Musgrove A.J., Noble D.G., Stroud D.A. & Gregory R.D. (2015). Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 108: 708–746.
- ECON & ABPmer (2022). Berwick Bank. Evidence and recommendations for compensation measures to support a Habitats Regulations Derogation. Internal report prepared for SSER.
- Grémillet, D., Péron, C., Provost, P. & Lescroël, A. (2015). Adult and juvenile European seabirds at risk from marine plundering off West Africa. *Biological Conservation* 182: 143–147.
- Grémillet, D., Péron, C., Lescroël, A., Fort, J., Patrick, S.C., Besnard, A. & Provost, P. (2020). No way home: collapse in northern gannet survival rates point to critical marine ecosystem perturbation. *Marine Biology* 167: 189 doi.org/10.1007/s00227-020-03801-y.
- Hamer, K.C., Phillips, R.A., Wanless, S., Harris, M.P., & Wood, A.G. (2000). Foraging ranges, diets and feeding locations of gannets *Morus bassanus* in the North Sea: evidence from satellite telemetry. *Marine Ecology Progress Series* 200: 257-264.
- Hamer, K.C., Humphreys, E.M., Garthe, S., Hennicke, J., Peters, G., Grémillet, D., Phillips, R.A., Harris, M.P. & Wanless, S. (2007). Annual variation in diets, feeding locations and foraging behaviour of gannets in the North Sea: flexibility, consistency and constraint. *Marine Ecology Progress Series* 338: 295–305.
- Horswill, C. & Robinson R. A. 2015. Review of seabird demographic rates and density dependence. JNCC Report No. 552. Joint Nature Conservation Committee, Peterborough.
- JNCC (Joint Nature Conservation Committee) (2021). *Seabird Population Trends and Causes of Change: 1986–2019 Report* (<https://jncc.gov.uk/our-work/smp-report-1986-2019>). Joint Nature Conservation Committee, Peterborough. Updated 20 May 2020.
- JNCC (2021). Seabird Population Trends and Causes of Change: 1986-2019 Report (<https://jncc.gov.uk/our-workshop/smp-report-1986-2019>). Joint Nature Conservation Committee, Peterborough. Updated 20 May 2021. Available online at: [SMP Report 1986–2019 | JNCC - Adviser to Government on Nature Conservation](#)
- Mavor, R.A., Parsons, M., Heubeck, M. & Schmitt, S. (2004). *Seabird numbers and breeding success in Britain and Ireland, 2003*. UK Nature Conservation No. 28, Joint Nature Conservation Committee, Peterborough:100 pp.
- Murray, S., Harris, M.P. & Wanless, S. (2014). The Bass Rock – now the world’s largest Northern Gannet colony. *British Birds* 107 765-769.
- Nelson, J.B. (2002). *The Atlantic Gannet*. Fenix Books Limited, Great Yarmouth.
- Northridge, S., Kingston, A. & Coram, A. (2020). Preliminary estimates of seabird bycatch by UK vessels in UK and adjacent waters. Final Report to JNCC (for Defra report ME6024 rev). Scottish Ocean Institute, University of St Andrews.
- Oliveira, N., Henriques, A., Miodonski, J., Pereira, J., Marujo, D., Almeida, A., Barros, N., Andrade, J., Marçalo, A., Santos, J., Oliveira, I.B., Ferreira, M., Araújo, H., Monteiro, S., Vingada, J. & Ramírez, I. (2015). Seabird bycatch in Portuguese mainland coastal fisheries: An assessment through on-board observations and fishermen interviews. *Global Ecology and Conservation* 3: 51–61.
- Stroud, D.A., Bainbridge, I.P., Maddock, A., Anthony, S., Baker, H., Buxton, N., Chambers, D., Enlander, I., Hearn, R.D., Jennings, K.R, Mavor, R., Whitehead, S. & Wilson, J.D. - on behalf of the

UK SPA & Ramsar Scientific Working Group (eds.) (2016). The status of UK SPAs in the 2000s: the Third Network Review. [c.1,108] pp. JNCC, Peterborough.

Trinder, M. (2016). Population viability analysis of the Sula Sgeir gannet population. Scottish Natural Heritage Commissioned Report No. 897, Scottish Natural Heritage, Inverness: 21pp.

Wanless, S. (1983). Seasonal variation in the numbers and condition of Gannets *Sula bassana* dying on Ailsa Craig, Scotland. *Bird Study* 30(2): 102–108.

Guga Hunt Cancelled: - <https://welovestornoway.com/index.php/articles-auto-3/24968-guga-hunt-cancelled> - accessed 17 July 2023.