Northumberland Coastal Wildlife 2019

Northumbrian *Naturalist* Volume 88

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Shag, Farne Islands.

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FOREWORD

Chris Redfern

Strange how things turn out. 2019 was a breeding season in which Arctic Terns *Sterna paradisaea* from one of the Northumberland colonies suffered a high adult mortality, suspected avian botulism. Forward to early 2020 and the human population globally is 'locked down' to various degrees to counter a viral pandemic, possibly caused by animal to human transfer as a result of trade in wildlife. Both situations serve to emphasise, from very different perspectives, that we must value, respect and conserve wildlife and the natural environment which sustains us all. In the UK, environmental legislation is under review now that we have left the European Union. But even when we were within the EU, political and economic pressures to weaken environmental legislation were only countered by Europe-wide public support for the protection provided by the Birds and Habitats Directives (Richter et al 2017). It will now be up to us in the UK to protect our natural environment through education, appreciation of the beauty of wildlife and wild places, and promoting the economic and social benefits of the natural world.

The Northumberland coast has a unique beauty and stunning wildlife. *Coastal Wildlife*, an annual component of *Northumbrian Naturalist*, celebrates not just the north-east coast and its wildlife, but also the volunteer and professional naturalists and conservationists who work to conserve, monitor and record what we have. All three activities are important and interconnected. Active conservation enables scarce species to breed successfully by protecting some coastal habitats from human disturbance, and in other contexts can be necessary to obtain a balance in species composition where a dominant species might take over and decrease the diversity that we value. Monitoring allows us to show the effectiveness, or otherwise, of conservation measures, and can alert us to changes in populations that may need action to address at local, national or even global scales. Finally, we need to document what we have, while we still can, not just the obvious mammals, birds and plants but also the smaller, creepier and slimier marine and terrestrial life. Examples of all these activities can be discovered in this *Coastal Wildlife*.

Active conservation is essential at the Long Nanny and Lindisfarne, two sand-dune environments that are the main breeding sites for Little Terns *Sternula albifrons* in Northumberland. At these sites, National Trust and Natural England rangers and volunteers (Figure 1) work hard to protect tern breeding areas from people enjoying the beach and walking their dogs during the summer. Physical exclusion is vital, but so too is public support for these conservation efforts and an important role of rangers and volunteers is to engage positively with visitors to educate and spread the message.

Much of the data described in various articles in this report are based on many years of monitoring, from 1975 to the present by RSPB for Roseate Terns *Sterna dougallii* on Coquet Island, 1980 by the

Figure 1. **a**, Fey Young erecting temporary fencing along the shoreline at the Long Nanny; **b**, the Long Nanny team in 2019: Tom Henson, Elizabeth Hickson, Sally Reay, Fey Young, Nick Thompson. **c**, Sally Reay keeping watch at the Long Nanny. **d**, Andrew Craggs and volunteer team bringing in the fencing kit at the end of the season at Lindisfarne.

National Trust for Little Terns at the Long Nanny, and from 1994 for Kittiwakes *Rissa tridactyla* along the River Tyne, to use just three examples. For the latter, we might be stretching the definition of 'coastal' a tad, but Kittiwakes have declined gradually in one of their main coastal sites for most of the last three decades (Figure 2) and new sites may be important to sustain their numbers in North East England.

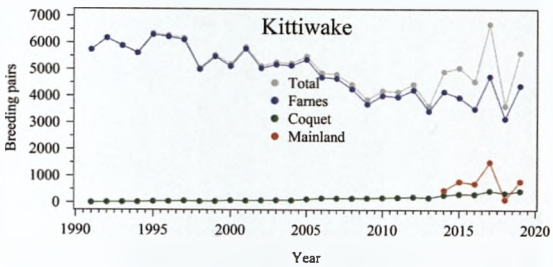


Figure 2. Kittiwake breeding pairs in the main Northumberland sites. Data of RSPB and National Trust, collated by Anne Wilson.

Along the River Tyne, buildings and bridges provide secure nesting sites for Kittiwakes. Dan Turner (Figure 3), a long-standing NHSN member, has monitored these nesting sites as a volunteer since 1994 and shows that breeding pairs have steadily increased during that time, a change that is almost the mirror-image of declines at the Farne Islands. Monitoring at a shorter scale can also be important, and the National Trust rangers on the Farnes (Figure 3) in 2019 carried out a study on the food brought back to Arctic Tern chicks by their parents. This shows that birds nesting on different islands may utilise different foraging resources, and could neatly explain why the suspected avian botulism in Arctic Terns that year affected one colony more than any of the others.

These conservation and monitoring projects are technical and scientific in their approach, and this is important because conservation interventions should ideally be rooted in evidence for their effectiveness to tackle clearly defined problems. But this is not

Figure 3. Monitoring our seabirds, **a**, Tyne Kittiwake expert Dan Turner. **b**, Farnes Ranger Rebekah Goodwill who led the Arctic Tern feeding study in 2019. **c**, monitoring Roseate Tern survival by reading rings on Coquet Island. **d**, Paul Morrison, RSPB Warden (standing), leading Puffin monitoring work by volunteers on Coquet Island.

Figure 4. **a**, Poet Katrina Porteous on the Northumberland coast. **b**, Hilary Brooker-Carey on Coquet Island beside her recreation of the Weeping Window which she made with 1000 red poppies crocheted during the year.

just about science; enjoyment and appreciation of wildlife and the environment has a deep emotional resonance for many that we have, in the past, been somewhat lax in capturing. This issue of *Coastal Wildlife* is something of a departure from normal and Northumberland Poet Katrina Porteous (Figure 4) has allowed us to reproduce her poem 'Long Nanny Burn' which evocatively captures the essence of this windswept dune and beach habitat.

The Coquet Island team of RSPB staff and volunteers care for the biggest Roseate Tern colony in the North Sea. Like the Farne Islands, it is an important seabird island, but with a different and slightly more-restricted mix of species, and historical links to St. Cuthbert (Hodgson, 1899). The island was also the site, in autumn 2019, for Hilary Brooker-Carey's recreation of the Weeping Window sculpture as her personal tribute for Remembrance Day (Figure 4).

NHSN has had a long involvement with Coquet Island and the Farne Islands, particularly through the foresight of Grace Hickling, nee Watt, NHSN's Secretary until her death in 1986. Since its inception in 1829, NHSN has been dedicated to the study of and education about natural history. NHSN is passionate about supporting conservation through education at all stages of life. The knowledge gained through study and monitoring by its members contributes to securing our natural heritage, and the social and cultural history which underpins it. Although work to monitor and document our wildlife is often carried out by professional conservationists, employment contracts tend to be short term and it is often only through the perspective of long-term monitoring sustained by volunteers in collaboration with key organisations and conservation professionals that we can appreciate fully how our environments are changing. NHSN, therefore, has a vital role in supporting local naturalists. 2019 was the 190th year of the NHSN's existence and *Northumbrian Naturalist* has been published, originally as the NHSN's *Transactions*, since 1831 (Figure 5). With this *Coastal Wildlife*, we continue the long NHSN tradition of celebrating the value of people observing wildlife, capturing their records in a structured way, and communicating the important work carried out by volunteer and professional naturalists. We hope to facilitate a new type of global warming – warmth towards our environment and those who look after it.

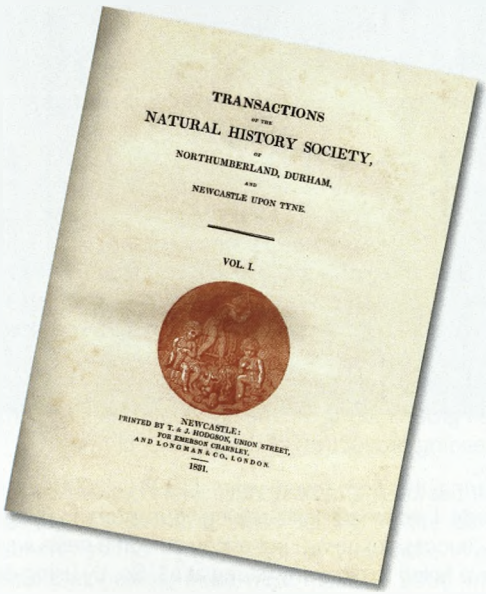
ACKNOWLEDGEMENTS

A massive thanks to all contributors to this report; the tremendous amount of work that goes into conservation and monitoring is hugely appreciated, not least the effort that goes into assembling data and the writing of the reports and articles at the end of each season. The Farne Islands and the work of the National Trust rangers, currently led by Harriet Reid and Tom Hendry, is a centrepiece for *Coastal Wildlife*, and not just in geographical terms: their papers on the monitoring of different groups of animals and plants in addition to birds provides a model to which we should aspire for other areas of our coast.

REFERENCES

RICHTER, K, KREISER, K and VON RUSCHKOWSKI, E (2017). Fit for Purpose! How Europe's Key Pillars for Nature Conservation Barely Escaped Abolition. *The George Wright Forum* **34**: 96-107. Retrieved February 3, 2020, from **www.jstor.org/stable/26342357**

HODGSON, J C (1899). *A history of Northumberland. Volume 5, the parish of Warkworth ... , the parish of Shilbottle, the chapelry or extra-parochial place of Brainshaugh*. Newcastle upon Tyne.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1831.

Figure 5. Above: celebrating NHSN's 190th birthday in 2019 with a team photo of volunteers, partners, trustees and staff. Top right: the front cover of Volume I of the Transactions in 1831.

KITTIWAKES BREEDING ALONG THE RIVER TYNE, 1994-2019: A BRIEF OVERVIEW

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Perhaps summer 1994 is a good place to begin to summarise the first 26 breeding seasons of my monitoring of the nesting Tyne Kittiwakes (Black-legged Kittiwake *Rissa tridactyla*, hereafter Kittiwake) population. It was a very different picture back then, with five main nesting sites along the river and a total of 227 successful nests which raised a minimum of 334 chicks, with potentially an additional 25 successful nests or thereabouts. With a varied rate of increase in nest numbers during the following 25 seasons, the summer of 2019 resulted in 1,355 apparently occupied nests (AON) producing 1,307 well-grown young at the 10 main sites, a strong breeding productivity of 0.96 chicks per nest.

During the first seven years (1994 - 2000) of my study, I recorded nests raising youngsters to fledging as 'successful nests', but of course some nests would have failed to raise any young at all. So, by using data concerning nest failures from more recent years (2016 - 2019, Table 1), we may calculate a mean failure rate of 31.2% of the AON during this period. This figure has then been used to estimate numbers of AON in the seven early study years (see Table 2) assuming a similar failure rate. Consequently, these early years may be plotted (Figure 1) alongside the period 2001 - 2019, when AON were recorded in addition to nests with young, to show the overall population growth of Kittiwakes nesting along the River Tyne during the whole period of study.

Year	River Tyne AON	Percentage of failed nests
2016	1,074	32.5%
2017	1,308	25.5%
2018	1,215	39.3%
2019	1,355	27.5%

Table 1. River Tyne summary, Kittiwake AON and percentage failure.

Year	Successful nests which raised young	Estimated AON
1994	227	330
1995	379	551
1996	324	471
1997	260	378
1998	72	105
1999	215	313
2000	340	494

Table 2. River Tyne summary, successful nests and estimated AON based on an average of 31.2% AON failure.

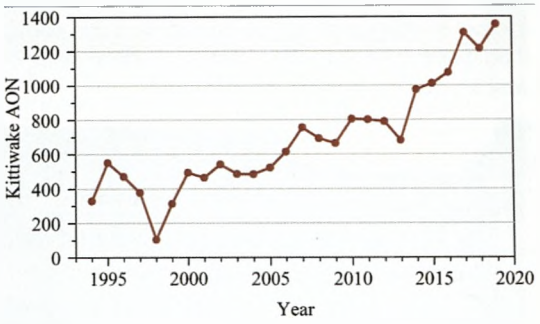

Figure 1. Kittiwake AON growth (see text and Table 2) for each year 1994 to 2019, River Tyne, north-east England.

The river Kittiwake population grew by 4.45% per annum during 2000 - 13, increasing to 9.9% per annum during 2013 - 19. This population growth followed a period of roughly steady numbers between 1994 and 2000, apart from a decline in 1998 which occurred after the Baltic (Flour Mill) in Gateshead was covered in netting during the preceding winter.

During 1994 - 1997, the Baltic had provided a home for most of the Tyne Kittiwake population, so the crash in 1998 may perhaps have been foreseen. Since the early 2000s, while the netting was gradually removed from the newly named Baltic Arts Centre (also Centre for Contemporary Art), Kittiwakes took to nesting there again. They first nested on the northern aspect, facing the river. Nesting began at the eastern end of the long ledge beneath the lettering 'Baltic Flour Mills' and slowly, over many years, progressed along the ledge with further nests (Figure 2). This

Figure 2. The main nesting ledge at Baltic Centre for Contemporary Art, Gateshead riverside, 7 June 2016.

site shows how the species prefers to nest in close proximity, since they gently spread from the eastern end of the ledge (which is about 33 m in length) without jumping or leap-frogging, to later reach the ledge's western extremity. Now the whole ledge is to be found with nests and increasing numbers of gulls have moved onto the ledge above the lettering and onto little window ledges above that. On this upper ledge, the gulls are similarly extending their reach, as time passes, from east to west. Since 2016, a few newcomers have moved around to nest on the eastern aspect of the building.

The Baltic Arts Centre provides a lovely demonstration of a gentle rise in population (Figure 3) since 2004 when they started to nest again, with an annual growth of 19.32% during 2008 - 19.

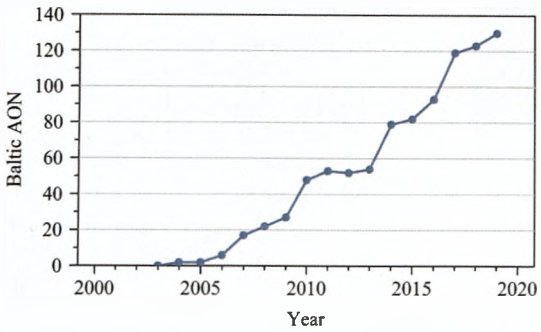

Figure 3. Baltic Centre for Contemporary Art (Gateshead riverside), Kittiwake AON growth during 2003 to 2019. This shows the steady growth in population at this site since bird-deterrent netting was removed.

In a similar way, I have witnessed and recorded the growth in population of those nesting on the north abutment of the Tyne Bridge at Newcastle. First attempts at nesting there were made in 1996 with three AON, but each nest failed to produce young to fledge in that summer. The population growth on the north abutment is shown in Figure 4. To me, it is quite a remarkable picture with a tentative beginning (1996 - 97) and then three years of rapid growth to 115 AON in 2000, followed by steady growth of 7.6% per annum during 2000 - 17 when a plateau was then reached with most ledges occupied (Figure 5). As the north abutment filled with bustle and became more and more crammed with nests and birds; this prompted new incomers (and perhaps displaced gulls) to cross the river and start to colonise the south abutment at Gateshead from 2002. The south abutment population of the Tyne Bridge has grown as also shown in Figure 4 with a growth during 2005 - 13 of 18.8% per annum, followed by an annual growth of 14.8% during 2013 - 19. As well as nesting on the bridge abutments, there are additional nests, not included in Figure 4, on some of the bridge girders – where again numbers are increasing.

Figure 5. North abutment, Tyne Bridge, Newcastle quayside, 6 June 2019.

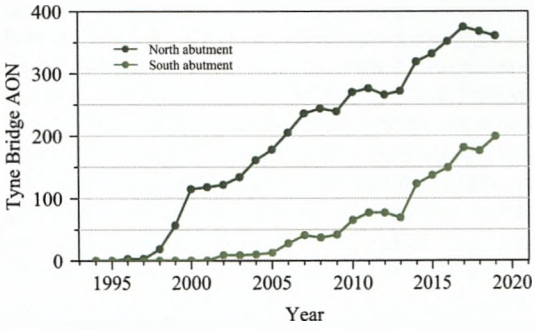

Figure 4. Kittiwake AON on the Tyne Bridge abutments from 1994: upper plot (dark green), north abutment (Newcastle quayside); lower plot (lighter green), south abutment (Gateshead quayside).

It was fantastic to hear a senior Newcastle City Councillor state (17 January 2019), in a meeting which was discussing the nesting Kittiwakes, that the City Council no longer wished to displace the gulls nesting on the Tyne Bridge. This was great news! The Tyne Kittiwake Partnership had come into existence in May 2012, mainly due to concerns at the time about those gulls nesting at Newcastle quayside, particularly on the north abutment of the Tyne Bridge. Newcastle City Council were bending to concerns raised by nearby businesses and had expressed a desire, in the latter half of 2011, to deter and relocate the nesting Kittiwakes from the north abutment. Through inclusion of the city council ecologist within the Partnership, great strides were made during the intervening years. In 2019 the Tyne Bridge as a whole held 54.3% (736 AON) of the River Tyne nesting population and its north abutment and nearby girders held 34.5%. The bridge is a major feature and attraction as far as the Tyne Kittiwakes are concerned. So, with the council now hoping to disturb the gulls as little as possible during future bridge maintenance work, the population may be assured of a good home for some years to come.

From the giddy heights of the Tyne Bridge and its relatively huge numbers of nesting Kittiwakes we may consider a much smaller group of nesting Kittiwakes at North Shields. A few buildings have been nested upon over the years at North Shields, one of which was the Brewery Bond Warehouse – a very important building in Kittiwake history and ecology. That was where Dr John C Coulson (a member of the Tyne Kittiwake Partnership) and his Durham University students studied its nesting Kittiwakes during 1962 - 1990 when there were 72 - 104 nests (Coulson & Coulson 2008, Coulson 2011, Turner 2010). Much knowledge and insight were learnt about the species from close study of this population by John and his

Figure 6. Ferry Mews nesting group, North Shields, 15 July 2017.

colleagues. During the period 1994 - 2019, I studied a much smaller North Shields population, focussed on the Ferry Mews building beside North Shields ferry landing stage. The small passenger ferry crosses the river daily between North and South Shields. At Ferry Mews, a small group of nesting Kittiwakes has clung on (Figure 6) with their sharp and gently curving claws, a slight overspill from the Brewery Bond Warehouse where none have nested since 2000 – that building now sanitised so no nesting was possible.

During 2001 - 2019, I recorded seven to 15 AON at the Ferry Mews building, generally a very successful small group of breeding adults. During 1994 - 2000 I additionally recorded up to 13 AON from this building and the building immediately to its east (directly overlooking the ferry landing). Sadly, each winter following nesting, the property owner would install deterrents, such as wire mesh netting, synthetic netting, spikes, wires, taut threads and in winter of 2018/19 anti-climb paint. The Kittiwakes stoically return for each new nesting season and somehow manage to re-build their nests and maintain a toe-hold. They are so determined! I do love their character. They nest here facing the river and only a short flight out to sea in search of food (Redfern and Bevan 2014). The anti-vandal paint managed to tarnish the plumage of some Kittiwakes, and it had been placed inappropriately. Printed letters from the RSPB found their way to the property owner and a clean-up was attempted so that nine nests in 2019 were able to fledge 12 chicks.

Maintaining the narrative of concerns from property owners, Kittiwakes have nested at Newcastle quayside since the late 1960s (Coulson 2019, page 385) with varying numbers of nests and properties involved, many years prior to first nesting on the Tyne Bridge. During 1994 - 2019 a range of buildings have been used for nesting close to the river at Newcastle and beneath the Tyne Bridge or close to its north abutment. In a brief summary, 2000 - 2019 has seen annual AON numbers of between 5 and 176 at the Newcastle quayside buildings, excluding the Tyne Bridge. One of these properties, Newcastle Guildhall, held a maximum of 72 AON (in 2017) after nesting commenced there in 2007. This quayside nesting group includes the railway viaduct over Dean Street where nests have increased from 11 to 62 since 2016. The main Newcastle quayside properties hold a bit of a shifting group of birds. Why? There are many commercial businesses amongst these properties, several have customers entering and

leaving the properties. Some of the businesses sell food and drink and may have unprotected outside seating areas; there are also hotels. The businesses and property owners have concerns about public health, cleanliness, noise levels and property maintenance. A range of bird deterrents have been used here, some perhaps initially installed to deter pigeons in past years, but now the main thrust is against the Kittiwakes. Newcastle City Council has produced some guidelines in relation to deterrents for property owners and businesses. This is a shifting group of gulls due to the fact that deterrents keep appearing and changing as the increasing overall population of Tyne Kittiwakes continues to probe the area for new nesting places. The deterrents can be unsightly and may have unintended consequences. For example, inadequate and poorly maintained deterrent netting caused the death of 12 - 15 Kittiwakes in summer 2018 at Newcastle quayside (Turner 2018 – unpublished report for Tyne Kittiwake Partnership). The public expressed their concerns in relation to these matters, often via social media, and wished to see the Kittiwakes kept as safe as possible. Some property owners/businesses have adopted a more kittiwake-friendly approach than others.

The Baltic Arts Centre has embraced their nesting Kittiwakes and now regards them as an asset to be nurtured, discussed, protected, celebrated and included in education. Akzo Nobel (or International Paints) is trying to work around any issues the Kittiwakes may cause at their site (Felling Shore), such as droppings falling onto hand-rails and walkways, and has endeavoured to assist their population by placement of new nesting ledges. This location held 212 nests in 2019.

It has also been good to monitor the small Kittiwake colony on Tynemouth cliffs, just to the north of the river mouth, during this period. Nests at this location have continued to grow and flourish, rising from 66 successful nests in 1994 to 350 apparently occupied nests in 2019 with a generally very good breeding productivity too (e.g. 1.07 in 2019 and 0.84 in 2018).

The continuing growth in numbers of Tyne breeding Kittiwakes accompanied by very good breeding productivity (Turner 2009 - 2019, Turner 2010) points towards a good food source offshore as well as generally encouraging weather during the breeding season. It seems our Tyne birds are attracting others from further afield, perhaps from failed colonies elsewhere where the food supply has dwindled. Having noted the impact of poor weather in the breeding season, particularly heavy rainfall during the critical period for nesting Kittiwakes (Turner 2010) it has been good to see that overall summer weather has been beneficial for our gulls. Poor breeding productivity of 0.57 in 2008 was the lowest recorded along the Tyne since 1994; the maximum River Tyne productivity during 1994 - 2019 was 1.19 - 1.20 in 2009 - 11.

There is much more that could be said, for example certain sites have not or hardly been touched on here: Tynemouth cliffs, North Shields lifeboat house, Port of Tyne Kittiwake tower, McNulty Offshore Yard, Port of Tyne gantry (North Shields), Akzo Nobel (International Paints), Saltmeadows Tower (Gateshead), Tyne Bridge girders and the High Level Bridge.

It has always been a pleasure to carry out the breeding surveys and 'get a handle' on how the Tyne Kittiwakes are faring. Perhaps my pace has slowed over the past 26 breeding seasons, but my interest remains. In this period, they have done well and numbers have progressively risen with the pairs experiencing good breeding productivity. This is good to see, especially when the Kittiwake is on the IUCN Red List of Threatened Species (IUCN 2018) and now evaluated as Vulnerable (since 2017) after a global population decline of around 40% over the past 39 years. It is always rewarding to speak with people from many countries about the Kittiwakes, for example when asked what I am doing while going about the surveys. Visitors come to Tyneside to see our Kittiwake spectacle nowadays – that has got to be good! They are concerned for the birds' welfare in our changing environment and wish to observe, learn and encourage (nurture nature!). Perhaps the recent tentative nesting on the High Level Bridge (south side), beginning in 2017, will progress over the next few years as on the Tyne Bridge, leading a fresh increase in the Tyne Kittiwake population. Based on the rate of rise in population during 2013 - 2019 (Figure 1), the Tyne population could almost double over the next seven breeding seasons up to the summer of 2026. Who knows what is around the corner?

ACKNOWLEDGEMENTS

Thanks are extended to all those who have encouraged me over the years with my Kittiwake observations. Such people (and this list is not exhaustive) include: Dr John C Coulson, Professor Mike P Harris, Martin Heubeck, Tyne Kittiwake Partnership, Northumberland & Tyneside Bird Club, Natural History Society of Northumbria, my family and Linda K Charlton. Thanks are also extended to Dr Kathy Evans who has joined me in the Tyne Kittiwake surveys by monitoring at Akzo Nobel since 2015.

REFERENCES

COULSON, J C and COULSON B A (2008). Measuring immigration and philopatry in seabirds; recruitment to Black-legged Kittiwake colonies. *Ibis* **150**: 288-299.

COULSON, J C (2011). *The Kittiwake*. T & A D Poyser.

COULSON, J C (2019). *Gulls*. The New Naturalist Library, HarperCollins Publishers.

The IUCN Red List of Threatened Species: *Rissa tridactyla* (2018) **http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22694497A132556442.en**

REDFERN, C P F and BEVAN, R M (2014). A comparison of foraging behaviour in the North Sea by Black-legged Kittiwakes *Rissa tridactyla* from an inland and a maritime colony. *Bird Study* **61**: 17-28.

TURNER, D M (2009-2019). Annual summaries (2001-2019) of Kittiwake breeding data recorded on the River Tyne. *Website of Natural History Society of Northumbria, under 'What we do', 'Conservation and Research', 'Tyne Kittiwakes', 'Tyne Kittiwake Population Data'*. **http://www.nhsn.ncl.ac.uk/**

TURNER, D M (2010). Counts and breeding success of Black-legged Kittiwakes *Rissa tridactyla* nesting on man-made structures along the River Tyne, northeast England, 1994-2009. *Seabird* **23**: 111 - 126.

TURNER, D M (2018) *Newcastle quayside (River Tyne) nesting Kittiwakes, 2018 breeding season: Incidents involving bird-deterrent netting on buildings*. Report prepared for Tyne Kittiwake Partnership.

APPENDIX

The Tyne Kittiwake Partnership (TKP)

The TKP brings together organisations and individuals who are working together to conserve and celebrate the most inland Kittiwake colony in the world. Members of the TKP include the RSPB, Northumberland and Durham Wildlife Trusts, independent ornithologists, local Councils, Natural England, Northumberland and Tyneside Bird Club, Natural History Society of Northumbria, the RSPCA and Newcastle University. The TKP formed in 2012 to safeguard Kittiwake nest sites and increase public knowledge and awareness of these urban seabirds. The TKP works with local people and organisations to celebrate and conserve this unique colony.

DEFINITIONS

AON: Apparently Occupied Nest

A well-built nest capable of containing eggs, with at least one adult present. Repeated counts in late May to mid-June or a single count in early to mid-June. In the text of this paper 'nests' refer to AONs unless stated otherwise.

Successful nest

A nest which raises youngsters to fledging.

Nest failure

A failed nest is an apparently occupied nest (AON) on which the adults failed to rear (fledge) any chicks.

Breeding Productivity / Success

Minimum number of young fledged per AON.

BIRDS AND WILDLIFE ON COQUET ISLAND

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INTRODUCTION

Coquet Island Special Protection Area (SPA) was designated in 1985 to ensure protection for its nationally-important assemblage of breeding seabirds. This now sits in the larger 'Northumberland Marine SPA', established in 2017, which offers protection for the foraging grounds of the seabirds breeding on Coquet Island. The island remains a Site of Special Scientific Interest (SSSI) designated for its internationally important populations of breeding seabirds, and is managed by RSPB to benefit four tern species, and Atlantic Puffin *Fratercula arctica*, Eider *Somateria mollissima*, Kittiwake *Rissa tridactyla*, Fulmar *Fulmarus glacialis* and recently, a few pairs of Mediterranean Gull *Ichthyaetus melanocephalus*. SSSIs were originally established by the National Parks and Access to the Countryside Act 1949, and modified by successive Acts of Parliament in relation to devolution and access to the countryside. SPAs were established in the UK in response to European Union (EU) legislation (Birds Directive and Habitats Directive), and these additional legislative layers enable meaningful protection of seabird breeding colonies- not just their nesting areas but the foraging resources that they need to breed successfully.

Apart from its diversity and number of breeding seabirds, Coquet Island has the only substantial breeding colony of Roseate Terns *Sterna dougallii* in the UK. As a Schedule 1 species of the Wildlife and Countryside Act 1981, the RSPB has a responsibility to manage Coquet Island to ensure the conservation of Roseate Terns. Although there is no public access onto the island because of this responsibility, boat trips run from Amble by a local boat company allow all species to be seen and enjoyed from a safe distance offshore. Cameras pointing along a nesting terrace and inside a single nest box give a unique insight into Roseate Tern behaviour during the breeding season; this can be viewed remotely on the internet (www.rspb.org.uk/coquetlive).

giving nature a home

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2019 SEASON OVERVIEW

It was a mixed season on Coquet this year but generally positive. The weather was far from predictable, with glorious sunshine and unseasonably high temperatures towards the end of February followed by a relatively cool, windy (and occasionally very wet) summer. Arrival and first egg dates for most breeding seabird species were slightly earlier than last season. Most species were largely unaffected by the poor summer and food supplies seemed relatively good – all four species of tern were regularly recorded bringing multiple sandeels (*Ammodytes* species) in at once, something usually seen only in Puffins. Notable highlights were a record-breaking number of breeding Roseate Terns and the second highest total of youngsters fledging from the island. Other species which had a good season in terms of breeding pairs included Puffins, Sandwich Terns and Kittiwakes. On a more sombre note, unseasonably stormy weather in June decimated Eider crèches and few youngsters made it to adulthood. Fortunately, duckling survival last year was high which will lessen the impact of 2019 in the long term. Breeding statistics are summarised in Table 1.

The story of the season was the presence of an Otter *Lutra lutra* on the island for most of the year, the first confirmed record since the RSPB took over management of the reserve in 1970. Footprints were first discovered on the beach in January and over the next few weeks, images of the animal were caught on trail cameras positioned around the island at locations where spraints and feeding remains had been found. Because of the regularity of camera sightings of the Otter, an electric fence around the Roseate Tern colony was installed. On 19 May, a large latrine was discovered at the pond along with a scattering of 30 - 40 adult Puffin corpses, all of which had been characteristically turned inside out. A trail camera was placed by the pond and, on the first night, the Otter was caught on camera, bringing an adult Puffin to the pond and feeding on it (Figure 1). After the camera had been in position for several nights, it was estimated that the Otter was taking two Puffins a night. When the birds started to leave the island as chicks fledged, Otter activity became

Species	Pairs 2018	Pairs 2019	% Change	1st egg 2018	1st egg 2019	Mean Clutch 2019	Fledged 2019	Productivity 2019	Productivity sample
Fulmar	52	**53**	1.9%	15-May	**18-May**	**n/a**	**25**	**0.47**	island
Eider	378	**325**	-14.0%	28-Apr	**14-Apr**	**n/a**	**n/a**	**n/a**	n/a
Med Gull	2	**0**	-200.0%	04-May	**n/a**	**n/a**	**n/a**	**n/a**	n/a
B-H Gull	5564	**5293**	-4.9%	23-Apr	**22-Apr**	**2.63**	**38**	**1.27**	30 enclosed nests
L B B-Gull	16	**20**	25.0%	17-May	**11-May**	**2.43**	**0**	**0**	island
Herring Gull	5	**7**	40.0%	17-May	**11-May**	**2.75**	**0**	**0**	island
Kittiwake	361	**439**	21.6%	21-May	**21-May**	**1.73**	**23**	**0.77**	30 nests
Sandwich Tern	1415	**1652**	16.7%	04-May	**05-May**	**1.31**	**n/a**	**n/a**	n/a
Roseate Tern	118	**122**	3.3%	21-May	**21-May**	**1.66**	**157**	**1.29**	island
Common Tern	1667	**1652**	-0.9%	12-May	**11-May**	**2.74**	**36**	**1.16**	31 enclosed nests
Arctic Tern	1240	**1155**	-6.9%	11-May	**12-May**	**2.02**	**35**	**1.09**	32 enclosed nests

Table 1. Seabird breeding statistics for Coquet Island in 2018 and 2019. Cells with a green background are record breaking numbers; declines are emphasised with red text, and increases with green text.

infrequent and the animal was not seen after the end of July. As the mainland is less than a mile away at low tide, it is not clear if the Otter was resident on the island or swimming over each day. Otter numbers are increasing in Northumberland and translocation of the animal to a less sensitive site was not likely to be a viable long-term solution. As an alternative, a more-robust electric fence will be installed around the Roseate Tern terraces during the winter to help safeguard this rare UK-breeding seabird.

Figure 1. The Otter returning to the pond in the centre of the island with a Puffin kill (23 May 2019).

SPECIES ACCOUNTS

Roseate Tern

The Roseate Tern nesting terraces were resurfaced with a finer shingle this season as video cameras have shown that the birds favour smaller shell fragments to make nest scrapes. The central terrace was also given a thick layer of sand and shingle to reduce the vegetation growth which blocked entrances to many of the boxes last season, making them inaccessible to the birds. Finally, a low electric fence was installed around all terraces to provide some protection from the Otter.

122 pairs of Roseate Terns nested on Coquet Island this season; an increase of four pairs on the record total in 2018. A high average clutch size of 1.66 eggs per pair, a good food supply and no observed predation events gave an impressive productivity of 1.29 chicks fledged per pair, the second-highest productivity since the RSPB took over the management of the island (Figure 2).

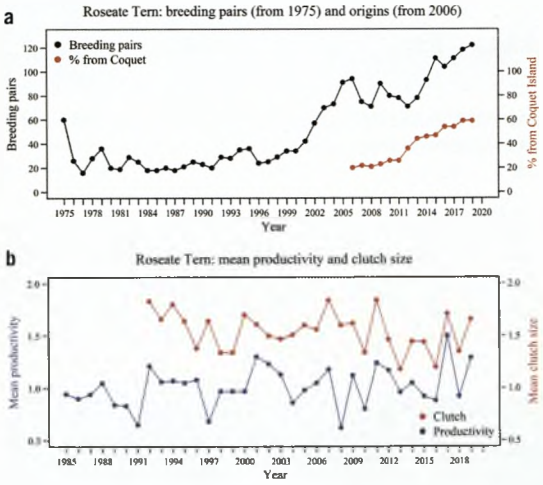

Figure 2. Roseate Tern breeding statistics on Coquet Island to 2019: **a**) breeding pairs and colony of origin determined from reading the 'Roseate Special' rings through a telescope; **b**) mean productivity (1985 to 2019) and clutch size (1992 to 2019).

161 chicks were ringed with a single, 'Roseate special' ring, and 157 successfully fledged from the island. This brings the total number of Roseate Tern chicks ringed on Coquet to 2,132. From a total of 632 ring-reads of adult birds this year, there were 237 unique sequences. As with last season, 59% of these birds were originally ringed as chicks on Coquet (Figure 2). This shows that the colony on Coquet is creeping towards becoming self-sustaining and a potential source of birds to establish colonies elsewhere along the east coast of the UK.

We eagerly awaited the return of the Roseate Terns this season to find out how many of the birds fitted with geolocators (geolocation sensors or GLS) in 2018 would make it back to Coquet. Of 20 deployed in 2018, 17 (85%) returned, and this is an average survival or return rate for the species (Seward et al. 2019). Sadly, one geolocator bird returned without its foot and the device missing from the tarsus above (Figure 3). The foot appeared to have been lost by separation at metatarsal bones of the joint between the base of the tarso-metatarsus and digits of the foot; the wound had healed completely and otherwise the bird appeared healthy. This is the first such injury seen out of 92 terns tagged with geolocators in Northumberland and Rockabill (Roseate and Arctic: overall return rate 87%). While the injury may have been unrelated to the presence of the geolocator, it is perhaps more likely that either the geolocator may have caught the bird's leg in discarded debris or fishing equipment, the foot may have been removed by a predatory fish (Kirkham et al. 1987) attracted to the geolocator, or that the bird has been trapped on a beach in West Africa and the foot and device removed by human intervention.

All 16 birds with geolocators were successfully retrapped and the devices retrieved; the devices were still working, and had full datasets from deployment to recovery. There was no evidence for any effects of the devices on the birds: the mass of the birds between 2018 when the devices were fitted and on recapture in 2019 was not significantly different, productivity (chicks fledged) in 2018 of pairs which included a geolocator tagged bird was as good or better than the rest of the colony, and clutch size in 2019 was as good as other pairs. Data are currently being analysed, and are giving a detailed picture of their migration and wintering areas throughout the year.

Figure 3. A tired, returning Roseate with geolocator (left) and the Roseate with its foot and geolocator missing (right).

24-hour CCTV surveillance of the colony was once again maintained throughout the season, with a Species Protection Assistant employed to prevent unauthorised landings during the night. There were fewer adverse events this season compared with 2018 with no unauthorised landings. However, there was one serious incident, thought to involve a known egg collector who lives locally. During a routine trip by RSPB staff to the mainland to gather firewood, a small dinghy containing three people wearing wetsuits was seen heading out to the island. This dinghy came in close to the jetty, but fortunately two of the conservation team were on the island and their presence, combined with a fair swell, prevented any incursion. We surmise that the dingy occupants had seen the RSPB boat leaving the island earlier and had assumed that the island would be unoccupied. This is a reminder that constant surveillance on the island is necessary, and is why the island is never left unattended during the breeding season.

Arctic and Common Terns

The Common Tern *Sterna hirundo* population remained stable this season at 1,652 pairs, just 15 pairs short of the 2018 total. However, after the decline in the Arctic Tern *Sterna paradisaea* population last season, there was added concern that the population had decreased again by 6.9% to 1,155 pairs. The decline in Arctic Terns this year may have been a result of the suspected botulism that has affected Northumberland colonies in 2019, and more than 40 adult Arctic Terns were found dead on Coquet Island. A small number of Common Terns may also have been affected by this disease, and of the five found dead, one had been ringed in Senegal in 2013 (Figure 4). Both species had larger average clutch sizes than last season, but botulism and the unsettled weather may have reduced chick survival: the productivities of 1.09 for Arctic Terns and 1.16 for Common Terns were both lower than in 2018.

Figure 4. A Common Tern ringed in Senegal, succumbed to suspected botulism.

Sandwich Tern

It was a good year for Coquet's Sandwich Terns *Thalasseus sandvicensis* with an increase of 16.7% on 2018, to 1,652 pairs. The main colony of 1,400 pairs was in the northerly tern plots, counted across two censuses. A later colony of a further 252 pairs again developed on South Beach, almost twice the number that nested there last season when there was less sand and nesting space. On 10 July, most adults and near-fledging chicks from the northerly plots moved over onto the path and then down onto the south Roseate Tern terrace (Figure 5). The birds stayed there for two days and fortunately there was no obvious negative effect on the Roseates. Numbers of fledglings appeared good although perhaps slightly down on last season, a similar trend to the Arctic and Common Terns.

Figure 5. Sandwich Terns on the Roseate Tern terrace.

It was another successful year for reading colour rings, with 1041 sightings of 211 different individuals (including three metal ringed birds). Of the 211 individuals, 68% were ringed on Coquet and the Farne Islands, and the rest comprised birds from Norfolk, Scotland, Ireland, the Netherlands, and a single bird from Denmark.

Samples of guano were collected for a fourth year and sent to the Research Institute for Nature in Brussels for diet analysis; these samples will be analysed alongside others from around Europe.

Atlantic Puffin

After the apparent dramatic increase in the Atlantic Puffin population on Coquet revealed in the 2018 census, a repeat census was carried out this season. The Puffin census unit is an 'apparently occupied burrow' (AOB) and we assume a relatively constant, although unknown, relationship to the actual number of pairs breeding. The census, carried out on 16 June, gave 25,029 AOBs, a decrease of 22.5% on

the 2018 census (Figure 6). This year, a burrow camera was used to test the accuracy of the visual inspection of a burrow entrance: do signs of fresh digging, Puffin footprints, clearance of vegetation at the burrow entrance, hatched eggshells, discarded fish, a latrine, smell, or warmth inside the burrow entrance, mean that the burrow is occupied? From the 30 quadrats visually inspected for the census, three quadrats were randomly selected to compare visual inspection with actual contents revealed with the camera (a 10% sample). In these three quadrats, 32 burrows were visually assessed as 'occupied', but with the camera only 24 were occupied (Figure 7). Although this may suggest that visual assessments overestimate breeding numbers, the census on Coquet is routinely carried out relatively late in the season, and an empty burrow visually classified as occupied may be empty at the time of census for a variety of reasons, such as breeding failure or predation (for example by an Otter!) earlier in the season. Furthermore, in a seabird colony the actual number of breeding pairs of any species can be hard to define accurately as a result of nest failures, relays, optimistic inexperienced breeders etc., unless a huge amount of effort is put in. Nevertheless, re-assessment of Puffin monitoring on Coquet Island would be useful, perhaps monitoring on an annual basis earlier in the season, at a time linked to first-egg dates, and including productivity monitoring in a sample of burrows.

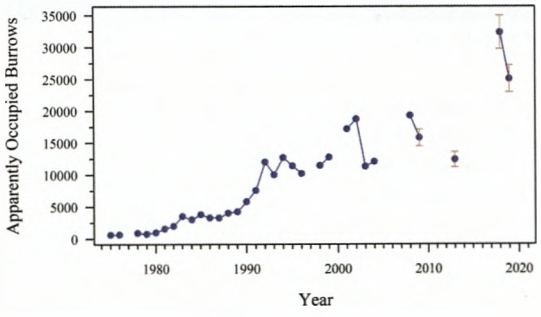

Figure 6. Coquet Puffin censuses from 1975 to 2019. Error bars are displayed on the 2009, 2013, 2018 and 2019 censuses.

giving nature a home

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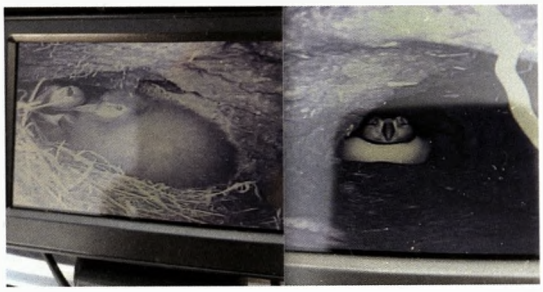

Figure 7. Example images captured from the new 'burrow-cam' including an adult and chick (left) and a presumed incubating bird (right).

Eider

Despite a decrease of 14% in the population this year, Coquet's Eiders had a good season with 325 nesting females recorded across two counts on 19 May and 15 June. The current five-year average for the species on Coquet is 330 nesting females which brings the island above the SSSI threshold level of 311 defined for Coquet Island by Natural England. However, the peak of 96 ducklings on 31 May was less than the peak of 136 last season, and storms on 12 and 13 June appeared to wipe out most of these youngsters, with low crèche counts for the remainder of the season.

Black-headed Gull *Chroicocephalus ridibundus*

For the first time since 2015, the population of Black-headed Gulls declined on the island with 5,293 pairs recorded. This represents a 4.9% decrease on the record total in 2018 of 5,564 pairs. Nevertheless, this is still the fourth-highest total recorded on Coquet since the RSPB has managed the island. In contrast to the terns, the average clutch size for Black-headed Gulls was lower than last season at 2.63 eggs per nest. Productivity was also slightly down on last season at 1.27 chicks fledged per nest.

Mediterranean Gull

Despite encouraging evidence of two pairs early in the season, no Mediterranean Gulls were recorded breeding on the island this season. During the Black-headed Gull census, no Mediterranean Gulls were heard calling; in previous years this has been a good sign that one or more pairs are nesting if the birds are otherwise proving elusive, and differences in egg patterning can help identify possible nests during the gull census work (Figure 8).

As compensation, the colour-ringing of Mediterranean Gull chicks from previous years is giving a fascinating insight into their movements. One of the youngsters ringed in the 2018 season on Coquet, 2X3R (Figure 9), was seen after fledging at Hauxley just down the

coast on 21 July, at the Hayle Estuary in Cornwall on 19 September 2018, and then on Nemiña beach, Muxía, A Coruña, North West Spain on 19 January 2019. Exactly a year after the Hauxley sighting, it was back in Northumberland at East Chevington on 21 July 2019.

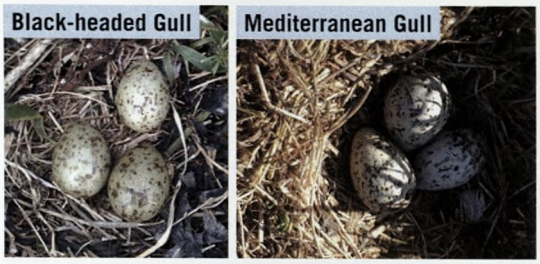

Figure 8. Differences between Black-headed Gull and Mediterranean Gull eggs.

Figure 9. Mediterranean Gull chick after being ringed with '2X3R' on 27 June 2018.

Fulmar

The Fulmar population increased by just a single pair, compared with last season, to 53 apparently occupied sites (AOS). The breeding population was comparable to the pre-exodus count of Fulmars on 14 April of 110 birds. Productivity was low for yet another season at 0.47 chicks fledged per pair. All 25 large chicks ringed towards the end of August successfully fledged from the island. Whilst ringing one chick, it regurgitated a piece of rubber which couldn't have been much smaller than its stomach (Figure 10). Ringing the chick may well have saved its life.

Figure 10. The large piece of rubber regurgitated by a Fulmar chick.

Kittiwake

The second-highest total of Kittiwakes since the first pair in 1991 nested on Coquet this year. An impressive 439 apparently-occupied sites (AOS) were recorded with birds nesting in new areas of the island such as the west-facing cliffs overlooking the beach. Despite a comparable average clutch size to last season, it was a poor year for productivity with 0.77 chicks fledged per pair; this was the lowest productivity on Coquet since 2008. Kittiwake nests on the island are very susceptible to water run-off from the plateau and a few of the failed nests this summer were waterlogged after periods of heavy rain.

Large Gulls

The breeding populations of Herring Gulls *Larus argentatus* and Lesser Black-backed Gulls *Larus fuscus* increased this season by 40% and 25%, respectively. This may have been caused by a reduction in disturbance measures applied during the year. Despite relatively stable clutch sizes from both species (2.75 for Herring Gulls and 2.43 for Lesser Black-backed Gulls), there was zero productivity for both, with chicks showing evidence of botulism. Therefore, no adults or chicks were ringed this season. Eleven colour-ringed adults from previous seasons were seen over the island. Disturbance and predation events were noted many times over the main Roseate Tern terrace, the South Beach and Sandwich Tern colony, although successful predation in these colonies was minimal.

Other species

Although the breeding seabird assemblage of Coquet Island is the major conservation interest, other species breed (approximate 2019 pairs in parentheses): Greylag *Anser anser* (6) and Canada

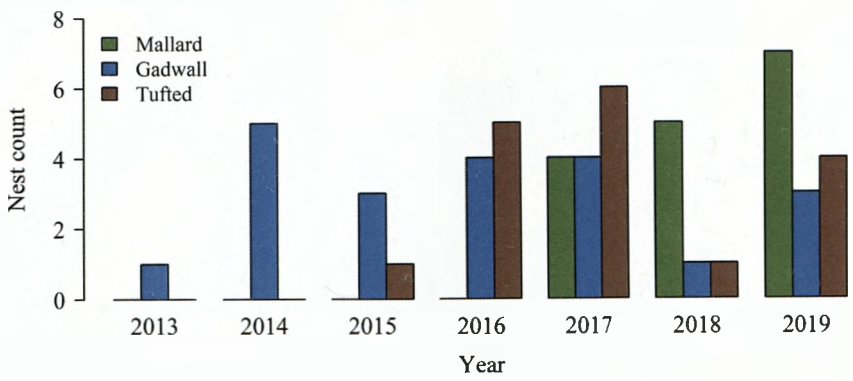

Figure 11. Numbers of Mallard, Gadwall and Tufted Duck nests encountered on Coquet Island in the last seven years.

Branta canadensis (8) Goose, Shelduck *Tadorna tadorna* (4), Oystercatcher *Haematopus ostralegus* (7), Mallard *Anas platyrhynchos* (7), Tufted Duck *Aythya fuligula* (4), Gadwall *Mareca strepera* (3), Feral Pigeon (not counted), as well as passerines Barn Swallow *Hirundo rustica* (2), Rock Pipit *Anthus petrosus* (10), Pied Wagtail *Motacilla alba yarrellii* (5) and Linnet *Linaria cannabina* (1). Nesting Mallard, Gadwall and Tufted Ducks are encountered incidentally during gull monitoring and the number of nests can fluctuate markedly from year to year. Gadwall have been a consistent feature over the last seven years, but Mallard and Tufted Duck have increased more recently (Figure 11).

It has been an interesting season with respect to mammals on or around the island, although the Otter was rather an unwelcome visitor. There were regular sightings of Bottlenose Dolphins *Tursiops truncatus* throughout the summer and two sightings of Minke Whale *Balaenoptera acutorostrata* on 2 July 2019. Four Grey Seal *Halichoerus grypus* pups were born over the 2018 - 19 winter, with three weaned. There were impressive numbers of Grey Seals hauling out on the north-east intertidal area, with a peak of *ca.* 850 on 29 March. The increasing numbers of Grey Seals using Coquet Island for pupping and as a haul-out is a growing concern. Seals hauling out on South Beach, particularly in northerly-swell conditions, regularly exceeded 150 animals in the spring (Figure 12). The risk is that seals will make their way onto the island plateau and damage fragile Puffin burrows, and also compromise the Sandwich Tern colony at the head of the beach. A dog bark was used on the gull-scaring sound equipment facing the beach this season but this was an inadequate seal deterrent. The Coquet team were therefore required to walk to the edge of the beach regularly and drive the seals into the sea to prevent the area becoming a regular seal haul-out.

Figure 12. Grey Seals hauling out on South Beach with relatively easy access onto the fragile plateau.

Although relatively common on the mainland, records of Cuckoo *Cuculus canorus* (Figure 13) and Kingfisher *Alcedo atthis* coming in August and September, respectively, were nice records for the island. On an overcast August day, a moulting adult Red-necked Phalarope *Phalaropus lobatus* was discovered feeding away in a rockpool close to the jetty, characteristically spinning around (Figure 13). This may be the first record of this species for Coquet.

Towards the end of September, a sustained spell of easterly winds brought some common migrants as well as some more unusual species. Poor visibility with light south-easterly winds on 22 September brought a Yellow-browed Warbler *Phylloscopus inornatus*, which was discovered in one of the Elder trees on the island; an hour later, a Little Bunting *Emberiza pusilla* was discovered feeding on the ground with Linnets in one of the walled gardens (Figure 13).

Numbers of wintering Ruddy Turnstone *Arenaria interpres* and Purple Sandpipers *Calidris maritima* were comparable to the last few years, with an impressive 135 Purple Sandpipers present on 24 April. This highlights the importance of Coquet Island as an undisturbed refuge for waders using the island and nearby mainland coast for foraging in the winter (Whittingham et al. 2020). Finally, on 29 July there was a mass-influx of Painted Lady *Vanessa cardui* butterflies on Coquet, and elsewhere along the East Coast, with the tiny Coquet Island of only eight hectares covered in an estimated 1000 butterflies.

Figure 13. Red-necked Phalarope (top left), Cuckoo (top right), Yellow-browed Warbler (bottom left), Little Bunting (bottom right).

INFRASTRUCTURE WORKS

In the Spring, wooden cladding with reflective insulation was installed around the bowser water storage tank which feeds the desalination water-treatment system on the island. This helped to protect the water inside from heating up in the direct sunlight which encouraged bacterial growth last season. An ultraviolet irradiation system was added at the start of the season to purify the water to drinking quality; this was confirmed by tests made by Northumbrian Water. This water treatment system is now of sufficient quality to reduce substantially the need for drinking water to be brought across to the island.

The main job for the 2019 - 2020 winter is to install a more robust electric fence around the Roseate Tern terraces and surrounding area to provide better protection from Otter predation. The proposed fence is to be mesh-linked with an overhang containing live wires and an underground 'skirt' reaching down to the bedrock of the island. The current CCTV system may also be replaced as the cameras are 14 years old and the technology is outdated, but this is dependent on funding. This new system would give a wider and clearer field of view which would further safeguard the island and the seabird assemblage.

PEOPLE ENGAGEMENT

Regular updates were made throughout the season to RSPB Northern England's Twitter site, keeping the public informed with news from the island. Feedback was once again very positive from the live wildlife cameras on the island with 18,246 views of the terrace camera which equates to around 1,757 hours of live footage watched. If we assume that the other two cameras on the island are equally popular, these figures can be trebled. A video was produced this season with footage of Coquet's Puffins, telling the story of the adults' arrival on the island to the eventual fledging of young pufflings. Copyrighting issues with the music used in the video, are waiting to be resolved before this can be uploaded onto YouTube. Finally, a photo of one of an estimated 1000 Painted Lady butterflies discovered on the island on 29 July was used on BBC *Look North*.

ACKNOWLEDGEMENTS

Many people contribute to the management of Coquet Island, both directly through volunteering and indirectly through the goodwill and encouragement of the local community. Hilary Brooker-Cary provides superb support to all aspects of Coquet conservation work, and the island's infrastructure continues to function despite the unforgiving marine environment as a result of Stephen Lunn's innovative engineering. We thank Tom Cadwallender for providing his expertise with ringing the Roseate Tern chicks, Rachelle Regan for her work on the night watches as a Species Protection Assistant, and Ibrahim Alfarwi for his PhD research studies on the large gulls. Preparing the island for the busy seabird breeding season and the following winter is a huge job which would not be possible without the help of our fantastic RSPB residential volunteers. Finally, we thank the EU LIFE Roseate Tern project, funded by the EU (LIFE14 NAT/UK/000394) and managed by Daniel Piec on behalf of RSPB, BirdWatch Ireland and the North Wales Wildlife Trust, for the enormous financial contribution which has helped provide the infrastructure and research essential for securing the future of Roseate Terns on Coquet Island.

REFERENCES

KIRKHAM, I R, MONTEVECCHI, W A, LIEN, O J, SKLEPKOVYCH, B O and BUTLER, R G (1987). Damage to Leach's Storm-Petrel Feet. *Ornis Scandinavica* **18**: 61-64.

SEWARD, S, RATCLIFFE, N, NEWTON, S, CALDOW, R, PIEC, D, MORRISON, P, CADWALLENDER, T, DAVIES, W and BOLTON, M (2019) Metapopulation dynamics of roseate terns: Sources, sinks and implications for conservation management decisions. *Journal of Animal Ecology* **88**: 138-153

WHITTINGHAM, M J, MCKENZIE, A J, FRANCKSEN, R M, FEIGE, D, CADWALLENDER, T, GRAINGER, M, FAZAA, M, RHYMER, C, WILKINSON, C, LLOYD, P, SMURTHWAITE, B, PERCIVAL, S M, MORRIS-HALE, T, RAWCLIFFE, C, DEWSON, C, WOODS, S, STEWART, G B, and OUGHTON, E (2020). Offshore refuges support higher densities and show slower population declines of wintering Ruddy Turnstones *Arenaria interpres*. *Bird Study* DOI: 10.1080/00063657.2020.1713725

"With the contribution of the LIFE Programme of the European Union"

Long Nanny Burn

Beadnell Bay

This place changes with every tide;
Buries the wheels and springs of World War II machines,
Twisting them deeper under the tons of sandhills
Like an obscene dream inside.

Down where the river scoops low, wind smooths, time passes,
Mounding the dunes up, carving them through from the floodland.
The sky, swept cold blue, sprawls enormously wide here.
Winged skeletons litter the sand.

But week by year, the river is shifting its wash.
It wrestles the irresistible push. The sea,
Its rage contained, inhales; retreats, revealing
Sharp-edged scrap, mud-sunk. Hard memory.

I've watched this, life-long, longer than all life; fighting
River, struggling, tight as a muscle, months; then suddenly strong,
Forcing its straight path through overnight, slicing the sand clean.
Nothing buried lies safe here for long.

Katrina Porteous, *The Lost Music* (Bloodaxe Books, 1996)
www.bloodaxebooks.com

SHOREBIRDS AT THE LONG NANNY

Tom Henson, Elizabeth Hickson, Kate Jones, Sally Reay, Nicholas Thompson and Fey Young

National Trust, Low Newton-by-the-Sea, Northumberland NE66 3EL

INTRODUCTION

The Long Nanny shorebird site is a 7.5-hectare scenic stretch of the Northumberland coast, extending southwards from the Long Nanny estuary between the villages of Beadnell and Low Newton to the south. The site is designated as a Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC), Special Protection Area (SPA) and a wetland of international importance under the Ramsar Convention, making it internationally important for shorebirds. The site consists of a long section of sandy beach ending in a small, low lying sand spit at the mouth of the Long Nanny Burn, bordered by an accreting sand dune system to the west.

During May to August, the reserve is important for three species of ground nesting bird: Little Tern *Sternula albifrons*, Arctic Tern *Sterna paradisaea* and Ringed Plover *Charadrius hiaticula*. To maximise the productivity of these three species, in particular the nationally-endangered Little Tern, a constant ranger presence is maintained throughout the breeding season. Their role is to protect the colony from disturbance, predation and tidal inundation, whilst monitoring the population and productivity of the Schedule 1-listed Little Terns.

The National Trust began protecting the Long Nanny shorebird site in 1977 when there were only three pairs of breeding Little Terns. Numbers have increased each breeding season since then to a current total of 30 - 50 pairs, thanks to the critical protection work performed by the rangers. The Long Nanny is a nationally-important site for the Little Terns, Britain's second-rarest breeding seabird, with approximately 2% of the British breeding population. This small tern, which has bred at the Long Nanny since 1950, over-winters on the west coast of Africa and has been steadily declining at a rate of 1.5% per annum, primarily as a result of decreases in suitable nesting habitat (IUCN, 2019). Little Terns generally nest on the coast in shallow scrapes in the sand, either on spits or inshore islets. An increase in human *Homo sapiens* visitors to our beaches puts increasing pressure on vulnerable and fragmented populations of this bird, which are also under pressure whenever their main food item, the Lesser Sandeel *Ammodytes tobianus*, declines.

The protection of the Long Nanny for Little Terns has also contributed to the colonisation of the site by Arctic Terns, first recorded breeding there in 1980. Since then the colony has reached a peak of 2,443 pairs in 2014, making it the largest mainland breeding colony in the UK. Arctic Terns have one of the longest annual migrations of any bird and travel to the Antarctic and back each year. The Long Nanny colony is now an important component of the Northumberland Arctic Tern population, together with the Farne Islands and Coquet Island.

The Long Nanny site with its salt marsh and tidal flats also supports an important breeding population of Ringed Plovers, with 5 to 10 pairs nesting annually. Ringed Plover were red-listed in Britain in 2015 (Eaton *et al.*, 2015) after a 37% decline between 1984 and 2007 (Robinson *et al.*, 2015). Although currently classed as Least Concern on the IUCN Red List (IUCN, 2019) because of its national importance, the species is afforded protection by the rangers at the Long Nanny along with Little Terns and Arctic Terns.

MANAGEMENT AND MONITORING IN 2019

Site set-up

Site set-up started on 7 May with erection of perimeter ropes to prevent public access to the site. A permanent fence lined with chicken wire runs around the inland extremities of the site to keep out mammalian predators and dogs. The diversion footpath around the site during the breeding season follows this fence and emerges on the North side of the burn. Heavy rain and high tides this season washed away the original footpath off the beach at the north end, so a new path was made up the dunes to allow public access to the diversion. In addition to the rope line discouraging the public from crossing the site, a fence was erected around the Little Tern nesting area. This helped to mark the borders of the colony but also provided some protection from mammalian predators such as foxes, otters and badgers. Later in the season, some nests were found outside of this fence, this could be either relaying pairs, or new pairs from other sites.

Habitat management

Habitat maintenance continued from previous years, under licence from Natural England because of the SSSI designation. The tern garden, situated between the ranger hut and the beach (Figure 1), was strimmed to provide nesting grounds for Arctic Terns away from the high tide mark; this also provides a closer view of the birds for public enjoyment and for monitoring by the rangers. An area on the west side of the dunes closer to the saltmarsh was strimmed and 12 pairs of Little-Tern decoys placed there to attract Little Terns to a safer habitat for breeding well above the water line. However, as in previous years, this was unsuccessful and all Little Terns nested on the spit.

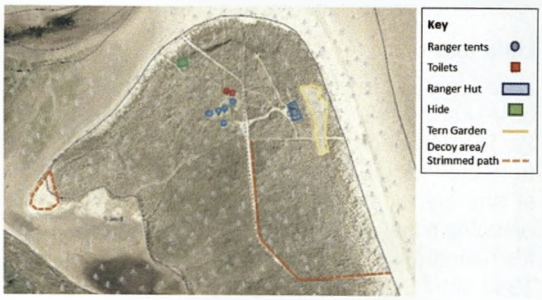

Figure 1. Location of ranger camp and facilities (tents, toilets, rangers hut), the tern garden, strimmed path and strimmed Little Tern decoy area inside electric fencing on the west of the dunes. Image: Google Earth; orientation: north (top)-south (bottom).

Monitoring

Routine monitoring was carried out from a distance as much as possible. Little Tern monitoring from 8 May to 8 August was mainly on a 24-hour basis, either from the hut platform, the remote hide (Figure 1) or the dunes above the burn using a telescope. Volunteers were present during the day from 10:00 to 17:00, and recorded visitor numbers and disturbance to the colony. Disturbance caused by rangers to nesting birds was reduced as much as possible and, for Little Terns, entry to the colony was limited to 20 minutes with no re-entry permitted within an hour. Feeding surveys with Little Tern chicks were conducted every other day for one hour from the remote hide or from the sand dunes on the north of the burn using a telescope once the first chicks had hatched. The ranger identified one nest to watch for the duration and recorded all feeding attempts. The time of the feed, prey species, outcome of feed (eaten by chick/adult) and, if possible, which chick received the item was recorded, along with environmental variables. Negative data (absence of feeding) were also recorded. Feeding surveys were rotated across ranger shifts to avoid timing bias. Nests were marked with rocks painted white with a black number and placed to the west side of the nest at a one metre distance from the incubating adult; standardising the rock placement ensured nests could be identified accurately by all rangers. If rangers entered the colony, data were also collected to supplement the remote nest-history observations.

Arctic Terns at the Long Nanny are monitored less intensively than the Little Terns. The Apparently occupied nest (AON) count was done using the same method as in previous years: observers stood in a line, roughly two metres apart, and walked through the site, from the south shoreline and to the south west of the spit. Each observer counted each AON on their transect line, recording the number of eggs in each scrape and placing dried pasta pieces in the nests as a 'counted' marker. Empty scrapes were only recorded as active nests containing zero eggs if there were signs of nest usage such as footprints.

Monitoring Ringed Plover nests involved rangers walking through areas of the site daily searching for active nests using adult behaviour such as 'broken-wing' displays as a cue; less accessible parts of the site were walked through less frequently on an ad-hoc basis. Nests were monitored from a distance using a scope when rangers were not able to enter the colony. Data such as clutch size and hatchling updates were collected from nests on the spit or amongst the Arctic Terns whenever it was necessary to enter the areas. Nests around the saltmarsh were monitored daily as no other species were breeding in the area.

Species protection

In anticipation of high tides on 5 June, Little Tern nests on the spit were raised onto fish boxes in two 20-minute sessions an hour apart. Recycled fish boxes were packed with marram grass to cover the corners and vents and placed with the shortest sides facing the sea. Sand was packed into the boxes, dry sand sprinkled on top, and a depression made to replicate the scrape together with any identifying features surrounding the original nest. Eggs were carefully lifted onto the replicated nest. Nests that were later laid outside of the protective fence were more prone to tidal flooding. The eggs in these nests were rescued during a July spring tide, put into labelled egg boxes with cotton wool for protection and transported to the hut to keep warm while the high tide passed. The eggs were then returned to their appropriate nests after 15 - 20 minutes or when the nest site was no longer under water. Ringed Plover nests were raised against tidal inundation by creating a mound from the material the nest was on, creating

a replica nest scrape at the top and returning the eggs to it. In the past this has been effective method with low levels of abandonment.

Due to the size of the colony, some Arctic Terns were not protected by the electric fence and nests were not raised onto boxes as protection from the tide. Otherwise, action was taken to deter Foxes *Vulpes vulpes* during the night, deflect dogs and humans, and scare off any Carrion Crows *Corvus corone* and Black-headed Gulls *Chroicocephalus ridibundus* that entered the colony. During the night a thermal scope was used to locate and identify mammalian predators which were then lamped and driven off site as necessary by rangers. Radios were also experimented with to provide a secondary level of protection. They were placed on the north rope line and rangers would call or speak into the walkie-talkie to deter the Fox.

Active Ringed Plover nests were protected against predators by caging with a dome-shaped wire cage placed over the nest and pinned to the ground. Decoy cages were placed approximately 5 m away to reduce the risk of predators associating cages with the presence of nests. This method (Gulickx & Kemp 2007) works well for Ringed Plovers as the gaps in the cage are large enough to allow them through but are too small for avian predators such as crows and gulls. Chick shelters, positioned so that chick activity could be observed from the hut or dunes, were provided as cover and protection of Little Tern chicks from predation and weather.

Disturbance monitoring

Site rangers continuously monitored disturbance as indicated by terns (either Arctic or Little, or both) 'dreading' over or away from the site. Occasionally the rangers could anticipate a disturbance and act accordingly to prevent it. Disturbance events were categorised as 'low', 'medium' or 'high' as in Table 1.

Effect on colony	Disturbance level recorded
>80% of colony lifted	High disturbance
20-80% of colony lifted	Medium disturbance
<20% of colony lifted	Low disturbance

Table 1: Definitions of disturbance levels.

Small disturbance events of unknown cause limited to <5% of the colony or which lasted less than 15 seconds were not recorded. However, such disturbance events in which a predator was involved were recorded as 'low'.

Staffing

Five assistant rangers staffed the site on a 24-hour basis in eight-hour shifts. An extra ranger was deployed over the weekend to work a daytime six-hour shift to aid in visitor engagement. In addition, a volunteer was present on a daily basis between the hours of 10:00 and 17:00 BST. The presence of volunteers on site provided excellent public engagement and allowed the rangers to focus on maintenance of fencing and signage, and essential monitoring of Little Terns and Ringed Plovers. Shift patterns were scheduled to end on 31 July but were revised and extended until 9 August because Little Tern chicks were still present on the spit.

SPECIES ACCOUNTS

Little Tern

Little Terns were first recorded on site at the beginning of May and were monitored until early August (Table 2). The total number of breeding pairs was estimated from the maximum number of active nests recorded at any one time, and indicated a minimum of 34 breeding pairs at the Long Nanny. Pair numbers have fluctuated over the years, with numbers peaking in 1994 at 57 pairs (Figure 2).

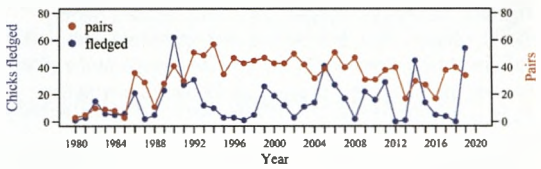

Figure 2. The number of Little Tern breeding pairs and chicks fledged each year at the Long Nanny since 1980.

Throughout the breeding season, counts of Little Tern adults on site were made each Monday between 11:00 -11:30 am and coordinated with similar counts of Little Terns at Lindisfarne National Nature Reserve. These 'snapshot' counts help to give a better idea of the relative numbers of Little Terns breeding at the two main Northumberland colonies. At the Long Nanny, the counts gave a good reflection of the estimated number of breeding pairs, showing a smooth increase to a peak in early June (Figure 3). The greater variability of the Lindisfarne counts may reflect differences in foraging areas between colonies, perhaps with more birds likely to be foraging in the immediate vicinity of the colony during counts at Lindisfarne compared to the Long Nanny.

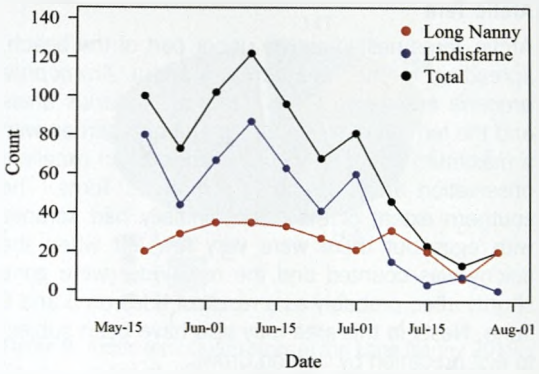

Figure 3: Coordinated Peak counts of Little Tern adults at the Long Nanny and Lindisfarne National Nature Reserve every Monday from mid-May to end of July 2019.

Little Terns at the Long Nanny had a mean clutch size over all nesting attempts of 2.09 and a maximum of three eggs (Figure 4).

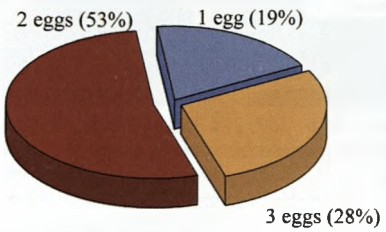

Figure 4. Little Tern clutch sizes in 2019 at the Long Nanny

The majority (56%) of Little Tern eggs hatched successfully (Figure 5). Eggs lost to flooding were in late nests outside the fenced area of the colony. These were not raised onto boxes because the disturbance may have caused other adults to abandon nests or chicks. This was the case with 13% of the nests: two were abandoned early in the season and two were abandoned after the first wave of boxing on 5 June. During the season, 34 nests were raised onto fish boxes and the return rate of adults to the nests after boxing was 86%. With respect to nests outside the fenced area, four (two numbered and two unmarked) were rescued by taking the eggs to safety for a short period at the height of the tide on 5 July. The return rate to these nests afterwards was 100%. Over the high tide the following day, two of the marked nests were rescued successfully, but three were washed out. However, eggs from one of these nests were recovered, returned to the scrape with dry sand and they hatched successfully on 13 July.

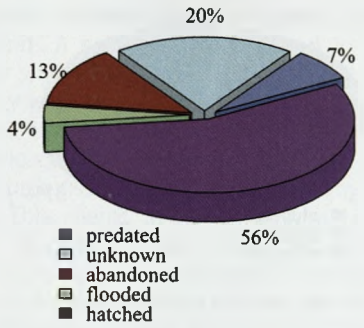

Figure 5. Outcomes of Little Tern nests in 2019.

There were fewer instances of predation this year compared to previous seasons, and no evidence of activity by Stoats *Mustela erminea* or Weasels *Mustela nivalis*. There was only one occasion when Little Tern nests appeared to have been predated: eggs in two unmarked nests and a chick at one of the marked nests were missing when checked and there were Fox tracks around the nests. This event coincided with the high tide on 6 July, resulting in five nests lost that night. The Fox was deterred using a nightscope the following night.

Although a Peregrine *Falco peregrinus* was seen on site during the season, it was only seen to take Arctic Terns. Carrion Crows were seen alongside the Long Nanny Burn, but they mainly fed on dead Arctic Tern adults or abandoned eggs. The Little Terns appeared to benefit from the mobbing activity by Arctic Terns towards predators throughout the season. However, towards the end of the season Little Terns did mob predators, and this may have been a result of most of the Arctic Terns leaving the site.

Event	Little Tern	Arctic Tern
First sighting	1 May	1 May
First scraping	16 May	7 May
First observed mating	19 May	7 May
First eggs	20 May	14 May
First chicks recorded	7 June	7 June
First fledging	2 July	30 June
Monitoring ended	8 August	8 August

Table 2. Key dates in 2019 for Little Terns and Arctic Terns.

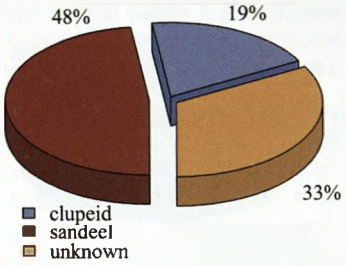

Figure 6. Little Tern diet from feeding surveys.

Sandeels formed the greatest proportion of diet fed to the Little Tern chicks (Figure 6) but a third of food items could not be identified because of observation distance, the rapidity of food transfer or heat haze. Clupeids such as Sprats *Sprattus sprattus* formed the remainder of the diet fed to chicks.

Regular fledgling counts were started when the earliest hatching chicks were around two weeks old. The maximum count was on the morning of 18 July with 29 fledged Little Terns. The total fledgling count for the season and site as a whole was based on a combination of data for nest histories, observations and hourly counts. This was thought to be accurate because of good visibility of the colony from the viewing platform and hide, accurate counts of chicks from nests on the spit and the absence of substantial predation. The final tally of 54 successfully-fledged chicks from 34 pairs was determined at an end date of 8 August and was the highest number of fledglings since 1990 (Figure 2).

	Little Tern	Arctic Tern	Ringed Plover
Minimum Pairs	34	1467	6
Nesting Attempts			12
Eggs		2953	45
Mean Clutch Size	2.09	2.01	3.75
Chicks hatched			25
Chicks lost		1291	3
Fledglings	54	400	9
Productivity	1.59	0.27*	1.5

Table 3: Breeding statistics for Little Tern, Arctic Tern and Ringed Plover at the Long Nanny in 2019. *Based on AON count before deaths of adults occurred.

Arctic Tern

Arctic Terns nested on the upper part of the beach, spreading to the less dense Marram *Ammophila arenaria* and Lyme Grass *Leymus arenarius* areas and the tern garden (Figure 7). The tern garden with a maximum count of 80 pairs provided an excellent observation area to monitor the Arctic Terns. The southern extent of the colony initially had scrapes with eggs but there were very few left when the colony was counted and the remainder were gone shortly after, probably as a result of tides on 5 and 6 June. Nests in this area may also have been subject to egg predation by Carrion Crows.

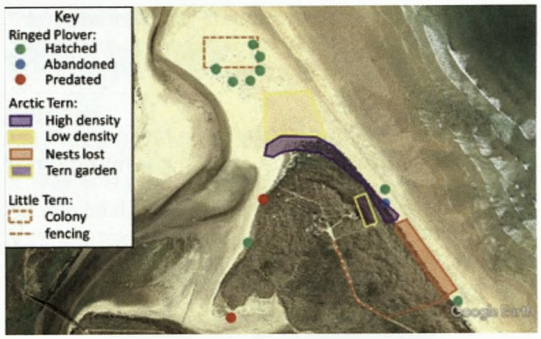

Figure 7. Arctic Tern and Ringed Plover nesting areas in relation to the Little Tern colony. Google Earth Satellite image.

The average number of pairs at the Long Nanny since 2000 is around 1500 (Figure 8). This season, a single full count of AON took place over 58 minutes with seven observers on 5 June in good weather, 21 days after the first egg was recorded. There was a minimum of 1467 pairs (total AON minus 114 AON with no eggs, the same method used in previous years; Figure 8). The total number of eggs was 2953, with clutch size ranging from 1 - 5 eggs (Figure 9), giving a mean clutch size of 2.01, the highest reported since 2013 (Figure 10).

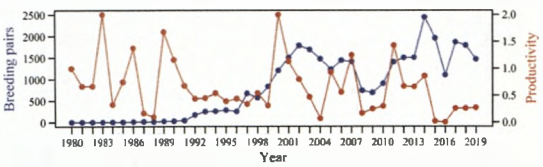

Figure 8. Arctic Tern pairs and productivity at the Long Nanny since 1980

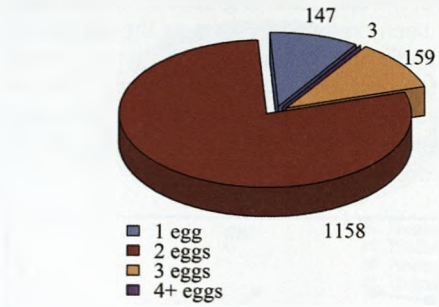

Figure 9. Arctic tern clutch sizes at the Long Nanny 2019. There were two clutches of four eggs and one with five.

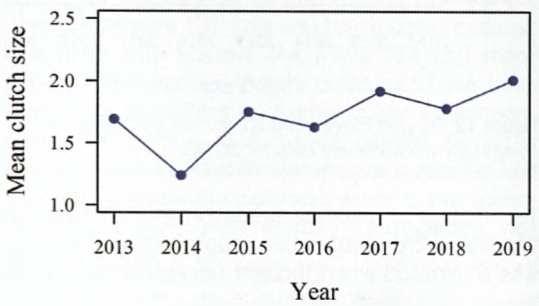

Figure 10: Annual variation in Arctic Tern clutch sizes at the Long Nanny since 2013.

No formal feeding surveys were carried out for Arctic Terns during the season, but from casual observations on up to 80 adults in the tern garden, sandeels *Ammodytes* species were the most frequent food items brought in; clupeids were also seen but less frequently. Fish sizes were consistent throughout the season and varied between 0.75x and 2x bill length, mainly around 1.5x bill length. Other minor components of the diet seen were snails, caterpillars and crustaceans. During the season, groups of birds were frequently seen fishing in Beadnell Bay.

Productivity estimates were based on counts of the maximum numbers of fledglings. This is a very approximate method with potential for a wide error because of the large size of the colony and availability of suitable observation points. The highest Arctic Tern fledgling count during July in the 2019 season was 400 fledglings and this was used for the productivity estimate (Table 3).

An unusual event this year was a high death rate of adult Arctic Terns with 921 adult Arctic Terns found dead on site over the course of the season. These deaths may have been due to avian botulism and rangers saw ill birds struggling to move or sitting unresponsive around the site, and some dying with wings spread out and bills pressed into the sand. A small number seemed to have died mid-air and fallen to the ground, whilst the vast majority were found with wings tucked in and lying on their side with green or yellow staining around their cloaca. The observations are consistent with the neuromuscular weakness caused by botulinum toxin. This seems to have mainly affected Arctic Terns, although a Kittiwake *Rissa tridactyla*, Herring Gull *Larus argentatus* and two Black-headed Gulls were found dead with no obvious signs of injury. A large proportion of dead or dying Arctic Terns, on the edges or further away from the colony, were eaten by Carrion Crows and although many dead Arctic Terns had signs of predation it was likely they had just been eaten after death or incapacitation caused by disease. This possible botulism may have also led to the death of 1291 Arctic Tern chicks, either directly from the effects of toxin or indirectly as a result of parental death. The AON count was made before the deaths of adult Arctic Terns started to occur, and as a consequence the productivity of surviving pairs will be underestimated.

Numerous staff and volunteers mentioned that the Arctic Terns were more aggressive in comparison to last year and were effective at mobbing predators and dive-bombing dogs and people who ventured too close to the colony. Black-headed Gulls and occasionally the Peregrine were effectively mobbed by Arctic Terns. This increased aggressiveness may have been a factor reducing the predation of adult Arctic Terns and chicks which appeared to be lower than previous years.

Avian predators seen on site this year were Carrion Crow, Lesser Black-backed Gull *Larus fuscus*, Black-headed Gull, Greater Black-backed Gull *Larus marinus*, Common Gull *Larus canus*, Herring Gull *Larus argentatus*, Jackdaw *Corvus monedula*, Osprey *Pandion haliaetus*, Kestrel *Falco tinnunculus*, Buzzard *Buteo buteo*, Peregrine Falcon, Grey Heron *Ardea cinerea*, Great Skua *Stercorarius skua* and Little Egret *Egretta garzetta*. The Peregrine caused the most deaths by predation in the colony as well as having a huge disturbance impact. On a few occasions Arctic Terns mobbed and chased the Peregrine away, but in five of 14 visits it killed an adult Arctic Tern. On 17 May, Arctic Terns were seen mobbing a Carrion Crow on site; the crow retaliated and attacked an Arctic Tern in flight which later died from its injuries. The heads and other remnants of Arctic Tern chicks were found around some of the bigger posts at the south end of the site; this is characteristic of owl feeding behaviour (Glue, 1967). A Barn Owl *Tyto alba* was seen on site during the season although no predation was actually witnessed.

With respect to mammalian predators, Brown Rats *Rattus norvegicus*, Stoats and Weasels were not seen

on site this year. Because rats were a problem in the previous season, the site was carefully checked and the traps set, but this year there was no evidence of their presence. However, Foxes were seen throughout the season in and around the site, and posed the most significant threat to the tern colony during the hours of darkness. A Fox den with possibly one adult and two cubs was present in the area. Foxes were only observed in the colony and to have likely taken Arctic Tern chicks and/or eggs once.

Ringed Plover

With the decline of British breeding birds, the Long Nanny is an important site hosting a regionally-significant population of 5 - 10 pairs. The first nests were found on 11 May and all active nests had hatched their eggs by 20 July. The mean clutch size at the Long Nanny was 3.75 this year (Table 3), with most nests containing four eggs. There were 12 known nesting attempts made by a minimum of six pairs of Ringed Plover; nest outcomes are summarised in Figure 11. Of nine successful nests, a maximum of 25 eggs successfully hatched. Nest success varied with location at the Long Nanny; all Ringed Plovers that nested on the spit amongst the tern colony hatched their eggs successfully and may have benefited from the extra protection provided by the terns. Nests at more peripheral locations around the site were less successful and half of these were either predated or abandoned (Figure 7).

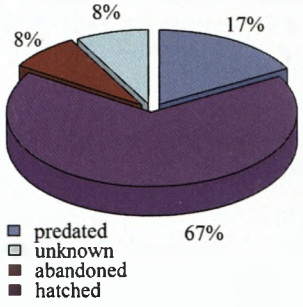

Figure 11. Nest outcomes of Ringed Plovers.

The mobility of young chicks makes it difficult to obtain accurate estimate of the number of fledglings. On 10 July, nine chicks were known to be successful fledglings and were almost adult-size birds with flight feathers. However, 25 chicks were known to have hatched and it is possible that more than nine may have made it to fledging age. No predation on Ringed Plover chicks was observed directly, but two nests may have been predated at the egg stage by an unknown predator on 15 May. A Fox was thought to have taken three chicks from the south shoreline on 6 July. In addition, chicks that were often seen on the edges of the spit, close to groups of loafing gulls, may have been predated by gulls as the number of chicks in these areas decreased with time. Overall, the minimum productivity this season was 1.5 chicks from 6 pairs (Table 3), the highest productivity since 2012 (Figure 12) and from the lowest number of pairs recorded at the site.

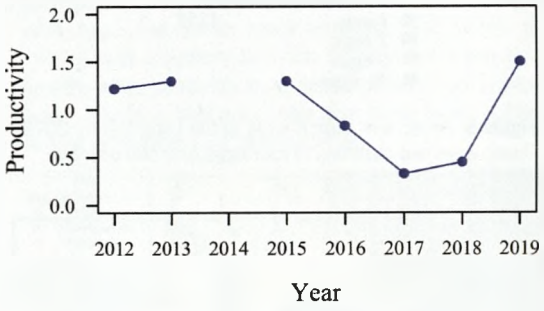

Figure 12. Ringed Plover productivity since 2012 at the Long Nanny. Insufficient data for 2014.

Techniques to minimise predation and nest loss to flooding were used when appropriate. Predation was minimised when thought necessary by caging; the return rate of adults to nests after caging was 100%. Two early nests underneath Marram Grass near the saltmarsh were not caged, but both nests were predated. Since then, all nests that were located were caged: one in front of the mobile hide beside the saltmarsh and three on the spit amongst the breeding terns. As protection against flooding, one nest close to the shoreline on the spit and at risk from high tides was raised. The adult returned to its raised nest immediately and continued to incubate; three of the four eggs later hatched successfully.

DISTURBANCE

The Long Nanny tern colony is on a large beach popular with both locals and tourists, and attracted 3037 visitors this year who came to experience the tern colony and engage with the work of the rangers and volunteers without disturbing the birds. The beach itself is popular for water sports, runners, dog walkers and walkers. This variety of human activities has the potential to impact the colony through the effects of disturbance, and this is monitored intensively to improve future management of the site. There were also incidents this year of low flying aircraft over the site. Disturbance may result in increased energy expenditure by breeding birds, higher levels of stress on the birds and an increase in the time eggs and chicks are left unattended by adults and exposed to predators.

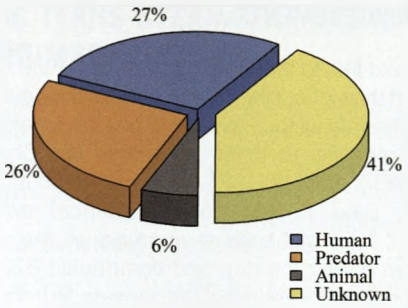

Figure 13. Causes of disturbance at the Long Nanny colony.

Causes of the majority of disturbance events were unknown (Figure 13). This is to be expected because it is difficult to observe the whole site and many apparent disturbance events could just have been a result of squabbles and other social interactions within the colony. Disturbance caused by other animals, such as Rabbits *Oryctolagus cuniculus* and a Pheasant *Phasianus colchicus* which chose a less-than-ideal place to nest next to the tern garden, was low at 6% (Figure 13).

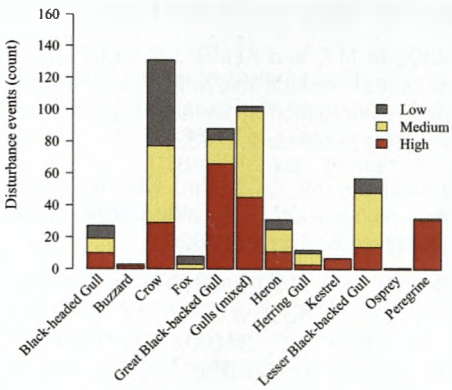

Figure 14. Disturbance caused by key predator species.

The Long Nanny is host to a large gull roost and their activities had a noticeable impact on the colony (Figure 14). Birds of prey tended to elicit a high level of disturbance that was all-or-nothing, so that although the number of incidents was low the effects of each incident were high. The greatest number of individual disturbance events were attributable to the crows, but many were low-level disturbance events. The ability of crows to move within or near the colony without immediately creating a fuss may have been a factor in their success at predation. There were also successful predation events by the Fox which usually accessed the spit via the north shore and caused only localised disturbance.

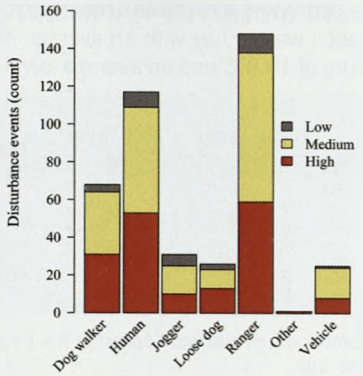

Figure 15. Disturbance caused by human activities.

Great effort was made to reduce disturbance caused by rangers, especially to the Little Terns. The rangers entered the Little Tern colony only 15 times this year for practical management, clutch counts and replacing batteries in the chick-feeding cameras; in contrast, last year rangers entered the colony on a daily basis, weather permitting, to collect accurate nest data. Nevertheless, rangers were still the source of most human disturbance to the colony as a whole (Figure 15), but rangers often had to enter the colony to discourage predators or intercept people and dogs about to enter the site. The most severe disturbances caused by other humans resulted from dog walkers with their dogs off-lead which, on rare occasions, encroached on the site. The majority of non-ranger human disturbances were due to the general public walking along the shoreline outside the boundary rope at different levels of tide. The boundary rope along the beach had to be placed close to the nesting birds because of the advancement of the dunes and the large shelf of the spit that had formed over the winter. Therefore, some disturbance caused by people legitimately walking along the beach, particularly at high tide, was unavoidable.

SEASON WEATHER SUMMARY

Over the three-month breeding period, there were no prolonged periods of heavy rain, strong winds or extreme heat (Table 4). Very low temperatures were recorded overnight in early May, reaching -1°C, but this was before terns had started laying. The most severe weather was experienced on 12 and 13 June, during the crucial hatching period, with rain and strong northerly and north-easterly winds. Fortunately, tides were low and the adverse weather conditions did not significantly affect the Little Terns or Arctic Terns. However, on 16 June, 115 Arctic Tern and four Little Tern chicks were found dead, which

may have been weather-related. The mildest weather of the season was in July with an average maximum temperature of 19.8°C and an average low of 12.9°C.

Averages	Max Temp °C	Min Temp °C	Wind (Beaufort Scale)
May	17.1	6.1	3
June	16.9	9.5	3.3
July	19.8	12.9	2.6

Table 4. Temperatures and wind speed at the Long Nanny from May to July.

RECOMMENDATIONS FOR FUTURE SEASONS

Monitoring Arctic Terns and Ringed Plovers can be difficult because of the large numbers of Arctic Terns and mobility of Ringed Plover chicks. To tackle these issues in the future it may be better to monitor a sample of Arctic Tern nests in representative areas as an estimate of fledging rates for the whole Arctic Tern colony, using methods in the JNCC seabird monitoring handbook (Walsh *et al.*, 1995). We would also recommend caging all Ringed Plover nests as soon as they are found because two nests that had not been caged were lost early in the season.

The 2019 season was unusual in respect of the large numbers of deaths of adult Arctic Terns that occurred on site as a result of suspected avian botulism. As this developed, it became clear that a greater awareness of how to respond was needed, particularly to protect staff and volunteers from any zoonoses or pathogens that might be involved, what public and animal health agencies should be informed and when, and how any animal carcasses should be disposed of or stored for appropriate diagnostic analyses. A revision of relevant risk assessments for the site is now a priority so that appropriate guidelines and personal protective equipment are in place to enable an effective response to similar events in the future.

A frequent problem was the number of people walking along the shoreline at low tide who are not close enough to read warning signs and may have their dogs off lead. Loose dogs cause considerable disturbance, especially to roosting birds on the beach and those nesting near the shoreline. A recommendation for next season would be to use signs with much larger writing, with a simple message such as 'Dogs on Leads', and additional temporary signs for dog owners at Beadnell car park to the north and at High Newton car park to the south.

ACKNOWLEDGMENTS

We would like to thank Kevin, Jane and Kate for their support throughout the season, and for their guidance, which has allowed us to work to our full potential. We would also like to thank volunteers Ian 'Chadders' Chadwick, Alan Goodall, Margaret Goodall, Sheila Marsh, Dave Rodger, John Rutherford and Alan Watson, who stationed themselves at the viewing platform during the day, and contributed 628 hours of their time in assisting the rangers in monitoring disturbance and engaging with the public. We would also like to thank Mike Hodgson and Ian Fisher for their specialist knowledge and skills which enabled us to carry out detailed monitoring of the site.

REFERENCES

EATON, M, AEBISCHER, N, BROWN, A, HEARN, R, LOCK, L, MUSGROVE, A, NOBLE, D, STROUD, D, AND GREGORY, R (2015). *Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man* British Birds **108**: 708-746.

GLUE, D E (1967). Prey taken by the Barn Owl in England and Wales, *Bird Study* **14**: 169-183.

GULICKX, M M C and KEMP, J B (2007). Provision of nest cages to reduce little ringed plover *Charadrius dubius* nest predation at Welney, Norfolk, England. *Conservation Evidence* **4**: 30-32.

IUCN (2019). The IUCN Red List of Threatened Species. Version 2019-3. **https://www.iucnredlist.org/; Accessed 21 February 2020**.

ROBINSON, R A, MARCHANT, J H, LEECH, D I, MASSIMINO, D, SULLIVAN, M J P, EGLINGTON, S M, BARIMORE, C, DADAM, D, DOWNIE, I S, HAMMOND, M J, HARRIS, S J, NOBLE, D G, WALKER, R H and BAILLIE, S R (2015). *BirdTrends 2015: trends in numbers, breeding success and survival for UK breeding birds.* Research Report 678. BTO, Thetford. **https://www.bto.org/our-science/publications/birdtrends/2015**.

WALSH, P M, HALLEY, D J, HARRIS, MP, DEL NEVO, A, SIM, I M W, and TASKER, M L (1995). *Seabird monitoring handbook for Britain and Ireland.* JNCC / RSPB / ITE / Seabird Group, Peterborough.

ARCTIC TERNS *STERNA PARADISAEA* AND SUSPECTED AVIAN BOTULISM IN NORTHUMBERLAND

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INTRODUCTION

Animals as reservoirs of diseases that can infect humans are well known, from viruses such as rabies in bats to bacterial diseases carried by rodents and other animals. This includes birds too, which can be infected by and transmit influenza virus strains with the potential for transfer to humans (Beigel *et al.*, 2005). Birds and other wildlife can also be susceptible to bacterial toxins that are a problem to humans. Botulism, a disease caused by toxins from *Clostridium* bacteria growing under anaerobic conditions in stagnant water, can be a particular problem for ducks and other waterbirds (Wobeser 1997).

In 2016, there was large-scale mortality of over 800 Arctic Terns *Sterna paradisaea* breeding in the Irish Sea on the Skerries near the coast of North Wales (Holmes *et al.*, 2018). This was thought to be a result of avian botulism on the basis of clinical signs in the affected birds and the finding of botulinum toxin Type C in a few samples (Holmes *et al.*, 2018). Although botulism can be common in waterbirds, the occurrence of this disease in Arctic Terns which feed in marine environments not often associated with problems of stagnant water is relatively unusual.

SUSPECTED BOTULISM IN ARCTIC TERNS IN NORTHUMBERLAND

Arctic Tern deaths in 2019

In late May to early June 2019, National Trust rangers at the Long Nanny began to encounter dead and dying Arctic Terns within and around the Arctic Tern breeding colony. During the season, 921 adult Arctic Terns were found dead, representing 31% of the estimated population of breeding birds (Figure 1).

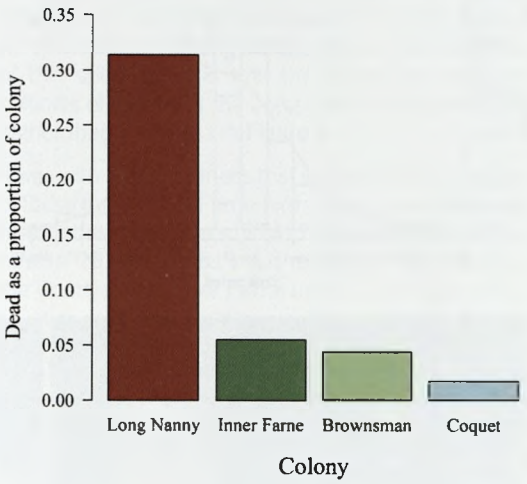

Figure 1. Arctic Tern deaths at the Long Nanny, Farnes (Inner Farne and Brownsman) and Coquet Island during the 2019 breeding season as a proportion of colony size (number of individuals).

The change in frequency at which deaths occurred can be described by a normal distribution with respect to the probability of death over the season, and reached a peak at the end of June (Figure 2). During the season, 1291 Arctic Tern chicks were also found dead at the Long Nanny, which may have been due to disease directly or indirectly from loss of parents, in addition to normal seasonal factors such as weather. Other species do not seem to have been involved to anything like the same extent as Arctic Terns, and none of the 68 adult Little Terns (34 active pairs) breeding at the Long Nanny were apparently affected.

Dead Arctic Terns were also picked up in other Northumberland colonies. On Inner Farne, with a breeding population of 1070 pairs of Arctic Terns in 2019, 118 terns were picked up dead and dying (Rebekah Goodwill, Personal communication). Fewer were found dead on Brownsman, and on Coquet Island, an important tern colony 30 km

further south hosting 1155 pairs of Arctic Terns in 2019, around 40 Arctic Terns were found dead. Because these colonies are well monitored from the perspective of gaining accurate yearly colony counts and productivity, we can estimate a minimum proportion of adult birds breeding at these colonies that have succumbed, and this shows that the death rate was considerably higher at the Long Nanny than any of the other colonies, with around one-third of the potentially-breeding adult birds found dead (Figure 1).

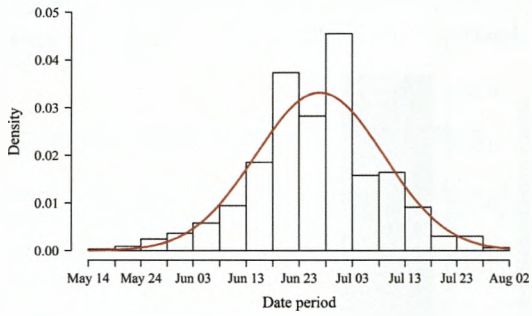

Figure 2. Frequency histogram of birds seen dying and subsequently collected by rangers at the Long Nanny Arctic Tern colony during the 2019 breeding season. The red line is a normal (Gaussian) frequency distribution (mean 26 June) fitted to the data for numbers by date in 5-day intervals. Data collected by National Trust rangers Tom Henson, Elizabeth Hickson, Kate Jones, Sally Reay, Nicholas Thompson and Fey Young.

Causes of death

Rangers at the Long Nanny observed ill birds struggling to move or sitting unresponsive, with some dying with wings spread out and bills pressed into the sand. Most were found with wings tucked in and lying on their side with green or yellow staining around their cloaca. As the mortality developed, appropriate disposal of carcasses to prevent possible spread of disease to other wildlife and to ensure the safety of rangers became a significant problem. Burial was initially used but became impractical and as the number of dead birds accumulated the carcasses were taken to a local veterinary practice in sealed containers for incineration.

The National Trust rangers involved the Animal and Plant Health Agency (APHA), a UK Government agency of the Department for Environment, Food and Rural Affairs (DEFRA), to identify the causes of death. From the APHA reports, post-mortem analyses of dead Arctic Terns suggested that body condition in most was fair, but stomachs were generally empty of food. Tests for avian influenza virus were fortunately negative, but some birds appeared to have bacterial infection. Overall, clinical signs in the field and post mortem analyses were all consistent with avian botulism (Pennycott, 2016; Duff and APHA Wildlife Expert Group 2017). Botulinum toxin was not detected directly, but current tests are not sufficiently sensitive (Duff and APHA Wildlife Expert Group 2017) and the development of new methods is the subject of current research (Le Maréchal et al., 2017). The APHA reports also indicated a similarity between the events at the Long Nanny and the Arctic Tern mortality on the Skerries in the Irish Sea in 2016 (Holmes *et al.*, 2018), and suggested that this could be a type of disease new to the UK.

If botulism was the cause, or part of the cause, the source of toxin is not known. During the previous winter and early spring, changes in the course of the Long Nanny Burn coupled with marine and tidal effects formed a bund across the burn outflow, leaving pools of standing water. Tests by the Environment Agency on 28 June on behalf of the National Trust found no evidence of pollution in the burn itself but pools were anaerobic, conditions that could allow *Clostridium* bacteria to grow. However, the known mortality was almost exclusively confined to Arctic Terns and it is not easy to understand how this could be linked to changes in outflow from the Long Nanny Burn and not affect Little Terns to some extent.

Origins and colony connectivity

Many of the Arctic Terns found dead at the Long Nanny and other Northumberland colonies this year had been ringed as a result of long-term ringing programs that have taken place on the Farne Islands, Coquet Island and the Long Nanny over many decades to study their movements and as part of productivity studies. Ringing also allows the natal origin of many of the birds to be determined. The 27 ringed birds found dead on Inner Farne were from the Farnes or Coquet Island, except for one from the Isle of May (Figure 3). For birds found at the Long Nanny, most had been ringed as chicks at the Long Nanny or elsewhere in Northumberland, but two had been ringed as chicks on the Skerries in the Irish Sea off North Wales, one on the Isle of May and one at Loch Borralie, Highland (both as chicks), and one had been ringed as a juvenile on the Ythan Esturary near Aberdeen (Figure 3).

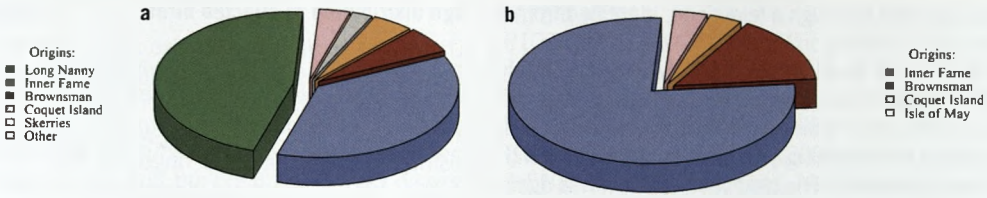

Figure 3. 3D pie diagrams illustrating the origins of birds found dead at the Long Nanny (a) and Inner Farne (b).

While it is possible that most of the birds found dead at the Long Nanny which had been ringed elsewhere were, at some time in the past, first-time breeder recruits to the Long Nanny colony (examples of natal dispersal from colony of hatching to some other colony to breed), this is not necessarily the case for all birds. Nine of the Farne Island birds found at the Long Nanny were ringed as breeding adults on Inner Farne and we have some more detail on the histories of a few birds. Six have not been retrapped since being ringed, but three have and were all nesting subsequently on Inner Farne. Breeding dispersal, where birds that have bred in one colony one year move to breed in another colony in a subsequent year, is less frequent than natal dispersal. These birds, then, are more likely to have been Farnes breeders in 2019 that have died at the Long Nanny while visiting or taking refuge there. The corollary of this speculation is that the impact on adjacent colonies of deaths at the Long Nanny may be slightly higher than indicated in Figure 1.

It was with much sadness that we discovered that one of these three Inner Farne birds had a more extensive history than the others. ST41774 was ringed on the nest in 2014 and has been retrapped every year in the Courtyard of Inner Farne until 2018 (Figure 4).

Figure 4. ST41774 on Inner Farne in 2017, soon after attachment of a geolocator (top left), back on the island in 2018 (top right) and with its new mate in 2018 (bottom).

It was last seen (through a telescope, identified from a colour ring) roosting on Inner Farne on 15 May 2019, but was found dead at the Long Nanny on 2 July 2019. In 2015 it was trapped on the nest and tagged with a geolocator mounted on a plastic leg-ring, G58; it returned the following year and its geolocator with data was recovered. The next year, 2017, it was again retrapped and fitted with a new geolocator, now with number G84. A few days later, its mate was also trapped and fitted with a geolocator; the pair went on to breed successfully. ST41774 came back to Inner Farne the following year, but divorced its previous mate and went on to breed successfully with a new mate (which happened to be a different geolocator-tagged bird from 2017). ST41774's mate from 2017 also bred successfully in 2018 with its new partner. ST41774, then, has given us two full datasets of its annual migration. It spent both wintering periods in the same region of Antarctica along the Pennell/Oates/George V/Adelie coasts of East Antarctica (Figure 5) which it reached via New Zealand waters after crossing the entire span of the southern Indian Ocean.

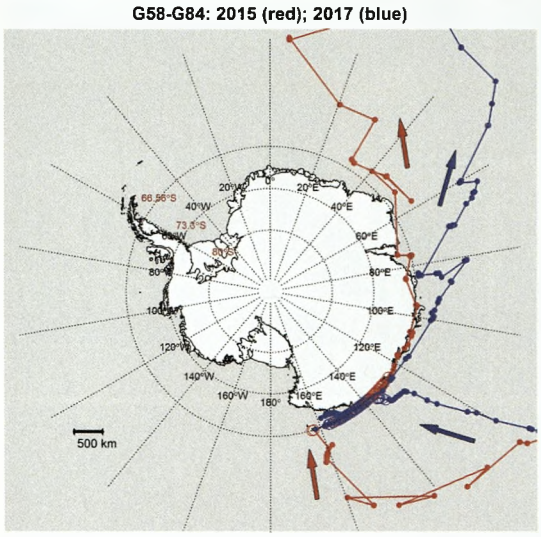

Figure 5. Antarctic wintering area of ST41774: tagged G58 with a geolocator in 2015, recovered the following year, retagged G84 with a geolocator in 2017 and retrapped again in 2018. Polar stereographic projection. Filled circles are latitude and longitude geolocations, open circles are longitudes determined while the bird was in 24-h daylight (Redfern and Bevan 2020). Arrows mark the directions of arrival and departure from Antarctica in each year.

Age distribution of affected birds

The ringed birds that died also allow us to examine age distributions of the casualties. For the sample overall, the age of recovered ringed birds ranged from 2 to 27 years, but there were very similar age distributions for the birds ringed on the Farnes or Coquet Island, and those ringed mainly at the Long Nanny and elsewhere (Figure 6a). On the Farne Islands, breeding adults have been nest-trapped and ringed/retrapped for nearly two decades, and we can compare the age distributions of birds found dead in 2019 with the age-distributions of healthy birds breeding on Inner Farne. For breeding birds retrapped in the Inner Farne Courtyard in 2018 and 2019 (to avoid year bias and a possible deficit of age classes due to death in 2019), the age distribution was broadly similar to the birds that died (Figure 6b). These data suggest that the cause of Arctic Tern death in 2019 was indiscriminate with respect to age.

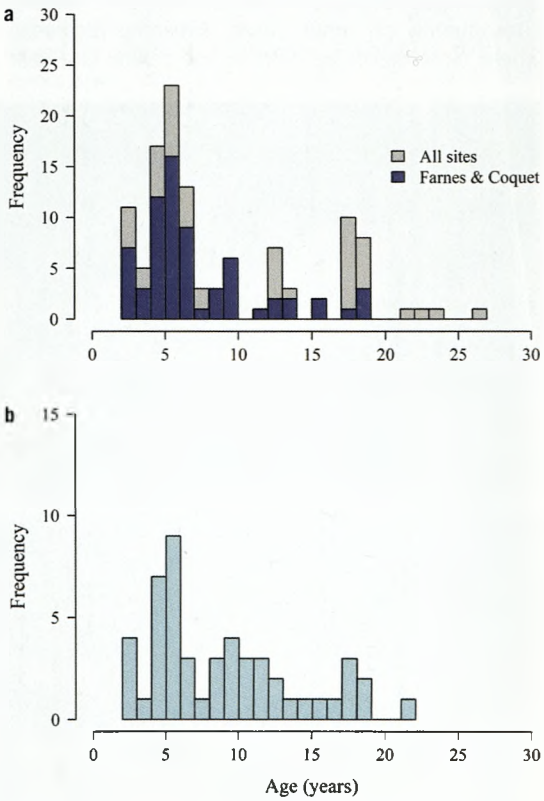

Figure 6. Age distributions of adult Arctic Terns found dead in 2019 (a), and retrapped as breeding adults on Inner Farne in 2018 and 2019.

SUMMARY

Sandeel availability to terns breeding in Northumberland has been relatively stable in past decades, but the consequences of climate change for their overwintering survival in the Antarctic (Redfern and Bevan 2020) and the possibility of new disease processes in their breeding colonies are new causes of concern for the security of Arctic Tern populations here. Botulism has not been definitively confirmed as the main cause of death during the 2019 season, but this seems likely, and has possible implications for reserve management with respect to local hydrology, if speculation about the source of such disease is correct. The fact that the mortality was centred on the Long Nanny implies a link between the reserve and the disease process that led to Arctic Tern mortality, but we do not understand why Little Terns were not affected to a similar extent, unless difference in diet was a key factor. The involvement of Arctic Terns from other Northumberland colonies emphasises the connectivity between these colonies. This connectivity has been revealed as a result of ringing over many years, and which has also allowed us to show that mortality was age-independent. These are powerful arguments for maintaining structured ringing programmes wherever possible, as this contributes to our understanding of colony dynamics at a local scale.

ACKNOWLEDGEMENTS

We thank the Long Nanny rangers Tom Henson, Elizabeth Hickson, Kate Jones, Sally Reay, Nicholas Thompson and Fey Young for their observations and work during the year in collecting data on the dead and dying Arctic Terns. CR would also like to thank the Natural History Society of Northumbria (NHSN) for providing the rings used on Arctic Terns on the Farnes and Coquet Island, the NHSN members and the Seabird Group who generously funded purchase of geolocators using in 2017, and BBC Springwatch and Migrate Technology for funding geolocators used in 2015.

REFERENCES

BEIGEL, J H, FARRAR, J, HAN, A M, HAYDEN, F G, HYER, R, DE JONG, M D, LOCHINDARAT, S, TIEN, N T K, HIEN, N T, HIEN, T T, NICOLL, A, TOUCH, S, and YUEN, K Y (2005). Avian influenza A (H5N1) infection in humans. *New England Journal of Medicine* 353: 1374–1385. **https://doi.org/10.1056/NEJMra052211**

DUFF, P and APHA Wildlife Expert Group (2017) Recognising clinical avian botulism in wild waterbirds. *Veterinary Record* 181, 15.

HOLMES, P, BOOTH, V and SIMS, I (2018). Investigation of mass mortality in Arctic Terns (Sterna paradisaea) at a breeding colony in Wales. *European Wildlife Disease Association, 13th Conference, Larrisa, Greece.*

REDFERN, C P F and BEVAN, R M (2020). Use of sea ice by arctic terns *Sterna paradisaea* in Antarctica and impacts of climate change. *Journal of Avian Biology*, e02318 doi:10.1111/jav.02318

WOBESER, G A (1997). *Diseases of wild waterfowl.* Plenum Press, New York.

PENNYCOTT, T (2016). Seabirds. Images of pathology (miscellaneous diseases 1). **https://datashare.is.ed.ac.uk/handle/10283/2199; accessed 20 February 2020.**

LE MARÉCHAL, C, ROUXEL, S, BALLAN, V, HOUARD, E, POEZEVARA, T, BAYON-AUBOYER, M H, SOUILLARD, R, MORVAN, H, BAUDOUARD, M A, WOUDSTRA, C, MAZUET, C, LE BOUQUIN, S, FACH, P, POPOFF, M, and CHEMALY, M (2017). Development and validation of a new reliable method for the diagnosis of avian botulism. *PLoS ONE, 12*(1), e0169640. **https://doi.org/10.1371/journal.pone.0169640**

BIRDS OF THE FARNE ISLANDS

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BREEDING BIRD OVERVIEW

Twenty-three species nested on the islands this year, some of which faced severe challenges in the form of extreme weather and disease, alongside the typical trials of predation, food provisioning and habitat degradation. Light winds and mild temperatures contributed to great success for key cliff nesting species. Kittiwakes *Rissa tridactyla* were big winners, with a 39% increase from the disastrous numbers last season. It was the second-best year for breeding pairs since 2007, and the highest productivity since 2015. In contrast, recovery for Shags *Phalacrocorax aristotelis*, the other key loser of 2018, was minimal with an increase of only nine pairs. Though clearly welcome, this still represents the second worst year since 1979, and below-average productivity is cause for concern. However, it was a fantastic year for Guillemots *Uria aalge* and the 64,042 individuals counted was the highest total since regular counting started in 1972.

The Arctic Terns *Sterna paradisaea* suffered this season, with an outbreak of suspected avian botulism at the neighbouring Long Nanny colony affecting the islands with around 150 dead adults found across Inner Farne and Brownsman. These deaths will have contributed to the lowest number of breeding pairs since 2002 and an 18% decrease from last year. Exceptionally heavy rainfall in June also resulted in the deaths of small chicks. Despite such challenges, productivity was stable and similar to the previous season, but still below the five-year average. Although numbers of Sandwich *Thalasseus sandvicensis* and Common Terns *Sterna hirundo* decreased by just 7 and 2 pairs, respectively, it was still the worst season in 70 years for Sandwich Terns and in over 40 years for Common Terns. The increase of Sandwich Terns on nearby Coquet Island makes it important to understand why the Farnes are becoming less attractive for such ground-nesting species.

The redesigned Puffin *Fratercula arctica* census was carried out for the second year running, and the breeding population estimate was just 203 breeding pairs less than last year, well within the margin of error for this type of census. However, the census showed that the increase in breeding pairs on the Inner Group and decrease on the Outer Group has continued from the previous season. Despite the overall relative stability, heavy rain in June flooded many burrows, particularly on Brownsman, and resulted in low productivity. Breeding Eiders *Somateria mollissima* were lower by 1% on last year with 472 nesting females across the islands; productivity was the lowest since 2012, so stability for this amber-listed species cannot be taken for granted. Razorbills *Alca torda* decreased by 3%, with 427 breeding pairs representing the lowest since 2012. In contrast, it was a successful year for ground-nesting gulls, with all four species increasing in number. Black-headed Gulls *Chroicocephalus ridibundus* and Lesser Black-backed Gulls *Larus fuscus* were the main winners, with population increases of 13% and 11%, respectively.

Fulmars *Fulmarus glacialis* experienced a worrying decline, with 186 pairs logged across the islands and a drop of 25%. This is only the second time since 2005 that numbers have fallen below 200 pairs. Cormorants *Phalacrocorax carbo* are perhaps of greater concern: having abandoned North Wamses in 2017, only 67 pairs nested this season, the lowest total since 1961. Ringed Plovers *Charadrius hiaticula* also dropped to just a single nest, and Oystercatchers *Haematopus ostralegus* fell by five pairs. In terms of rarer species, Canada Goose *Branta canadensis* failed to breed this season, though Red-breasted Merganser *Mergus serrato* and Carrion Crow *Corvus corone* both nested once again. This season, only eight and five cliff counts were carried out on the Inner and Outer Groups, respectively; heavy swell prevented the maximum number of ten surveys being achieved, but at least the weather enabled counts of all islands to take place.

BIRD MIGRATION OVERVIEW

It was a disappointing season for migratory birds with only 145 species recorded around the islands, although some rare visitors and long-absent scarcities provided welcome highlights. A quiet spring offered such surprises as Bullfinch *Pyrrhula pyrrhula* (first since 2010), Hooded Crow *Corvus cornix* (first since 2013) and the thirteenth record of Hoopoe *Upupa epops*, alongside more reliable species such as Bluethroat *Luscinia svecica*. Autumn got off to surreal start with the second Red Kite *Milvus milvus* for the islands in August. A pair of Ravens *Corvus corax* graced the Inner Group for the second year running,

Species	Productivity Inner Group	Productivity Outer Group	Productivity All islands 2018	Productivity All islands 2019	5-year mean
Arctic Tern	0.45	0.18	0.35	0.35	0.4
Eider	2.04	2.14	2.45	2.1	2.48
Shag	0.74	1.67	1.45	0.91	1.47
Kittiwake	0.79	0.68	0.67	0.74	0.71
Fulmar	0.58	-	0.52	0.58	0.52
Razorbill	0.58	0.5	0.51	0.53	0.54
Puffin	0.6	0.26	0.74	0.44	0.67

Table 1: Productivity for key seabird species on the Farne Islands in 2019. Decreased productivity compared to 2018 is highlighted using red text, increases or no change in blue.

Species	2019	2018	% change
Mallard	12	12	0
Eider	472	477	-1
Red-breasted Merganser	1	1	0
Fulmar	186	248	-25
Cormorant	67	83	-19
Shag	484	476	+ 2
Oystercatcher	18	23	-22
Ringed Plover	1	3	-67
Black-headed Gull	544	483	+13
Lesser Black-backed Gull	681	576	+11
Herring Gull	748	743	+1
Great Black-backed Gull	20	18	+11
Kittiwake	4402	3157	+39
Sandwich Tern	417	424	-2
Common Tern	65	67	-3
Arctic Tern	1416	1735	-18
Guillemot	64,042	49,970	+28
Razorbill	427	440	-3
Puffin	43,752	43,955	-0.5
Carrion Crow	1	1	0
Barn Swallow	6	6	0
Pied Wagtail	5	7	-14
Rock Pipit	11	9	+22

Table 2: Total counts of breeding pairs in 2019, except for Guillemots which are given as individuals. Declines compared to 2018 are in red, increases or no change in blue.

a Shore Lark *Eremophila alpestris* (first since 2013) lingered on Brownsman, whilst Olive-backed Pipit *Anthus hodgsoni* and Little Bunting *Emberiza pusilla* provided an overdue Siberian influence in early November. The thrilling appearance of the first Ivory Gull *Pagophila eburnea* for the islands in December was the unequivocal 'bird of the year'.

In order of rarity status, the highlights of this season were Ivory Gull (potential first record), Red Kite (second record), Raven (seventh record), Olive-backed Pipit (tenth record), Hoopoe (thirteenth record), Bullfinch (twenty-second record), Treecreeper (twenty-third and twenty-fourth record) and Dark-bellied Brent Goose (twenty-fifth record). The only notable high counts this season involved the second-largest day counts for Whooper Swan *Cygnus cygnus* in April, and the joint fifth-highest count for Song Thrush *Turdus philomelos* in October.

Additional highlights were (number of individuals in brackets): Mute Swan *Cygnus olor*, Storm Petrel *Hydrobates pelagicus* (5), Balearic Shearwater *Puffinus mauretanicus*, Water Rail *Rallus aquaticus* (3), Sparrowhawk *Accipiter nisus* (3), Little Stint *Calidris minuta* (3), Wood Sandpiper *Tringa glareola*, Green Sandpiper *Tringa ochropus*, Iceland Gull *Larus glaucoides* (2), Black Tern *Chlidonias niger*, Collared Dove *Streptopelia decaocto*, Woodpigeon *Columba palumbus*, Cuckoo *Cuculus canorus* (2), Short-eared Owl *Asio flammeus* (6), Hooded Crow *Corvus cornix*, Yellow-browed Warbler *Phylloscopus inornatus*, Ring Ouzel *Turdus torquatus* (4), Pied Flycatcher *Ficedula hypoleuca* (7), Stonechat *Saxicola rubicola* (4), Yellow Wagtail *Motacilla flava* (4), Common Redpoll *Acanthis flammea* and Greenfinch *Chloris chloris* (4).

A poor seawatching season contributed to the depleted year list, with a number of species notable for their absence. The lack of Red-necked Grebe *Podiceps grisegena* (second blank year since 1981), and Scaup *Aythya marila* (first blank since 2011), alongside species such as Grey Phalarope *Phalaropus fulicarius* (fourth blank year since 2015) and Glaucous Gull *Larus hyperboreus* (first blank year since 2014) was keenly felt. A lack of regular drift migrants, such as Red-backed Shrike *Lanius collurio* and Barred Warbler *Sylvia nisoria* was also evident, as was the nonappearance of waders such as Greenshank *Tringa nebularia* and Black-tailed Godwit *Limosa limosa*. Bitter pills to swallow were vagrant species that birdwatchers tracked locally along the coast yet failed to reach the Farnes: Giant Petrel *Macronectes* species, Sooty Tern *Onychoprion fuscatus* and Bonaparte's Gull *Chroicocephalus Philadelphia* fell into this category, despite the rangers' best efforts!

WEATHER

The rangers arrived on Inner Farne on 21 March, amidst light- to moderate westerlies that persisted until the end of the month. Puffins and Fulmars had arrived, and Shags were already copulating and building nests on the cliffs. On 22 March, two flocks of Whooper Swans (second-highest day count) and a drake Northern Shoveler *Anas clypeata* nicely supplemented the regular passage and overwintering birds. As April progressed, a persistent easterly flow held northerly and southernly influences. An obliging female Bullfinch was the only real surprise, and the first Black Redstart *Phoenicurus ochruros* met its end in the talons of a Sparrowhawk.

Light northerlies defined early May, with residual swell closing Staple Island for almost a week after just one day of opening. Despite a few isolated days of rain, the light winds no doubt assisted the nesting birds in the early part of the season. A resumption of light easterlies in mid-May provided a host of spring migrants; the most notable being Cuckoo, Hooded crow and a visible movement of Yellow Wagtails. It was not only birds that benefitted, as such conditions culminated in the fall of over a thousand Diamond-back Moths *Plutella xylostella* from 18 May to mid-June. On 8 June, a male Bluethroat and a Hoopoe were flamboyant surprises.

June was a challenging month, with a cocktail of south-easterly, westerly and northerly winds and the resultant swell restricting the number of cliff counts that could be carried out. Storms washed Shag nests from the Inner Farne Tower Cliffs, but torrential rain was particularly problematic for seabirds: 87 mm of rain fell on 13 June, more than three times the total June rainfall in 2018. The deluge resulted in the flooding of dozens of Puffin burrows on Brownsman, many of which had dead pufflings floating in them. Young Arctic Tern chicks were also affected. Despite being wetter overall (Table 1), July was less problematic with light winds and higher temperatures (Table 2) enabling Shags and Kittiwakes to build on the dismal numbers seen in 2018.

Warm weather continued into August, with a high average temperature of 18.6 degrees Celsius (°C) for that month (Table 2). Early easterlies gave way to moderate westerlies, as reflected in the surprise appearances of Red Kite and Eurasian Treecreeper *Certhia familiaris*, along with the arrival of hundreds of Red Admiral butterflies *Vanessa atalanta*. September was quiet, except for a Balearic Shearwater and Yellow-browed Warbler *Phylloscopus inornatus*. Strong south-easterlies, mist and drizzle from 6 October onwards brought decent thrush passage, with a scattering of Short-eared Owls, Water Rails and other visitors, and later Shore Lark, whilst

	May	June	July	Aug	Sept	Oct	Nov	Total
Inner Farne 2019	119.7	225.2	240.2	249.2	48.2	190.69	46	1119.19
Inner Farne 2018	10.6	24.8	26.5	35	62.2	50	67.1	276.2
Inner Farne 2017	16.9	98.2	90.6	27.6	39.3	46.9	65.5	385
Inner Farne 2016	23	49.2	39.5	29.7	28.4	36.4	57.6	263.8
Seahouses average	52	48	55	72	61	59	71	418

Table 1. Total rainfall (mm) for Inner Farne by month in 2016, 2017, 2018, 2019 and the Seahouses average.

	May	June	July	Aug	Sept	Oct	Nov
Inner Farne 2019	10	13.6	16.2	18.6	16	10.9	9.6
Inner Farne 2018	10.7	13.2	16.9	15.7	13.1	10.7	7.8
Inner Farne 2017	11.4	13.3	14.5	15.1	12.7	11.7	4.7
Seahouses average	10.1	12.8	14.3	14.4	12.2	9.8	6.3

Table 2: Average temperatures (°C) for Inner Farne by month in 2016, 2017, 2018 and the Seahouses average.

westerly interludes offered two Ravens and a second Treecreeper. Olive-backed Pipit and Little Bunting were welcome late arrivals in early November. Much of November was dominated by a strong easterly swell that made it difficult to visit some of the islands to count seal pups. This also resulted in many spray-marked Grey Seal pups being washed out to sea, with several retrieved by the British Divers Marine Life Rescue (BDMLR) as far afield as Spittal in North Northumberland. However, the challenging weather has failed to have an impact on pup production, which continues to grow.

In summary, average temperatures and relatively light winds created favourable conditions for cliff nesting Kittiwakes and Guillemots. Shags had an improved year, although several low lying and exposed nests were washed out by storms resulting in low productivity. Total rainfall was high (Table 1), but with uneven distribution and downpours leading to 'washouts' during peak season. Exposure-related deaths among pufflings was evident, particularly on Brownsman where soil compaction and erosion are an issue. Although many Arctic Tern chicks died as a result of poor weather, the suspected avian botulism linked to the Long Nanny colony was likely to have contributed to the low productivity this season. The prevailing wind was south-easterly, although this did not bring in many of the continental migrants normally associated with such conditions.

SYSTEMATIC LIST

Species are listed in the order used in the ninth edition (with updates) of the British List (British Ornithologists' Union, 2017). The status of each species is classified using categories listed below. For breeding species on the Farnes, an occurrence is counted as a single nesting pair, and a mean of pairs for the previous five years (given in parentheses in the text) is used to decide the most suitable category:

Abundant	More than 1,000 occurrences per annum
Common	101 - 1,000 occurrences per annum
Well represented	11 - 100 occurrences per annum
Uncommon	No more than 10 occurrences per annum, bit more than 20 in total
Scarce	11 - 20 occurrences in total
Rare	6 - 10 occurrences in total
Extremely rare	No more than 5 occurrences in total

Brent Goose *Branta bernicla.* A well represented passage and winter visitor.

As in previous years, Pale-bellied *B. b. hrota,* which winter at nearby Lindisfarne, made up the bulk of the records. Autumn passage commenced on 8 September, with a flock of six flying north over the Kettle. Afterwards, an individual was spotted on 17 September flying north through Staple Sound. Steady passage commenced from 18 - 23 September, with 138 individuals logged during this time. The peak count was a flock of 40 passing north through Staple Sound on 19 September. A single Black-bellied Brent Goose *B. b. nigricans* was recorded rafting in Brownsman Gut on 27 September.

Canada Goose *B. canadensis.* An uncommon passage visitor.

In contrast to the successful breeding attempt last year, there was no evidence of nesting in 2019. However, two pairs were present, one on the Inner and another on the Outer Group islands. The first pair was seen on West Wideopen on 23 March. Thereafter, the birds were present until 15 May. Passage birds included skeins of 20 and 18 heading north across Inner Farne on 28 May and 3 June, respectively. The peak count was on 20 September with a skein of 83 heading east from Inner Farne. This represents the highest count since 2006 and sixth highest overall. A pair of wintering Canada Geese was seen around the Inner Group on several dates from 26 October to 2 December.

Barnacle Goose *B. Leucopsis.* A well represented passage and winter visitor.

It was a quiet year for this Arctic-breeding goose, with only small numbers logged in spring and autumn passages. First sighting was on 29 April, with a flock of four birds on West Wideopen, with another skein of 19 flying north over Brownsman on 2 May. A flock of 12 heading north on 26 May marked the last ones of spring. Autumn passage commenced on 23 September with four seen on Big Harcar. The last record was on 22 November, with one flushed from Inner Farne Central Meadow.

Greylag Goose *Anser Anser.* An uncommon passage migrant and winter visitor.

Despite the presence of resident feral flocks on the Northumberland Coast, this species remains scarce on the islands. The only record was a flock of five flying east on 2 October.

Pink-footed Goose *A. brachyrhynchyus.* A well represented passage and winter visitor.

After the record-breaking numbers of 2017, it was another quiet year for this species with no spring sightings. The first record on 4 September was a skein of 28 birds heading north high over Inner Farne. An additional 428 were recorded on eight subsequent dates during September and October, with further birds heard calling overnight on 12 October. The peak count was recorded on 15 September, with 148 in four different skeins. The largest skein of 130 was seen on 18 November heading southwest over the Kettle. Birds were heard flying over Inner Farne on 22 November, before the last skein of four were recorded two days later, flying southeast over the Kettle.

Mute Swan *Cygnu olor.* An uncommon visitor.

The only record this season consisted of a juvenile, photographed rafting off South Wamses by the crew of MV Serenity on 25 April. This was the first spring record since 2014 for this iconic inland species.

Whooper Swan *C. cygnus.* An uncommon winter and passage visitor.

It was an impressive year for this elegant migratory Arctic swan, with the second-highest day count on record. 76 flew north past Inner Farne on 22 March, in two separate flocks of 70 and six birds. This is the highest count since 2009, when 92 were seen on the same date. Two juveniles seen on West Wideopen on 13 October was the only autumn record.

Shelduck *Tadorna tadorna*. A well represented visitor and occasional breeder.

As in previous years, a pair of Shelduck was present throughout much of spring, with 23 sightings from 27 April to 12 June, mainly on the Outer Group. The pair was joined by further individuals on five dates, with a peak count of 11 flushed from Brownsman Pond on 2 May. There was no evidence of any breeding attempt. There were only two records during the autumn passage, a single among a Brent Goose flock on 18 September, and then a group of four heading north on 7 October.

Shoveler *Spatula clypeata*. A well represented passage and winter visitor and extremely rare breeder.

A quiet year for this striking species with no breeding attempt. The only record was a male rafting on the Kettle on 22 March.

Wigeon *Mareca penelope*. A common passage and winter visitor.

With no spring sightings, it was a late appearance for this dabbling duck with just a few autumn records. 18 were noted on 22 August from Inner Farne, and then two birds crossing Staple Sound on 19 September. On 20 September, two flocks of five and 40 headed north through Inner Sound, followed by groups of seven and 12 on 22 and 23 September, respectively. Two flocks of nine birds seen from Brownsman on 31 October marked the only records that month. Wintering birds were present around the islands from November onwards. The highest count of wintering birds was 40 around the Inner Group on 7 November.

Mallard *Anas platyrhynchos*. A common passage and winter visitor.

It was a stable year for this resident duck, with 12 (16.4) pairs nesting across the islands. These were distributed as follows: Inner Farne 8 (7), West Wideopen 1 (3.2) and Brownsman 3 (4). The first clutch of 11 eggs was discovered in the Inner Farne Lighthouse Compound on 27 March, with a nest of cold eggs found at the Dock Bank on 2 April. As April progressed, a host of new nests were found in the Vegetable Garden, Top Meadow, and other locations around Prior Castell's Tower and the Vegetable Garden on Inner Farne. 10 ducklings seen in the Lighthouse Compound marked the first hatching of the season. In the Outer Group, the first nest was found in the Brownsman Vegetable Garden on 6 May, with the first ducklings appearing on 30 May. After the breeding season, a notable count of 43 was observed passing through Inner Sound on 26 September. Small numbers were present across the islands in October and November.

Teal *A. cecca*. A common passage and winter visitor.

In a quiet spring for this small dabbling duck, pairs were seen on 26 March and 7 April from Inner Farne. Autumn passage was typically busier, with 1 - 30 birds seen on 22 dates from 26 August to 31 October; 30 on 15 October was the peak count for this period, followed by 20 flushed from Brownsman Pond on 19 September. Wintering birds were present across both island groups from November onwards, with a high count of 50 from Longstone on 19 November.

Tufted Duck *Aythya fuligula*. Well represented visitor.

Only a single record for this diving species in the 2019 season, a female flying west across Inner Sound in the company of Mallards on 25 October.

Eider *Somateria mollissima*. A common breeding resident.

A relatively stable season saw 472 (532) females nesting on the islands. The species might be undergoing a slow recovery from the historic low of 2017, but although the decrease of 1% from last season appears negligible, this is also only the fourth time since 1969 that numbers have dipped below 500 pairs. Males were displaying as the rangers arrived on Inner Farne on 21 March, with roosting birds seen along Ladies Path. The largest roost count involved 83 birds on 8 April. The nesting females were distributed as follows: Inner Farne 237 (304.2), West Wideopen 18 (16.6), East Wideopen 2 (4.6), Knoxes Reef 3 (1.8), Staple 52 (35.8), Brownsman 140 (146.8), North Wamses 3 (2.75), South Wamses 5 (6.75), Longstone 10 (5.25) and Longstone End 2 (4.25). Numbers on Longstone were the highest in 41 years. Overall productivity was 2.1 (2.48), with a total of 644 chicks leaving from 306 monitored nests across Inner Farne, Staple and Brownsman. Despite the higher productivity of 2.38 on Staple, this was the worst breeding outcome since 2012. The first nest was found on Inner Farne on 10 April, with the first ducklings seen on 10 May on Inner Farne and Brownsman, a full six days earlier than last season. In contrast to 2018, there appeared to be less predation of Eider chicks and there were larger crèches in Seahouses harbour, a nursery site used by Eiders from the Farnes. After breeding, Eider numbers increased around the islands from September onwards.

SCRAMBLED EGGS

An interesting discovery was made whilst monitoring Eiders on 21 May 2019. The clutch being incubated by a female Eider consisted of three Eider eggs, but also included two Oystercatcher eggs! As far as we know, this is the first recorded instance of an Eider incubating Oystercatcher eggs along with her own clutch. Whether the Eider laid her clutch in an Oystercatcher nest-scrape with eggs, or an Oystercatcher 'dumped' its eggs in the Eider nest, is unknown, though the former scenario seems the most likely. Eiders may take over gull nests, making use of the ready-made grassy hollow, and incubate their own eggs along with the gull eggs (Perry 1982). Unfortunately, our novel mixed clutch was predated on 28 May, so we have no way of knowing if the eggs would have eventually hatched.

Jack Barton
National Trust, Farne Island, Seahouses, Northumberland NE68 7SR

An obliging female Eider, gently tipped away from her eggs to reveal a clutch of three Eider eggs and two Oystercatcher eggs.

REFERENCE

PERRY, P (1982). The use of gull nests by Eider. *British Birds* **75**: 360-365.

Velvet Scoter *Melanitta fusca*. A well represented passage and winter visitor.

A quiet year for Velvet Scoter which was recorded on only two dates in autumn: four flying west through Inner Sound on 22 October, and a male heading east off Brownsman on 23 October.

Common Scoter *M. nigra*. A common passage and winter visitor.

It was also a very poor year for Common Scoter with only 341 recorded over 11 dates. There were two spring records, a group of four passing north through Inner Sound on 9 April, and 30 north through Staple Sound on 23 June. The first autumn record was 39 birds on 24 July, with no further sightings until 9 September when groups of five and three passed through Inner Sound and Staple Sound, respectively. The highest day count was on 29 October, with 95 birds in three flocks seen in Inner Sound. A flock of 80 heading north through Inner Sound on 4 December was the largest single group and the final record of the season.

Long-tailed duck *Clangula hyemalis*. A well represented passage and winter visitor.

There were no spring records of this wintering duck for the fourth consecutive season, and only two autumn records, both of single birds from Staple Sound, with one north on 8 September and a female on 3 December.

Goldeneye *Bucephala clangula*. A common passage and winter visitor.

Autumn passage produced records on three dates in October and November. A single female was seen flying through Inner Sound on 6 October, followed by two females heading south through Inner Sound the next day. On 16 November, four passed through Inner Sound, whilst a single female flying south over the Kettle on comprised the last record on 19 November. Contrary to last season, there were no wintering birds.

Goosander *Mergus merganser*. An uncommon passage visitor.

Normally associated with inland freshwater sites, this sawbill species made two appearances on the islands this season. On 6 November, a single male was seen heading west from Brownsman. A second bird was seen on the 28 November heading west from St Cuthbert's Gut on Inner Farne.

Red-breasted Merganser *M. serrator* A well represented passage and winter visitor and rare breeder.

For the fourteenth consecutive year, the islands hosted this rare Northumberland breeder. After the first sighting of a female along Ladies Path on Inner Farne on 6 April, both male and female were seen on 20 April. The pair were observed on a further 26 days between 23 April and 21 June, either individually or together, although no nest was located. On 1 July, a female was seen with eight ducklings on a pool at Inner Farne North Rocks. This was the first confirmation of hatching success since 2017. The male was seen fourteen days later, and a single flying north east over the Kettle on 22 October was the only passage bird.

Swift *Apus apus.* A well represented summer and passage visitor.

It was a better year for this aerial acrobat, with birds recorded on eleven separate dates. The first record was from 8 July when five were seen flying over Staple. Passage remained light throughout July and August with birds in groups of 1 - 5 comprising a further eight sightings. The peak count was on 29 August when 14 were recorded flying over St. Cuthbert's Cove on Inner Farne. One was seen on 31 August by Inner Farne Cliff. Nine were recorded over the island on 2 September, 10 were seen a couple of days later on 4 September and two on 14 September. The final record was of one flying over the Picnic Area on 15 September, more than a month later than in 2018.

Cuckoo *Cuculus canorus.* An uncommon passage visitor.

Two were recorded this year, both on the Outer Group of islands. Last recorded in 2016, the bird was a welcome sight to the rangers who spotted it on Staple Island on the morning of 18 May. A second individual, a rufous female, was seen outside Brownsman Cottage on 29 July and again on 30 July. The Arctic Terns did not appreciate the visitor, which was mobbed by the persistent seabirds.

Feral Pigeon *Columba livia.* A common breeding resident.

Feral Pigeons were present on the islands throughout the year. Breeding pairs were very evident, and utilized rabbit burrows, tern shelters and dense vegetation for nest cover. As is usual, numbers peaked in the autumn, serving as fodder for Peregrine and Great Black-backed Gulls.

Woodpigeon *Columba palumbus.* An uncommon passage visitor.

While numbers rarely reach double figures, it was a particularly poor year for this species, with only one recorded, flying over Inner Farne Top Meadow on 7 October.

Collared Dove *Streptopelia decaocto.* An uncommon passage visitor.

Spring produced the only record of the year: one flew over Brownsman Tower on 28 April.

Water Rail *Rallus aquaticus.* An uncommon passage visitor.

There were three records of this shy species, all from Inner Farne. On 5 October, the rangers were treated to a prolonged view of an individual preening in the sticks near Prior Castell's Tower, before the distinctive 'piglet squeal' call was heard from the Dock Bank on 16 October. A single bird seen wandering around Central Meadow Pond on 19 November was the last record.

Oystercatcher *Haematopus ostralegus.* A common winter and passage visitor and well represented breeder.

A poor year for Oystercatcher resulted in 18 (26.8) breeding pairs across the islands, a decline of 5 pairs from last season and the second-worst result since 1975. Roosting birds were present when the rangers arrived on 22 March, with up to 44 birds logged on Inner Farne South Rocks by 9 April. The first egg was discovered on Brownsman on 4 May, with the first nest for the Inner Group with two eggs on 15 May. The breeding pairs were distributed as follows: Inner Farne 2 (5), West Wideopen 2 (2), Knoxes Reef 1 (2.2), Staple 4 (4.4), Brownsman 7 (7.4), Longstone 1 (1.5) and Longstone End 1 (1.25). The first chick was seen on 6 June on Brownsman, with two chicks on Inner Farne South Rocks the first for the Inner Group on 17 June. Subsequently, there were numerous chick sightings on Inner Farne, Brownsman and Staple. Numbers increased in autumn, with 70 roosting on 4 October the peak count.

Lapwing *Vanellus vanellus.* A well represented passage visitor.

A quieter season for this farmland bird with singles recorded on four dates. With no spring records, the first bird was spotted on Inner Farne Central Meadow on 23 September. During the strong winds that hit the islands from 3 - 8 October, singles sought refuge from the weather on Inner Farne on 6 and 7 October. A single on Inner Farne Central Meadow on 25 November was the last record.

Golden Plover *Pluvialis apricaria.* A well represented passage visitor.

A late first appearance for Golden Plovers this year, with a group of six recorded flying over Blue Caps on 23 July. Passage was noted over four days from 24 - 28 July, with 8 - 50 over Big Harcar, Brownsman and Inner Farne. Thereafter, most records related to the large post-breeding flock that forms on Longstone, which peaked at 540 roosting birds on 24 August. The final roost count of 400+ was supplemented by a flock of 36 heading west over Inner Farne on 22 September.

Grey Plover *P. squatarola.* A well represented passage visitor.

Although regular on the coast, this medium-sized wader has become scarcer on the islands in the past few years. One on Scarca Rock on 3 September was the only record this season.

Ringed Plover *Charadrius hiaticula.* A common passage visitor, uncommon as a breeding species.

It was an abysmal year for this red-listed shorebird, with only 1 (4.6) nest on Inner Farne. This was the worst year since 1944 when a single pair bred on Brownsman during the Second World War. After the first sighting of one on Inner Farne on 16 April, a pair was seen throughout the breeding season around St. Cuthbert's Cove and Ladies Path during May, June and July. A third bird joined them on 21 May. A nest of four eggs was found on 24 June, which resulted in a single chick first seen on 6 July. Despite the presence of 1 - 2 birds across Brownsman and Staple from April to July, there were no nests on the Outer Group. After the breeding period, 1 - 3 birds were recorded on 6 dates from 28 August to 23 September, all from Inner Farne. Four birds on 4 and 19 September were peak counts for the season.

Whimbrel *Numenius phaeopus.* A well represented passage visitor.

Another quiet year with just 19 records. A light spring passage produced three records: a single on Inner Farne North Rocks on 4 May was followed by four roosting on Brownsman the next day. Two on West Wideopen on 9 May was the last spring record. The first returning bird was a single bird on Inner Farne North Rocks on 24 June. Subsequent sightings were mainly from 8 July - 10 October, with 1 - 10 birds recorded on 18 days during this period. One on Knoxes Reef on 9 November was the final record for the season.

Curlew *N.arquata.* A common winter and passage bird.

This species is present all year round with large numbers roosting around the Inner Group after breeding on the mainland. The peak count for this season was up to 400 birds roosting on Scarcar Rocks on 20 October (Table 3). This was the highest count since 2016 and third-highest since 2009.

This year the autumn Curlew passage reached a peak in July; the last time this was noted was in 2014 and may be a result of nesting failures (Figure 1).

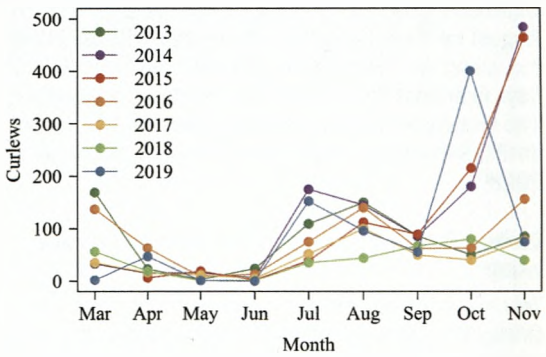

Figure 1. Curlew monthly counts from 2013 to 2019.

	March	April	May	June	July	Aug	Sept	Oct	Nov
Inner	2	47	1	-	152	96	55	400	87
Outer	-	1	1	-	1	-	1	8	2

Table 1. Curlew monthly peak counts

	March	April	May	June	July	Aug	Sept	Oct	Nov
Inner	35	35	14	13	71	146	20	200	200
Outer	-	60	18	18	15	-	4	37	40

Table 2. Turnstone monthly peak counts.

	March	April	May	June	July	Aug	Sept	Oct	Nov
Inner	6	80	147	-	5	15	4	12	16
Outer	-	14	8	-	20	-	5	6	26

Table 3. Purple Sandpiper monthly peak counts.

Bar-tailed Godwit *Limosa lapponica*. A well represented passage visitor.

As last year, it was again a quiet year for this wader with five records. The only spring record of one flying north past Brownsman also marked the only Outer Group record. Singles were observed from Inner Farne on 1 and 28 August, whilst a group of eight roosted on Knoxes Reef on 12 August. A roost of 26 on Inner Farne South Rocks on 26 November was the peak count and last record of the season.

Turnstone *Arenaria interpres*. A common passage and wintering bird.

Present all year round, with largest roosts typically occurring on West Wideopen, Knoxes Reef and Longstone. Peak passage occurred in October and November (Table 2), with 200 birds present across the Inner Group during those months.

Turnstone © Chris Cachia Zammit

Knot *Calidris canutus*. A well represented passage visitor.

A regular summer visitor to the islands, the first Knots appeared on 7 June with ten birds roosting near Cuthbert's Cove on Inner Farne. This was followed by a steady stream of sightings over 28 dates from 9 June until 25 August, with numbers fluctuating from singles to the peak count of 39 birds, logged on Ladies Path on 18 August. Other notable high counts included 36 on Inner Farne on 19 August and 30 on Knoxes Reef from 9 June. The Outer Group was considerably quieter with just singles and pairs seen. The last record was on 8 October, with a flock of 20 seen on West Wideopen.

Ruff *Philomachus pugnax*. A well represented passage visitor.

Although an improvement from the zero records of 2018, it was a very poor showing for this characteristic wader. A juvenile was discovered skulking around the Inner Farne Central Meadow Pond on 28 June and was last seen on 30 June.

Sanderling *Calidris alba*.

An uncommon passage visitor.

Although a frequent visitor on the mainland, this energetic high-arctic wader is a scarce visitor on the Farnes. Last recorded in 2017, there were three individuals this season: two were seen on Inner Farne on 15 July, followed by a single roosting on Ladies Path on 8 August.

Dunlin *C. alpina*. A common passage and winter visitor

Spring passage was typically light with 1 - 2 birds recorded on 11 dates from 22 May to 27 June. Autumn was busier, with peak movements near the end of July; 1 - 6 birds were recorded from 2 - 26 July on 18 dates, with higher counts of nine and 12 on 27 and 28 July. The peak count of 15 was on 30 July. Numbers decreased as autumn progressed, with 1 - 3 birds recorded on the Inner Group from 1 August - 7 September on 14 dates. The last records were singles on 15 and 29 September and 5 October.

Purple Sandpiper *C. maritima*. A common passage and winter visitor.

The islands hold nationally-important numbers of this sandpiper, supporting 1% of the UK wintering population. The highest daily count was 147 roosting on Knoxes Reef on 9 May (Table 3), the highest count since 2016. In contrast to the last two years, there were no records of Purple Sandpipers on the islands in June this season.

	March	April	May	June	July	Aug	Sept	Oct	Nov
Inner	3	5	-	1	5	29	6	3	12
Outer	-	1	6	2	7	22	12	5	8

Table 4. Redshank monthly peak count.

Woodcock *Scolopax rusticola*. A well represented passage visitor.

Light spring passage produced records on two dates, with singles flushed from Inner Farne on 6 and 12 April. Autumn was typically busier, with singles flushed from Inner Farne, Staple and Brownsman on 7, 15, 30 and 31 October. After a peak count of three on the Outer Group on 3 November, singles were logged on a further nine dates from 5 November until the last record of one flying west off Northern Hares on 3 December.

Jack Snipe *Lymnocryptes minimus*. A well represented passage visitor.

A marginal improvement on last season with three records: a bird flushed from Brownsman on 1 May was the first spring record since 2016. The two autumn records, both of single birds on Inner Farne, were from the South Rocks on 7 October and the Central Meadow on 22 November.

Snipe *Gallinago gallinago*. A well represented passage visitor.

There were records on seventeen dates this year. The first record of the spring was one on Inner Farne on 22 March, and three seen on Inner Farne on 7 April was the last spring record and the peak count for the year. Autumn passage was first noted on Staple with one flushed on 7 July, and one was in the Inner Farne Cemetery on 9 August. Individual birds were subsequently logged on 10 further dates from 4 October to 16 November. Two singles were seen on Brownsman and Inner Farne on 19 November, with two more flushed from Inner Farne Central Meadow on 22 November. A single was flushed the next day and the last one for the year was recorded on 28 November.

Common Sandpiper *Actitis hypoleucos*. A well represented passage visitor.

It was decent spring for this freshwater breeder, with singles recorded on eight dates from 25 April to 21 May on Inner Farne and Brownsman. The first returning bird was heard on 4 July on Brownsman, with singles seen on five additional days that month; two on 30 July was the only multiple record of the season. In autumn, singles were logged from Inner Farne on six dates from 7 August to 1 September, and one heard calling on 18 September was the last record of the season.

Green Sandpiper *Tringa ochropus*. An uncommon passage visitor.

Up to two individuals were recorded over five dates on Brownsman. The first was seen feeding around Brownsman Pond on 24 July and one, possibly the same bird, was flying around the island on 27 July. On the next day it was briefly joined by another, and lingered for two more days with the last sighting on 30 July.

Redshank *T. totanus*. A common passage and winter visitor.

This vocal wader was present throughout the year with the bulk of records recorded during autumn passage. The peak count of 29 for the year was on the 4 August (Table 4).

Redshank © Chris Cachia Zammit

Wood Sandpiper *T. glareola*. Uncommon passage visitor.

2019 saw a massive influx of Wood Sandpipers across the UK, and the islands were fortunate to host an obliging individual on Brownsman Flats on 27 July. This was the first record since 2017 and the second since 2014.

Kittiwake *Rissa tridactyla*. An abundant breeder and passage visitor.

An excellent year for Kittiwake with 4402 (3913.8) nesting pairs, a 39% increase from the 46-year low of last season, and the second-highest count since 2007. The breeding pairs were distributed across the islands as follows: Megstone 1 (8), Inner Farne 1603 (1318), West Wideopen 256 (197.6), East Wideopen 261 (224.6), Skeney Scar 144 (125.8), Staple Island 1016 (935.4), Brownsman 989 (1034.2), North Wamses 41 (27), South Wamses 7 (0.4), Roddam and Green 16 (9) and Big Harcar 68 (50.25). The population growth this season was reflected in a visible expansion of occupied nest sites, particularly on Inner Farne and Staple. Megstone and South Wamses continued to host nests for the second year running, having previously been vacant since 2010 and 2011, respectively. A total of 484 chicks fledged from 656 monitored nests, resulting in productivity of 0.73 (0.71). This was the best season for nesting success since 2015, and productivity was higher on Inner Farne (0.79) compared to Brownsman (0.66) and Staple (0.73). Birds were noted on nest sites from 3 April, with the first eggs laid on 20 May on Staple and Inner Farne. The first chick hatched on 16 June on Staple. After the breeding season, small numbers were noted on passage from September to November.

Ivory Gull *Pagophila eburnea*. An extremely rare visitor.

On the morning that the rangers were moving off the islands on 4 December, a medium-sized white gull was seen flying north low over Ladies Path on Inner Farne. A closer view revealed the telltale black spots on the wings, diagnostic of Ivory Gull. More familiar in the company of Polar bears, it was hoped by rangers and locals alike that the bird may linger to feed around the numerous seal carcasses littered across the islands. However, the bird was not seen again. If accepted by the British Birds Rarities Committee (BBRC) this would be the first record of this high-arctic breeder to the Farne Islands.

Black-headed Gull *Chroicocephalus ridibundus*. A common breeding species and visitor.

It was an excellent year for Black-headed Gulls with 544 (512.2) pairs nesting almost exclusively on Inner Farne. This was a 13% increase from 2018 and the third-highest count since records began. Inner Farne hosted 543 (511) pairs spread across Central Meadow, the Vegetable Garden and Cemetary walls. They were first seen on the Central Meadow on 22 March, with the first egg found on 30 April. The first chicks hatched on 25 May. As last year, Brownsman hosted 1 (1.2) nest, discovered by the Jetty on 2 June. The attempt was not successful, but the Outer Group hosted roaming juveniles, presumably from Inner Farne, in July. As kleptoparasites, Black-headed Gulls were observed mobbing Puffins for sandeels on a regular basis. After breeding, birds were present in autumn with some larger flocks present from November onwards.

Little Gull *Hydrocoloeus minutus*. Well represented passage and winter visitor.

There were three records of this minute gull this year, all from Inner Farne in spring. The first was a stunning first-summer bird, with full black hood, discovered in the tern roost on Inner Farne South Rocks on 18 May. This was followed by another roosting by St Cuthbert's Cove on 25 May, and the final bird was seen on North Rocks on 9 June.

Mediterranean Gull *Ichthyaetus melanocephalus*. Uncommon passage and winter visitor.

As in previous years an adult of this striking hooded gull was present among the Black-headed Gull roost on Inner Farne on 23 March, and again on 26 March. On 18 April, this was joined by a second bird in the Ladies Path roost. There were no signs of a breeding attempt. The final record of the season was a sub-adult bird on Ladies Path on 21 April.

Common Gull *Larus canus*. A common visitor.

Low numbers were present during spring and autumn. The first spring record was on 2 April and involved seven roosting on Knoxes Reef. This was followed by three singles on 8, 17 and 18 April, all seen on Ladies Path on Inner Farne. The autumn passage was also quiet, with individuals recorded on 4 dates from 28 September to 11 November, all on Inner Farne.

Great Black-backed Gull *L. marinus*. A well represented breeder and common winter and passage visitor.

There were only three pairs on the Inner Group this year and the Outer Group islands are a clear focus for the small number of Great Black-backed Gulls breeding on the Farnes. The 20 (18.4) pairs, an increase of two on the 2018 total, were distributed as follows: West Wideopen 2 (1.6), East Wideopen 1 (4.2), Brownsman 2 (1.6), Staple 6 (2.4), Skeney Scar 0 (0.2), North Wamses 6 (3.6), South Wamses 2 (2.4), Big Harcar 0 (1.6), Northern Hares 1 (0), Longstone End 0 (0.4).

Iceland Gull *Larus glaucoides*. Uncommon winter and passage visitor.

After drawing a blank in 2018, there were two records of this sleek white-winged gull this season. A third-winter bird was seen rafting off the Inner Farne Lighthouse Cliffs, before flying north behind West Wideopen on 7 April. A second-winter bird was also seen by the crew of Serenity in Inner Sound, on the rather unseasonable date of 26 June.

Iceland Gull © Andrew Douglas

Herring Gull *L. argentatus*. A common breeding species and abundant winter and passage visitor.

An unusually stable year for this resident predator and 743 (724) pairs were present across the islands. With an increase on last season of just 5 pairs, this was the highest count since 2016. The nests were distributed as follows: Inner Farne 45 (31), West Wideopen 127 (97.2), East Wideopen 116 (161.8), Knoxes Reef 46 (62), Skeney Scar 14 (27.4), Staple 61 (15), Brownsman 19 (27.4), North Wamses 65 (116.2), South Wamses 96 (51.8), Roddam and Green 24 (24), Big Harcar 76 (77.4), Northern Hares 23 (15), Longstone 4 (5.25) and Longstone End 32 (13.2). Herring and Lesser Black-backed Gulls were lumped together as 'large gulls' until 2002. The habitat and ecology of both species overlap in such joint colonies, so considering them together is useful in assessing relationships between large-gull populations and other species breeding on the Farnes. This is the fourth-highest combined count for large gulls since 1979. The first two Herring Gull nests were discovered on Inner Farne on 10 May, with the first egg on Brownsman confirmed a day later. After breeding, large numbers winter around the islands.

Lesser Black-backed Gull *L. fuscus*. A common breeding summer and passage visitor.

It was a good year for this migratory breeder, with 681 (604.2) pairs nesting across the islands. This was an 11% increase from last season, and the fourth-highest since counts for this species began in 2002. The pairs were distributed as follows: Inner Farne 51 (34.6), West Wideopen 128 (134.4), East Wideopen 63 (72.4), Knoxes Reef 103 (35.6), Skeney Scar 0 (4.8), Staple 95 (84.4), Brownsman 13 (11.2), North Wamses 55 (50.4), South Wamses 58 (93.6), Roddam and Green 3 (2.2), Big Harcar 38 (65.2), Northern Hares 37 (8), Longstone 7 (3.25) and Longstone End 30 (8.25). Typically, there are more Herring Gulls than Lesser Black-backed Gulls on the Farnes, and this season the proportion was 52% to 48%, respectively. 2003, 2006 and 2015 were the only years when greater numbers of Lesser Black-backed Gulls than Herring Gulls were recorded.

Sandwich Tern *Thalasseus sandvicensis*. A common breeding summer and passage visitor.

This year there were 417 (658.8) breeding pairs in the breeding colony on Inner Farne, and the species has continued its gradual downward trend. The first sighting of the year was of six birds on 30 March, followed by a pair on Knoxes Reef on 2 April. After a group of 26 on Ladies Path on 4 April, numbers steadily grew in the pre-breeding roosts throughout the month with 264 by 25 April. The first pair visited the breeding area on Inner Farne Central Meadow on the same day. There were 670 on the Central Meadow by 10 May, with the first egg appearing a day later. The first chick hatched on 11 June. With the small decline from last year of 7 breeding pairs, this was the worst year in 50 years, when 396 nested on the Outer Group in 1949. Sandwich Terns have declined by 90% since the peak count of 4086 in 1982, and breeding colonies are known to fluctuate in number as birds abandon islands and establish new colonies elsewhere. This may partially explain the recent increases on neighbouring Coquet Island. Despite a daily presence of 1 - 2 birds on Brownsman and Staple from April to July, there was no evidence of a nesting attempt. After the breeding season, small numbers of 1 - 10 were recorded on seven dates from 29 September to 22 October.


Sandwich Tern © Chris Cachia Zammit

Little Tern *Sternula albifrons.* A well represented passage visitor.

Inner Farne provides an important evening roost for this amber-listed species, prior to dispersing to breeding sites on the mainland. Seven seen on 29 April was the first record of the season, with up to 12 in the traditional roost site on St. Cuthbert's Cove the following day. Numbers steadily increased in May, with a peak count of 115 birds on 10 May. Numbers subsequently decreased, with counts of 79 and 13 on 13 and 16 May, respectively (Figure 2). Four birds present in the roost on 20 May marked the last record of the season. A successful colour-ringing session on 14 May resulted in three birds being ringed.

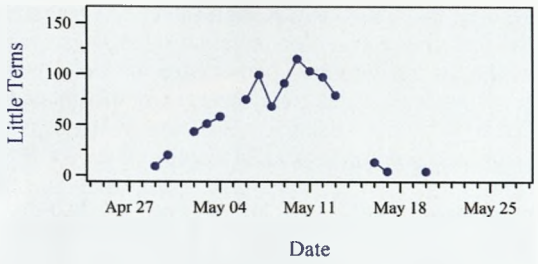

Figure 2. Little Tern numbers at the Inner Farne roost site.

Roseate Tern *Sterna dougallii.* A well represented summer and passage visitor.

The first two were spotted on Ladies Path on Inner Farne on 19 May. They were a regular presence subsequently, with 1 - 2 recorded on 17 further dates until the last record of a single on 13 August on Ladies Path. In addition, peak counts of three birds were on 26 June and 12 August. On the Outer Group, a pair was observed on 26 June and 4 July, with singles on 5 and 23 July around Brownsman and Staple. On 13 July, one was seen around Longstone.

Common Tern *S. hirundo.* A Common breeding summer and passage visitor.

The first three birds were present on Ladies Path on 19 April, with numbers increasing to 36 in the Ladies Path roost on 27 April. By early May, pairs had settled into the usual nesting sites on Inner Farne Central Meadow. There were 65 (83) breeding pairs this year, a decline of two pairs from last year. However, this represents the lowest numbers since 1975, when 40 pairs nested on Inner Farne and Brownsman. On

SANDWICH TERN WINTERING AREAS

Sandwich Terns from the Inner Farne colony, coloured-ringed as chicks between 2013 and 2016, continue to generate interesting sightings along their migration routes and from their wintering areas. Blue-UDP was ringed as a chick on Inner Farne on 28 June 2014 and has been seen on Coquet Island in August 2016 and May 2017, but was seen briefly back on Inner Farne and then in the Firth of Forth on 9 June 2017. The wintering area of this bird is further south than many of our Sandwich Terns, and it has been seen in the same area of Western Cape Province, South Africa, by Theuns Kruger in four successive wintering seasons: April 2017, March 2018, March 2019 and February 2020. It was back in the Inner Farne colony, possibly breeding, in 2019 and we will look out for it again in the 2020 breeding season.


Blue-UDP (DK52872) photographed by Theuns Kruger at Greenways, Strand, Western Cape, South Africa (latitude -34.127985; longitude 18.835065) on 5 February 2020.

Chris Redfern
Natural History Society of Northumbria

18 May, the first adult was seen sitting on eggs, and the first chicks noted on 19 June. Fledglings were by the Central Meadow Pond in early-mid July. After breeding, there were no confirmed autumn sightings. There was no breeding on Brownsman, though a single was seen on 22 and 24 April.

Arctic Tern *S. paradisaea.* An abundant breeding summer and passage visitor.

It proved to be a challenging season for Arctic Tern, with suspected botulism and heavy rainfall contributing to the third consecutive year of decline. The 1416 (1805.2) nesting pairs was the lowest total since 2002. On 25 April, a single bird on Ladies Path marked the first returning bird, with four present two days later. The pre-breeding roost had grown to 276 birds by 30 April, with birds touching down in the Inner Farne breeding area on 5 May, and a day later on Brownsman. On Inner Farne, numbers had grown to 2186 by 9 May, before the first egg was found on 14 May, and on the 16 May on Brownsman. The nesting pairs were distributed as follows: Inner Farne 1070 (1268), Brownsman 344 (532) and Staple 2 (7). The suspected avian botulism resulted in the deaths of around at least 150 birds on the islands. The first chick hatched on Inner Farne on 6 June, followed 2 days later by the first chick on Brownsman. In total, 434 chicks fledged from 1225 monitored nests, giving a productivity of 0.35 (0.4). Although below average, this is equal to last year and an improvement on 2015 and 2016. Productivity on Brownsman was particularly low (0.18), with predation and heavy rainfall having a greater impact than on Inner Farne, which had better nesting success (0.45). After the breeding season there were no records of passage birds.

Black Tern *Chlidonias niger.* An uncommon passage visitor.

There was one record of this dainty marsh tern this season. An adult was observed in the tern roost on Inner Farne South Rocks on 9 May.

Great Skua *Stercorarius skua.* A common passage visitor.

The first spring record of this aggressive pirate was one feeding on a Herring Gull carcass in Inner Sound on 24 April. This was the first April record since 2015. There were five records of 1 - 2 birds in the period 4 - 28 May, with the most notable being one mobbed by Arctic Terns over Brownsman Cottage on

ARCTIC TERN EGG COLOUR

Colour variation of eggs (a, b) and chicks (c) of Arctic Terns. a, 'buff' eggs; these can vary in hue from a golden yellow to muddy brown. b, grey eggs; these often have a bluish hue. c, a buff and grey chick from the same clutch.

Arctic Tern eggs and chicks can be very variable in their colouration but can generally be classified into two colour types: grey or buff. We recorded the colour of 136 eggs on Brownsman Island. Of these 105 (77%) were buff, 23 (17%) were grey, and 8 (6%) were an intermediate hue. Buff eggs appear to be a better match for the earthy substrate on Brownsman, at least to the human eye. Buff chicks were also more prevalent. In a survey of 44 chicks, 32 (73%) were buff and 12 (27%) were grey. Chick colour does not seem to relate to egg colour: buff chicks were recorded hatching from grey eggs, and vice versa, and some broods were recorded with one grey and one buff chick, despite the egg colour from which the chicks hatched being the same.

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Arctic Tern © Chris Cachia Zammit

11 May. Autumn passage commenced on 4 August with a bird heading through Inner Sound. 1 - 2 were subsequently recorded on 21 dates between 10 August and 14 September. A bird from Longstone seen on 22 September was the last sighting of the season.

Pomarine Skua *S. pomarinus.* A well represented passage visitor.

It was poor season for this powerful skua with only three records comprising five individuals. The first was seen flying north through Staple Sound on 8 August. The second record involved prolonged views of three birds, including a full spoon-tailed pale adult on 18 September. They lingered off Crumstone and were observed mobbing Kittiwakes. The final bird was a dark morph, flying south through Inner Sound on 20 September.

Arctic Skua *S. parasiticus.* A common passage visitor.

Only 14 Arctic Skuas were recorded over 10 days. With none recorded during spring passage, the first record was of two pale-phase birds heading south through Staple Sound on 15 July. Three passing south over West Wideopens on 27 July was the joint peak count this season, with three also seen on 10 September. Single birds were noted on six further dates from 27 September to the final record on 23 September.

Little Auk *Alle alle.* A well represented to abundant winter and passage visitor.

The smallest of the Atlantic auks was recorded on nine autumn dates. Most observations were of rafting birds, made by rangers from the zodiac whilst carrying out seal pup counts. The first was on 30 October, when a lone bird, and then later a group of three, were seen rafting in Staple Sound. On 3 and 4 November, two were seen in Staple Sound, and then a single on 6 November. Another single was seen in the waters behind Knoxes Reef on 10 November, with further records of pairs on 16 and 17 November. Four were recorded on 19 November and involved pairs in Staple Sound and off Big Harcar. An individual seen off Inner Farne on 20 December was the final record.

Guillemot *Uria aalge.* An abundant breeding resident and passage visitor.

This season was the best on record for Guillemots, with 64,042 (50,517) individuals recorded across the islands, an increase of 14,072. Despite some heavy rainfall during peak season, relatively light winds enabled the colonies to expand to previously-vacant patches, particularly on Inner Farne and Staple. Guillemots were present on the Inner Farne cliffs when rangers arrived on 21 March. The first eggs for each island group were discovered on 23 April, first on Inner Farne, then on Staple. On Inner Farne, the first chick was visible on 24 May, whilst on

the Outer Group the first chicks were first heard on 1 June but not seen until the following day. Jumplings were recorded from 18 June, the first having made the leap from Inner Farne. Individuals were distributed across the islands as follows: Inner Farne 14,372 (9385.2), West Wideopen 3179 (2361), East Wideopen 4889 (3549), Megstone 261 (199.25), Skeney Scar 4587 (2264), Staple Island 24,475 (21,096.8), Brownsman 10,039 (9888.4), North Wamses 820 (891), South Wamses 523 (443.2), Roddam and Green 217 (146) and Big Harcar 680 (323). Regular sightings were made of passage and wintering birds after the breeding season, with small numbers logged on most days from 3 September until December. Peak passage occurred in October, with high counts of 500+ on 6 and 15 October.

Razorbill *Alca torda*. A common breeding resident and passage visitor.

This solitary auk declined for the third consecutive season, with 427 (473.4) breeding pairs across the islands. Although a 3% decrease on 2018, numbers only exceeded 400 pairs as recently as 2012, and 2019 was still the seventh best year on record. First seen back on the cliffs on 27 March, copulation was observed soon after with a pair on Inner Farne Cliff on 29 March. The nesting pairs were distributed as follows: Inner Farne 232 (219.4), West Wideopen 55 (67), East Wideopen 31 (33.4), Skeney Scar 7 (16), Staple Island 62 (77.6), Brownsman 8 (17.2), North Wamses 7 (10.6), South Wamses 11 (17.2), Roddam and Green 2 (1), Big Harcar 7 (16) and Longstone End 4 (2). The first egg was found on Inner Farne on 30 April and the first egg for the Outer Group on 6 May on Brownsman. The first chick was seen on Staple on 3 June. Productivity was fairly stable at 0.53 (0.54), with 56 chicks fledging from 105 monitored nests across Inner Farne, Staple and Brownsman. Nesting success on the Inner Group was higher at 0.58, compared to 0.5 for the Outer Group. After the breeding season, wintering birds were well represented in the waters around the islands with 23 records between 9 September and 17 December, most notably on 3 October when 100 birds were seen from Brownsman.

Black Guillemot *Cepphus grille*. A well represented winter and passage visitor.

It was a decent year for this non-breeding auk, with a strong wintering presence in the Outer Group. Spring failed to produce any sightings, and the first record was not until 28 October when two singles flew through Inner Sound. Two were then seen in Staple Sound on 13 November. From 14 November onwards, 1 - 2 were present in the regular wintering grounds off Gun Rocks and the Wamses on ten additional dates, including the final record on 31 December of a single off North Wamses.

Razorbill with chick. © Andrew Davis


Black Guillemot, October 2019 © Andrew Davis

Puffin *Fratercula arctica.* An abundant breeding summer and passage visitor.

Puffin numbers were stable compared to last year with 43,752 breeding pairs across the islands, representing a minor decrease of 203 pairs from 2018, but this is well within the sampling error of the survey method. The first birds were on land on 22 March, with over a thousand present by 27 March. The first egg was discovered on Inner Farne on 22 April, with an adult seen with sandeels on 7 May and the first evidence of pufflings for the Outer Group. This was the second consecutive year of the new annual census, and therefore there is no five-year mean; the census results are shown for 2019 in comparison to 2018 in Table 5. The inter-island trends were generally consistent with those of last season. The Outer Group has declined by 1016 pairs (5%), with Brownsman faring worst with a 6.6% decrease. By contrast, the Inner Group increased by 813 pairs (3%), with West Wideopen seeing the most dramatic increase of 19.27%. Inner Farne and Staple, two major islands that saw increases between 2013 and 2018, both decreased, by 4.45% and 4.1%, respectively. Heavy rainfall flooded out many burrows in June, with Brownsman acutely affected because of compaction and erosion of the soil cap by seals. Productivity was therefore low on Brownsman (0.25), although Inner Farne fared better (0.6), resulting in an overall nesting success of 0.44 (0.67). This was, therefore, the worst breeding year since 2015, when heavy rain also resulted in the deaths of many pufflings. Birds returned in the autumn and there were regular sightings of 1 - 3 birds from 16 September. It was an exceptional year for wintering Puffins, with adults and juveniles noted across the islands in November and December.


Puffin © Chris Cachia Zammit

	Inner Group				Outer Group				
	Inner Farne	West Wideopen	East Wideopen	Brownsman	Staple	North Wamses	South Wamses	Big Harcar	Total
2018	16541	6685	637	6868	12380	464	357	24	43955
2019	15854	8281	541	6414	11829	350	460	23	43752
Change (AOB)	-687	+1,623	-96	-454	-551	-114	+103	-1	-203
Change (%)	-4.1%	+23.8%	-15%	-6.6%	-4.4%	-24.5%	28.8%	-4%	-0.46%

Table 5. Puffin survey data for 2019 in comparison to 2018. AOB, apparently-occupied burrows.

Red-throated Diver *Gavia stellata.* A common winter and passage visitor.

Spring passage was light with singles recorded on six dates from 15 April to 22 May, with all but one coming from Inner Sound. Autumn was typically busier, with 27 recorded between 18 September and 29 October on nine dates. The peak count was nine seen passing through Inner Sound on 20 September. The following month produced three records, all from Inner Sound. One flew southwest on 6 November, three singles passed south on 16 November and a lone bird was seen heading south the following day. Two seen off Inner Farne on 23 December was the final record of the season.

Black-throated Diver *G. arctica.* An uncommon passage and winter visitor.

A scarce diver for the islands with only a handful of records each year. The only record this season was one heading south through Inner Sound on 16 November.

Great Northern Diver *G. Immer.* A well represented winter and passage visitor.

A disappointing year for this powerful diver with records on only three dates this season: single birds were seen flying through Inner Sound on 13 and 16 November, and two were observed off Inner Farne on 23 December.

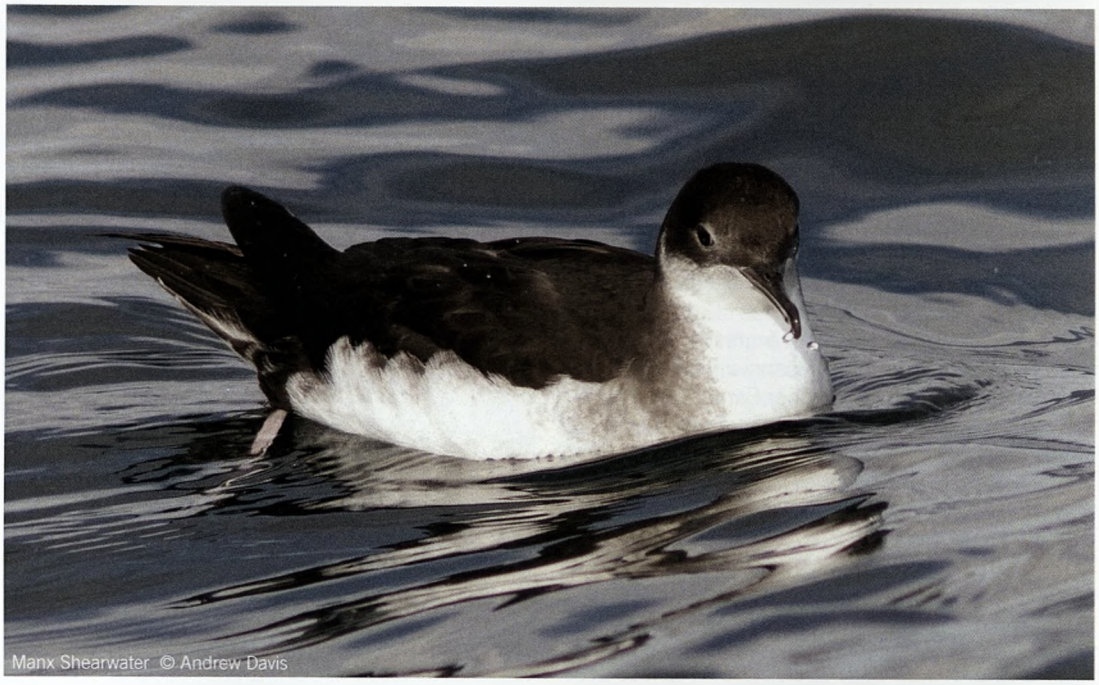
Storm Petrel *Hydrobates pelagicus.* An uncommon passage visitor

All records of this small petrel were from night-time mist-netting sessions on Inner Farne using a sound lure. Five were trapped for ringing on 13 July. One of these was a 'control' which had been ringed previously at Sumburgh, Shetland, on 3 August 2014, where it was aged two years old at least; this made the bird at least seven years old on recapture on Inner Farne in 2019. Storm Petrels caught using sound lures are young birds generally less than five years old prospecting for potential breeding sites (Okill and Bolton 2005), and this capture is, therefore, unusual. This bird was also missing a leg, a type of injury that is common in small petrels, possibly caused by predatory fish (Wojczulanis-Jakubas *et al.*, 2014).

Fulmar *Fulmaris glacialis.* A common breeder and abundant passage visitor.

Despite a slight increase on numbers from the Inner Group, it was a disappointing season for Fulmars, with 186 (235.8) pairs, a 25% decrease from 2018. This is the fourth time since 1987 that numbers have fallen below 200 pairs. Birds were present at nesting sites as the rangers arrived on Inner Farne on 22 March, with the first egg found on Brownsman on 23 May. The first chick was seen on 6 July on the same island, with the first Inner Farne chick on 13 July at the Lighthouse Cliffs. The breeding pairs were distributed across the islands as follows: Inner Farne 25 (26.8),


Fulmars © Chris Cachia Zammit


Manx Shearwater © Andrew Davis

West Wideopen 8 (13.4), East Wideopen 12 (18.8), Knoxes Reef 16 (10), Staple 33 (44.4), Brownsman 30 (55.2), North Wamses 23 (32.25), South Wamses 18 (29), Big Harcar 16 (11.75) and Longstone End (6.25). Productivity was above average at 0.58 (0.52) for the Inner Group of islands; productivity data were not obtained from the Outer Group because of logistical difficulties, so the Inner Farne result will be applied to the islands as a whole. After the breeding season, birds returned to the islands at the end of October and were often seen rafting off Lighthouse Cliffs on Inner Farne. A visit to Knoxes Reef on 19 November revealed 13 birds sitting at traditional nest sites. Thereafter, sitting adults were seen on the Inner and Outer Group islands until the rangers departed in December.

Sooty Shearwater *Puffinus griseus*. A well represented to common passage visitor.

Another very poor year for this pelagic wanderer from the southern hemisphere, with just two autumn records, both of birds flying through Staple Sound: one north on 17 September and then two the following day.

Manx Shearwater *P. puffinus*. A common passage visitor.

In this rather poor seawatching season, only 87 were recorded, on 16 days between 3 May and 21 September. The highest count was 58 passing north through Staple Sound on 3 July. Seven seen on 18 September comprised the only other notable count. The final one of the season was a single bird rafting in Inner Sound on 23 September.

Balearic Shearwater *P. mauretanicus*. Uncommon passage visitor.

There was one record of this critically-endangered seabird: a lone Balearic Shearwater was seen flying north through Staple Sound on 7 September. Small numbers are recorded most years, but this is the first record since 2017.

Gannet *Morus bassanus*. An abundant passage and non-breeding summer visitor.

Europe's largest seabird was recorded almost daily around the islands on their foraging trips from gannetries in Lothian and East Yorkshire. High counts were logged on several days: on 13 April, 94 passed through Inner Sound in a 30-minute period, whilst on 8 June, a large feeding flock of 168 was recorded off Staple. A peak count of 1000+ birds passed through both Inner and Staple Sounds on 6 October. A juvenile roosting on Knoxes Reef on 22 September was the only notable grounded bird.

Shag *Phalacrocorax aristotelis.* A common breeding resident.

Present all year, Shags maintain a significant wintering presence around the Farne Islands. After last year's storm battered season, it was a relief on 22 March to find Shags copulating and nest building at the regular sites on Inner Farne. The first egg was found on 7 April at the Lighthouse Cliffs, 14 days earlier than last season. Despite such promising signs, recovery has been slow with a noticeably reduced population failing to occupy former nest sites. 484 (677.6) pairs were present, an increase of just nine pairs and the second-worst season since 1979. They were distributed as follows: Inner Farne 215 (257.2), West Wideopen 49 (74.2), East Wideopen 38 (55.3), Megstone 4 (9), Skeney Scar 5 (28.6), Staple Island 76 (101.8), Brownsman 63 (75.8), North Wamses 4 (18.6), South Wamses 4 (18.6), Roddam and Green 5 (6.8), Big Harcar 10 (25.5) and Longstone End 11 (15.25). Significantly, productivity was low at 0.91 (1.47), with 288 bird fledged from 318 monitored nests. This represents the worst breeding outcome since 2016. The first chicks hatched on 15 May, 8 days earlier than last season. Despite mild temperatures and light winds dominating much of the breeding season, low-lying nests, such as those around Inner Farne Tower Cliffs, were washed out by a northerly swell, and heavy rainfall was detrimental to developing chicks.

Cormorant *P. Carbo.* A well represented breeding resident.

Present in small numbers throughout the year, numbers increase prior to spring with the arrival of nesting birds. The situation for Cormorant is increasingly poor around the islands, with just 67 (89) breeding pairs in 2019. This was the lowest count for at least 59 years, when 32 late nests were logged on 27 July 1960, after a destructive storm earlier that year. This season, 30 (40.2) pairs bred on East Wideopen and 37 (39.2) on Big Harcar, a decrease of 16 pairs on the total last year. For the third year running, no birds nested on North Wamses. Birds were on nests by mid-April, but the policy of non-disturbance meant that obtaining dates for first eggs laid and hatching is not possible. Cormorants have proved to be adaptable and versatile breeders over the decades, having abandoned islands including Megstone to colonize others. However, with such low numbers, the future of this species on The Farne Islands hangs in the balance,

Grey Heron *Ardea cinerea.* A well represented visitor.

There were twelve days in spring from 23 March until 25 May in which one was present across the Inner and Outer Groups of islands. Apart from three birds seen on Knoxes Reef on 16 June, a lone bird was seen on seven dates in the Outer Group from 1 June to 27 July. In the autumn, after one was seen on 8 August, 1 - 4 birds were observed across 25 dates from 28 August to 27 October, typically at the favoured roosting site of Knoxes Reef. A peak count of five was seen from Inner Farne on 5 October. The last records were of two birds on 15 and 20 November in the Inner Group.

Sparrowhawk *Accipiter nisus.* An uncommon visitor

It was a reasonable year for this fierce-eyed woodland predator, with a female bird regularly seen on Inner Farne on seven dates from 22 March to 18 April. An active hunter, it was seen feeding on a Black Redstart in the Picnic Area on 9 April. One seen on Brownsman on 30 April was the first record for the Outer Group since 2015. A single flying around Inner Farne North Rocks on 2 November was the only autumn record.

Red Kite *Milvus milvus.* An extremely rare visitor. One individual 2013.

A fast-recovering bird of prey in the UK after historical persecution, this species is becoming a more regular sight in North Northumberland. A single bird was photographed flying around Longstone by the crew of Serenity on 5 August. This marks the second record for the Farne Islands, after the first on 30 July 2013. With its fortunes improving, perhaps we can expect further records of this distinctive scavenger.


Red Kite © Andrew Davis

Short-eared Owl *Asio flammeus.* An uncommon passage visitor.

Another quiet year with just six sightings. The first was on Inner Farne on 29 September, with a second bird seeking refuge on Inner Farne against the tail end of Hurricane Lorenzo on October 6. Another made

an appearance over Staple on 16 October. A record from Brownsman on 24 October and another from Inner Farne, where it was seen flying from the Top Meadow over to West Wideopen on 25 October, could potentially be the same individual. Another was seen around Inner Farne on 29 October. The final record of the year was from 30 October when two were seen by rangers after an early morning seal pup spraying session: the first of these was flying from Brownsman to Staple, and the second bird was roosting on a post just outside the Fishe House on the rangers' return to Inner Farne.

Short-eared Owl
© Chris Cachia Zammit

Hoopoe *Upupa epops*. A rare visitor. Last recorded 2013.

Brownsman briefly hosted one of these striking southern migrants: on a drizzly June morning, a ranger peered out of the cottage window to see a bedraggled bird sheltering at the base of Brownsman Tower. Rock pipits proceeded to mob it, and the Hoopoe fled a few seconds later. Despite the rangers' best efforts, the bird was not relocated. This brief encounter on 8 June marked the thirteenth record for the Farne Islands, and the first since 2013.

Hoopoe: view from Brownsman cottage window
© Chris Cachia Zammit

Kestrel *Falco tinnunculus*. A well represented passage visitor. May have bred 1916.

The first was on 23 September, flying over Inner Farne, and a female was seen crossing from Brownsman to the Wideopens on 3 October. Subsequently, there were seven sightings from 12 - 18 October, presumably of the same female bird: it was first seen on Staple, and moved to Brownsman until 16 October. Later that day it was seen over the Inner Farne Jetty and remained on Inner Farne for several days, last seen flying over the Dock Bank on 18 October. Finally, a lone bird, presumed to be the same individual, was seen flying over the Inner Farne Vegetable Garden on 30 October, and again on 2 November on Brownsman.

Merlin *F. columbarius*. A well represented passage and winter visitor.

With no spring records, it was a late arrival for the usually well represented Merlin. The first was seen flying over the Inner Farne South Rocks on 3 October. The bird appeared to take up residency on the island and was seen on a further twenty dates until 2 December. On 20 November, the bird was seen hunting a Starling over the Cemetery. In the Outer Group, a lone female was seen on 15 October, followed by singles on Brownsman on 31 October and 5 November. The final record was from Brownsman on 15 December.

Peregrine *F. peregrinus*. A well represented passage and winter visitor. May have bred ca 1925.

Although all records consisted of singles, an adult female and juvenile bird were present across the islands this season. There were three spring sightings, all on Inner Farne. The first was on 26 May, then again on 1 April, and one was seen flying over the Central Meadow on 9 April. Subsequent sightings were all in autumn, with birds recorded on Inner Farne on 22 dates from 14 August until 22 November. There were five autumn records from the Outer Group, with singles recorded across Brownsman, Staple and Longstone on six dates from 26 August to 19 November. The final record was a bird heading west across Staple Sound on 3 December.

Peregrine sequential
© Chris Cachia Zammit

Jackdaw *Corvus monedula*. A well represented visitor. Former breeder, last in 1966.

There was just one record this year for this steely-eyed corvid. After the rangers' move to the islands, two were seen flying west through Inner Sound on 23 March. This is in keeping with past records, with Jackdaws usually seen on passage in early spring.

Rook *C. frugilegus*. A well represented visitor.

An indifferent year with a total of four seen over two dates. Recorded in both spring and autumn, the first sighting was of three flying east over Inner Farne North Rocks on 17 April. A lone bird was seen on Brownsman Beach on 30 October.

Carrion Crow *C. corone*. A well represented visitor and rare breeding species.

Small numbers were recorded throughout the year, with 1 - 6 recorded on 97 dates across the Inner and Outer Groups. Additionally, peak counts of nine were recorded on 12 April, 23 April and 5 October from Inner Farne. An individual eating a fish on Inner Farne North Rocks was a notable observation! As of last season, a breeding attempt was made on 27 April on Brownsman Tower. This is the fifth season that this species has nested since 2013.

Hooded Crow *C. cornix*. An uncommon visitor.

A single bird caused great excitement on 11 May, when it was seen by rangers on Brownsman. It was spotted in Staple Sound, flying east with a flock of four Carrion Crows. It flew low over Brownsman Tower and continued towards Longstone. This marks the first record of this distinctive corvid since 2013.

Raven *C. corax*. A rare visitor.

Two of these large corvids were seen on West Wideopen on the morning of 25 October. The pair were mobbed by large gulls and Carrion Crows, before circling the island, flying northwest over Inner Farne South Rocks, passing the Lighthouse Compound and then heading west towards the mainland. After last year's pair, this is the second record since 2008 and the seventh record overall.

Skylark *Alauda arvensis*. A common passage visitor. May have bred 1865 and *ca* 1900.

As last year, spring passage of this farmland passerine was light with just three sightings of single birds on Inner Farne on 6, 7 and 8 April. Autumn produced an additional eighteen records, typically 1 - 3 birds were seen between 27 September and 30 November, however seven, the peak count, were seen flying over Inner Farne Central Meadow on 28 September.

Shore Lark *Eremophila alpestris*. An uncommon passage and winter visitor. Last recorded 2013

Last recorded in 2013, a lone bird dropped in on autumn passage. It was discovered by the beach on Brownsman in the afternoon of 25 October. It continued to linger around the beach, offering excellent views, and was last seen on 8 November.

Sand Martin *Riparia riparia*. A well represented summer and passage visitor.

There were no spring records this year, but individuals were recorded on three dates during late August and early September. The first sighting was on 17 August at the Lighthouse Cliffs and the last on 4 September at St Cuthbert's Cove.

Barn Swallow *Hirundo rustica*. A common summer and passage visitor.

The first bird was seen on Inner Farne on 17 April, and there was a daily presence until the final fledglings left. It was a reasonable breeding season with 6 (6.6) pairs across the islands, with some nests producing second broods; one pair in the Inner Farne Information Centre produced a rather late second brood, fledging in late September. Nests were built in St Cuthbert's Chapel, the Information Centre, and the Acetylene Store on Inner Farne. Longstone held 2 (2) nesting pairs this season. Despite eight consecutive years of nesting, there was no attempt on Brownsman this year, although a pair was present throughout the season. After breeding, 20 were seen heading south from Inner Farne on 16 September. The last sighting was on 4 October at the Lighthouse Cliffs.

House Martin *Delichon urbicum*. A well represented summer and passage visitor. Six pairs attempted to breed in 1950.

The first sighting was on 8 May when two birds were recorded on the Outer Group. There were records from the Outer Group on four more dates until the last spring sighting on 8 June; all were of individuals except for three seen on 18 May. There were no spring sightings from the Inner Group. Autumn produced 6 records, all from Inner Farne between 25 August and 14 September, and were of one or two individuals except for 2 September when 22 birds were seen flying southwest.

Wood Warbler *Phylloscopus sibilatrix*. An uncommon passage visitor.

After the no-show last season, there was a single record of this vibrant leaf warbler in 2019 with one present on Brownsman on 10 May.


Yellow-browed Warbler © Chris Cachia Zammit

Yellow-browed Warbler *P. inornatus*. An uncommon passage visitor.

This Siberian leaf warbler was recorded on Inner Farne on five dates, between 23 September and 18 October. All records were of single birds, and probably represented three individuals.

Willow Warbler *P. trochilus*. A common passage visitor.

The first sighting was on Inner Farne on 21 April, with further sightings on 22 April and 27 April. There were no other spring records for Inner Farne but there were 14 records on the Outer Group between 28 April and 26 May, with daily records between 8 May and 13 May. Birds were recorded on the Outer Group on a further five dates between 5 June to 13 September. On Inner Farne there were 52 records between 8 August and 29 October with an almost daily presence between 8 August and 15 September.

Chiffchaff *P. collybita*. A common passage visitor.

It was another early start for this dainty warbler, with the first sighting on 22 March in the Inner Farne Vegetable Garden. There was an almost daily presence on Inner Farne throughout April, with 26 records for that month. Numbers peaked on 17, 18, 19 and 20 April with counts of 15, 18, 20 and 10, respectively. Individuals were recorded on several dates throughout May, with only 6 records in June and none in July across all the islands. Sightings increased again in August with records on 84 dates between 12 August and 27 November across both island groups. Counts of six birds on 10 and 21 April represented peak counts for autumn.

Siberian Chiffchaff *P. collybita tristis*. Scarce visitor, last recorded 2016.

There was a single sighting of one near Brownsman Jetty on 15 October.

Sedge Warbler *Acrocephalus schoenobaenus*. A well represented passage visitor.

Another poor year with just four records across the islands: three sightings of individuals in spring, all on Brownsman, between 2 May and 27 May, and an autumn record of a single bird near Inner Farne Top Meadow Pond on 17 September.

Reed Warbler *A. scirpaceus.* A well represented passage visitor.

There was just one spring record for this species on the Brownsman flats on 27 April. There were three sightings in autumn, all of singles on Inner Farne, with the final record on 8 October.

Blackcap *Sylvia atricapilla.* A common passage visitor.

The first record of the year was a female in the Inner Farne Vegetable Garden on 7 April. There was then a regular presence on Inner Farne throughout April, with records on 16 dates. In autumn, there were 12 records for Inner Farne between 23 September and 21 October. On the Outer Group there were sightings on three dates in May and four dates in October. All sightings were of one or two individuals, except for 15 October when 24 individuals were seen across Brownsman and Staple.

Garden Warbler *S. borin.* A common passage visitor.

Another extremely poor year on the islands for this warbler with no spring sightings. There were two autumn records, both of a single bird on Inner Farne, on 22 September and 5 October. There were no records on the Outer Group.

Lesser Whitethroat *S. curruca.* A common passage visitor.

The first spring sightings were on Inner Farne, with a single bird seen on both 22 and 23 April, and two birds on 24 and 25 April. On Brownsman, a single bird was seen daily between 27 and 30 April. There were five more spring sightings across the islands, all of individual birds, until 21 May. In autumn, a single bird was seen in Inner Farne Vegetable Garden on 11 and 14 October, and the final record of the year was from Brownsman on 15 October.

Whitethroat *S. communis.* A common passage visitor.

The first record for the season, and the only record for the Inner Group this year, was one seen near Inner Farne Lighthouse on 25 April. On Brownsman, there were two records in late April and further records on eight dates between 3 and 21 May, all of which were of single birds except two on 10 and 19 May. One was also seen on Longstone on 15 May. There was one autumn record of one on Brownsman on 26 August.

Whitethroat © Chris Cachia Zammit

Goldcrest *Regulus regulus.* A common passage visitor.

Spring passage was light. Although three were seen on 7 April, and two the following day, other spring records were of individual birds and all were on the Inner Group. The first was seen on 29 March, in the Inner Farne Courtyard, and a further nine were recorded until 26 April. The first of the autumn visitors arrived on Inner Farne on 13 September and 1 - 3 were seen on nine additional dates, until 4 October. Strong south-easterly winds over the weekend of 5 - 7 October blew in larger numbers, with 20, 25 and 15 birds seen each day, respectively. Subsequently, one was seen in the Cemetery on 8 October, and numbers increased to 10 on 9 - 10 October. Smaller numbers were then seen over eight dates until the last record on 16 November. It was a better year for the Outer Group than in the past, with eight records from 14 October until 7 November, and a peak count of 6 on 16 October.

Goldcrest © Chris Cachia Zammit


Wren © Chris Cachia Zammit

Wren *Troglodytes troglodytes.* A common visitor; a rare breeder.

Four birds were present on Inner Farne on 22 March, the day after the rangers first arrived. There was an almost daily presence until 16 May, usually with one or two seen, but occasionally three. On Brownsman there was just one spring record, on 27 April. Wrens returned on 2 September and there were regular sightings until the rangers left on 4 December. On the Outer Group one to three birds were seen regularly between 14 October and 3 December, with four seen on 24 October and six seen on 4 November. On Inner Farne, the maximum counts were of 10, eight and eight birds on 18, 21 October and 9 November, respectively.

Treecreeper *Certhia familiaris.* An uncommon passage visitor. Twenty-five individuals.

It was a good year for this elusive forager with two sightings on Inner Farne, the 23rd and 24th records for the islands. The first was on the wall of the Fishe House by the Dock Bank on the morning of 30 August, but the bird disappeared shortly after. The second was on the wall of Prior Castell's Tower on 17 October, and the bird was seen regularly throughout the day around the Tower and Courtyard. Prior to the sighting on Inner Farne last year, a Treecreeper was last seen on the islands in 2008.


Treecreeper © Chris Cachia Zammit

Starling *Sturnus vulgaris*. A common visitor, formerly uncommon breeder, last in 2000.

Starlings had an almost daily presence on the islands during spring, with five birds seen on 22 March and 10 birds on 23 March. Subsequently, 1 - 8 were seen on 30 dates until 17 June when larger flocks developed and 10 - 20 were seen regularly during June and July, with peak counts of 47 on 7 July and 45 on 14 and 15 July. Large numbers continued to be recorded on both the Inner and Outer Groups until the end of the season, with the largest a flock of 50 on 9 November and one of 39 on 12 November.

Ring Ouzel *Turdus torquatus*. An uncommon passage visitor.

There were no spring sightings of this mountain blackbird, but there were records on five dates in October, all of individuals. A single male was seen around the island on 5, 6 and 7 October, and on 15 October a male surprised rangers and visitors by flying into the Information Centre. The final sighting was a few days later on 18 October.

Blackbird *T. merula*. An abundant passage visitor. Rare historic breeder.

Only ten sightings on Inner Farne between 22 March and 19 April made it a quiet spring for this species, with all but the first sighting being of single birds. There were sightings from Brownsman on 1 and 21 May of two and one individuals, respectively. The first autumn sighting was on 23 September, with passage starting in earnest on 4 October with 200 birds seen, the peak count for this season. From then, Blackbirds were present almost daily until 1 December, with records from Inner Farne on 48 dates, and Brownsman on 18 dates. Flocks of 50 birds were seen on 6 and 7 October, after which records from Inner Farne were of 10 birds or fewer; on Brownsman, slightly larger flocks were recorded on a few dates, with the peak count of 15 on 3 November.

Fieldfare *T. pilaris*. A common passage visitor.

Fieldfare were only recorded on five spring dates across the islands, between 19 and 27 April. Records were mostly of single birds, although three were seen on Brownsman on 27 April and 13 were recorded on Inner Farne on 24 April. Autumn passage was better, with 22 records between 5 October and 26 November. The peak count was on 2 November when 39 birds were seen flying east from Brownsman. Other high counts were on 3 and 4 November, with 14 birds seen on Inner Farne both days, and a flock of 15 seen on Brownsman on 4 November.

Redwing *T. iliacus*. An abundant passage visitor.

A flock of seven was seen on 22 March on the rangers' first full day on the islands. Singles were subsequently seen on six dates between 7 April and 1 May. Autumn passage began with 20 birds seen on 4 October, and birds were then seen on most days until mid-November. The highest daily count was on 15 October when at least 600 were recorded on Brownsman. Other peak counts were on 5, 6 and 7 October with flocks of 300, 100 and 400, respectively, seen on Inner Farne. Passage in November was much lighter, with 1 - 10 recorded on 16 dates; the final record was of a single bird on 28 November.

Song Thrush *T. philomelos*. A common passage visitor.

There were 14 seen on 22 March, heading west over Inner Farne; subsequently, there were 12 further spring sightings, all of one or two birds, except 18 April when three were seen on Inner Farne South Rocks, and 27 April when four were seen on Brownsman. The last spring bird was one on Brownsman on 1 May. The start of autumn passage was evident from one seen on Inner Farne Central Meadow on 21 September and birds were subsequently recorded on 27 additional dates until 30 November, with an almost daily presence during the first two weeks of October. Numbers were generally 1 - 10, although groups of 20 - 50 were seen on a few dates. Peak counts were 500, 100 and 80 on 7, 6 and 15 October, respectively. The total on 7 October is the joint fifth-highest count for the islands, along with the 500 seen on 23 October 1996.

Spotted Flycatcher *Muscicapa striata*. A well represented passage visitor.

A very poor year for this small passerine, with only five sightings, and no autumn passage. There were four sightings in May, all of singles on the Outer Group. There was only one sighting from the Inner Group, an individual near the Information Centre on Inner Farne on 8 June. This is the first year since at least 1971 in which there were no autumn records.

Robin *Erithacus rubecula*. A common passage visitor. Bred in 1951.

Robins were recorded on 32 dates in spring for Inner Farne, mostly of singles but 16 records were of 2 - 10 birds. The highest spring count was of 10 on 9 April. Between 6 and 28, April Robins had a daily presence on Inner Farne. On Brownsman, there were 10 spring records, all of singles except for two on 9 May. July was the only month without any sightings across the


Male Pied Flycatcher © Chris Cachia Zammit

islands. There were 73 records between 28 August and 3 December, and sightings almost daily from 1 October until the rangers departed. The peak count was 20 birds on 15 and 16 October.

Bluethroat *Luscinia svecica*. An uncommon passage visitor. Well represented in some years.

The Farnes Islands is a premier location on the east coast for this striking chat, and this season was no exception. The Inner Farne rangers were delighted to spot a conspicuous male by the Picnic Area on 8 June and again on 9 June in the Lighthouse Compound. This was the first male for the islands since 2016.


Male Bluethroat © Rebekah Goodwill

Pied Flycatcher *Ficedula hypoleuca*. An uncommon passage visitor.

It was a better year for this striking flycatcher with nine records over six days from across the islands. The first sightings were on 18 May when a male and female were seen on Brownsman, and a female was also found on Inner Farne by the Tower Sticks. A male was seen on Brownsman the following day, and a female was still present on Inner Farne. In autumn, there were sightings of one on Inner Farne on 24, 26, 27 and 28 August, and two were recorded on Brownsman on 26 August.

Black Redstart *Phoenicurus ochruros*. A well represented passage visitor.

The first sighting was of one near the Inner Farne Lighthouse on 6 April. An individual, likely to be the same bird, was seen daily until 9 April when rangers witnessed it being eaten by a visiting Sparrowhawk. On 8 June, a female was recorded on Brownsman, and on the same day another was seen near the Inner Farne Information Centre. All the autumn records this year were of singles from the Outer Group, recorded on 18 October and 5, 8 and 9 November.

Redstart *P. phoenicurus*. A common passage visitor.

The first spring sighting was a male in the Inner Farne Vegetable Garden on 18 April, with another sighting in the Vegetable Garden on 24 April. On Brownsman, a male was seen on 27 April, and a female the following day, and a male was seen again on 29 and 30 April. A female on 9 May was the final sighting for the Outer Group. There were autumn records from Inner Farne on 30 August, 5, 6 and 7 October, all of individuals except on 5 October when an adult male and first-winter female were seen on the Tower Sticks.

Whinchat *Saxicola rubetra*. A common passage visitor.

After no spring sightings last year, rangers were happy to see a single Whinchat on Inner Farne Top Meadow on 24 April. This was followed by two birds on Brownsman on 19 May, and singles on Inner Farne on 14 and 15 June. Autumn passage started on 26 August with two individuals on the Outer Group, and then three on Inner Farne on 28 and 29 August. Between 31 August and 23 September, one or two birds were seen on 17 dates. The final sighting was one on 14 October, again near the Top Meadow.

Stonechat *S. rubicola*. An uncommon passage visitor. Bred in 1946.

It was another relatively good year for this common mainland species which has undergone a notable decrease in sightings since 2010. There were records on four dates, beginning with the only spring sighting, of a single male on 30 March. In autumn, singles were seen on Inner Farne on 13 September and 14 October, with a male and female on Brownsman on 15 October.

Wheatear *Oenanthe oenanthe*. A common passage visitor.

The first sightings were on 30 March with a male and female on Inner Farne. From then on, there was a regular presence on the islands, with records on 33 dates between 7 April and 23 May. The majority of records were of individuals but three were present on 19 April, 9 and 11 May and at least four were present on 20 April. Autumn passage began on 9 August with one spotted on Inner Farne Central Meadow. There were then regular sightings on Inner Farne throughout August and September, with records on 46 dates until the final sighting on 7 October. Conversely, on Brownsman there were just three autumn sightings, on 26 August, 13 and 19 September. The majority of autumn records were of 1 - 3 birds, but four were seen on 28 August, 3 and 6 September.

Dunnock *Prunella modularis*. A common passage visitor.

Compared with the previous year, it was a poor spring for Dunnocks on the Farnes. Two were present on Inner Farne on 22 March, with singles on another three dates in March. Autumn was busier, with sightings on 16 dates between 4 October and 28 November. Four records were of two birds, with the rest comprising singles. All were from Inner Farne, except for one seen on Brownsman on 14 October.

Yellow Wagtail *Motacilla flava*. An uncommon passage visitor.

After last year when there were no recorded sightings, it was a better year for this brightly coloured wagtail. For the first time in five years there were spring records for the islands, with one seen near the Inner Farne Lighthouse on 7 May and two on Staple Island on 12 May. The last sighting for the year was one on Inner Farne Central Meadow on 8 September.

Pied Wagtail *M. alba yarrellii*. A well represented summer and passage visitor and uncommon breeder.

Another quiet year for this Farnes breeding passerine with 5 (6.4) nesting pairs across the islands. These were distributed as follows: Inner Farne 2 (3.4), Staple 1 (0.8) and Brownsman 2 (1.8). Birds were a daily presence across the islands from early April, and the first fledgling was seen on 7 June on Brownsman. As usual, there was a small post-breeding influx during the autumn. Unusually, there were no records of White Wagtail *M. a. alba* this season.

Meadow Pipit *Anthus pratensis*. A common passage visitor.

There were records on 25 spring dates between 4 April and 15 June. The majority of sightings involved individuals, although five were seen on 6 April and again the following day. The final sighting from the Outer Group was on 22 July. Autumn passage was light and limited to Inner Farne, where sightings were recorded on 23 dates between 22 August and 11 October. There were peak counts of 15 on 14 September, and seven on 16 September. The final record was of three heading west on 11 October.

Tree Pipit *A. trivialis*. A common passage visitor.

It was an extremely poor year for this pipit, with just two records. The first was one near the Inner Farne Picnic Area on 14 April. The second was in the Lighthouse Compound on 25 August.

Rock Pipit © Chris Cachia Zammit

Olive-backed Pipit *A. hodgsoni.* Rare visitor. Nine individuals (two together in 2012 was notable).

Rangers on Brownsman were thrilled to spot this Siberian visitor for the first time since 2014 on 8 November. An individual was seen in the vegetation around the Brownsman Tower, and the bird stayed to the following day. This is the first record since the five consecutive years of sightings between 2010 and 2014, and the tenth individual to be recorded on the islands, the first sighting being in 2001. It is also the latest seasonal sighting recorded, with all others being in October or late September.

Rock Pipit *A. petrosus.* A common resident well represented as a breeding species.

It was an improved year for Rock Pipit, with 11 (17.2) breeding pairs noted across the islands. Most records relate to the breeding population, with birds present on the islands throughout the year. Evidence of nest building in the Inner Farne Cemetery was noted on 2 April, with an adult carrying nest material seen on 6 April. In the Outer Group, the first sign of nest building was observed on 29 April on Brownsman, with the first fledgling seen there on 25 May. The first fledgling on Inner Farne was seen on 7 June. Nesting pairs were distributed across the islands as follows: Inner Farne 2 (4.8), Staple 2 (2.8), Brownsman 4 (6), South Wamses 1 (1), North Wamses 1 (1) and Longstone 1 (0.5). In autumn, resident birds are supplemented by passage birds.

Chaffinch *Fringilla coelebs.* A common passage visitor.

Inner Farne produced all the records this year. A lone female was seen on four consecutive days from 6 to 9 April, each time in the Inner Farne Courtyard and comprised all the spring records. In Autumn, 1 - 3 birds were seen consecutively from 25 - 27 September and 1 - 4 were recorded on six dates from 4 - 10 October. The final record was of a lone bird in the Cemetery on 19 October.

Brambling *F. montifringilla.* A common passage visitor.

Spring passage was light with seven records between 24 April and 18 May. Autumn proved to be better, with the first bird heard on 27 September. There were then a further 16 records across the islands until 24 November. Most sightings were of 1 - 3 birds, but a group of four were seen on Inner Farne on 17 October, and five were seen in the Inner Farne Vegetable Garden on 2 November.

Female Bullfinch © Tom Hendry

Bullfinch *Pyrrhula pyrrhula.* An uncommon passage visitor.

A female was seen in the Inner Farne Lighthouse Compound on 10 April. It was seen again around the Lighthouse and the Courtyard several times the next day. This is the first record since a male was seen in autumn 2011 and marks the twelfth year that Bullfinches have been recorded on the islands. Before this year, 31 individuals have been recorded on the islands, but 15 of those occurred in an unprecedented influx in 2004.

Greenfinch *Chloris chloris.* A well represented passage visitor.

On 13 October, four birds were heard and seen flying over the Inner Farne Top Meadow. A welcome sight as this nationally-declining species was last recorded in 2016.

Linnet *Linaria cannabina.* A common passage and winter visitor.

Spring brought 24 records, usually comprising two birds with a maximum count of six on 23 March. The final spring record was a male on Brownsman on 8 May. The first Linnet of the autumn was a single bird in the vegetation above Ladies Path on Inner Farne, recorded on 20 September. They remained a near-constant presence around the islands for the remainder of the season, peaking on 8 October with a flock of 60 on Inner Farne.

Common Redpoll *Acanthis flammea.* An uncommon passage visitor.

The only one recorded this season was one discovered on Brownsman on 20 October which was seen until 23 October.

Goldfinch *Carduelis carduelis*. A well represented passage visitor.

It was a quiet year for this distinctive finch with Inner Farne producing both records: two birds were seen flying north over Ladies Path on 13 April, and two were seen from the Lighthouse Compound flying towards the mainland on 15 April. Autumn failed to produce any records.

Siskin *Spinus spinus*. A common passage visitor.

2019 produced only two records, representing another poor year for this species. A lone individual was discovered in the Lighthouse Compound on 20 April and a female was seen on the Brownsman jetty on 14 October.

Snow Bunting *Plectrophenax nivalis*. A well represented passage visitor.

There were only three records of this winter visitor in 2019, all in the autumn. Two on 28 October and a single bird on 8 November were the only Brownsman records. The final record of the season was an individual spotted during a trip to Knoxes Reef on 15 November.

Little Bunting *Emberiza pusilla*. An uncommon passage visitor.

On 9 November, one was discovered outside Brownsman Cottage. It showed well throughout the day but could not be relocated the following morning. This was the only record of this attractive Siberian vagrant this year.

Reed Bunting *E. schoeniclus*. A well represented passage visitor.

A quiet year for Reed Bunting with just five records. A single bird seen on the Inner Farne Tower Sticks on 19 May was the only spring record. A first-winter bird on Inner Farne on 4 October was the first autumn sighting, followed by a female on Central Meadow on 20 October. An individual present on Brownsman from 26 - 27 October was the final bird of the season.

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REFERENCES

BRITISH ORNITHOLOGISTS' UNION (2017). The British List: A Checklist of Birds of Britain (9th edition). *Ibis* **160**: 190-240. **https://www.bou.org.uk/british-list/**. Accessed 11 March 2020.

OKILL, D, and BOLTON, M (2005). Ages of Storm Petrels *Hydrobates pelagicus* prospecting potential breeding colonies. *Ringing & Migration* **22**: 205-208.

WOJCZULANIS-JAKUBAS, K, JAKUBAS, D, KOŚMICKA, A, and JENSEN, J-K (2014). Leg abnormalities and leucocyte profiles in the European Storm-Petrel (Hydrobates p. pelagicus) from the Faroe Islands. *The Wilson Journal of Ornithology* **126**:739-745.

A STUDY OF PREY CAUGHT BY ARCTIC TERNS *STERNA PARADISAEA* NESTING ON THE FARNE ISLANDS

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INTRODUCTION

Arctic Tern *Sterna paradisaea* is one of five tern species that breed each year in the UK. On the Farne Islands, 1735 pairs bred in 2018 and this abundance makes them an important species for studying food availability, particularly because the number of breeding pairs on the Farnes has fluctuated over the past ten years and decreased overall.

Breeding requires individual birds to expend a large amount of energy (Suddaby and Ratcliffe, 1997; Monaghan *et al*, 1989). Even before the first egg is laid the male Arctic Terns forage for large display fish in addition to providing food for themselves and the female until the first egg is laid. As a surface feeder, the feeding and foraging habits of Arctic Terns can provide important indicators of changes in the local marine environment (Scopel and Diamond, 2017; Mallory *et al*, 2017). By studying the prey that Arctic Terns are bringing for their young, and comparing this to other factors, we can begin to understand the needs of this declining species. This study was carried out to contribute to the understanding of local environmental factors affecting the breeding success of Arctic Terns. Although over 26 hours of observation were carried out, disentangling the contributions of weather and tide to foraging success against a background of potential yearly variation in the surface availability of different forage fish species requires data collected over several years. Therefore, apart from analyses of prey species and prey size distributions, we report summaries of data for food delivery rates without detailed statistical analysis.

METHODS

The study was undertaken on Inner Farne and Brownsman during June and July 2019 when the nesting Arctic Terns were present with chicks. The observer monitored nests for one hour at a time, recording the number of food deliveries to chicks, type of prey, size of prey relative to adult bill length, time (BST), nest number, brood size and age (chick feather stage using the BTO system, given in the text below), weather (wind strength using the Beaufort scale, wind direction, cloud cover, rain, temperature), and tide state (High, Ebb, Low, Flood).

For each session, delivery rate per nest per hour was calculated ([deliveries/session length]/number of nests). This was then used in analyses to test for effects of environmental factors on provisioning. Because of time constraints as the season progressed, shorter survey sessions and remote cameras were utilised to enable more surveys to be completed.

	Inner Farne	Brownsman	Total
Surveys	18	21	39
Total observation time (minutes)	363	1238	1601
Total deliveries	322	297	619
Mean delivery rate (feeds/hour)	8.9	6.3	7.3
Successful feeds	297	269	566
Success rate	92.2%	90.6%	91.4%
Display fish	8	0	8
Mean fish Size	1.33	0.99	1.19
Identified prey	sandeel, clupeid, gadoid	sandeel, rockling, clupeid	

Table 1: Summary of Arctic Tern chick provisioning surveys.

RESULTS

Prey Delivery

The mean delivery rate was 7.3 per nest per hour for the two islands, but deliveries were more frequent on Inner Farne with a mean rate of 8.9, compared to 6.3 on Brownsman (Table 1). However, this is not a measure of food intake as it does not take feeding success into account. Inner Farne recorded the greatest range of delivery rates with 16.7 and 2.4 recorded on 1 July and 1 June, respectively. As the season progressed, delivery rates appeared to increase on Inner Farne, but the reverse was apparent on Brownsman.

Successful Feeding Attempts

Provisioning success rate was > 90% for each island individually and overall (Table 1). Inner Farne had the highest success rate with 92.2% of prey deliveries being successfully ingested by chicks. Multiple feed events occurred on three occasions: twice on Inner Farne when adults successfully brought back three sandeels *Ammodytes* species (sizes 1x, 1x, 1.5x bill length) to a nest containing two chicks on 1 June and to a single chick on 7 July, and on 15 July an adult brought back three sandeels (1x, 0.75x, 0.75x) to an individual chick on Brownsman.

Prey Species

Prey comprised primarily of sandeels, which represented 78% of the total prey brought to the islands (Figure 1), and 89% of prey on Inner Farne and 65% on Brownsman. There was a marked difference between the two islands in the composition of prey species. Brownsman had a greater diversity of fish, with five different identifiable types compared to four on Inner Farne. There was a complete absence of rockling on Inner Farne, whereas they represented 14% of all the fish brought back to Brownsman.

Prey Size

The mean prey size was 1.19 bill lengths, but there was a significant difference between the two islands in the size distribution of fish brought in (Figure 2). While the most frequently observed prey size for both islands was 1 bill length, more than half (52.7%) of the fish brought back to Inner Farne were >1 (Figure 2); in contrast, the amount of smaller fish brought to nests on Brownsman was considerably higher, with 33.4% of all prey caught measuring <1 in comparison to just 3.9% on Inner Farne. With respect to sandeels alone, as this was the dominant prey species in both islands, comparing Inner Farne and Brownsman with respect to frequencies of prey in the 0.5 (0.5 to <1), 1 (1 to <1.5), 1.5 (1.5 to <2) and 2 (2 to <2.5) bill-length categories, there was also a significant difference between islands (Fisher's Exact test, 2 x 4 contingency table, $P < 0.0001$).

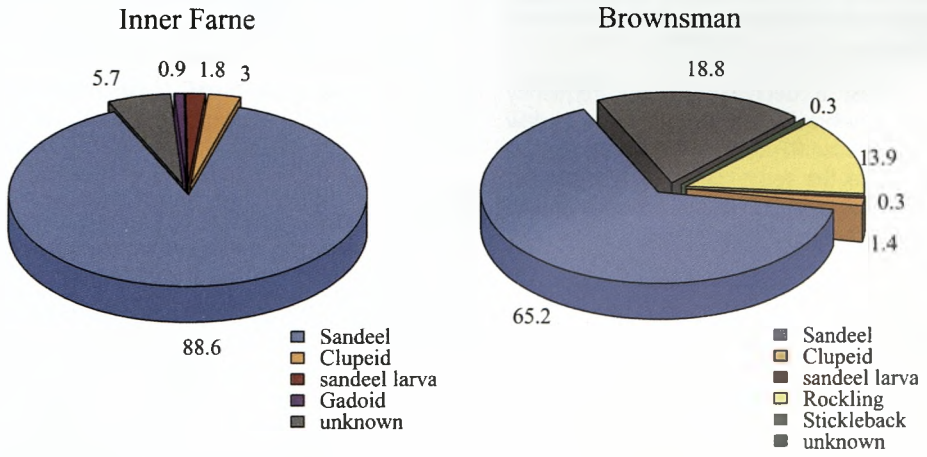

Figure 1: Composition of prey species brought back during provisioning surveys on Inner Farne and Brownsman. Numbers next to each segment are percentages.

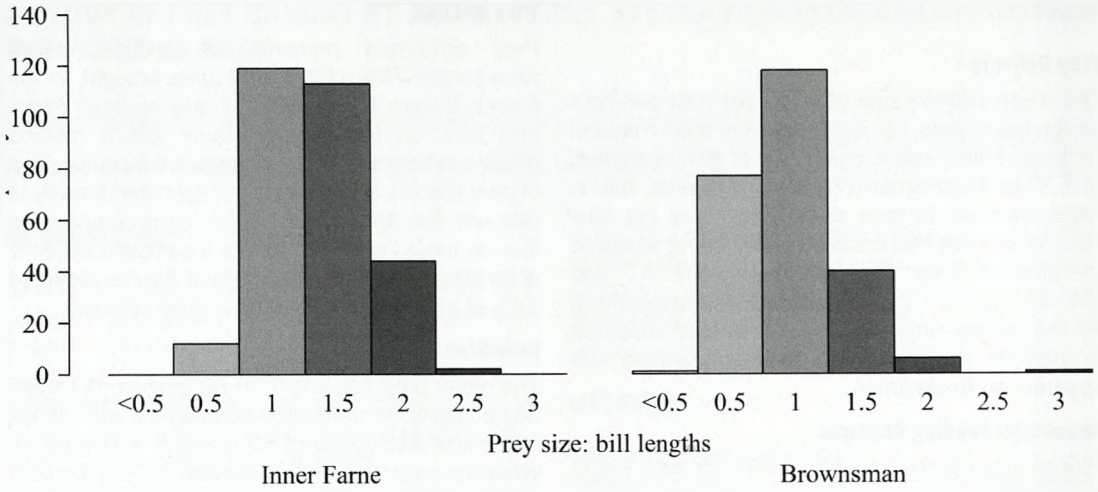

Figure 2. Prey size (all species) in relation to adult Arctic Tern bill length. Size categories are: < 0.5 bill lengths; 0.5, 0.5 to <1; 1, 1 to <1.5; 1.5, 1.5 to <2; 2, 2 to <2.5; 2.5, 2.5 to <3; 3, 3 or more. The difference in prey size distribution between the two islands was significant, Fisher's Exact Test, $P < 0.001$.

Delivery rates in relation to brood size and age

There was considerable variation across the data sets for delivery rates in relation to chick age and brood size. Six levels of chick age were used: downy feathers only (DO), juvenile flight feathers in pin (IP), Juvenile flight feathers short (FS), juvenile flight feathers medium (FM), juvenile flight feathers long and nearly fully grown (FL), chick ready to fledge (RF). As the age of chicks increased past the downy (DO) stage, deliveries were more frequent, with a maximum of 11 attempts recorded in 25 minutes (26.4 attempts per hour) for a nest with stage FL chicks (Figure 3). This is expected as older chicks no longer require incubating and both adults are able to leave the nest to find food (Morris, 2013).

The data suggest a decrease in the frequency of deliveries between FL and RF birds, with few attempts recorded for RF birds. This would also be expected because the ready-to-fledge young need encouragement to strengthen flight muscles and to begin learning to forage for themselves.

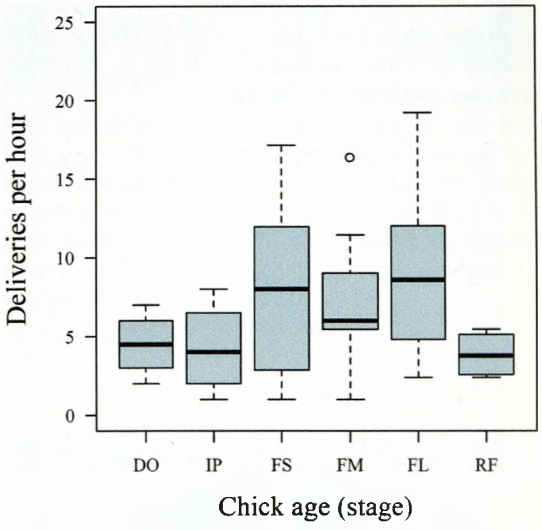

Figure 3. Food delivery rates (mean attempts per hour) for young of different ages (DO, IP, FS, FM, FL and RF) as a box and whisker plot showing median (horizontal bar), minimum and maximum (upper and lower bars at the end of the dotted 'whiskers'), first and third quartile (box limits) and outliers (open circles).

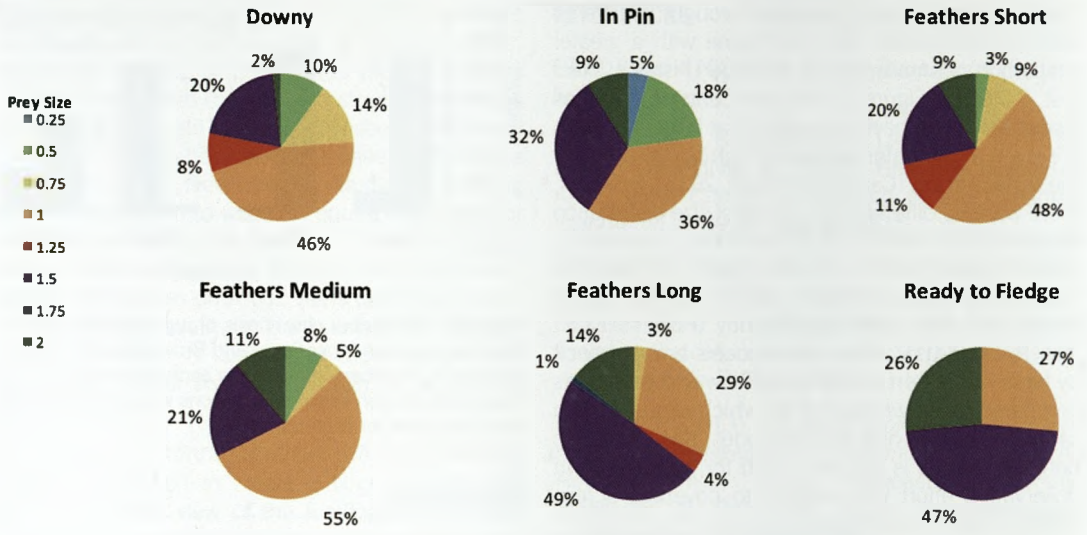

Figure 4. Diagrams showing the different prey sizes fed to chicks, compared to the bill length of an adult tern, brought in for each age group: Downy, In Pin, Feathers Short, Feathers Medium, Feathers Long and Ready to Fledge.

Size of prey in relation to brood size and chick age

The most commonly recorded prey size was of length equal to one adult tern bill (=1), and this was largely the same across all chick ages. There was a slightly higher percentage of small fish (<1) brought in for young than for older chicks which was 23.7% and 22.7% for DO and IP chicks, respectively, compared to 0 - 12.9% for FS to RF young. Similarly, there was a higher percentage of larger fish (size >1.25) brought in for FL (64.5%) and RF (73.5%) young, compared to 22.0 - 40.9% for DO to FM young (Figure 4). However, these apparent differences in size distribution between the age groups were not significant, both with respect to sandeels on Inner Farne (Fisher's Exact Test, P = 0.52), sandeels on Brownsman (P = 0.102) or all fish species on Brownsman (P = 0.3). There was also no significant difference in the size frequencies of sandeels brought to broods of one or two chicks, for either Inner Farne or Brownsman (Fisher's Exact Test, P > 0.14).

Weather

During the study, wind strength varied from 1 to 5, but most surveys fell within the range 1 to 4 and showed little variation in the food delivery rate (Figure 5). One survey took place at a Beaufort wind strength 5, with a high delivery rate. Mean delivery rates also varied according to wind direction, with higher delivery rates in westerly or easterly winds (Figure 5), but, as with wind strengths, sample sizes vary for different wind directions. Other weather factors (cloud cover, temperature, rain) may have contributed to variations in delivery rates but data were insufficient for analysis.

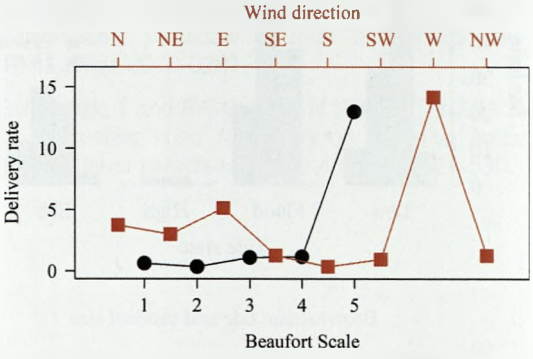

Figure 5. Delivery rates in relation to wind strength (black; Beaufort scale, lower horizontal axis) and wind direction (red, upper horizontal axis).

Tide State

The majority of deliveries were during high tide, but this showed some variation between islands. Highest delivery rates on Brownsman were during flood tides, whereas these were during high tide on Inner Farne (Figure 6).

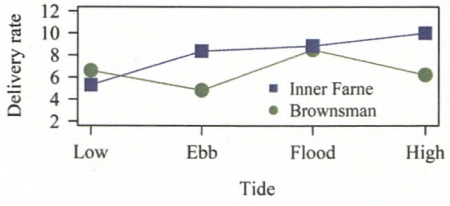

Figure 6. Delivery rates per tidal state.

The size distribution of sandeels brought in differed between tidal states for Inner Farne with a greater proportion of smaller fish at low tide (Fisher's Exact test, P 0.0015; Figure 7). This is in contrast to studies elsewhere which have suggested that larger sandeels are lower in the water column at high tide and nearer the surface at low (Cabot and Nisbet, 2013). However, there were no differences in sandeel size distribution between tidal states for the Brownsman observations (Fisher's Exact test, P= 0.36; Figure 7). The total number of sandeels brought back at different states of the tide also varied significantly (Fisher's Exact test, $P < 0.0001$), with more sandeels brought back by birds nesting on Inner Farne at low and flood tides compared to Brownsman birds which brought more sandeels back at high and ebb tides; this difference between islands is not accounted for by variation in observation effort with respect to coverage across different tidal states (Figure 8).

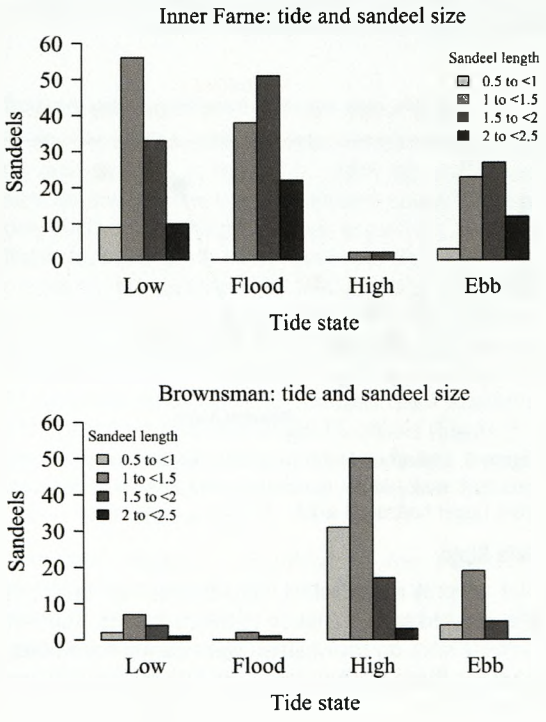

Figure 7. Sandeel size distribution (relative to adult beak lengths) for different tidal states for Inner Farne (upper) and Brownsman (lower).

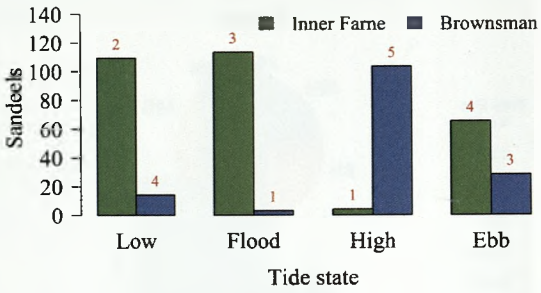

Figure 8. The number of sandeels brought back to chicks by Arctic Terns on Inner Farne and Brownsman at different tidal states. Numbers in red above each bar are the number of days on which observations were carried out at each tidal state for each island.

DISCUSSION

Most of these results mirror data from studies on other colonies. However, local factors are important and colony-specific data can be used to understand the causes of changes in the size and breeding success of Northumberland seabirds. Although fewer surveys were carried out on Inner Farne, this island had a higher food delivery rate than on Brownsman and may be a factor contributing to the higher Arctic Tern productivity (chicks per pair) on Inner Farne compared to Brownsman. As the season progressed, the food delivery rate on Inner Farne increased as the chicks got older. However, on Brownsman, there was a decline in delivery rate as the season progressed which may have resulted from a higher rate of failure of early nests and, in consequence a higher proportion of younger chicks in July from re-lays than on Inner Farne. This may also have been a factor in the lower productivity on Brownsman.

Nevertheless, the clear differences between the islands in the proportion of different prey types brought in is an important indication that the Arctic Terns on the two islands, although only 2.5 km apart, have different feeding grounds or foraging strategies. This was apparent with respect to inter-island differences at three levels: (1) the proportion of different type of forage fish brought back; (2) for the sandeels, which formed the major component of diet on both islands, differences in the size distribution of these prey items, and (3) tidal effects on the patterns of sandeel delivery. It will be important to carry out similar studies in the future to find out if such effects are consistent from year to year, or reflect short-term changes in the marine environment which may affect the inner and outer group islands to different extents.

It is known from other studies that weather can have an impact on the delivery rate of prey to chicks, as well as the type of prey that is provided. Those studies have shown that as wind strength increases so does delivery rate (Cabot and Nisbet, 2013), and this also seems to have been the case on the Farne Islands in 2019. Nevertheless, studies of feeding patterns in relation to weather require more data for successful analysis. With respect to tides, the highest delivery rates were seen on high and ebb tides, which agrees with studies on Arctic Terns carried out some 30 km further south in Northumberland (Morris, 2013). However, in contrast to those studies, we found that smaller fish were brought in at low tide (Morris, 2013).

It is clear that further surveys over the following years are required to create a larger dataset and a more-accurate view of the feeding habits of the Arctic Tern on the Farne Islands. The most important conclusion from this study is that local factors can have a marked effect of the foraging success of birds nesting on different islands within the Farnes archipelago, and this will have important implications for interpreting the results from monitoring data and for future management of the marine environment of the Farne Islands.

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REFERENCES

CABOT, D and NISBET, I (2013). *Terns*. HarperCollins, London.

MALLORY, M L, BOADWAY, K A, DAVIS, S E, MAFTEI, M and DIAMOND, A (2017). Breeding biology of Arctic terns (*Sterna paradisaea*) in the Canadian High Arctic. *Polar Biology* **40**: 1515 – 1525.

MONAGHAN, P, UTTLEY, J D, BURNS, M D, THAINE, C and BLACKWOOD, J (1989). The Relationship between Food Supply, Reproductive Effort and Breeding Success in Arctic Terns *Sterna paradisaea*. *Journal of Animal Ecology* **58**: 261-274.

MORRIS, L (2013). *Breeding ecology of Arctic Tern (Sterna paradisaea) and Common Tern (Sterna Hirundo)* Ph.D. thesis, Newcastle University, accessed 28 December 2019. **http://theses.ncl.ac.uk/jspui/handle/10443/1882**

SCOPEL, L and DIAMOND, A (2017). Predation and food-weather interactions drive colony collapse in a managed metapopulation of Arctic Terns (Sterna paradisaea). *Canadian Journal of Zoology*. **96**: 10.1139/cjz-2016-0281.

SUDDABY, T and RATCLIFFE, N (1997). The Effects of Fluctuating Food Availability on Breeding Arctic Terns (Sterna paradisaea). *The Auk*. **114:** 524-530.

BUTTERFLIES ON THE FARNE ISLANDS

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SEASON SUMMARY

Eleven species of butterfly were recorded on the Farne Islands in 2019, with an impressive total of 3943 individuals seen. These results suggest that it was, overall, a good year for butterflies, with the highest number of individual sightings since regular monitoring began in 2010 (Table 1). However, if the abundant Painted Lady and Red Admiral are excluded from the totals, it was not an exceptional year for butterflies on the Farnes.

Common Blue *Polyommatus icarus* was again absent this year; Comma *Polygonia c-album*, Dark Green Fritillary *Speyeria aglaja* and Meadow Brown *Maniola jurtina* did not return; and sightings of Large White, Small White, Green-veined White, Small Tortoiseshell, Peacock, and Wall declined compared to last year (Table 1 and Systematic List). Butterfly numbers are significantly affected by weather and these declines may, in part, have been a result of the cold and rainy summer weather this year, with rain on more than 50% of days in the period from May through to September. This included a storm in mid-June when there was over 100 mm rainfall within two days on 13 and 14 June. Compared to the calm summer of last year, this will have had a detrimental impact on the larval and pupal stages of these species.

Despite this, a highlight of the year was a huge influx of Painted Lady butterflies (Figure 1), with a total of 1712 individuals and peak numbers of 1023 in July (Table 2). The year has turned out to be a 'Painted Lady year', with vast numbers of this intercontinental migrant arriving in the UK in mid- to late June and laying eggs to produce a new generation of butterflies that gained Painted Ladies the title of most numerous species recorded in England, Northern Ireland, Scotland and Wales (Big Butterfly Count, 2019).

This influx of the Painted Lady was followed by an influx of another migratory species, the Red Admiral, with a total of 1991 individuals and peak numbers of 1555 in August.

Regular transects under the UK Butterfly monitoring Scheme (UKBMS, 2018) were conducted from 7 June to 25 September on Inner Farne, and these provided the majority of sightings. However, there were also plenty of casual sightings, with popular spots being St. Cuthbert's Cove and the Courtyard on Inner Farne (Table 3).

Figure 1. Painted Lady Butterfly.

Species	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Large White	185	15	78	408	208	9	66	36	303	38
Small White	669	173	276	702	537	35	11	86	495	51
Green-veined White	73	17	23	151	331	29	18	38	146	48
Small Copper	40	0	0	2	4	0	0	3	2	4
Common Blue	0	0	0	1	0	0	0	0	0	0
Red Admiral	323	1051	513	110	2039	676	157	317	143	1991
Painted Lady	20	136	8	24	39	26	56	25	51	1712
Small Tortoiseshell	312	138	391	355	229	74	48	48	71	67
Peacock	45	30	102	62	47	11	15	30	12	7
Comma	2	1	1	0	0	1	1	0	1	0
Dark Green Fritillary	1	1	0	0	0	0	0	0	1	0
Speckled Wood	0	3	2	1	10	1	1	6	3	5
Wall	17	6	0	37	7	3	4	8	11	4
Meadow Brown	0	30	4	4	1	4	3	0	1	0
Ringlet	1	0	0	13	2	0	1	0	1	3
White spp	0	0	0	904	0	0	0	0	102	13
Total	**1688**	**1601**	**1398**	**2774**	**3454**	**869**	**381**	**597**	**1343**	**3943**

Table 1: Yearly species totals from transect, moth trap, and casual sightings for 2010 to 2019. Scientific names are given in the systematic list.

Species	March	April	May	June	July	August	September	October
Large White	0	0	1	2	20	10	4	1
Small White	0	0	12	7	4	14	13	1
Green-veined White	0	0	8	2	29	8	1	0
Small Copper	0	0	0	0	2	2	0	0
Common Blue	0	0	0	0	0	0	0	0
Red Admiral	0	0	1	206	45	1555	179	5
Painted Lady	0	0	1	143	1023	537	8	0
Small Tortoiseshell	3	5	3	5	43	2	4	2
Peacock	2	0	0	0	1	4	0	0
Comma	0	0	0	0	0	0	0	0
Dark Green Fritillary	0	0	0	0	0	0	0	0
Speckled Wood	0	0	0	0	0	0	4	1
Wall	0	0	2	0	0	0	0	2
Meadow Brown	0	0	0	0	0	0	0	0
Ringlet	0	0	0	0	3	0	0	0
White spp	0	0	0	12	0	1	0	0
Total	**5**	**5**	**28**	**377**	**1170**	**2133**	**213**	**12**

Table 2: Monthly breakdown of sightings for each species seen on the Farnes in 2019.

Species	UKBMS	Casual sightings
Large White	30	8
Small White	29	22
Green-veined White	35	13
Small Copper	4	0
Red Admiral	1850	141
Painted Lady	892	819
Small Tortoiseshell	36	30
Peacock	1	6
Speckled Wood	0	5
Wall	0	4
Ringlet	0	3
White spp	3	10
Total	**2880**	**1061**

Table 3: UK Butterfly Monitoring Scheme (UKBMS, 2018) transect results compared to casual observation for 2019. Transect data are from Inner Farne only; Casual sightings include counts from both Inner Farne and the Outer group of islands. Transects were conducted from 7 June to 25 September.

SYSTEMATIC LIST

Pieridae

Large White *Pieris brassicae*

Recorded: 25 May – 12 October

Peak: 5 on 28 July

This species has shown a decline in recent years, with a national reduction in abundance of 28% from 2005 to 2014 (UK butterflies, Butterfly Conservation), and of 42% compared to just last year (Big Butterfly Count, 2019). This was reflected on the Farnes, being the least abundant member of the *Pieridae* family with only 38 sightings this year; a huge decline of 87% from the 303 individuals spotted last year, and a decline of 79% from 2010.

Small White *P. rapae*

Recorded: 17 May – 1 October

Peak: 7 on 23 May (2 on Inner Group islands, 5 on Outer Group)

Whilst being the most abundant *Pieris* species spotted on the Farnes this year with 51 individual sightings, this species has also declined nationally by 42% compared to 2018 (Big Butterfly Count, 2019); this national decline was reflected on the Farnes with a reduction in sightings of 92% from 2010, and 90% when compared to last year.

Green-veined White *P. napi*

Recorded: 24 May – 7 September

Peak: 14 on 23 July

Bizarrely, as with the other *Pieris* species, the Green-veined White also showed a national decline of 42% compared with the same period last year (Butterfly Conservation, 2019). On the Farnes, this species has also declined, but to a slightly smaller extent than the other species: 48 individuals were recorded, a decline of 34% from 2010, and 67% from 2018.

White Species *Pieris sp.*

Recorded: 6 June – 1 August

Peak: 10 on Outer Group on 6 June

There was a small influx of *Pieris* species on the Outer Group islands this year, with 10 individuals spotted on Staple and Brownsman Islands. Three other individuals were also recorded on Inner Farne.

Nymphalidae

Red Admiral *Vanessa atalanta*

Recorded: 3 May – 26 October

Peak: 20 August (209 individuals)

The Red Admiral (Figure 2) was the most numerous species on the Farnes this year, with 1991 individual sightings and a peak of 209 on the Dock Bank of Inner Farne; an increase of 516% since 2010, and 1292%

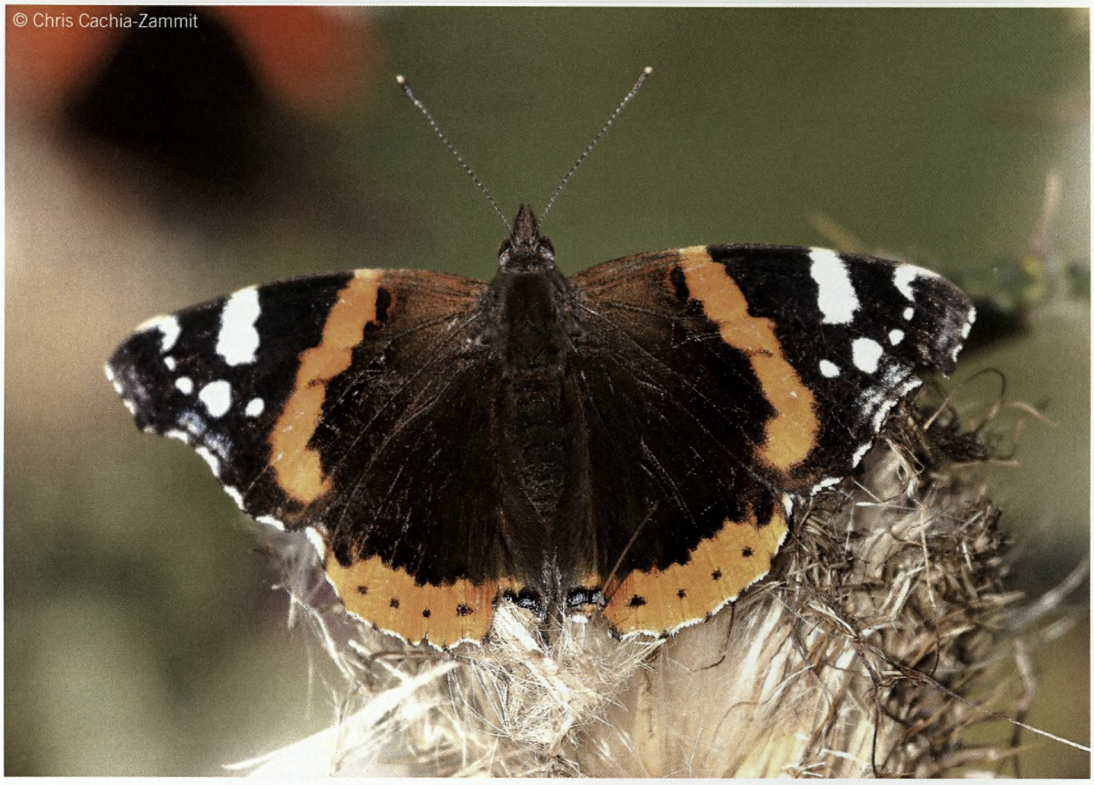

Figure 2. Red Admiral.

since 2018. This species migrates northwards from North Africa and continental Europe to lay its eggs in the UK. Nationally, there are indications that numbers have increased in recent years, with their distribution having increased by 25% in Britain since the 1970s (Big Butterfly Count, 2019). Frequent westerly winds may have blown large numbers across to the islands from the mainland, and on the islands the high abundance of their larval food plants Common Nettle *Urtica dioica* and Small Nettle *Urtica urens* will have supported an increase in abundance this year.

Painted Lady *V. cardui*

Recorded: 28 May – 13 September

Peak: 460 in Courtyard on 30 July

This regular migrant to the UK arrived in impressive numbers, with 1712 individual sightings and a peak of 460 individuals in the Courtyard on Inner Farne; an astonishing increase of 8460% from 2010 to 2019, and 3257% from 2018 to 2019. Each year successive generations of these butterflies make an impressive round trip of 7000 miles, moving northward from Africa to breed in central and northern Europe during the summer; their offspring then make the return journey south to avoid the cold (Big Butterfly Count, 2019). The number that reaches the UK varies greatly from year to year, with a dramatic increase in abundance occurring on average once every ten years. The huge numbers on the Farnes in 2019 may, in part, have been helped by the weather, with frequent light to moderate westerly winds blowing individuals onto the islands from the mainland, as well as there being many emerging on the islands due to a great abundance of their larval food plants Common Nettle, Small Nettle and Spear Thistle *Cirsium vulgare*.

Small Tortoiseshell *Aglais urticae*

Recorded: 22 March – 12 October

Peak: 5 on 28 July

It was a poor year on the Farnes for the Small Tortoiseshell, with only 66 individual sightings across the Inner and Outer Groups, the second lowest record and a decline of 79% since 2010. Nevertheless, records show a less startling decline of only 7% when compared to last year, which although still concerning, is a positive sign for this common resident species of conservation concern which nationally has suffered widespread declines of 73% since 1976 (Big Butterfly Count, 2019).

Peacock *A. io*

Recorded: 23 March – 24 August

Peak: 2 on 5 August

Whilst nationally this species seems to be faring well with an increase in abundance of 235% from 2018 being seen (Big Butterfly Count, 2019), this was not reflected on the Farnes. Only seven individuals were seen; a decrease of 84% and the lowest count since 2010.

Satyridae

Speckled Wood *Pararge aegeria*

Recorded: 11 September – 12 October

Peak: 1 each of 11, 23, 24 and 25 September, and 1 on 12 October.

An average year for this woodland species with five individuals being seen throughout September and October on Inner Farne. There were no sightings on the Outer Group.

Wall *Lasiommata megera*

Recorded: 25 May – 12 October

Peak: 2 on 12 October

Whilst never reaching high numbers on the Farnes, the most sightings having been 38 in 2013, the Wall butterfly experienced quite a bad year, with only four individuals being spotted on Inner Farne. Despite this species faring quite well in coastal areas, this was the lowest number seen after no sightings in 2012.

Ringlet *Aphantopus hyperantus*

Recorded: 17 July

Peak: 3 on 17 July

This year, this relatively common butterfly has increased in abundance nationally by 132% compared to 2018 (Big Butterfly Count, 2019). Although not common on the Farnes, having shown sporadic appearances since it was first recorded in 2010, the Ringlet made a welcome appearance this year with three individuals seen, the second highest record after 13 in 2013.

Lycaenidae

Small Copper *Lycaena phlaeas*

Recorded: 28 July – 24 August

Peak: 2 on each of 28 July and 24 August.

Another average year for the Small Copper with just four sightings, all on St. Cuthbert's Cove on Inner Farne. Whilst this is a decrease of 90% compared to 2010, it is the highest number recorded in the last 5 years, a positive for this nationally declining species (UK Butterflies, 2019).

REFERENCES

BIG BUTTERFLY COUNT (2019). **https://www.bigbutterflycount.org/2019mainresults** Accessed 17 October 2019.

UKBMS (2018). **https://www.ukbms.org/**. Accessed 17 October 2019.

UK BUTTERFLIES (2019). **http://www.ukbutterflies.co.uk/index.php**. Accessed 17 October 2019.

MOTHS ON THE FARNE ISLANDS

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SEASON SUMMARY

Moths are in decline in the UK and it is thought that since the 1960s macro moth numbers have dropped by almost 30%, with the Garden Tiger believed to have declined by over 90% (Fox *et al*, 2013). Moths and their caterpillars are an important food source for many different species of birds and bats and, therefore, declines in abundance could have a significant impact on wildlife. Because of this and their sensitivity to changes in the environment, moths are viewed as important indicator species. Understanding the range of moth species that we have is more important than ever in helping to conserve the environment for future generations.

Despite a renewed interest from the Farnes rangers, it was a slow start this year with several trapping nights early in the season failing to catch a single moth. This was reflected across the county with low numbers of moths being trapped (Northumberland Moths, 2019). Fortunately, things picked up with the warmer weather and over 100 individual moths were caught in July. On Inner Farne, 16 successful moth-trapping nights between 30 March and 19 September using the 125W MV Robinson trap resulted in 556 individual moths being caught. In addition, during day-time activities or while walking the butterfly transect there were casual sightings of many day-flying moths, with 1666 Nettletaps seen in one day (26 September). Unfortunately, the 15W actinic trap on Brownsman broke early in the season and as a result it was not possible to get a good idea of the species present. Despite this, 2613 Diamond-back moths were still recorded on Brownsman between 18 May and 21 June. In total, 5584 individual moths from 74 different species were recorded across the islands, which is the 3rd highest count since records began.

SEASON HIGHLIGHTS

Dark Crimson Underwing *Catocala sponsa*

This beautiful moth is considered a Red Data Book species, indicating that it is rare in the UK and breeding in 15 or less 10 km squares. The few sightings that there are, are usually located in the south of England. On 28 July, a ranger reported that there was an interesting moth on the outside of a window on the staircase to the Pele tower roof on Inner Farne. Our initial thought was that it was the common Red Underwing *Catocala nupta*, however, it was noted that the marking of the underwing looked very different. Unfortunately, the location of the moth meant we were unable to get a better look and so, after much deliberation, we sent off some photos (Figure 1) to several local moth groups, who, to our surprise, all said that it was a Dark Crimson Underwing. Despite our best efforts to lure it in to the light trap that night, this was the only sighting that we had of it. This amazing moth is not only a first for the islands but also a first for Northumberland, making it the moth highlight of the year.

Figure 1. Photos of Dark Crimson Underwing taken through a window - the best that could be obtained in the circumstances!

Narrow-winged Pug *Eupithecia nanata*

A common UK moth that is usually found on moorlands and Heathland, so not all that surprising that it has not made its way over to the islands before. A single individual was in our moth trap on the night of 25 July.

Iron Prominent *Notodonta dromedaries*

This handsome moth was discovered in the trap on Inner Farne on 11 July. It is considered a common species for the UK and Northumberland, however before now had not ventured out to the islands. The individual caught in the trap was of the darker form which is often thought to be the northern variety of this moth.

Nutmeg *Anarta trifolii*

A common moth that is recorded breeding as far North in England as Yorkshire but is often seen in low numbers every year in Northumberland. As well as being a resident species, it is also thought to be a migrant, with most migratory sightings being along the coast. Therefore, it is perhaps inevitable that it would eventually be recorded on the Farnes. One individual was caught in the light trap on Inner Farne on 29 July.

Pale-shouldered brocade *Lacanobia thalassina*

Another common moth that had not been recorded on the Farnes before. It is typically found in woodland or moorland but one was discovered in the trap on 29 July.

Micro moths

Due to their small size and similarity, micro moths can be extremely difficult to identify and are usually very under-recorded on the Farnes apart from the few with unique identification characteristics. Fortunately, this year a few rangers were interested in identifying these tricky Lepidoptera, and this resulted in the discovery of five new species (*Mompha epilobiella, Limnaecia phragmitella, Eucosma campoliliana, Eucosma hohenwartiana* and *Crambus perlella*) as well as several others that have not been recorded since 2013. Understanding all the moths that we have on the islands is more important than ever, so hopefully this interest in micro moths will continue and help us to gain a better idea of the variety of lepidoptera that are present on the Farne Islands.

SYSTEMATIC LIST

Species	First date	Last date	Total days	Moths Inner Farne	Moths Brownsman	Peak Count	Total moths 2019	Total moths 2018	UK Status
MACROLEPIDOPTERA									
Family: Hepialidae									
Common Swift *Korscheltellus lu pulina*	30 May	25 Jul	10	16	-	3	16	0	Common
Map-winged Swift *Korscheltellus fusconebulosa*	26 Jun	26 Jun	1	1	-	1	1	1	Common
Ghost Moth *Hepialus humuli*	30 Jun	29 Jul	4	8	-	4	8	2	Common
Family: Sphingidae									
Poplar Hawk-moth *Laothoe populi*	15 Sep	15 Sep	1	1	-	1	1	-	
Hummingbird Hawk-moth *Macroglossum stellatarum*	26 Jun	29 Jun	2	2	-	1	2	12	Immigrant
Family: Geometridae									
Bloodvein *Timandra comae*	29 Jul	29 Jul	1	1	-	1	1	-	
Garden Carpet *Xanthorhoe fluctuata*	12 May	26 May	2	-	2	1	2	9	Common
Silver-ground Carpet *Xanthorhoe montanata montanata*	31 May	18 Jul	6	10	-	3	10	2	Common
Dark Spinach *Pelurga comitata*	11 Jul	8 Aug	6	66	11	47	77	93	Common
Plain Pug *Eupithecia simpliciata*	11 Jul	29 Jul	3	32	-	20	32	14	Common
Narrow-winged Pug *Eupithecia nanata*	25 Jul	25 Jul	1	1	-	1	1	-	Common
Pug Species	11 Jul	29 Jul	3	6	-	2	6	3	Common
Magpie *Abraxas grossulariata*	30 May	30 May	1	-	1	1	1	-	Common
Bordered White *Bupalus piniaria*	11 Jul	11 Jul	1	1	-	1	1	-	Common
Family: Notodontidae									
Iron Prominent *Notodonta dromedaries*	11 Jul	11 Jul	1	1	-	1	1	-	Common
Family: Erebidae									
Herald *Scoliopteryx libatrix*	25 Sep	25 Sep	1	1	-	1	1	-	Common
Snout *Hypena obsitalis*	29 Jul	8 Aug	2	7	-	6	7	2	Common
Buff Ermine *Spilosoma lutea*	11 Jun	11 Jun	1	-	2	2	2	9	Common
White Ermine *Spilosoma lubricipeda*	31 May	17 Aug	3	3	-	1	3	-	Common
Garden Tiger *Arctica caja*	11 Jul	29 Jul	3	4	-	2	4	5	Common
Common Footman *Eilema lurideola*	29 Jul	29 Jul	1	2	-	1	2	3	Common
Dark Crimson Underwing *Catocala sponsa*	28 Jul	28 Jul	1	1	-	1	1	-	Red Data Book
Family: Noctuidae									
Spectacle *Abrostola tripartita*	31 May	18 Jul	3	8	-	4	8	1	Common
Silver Y *Autographa gamma*	6 Jun	25 Sep	22	191	1	55	192	520	Immigrant

Species	First date	Last date	Total days	Moths Inner Farne	Moths Brownsman	Peak Count	Total moths 2019	Total moths 2018	UK Status
Gold Spot *Plusia festucae*	28 Aug	28 Aug	1	1	-	1	1	1	Common
Copper Underwing *Amphipyra pyramidea*	20 Sep	20 Sep	1	1	-	1	1	-	Common
Mouse Moth *Amphipyra tragopoginis*	8 Aug	26 Aug	4	6	-	3	6	4	Common
Marbled Beauty *Bryophila domestica*	11 Jul	8 Aug	4	6	-	2	6	-	Common
Mottled Rustic *Caradrina morpheus*	31 May	25 Jul	5	56	-	46	56	-	Common
Angle Shades *Phlogophora meticulosa*	12 May	29 Sep	6	6	-	1	6	12	Common
Frosted Orange *Gortyna flavago*	26 Aug	19 Sep	3	6	-	3	6	10	Common
Rosy Rustic *Hydraecia micacea*	29 Jul	19 Sep	5	56	-	34	56	138	Common
Flounced Rustic *Luperina testacea*	16 Aug	16 Aug	1	1	-	1	1	36	Common
Small Wainscot *Denticucullus pygmina*	26 Aug	26 Aug	1	1	-	1	1	1	Common
Dark Arches *Aparmea monoglypha*	11 Jul	26 Aug	10	51	-	24	51	118	Common
Common Rustic agg *Mesapamea secalis*	25 May	26 Aug	5	14	1	7	15	157	Common
Middle-barred Minor *Oligia fasciuncula*	11 Jul	11 Jul	1	1	-	1	1	4	Common
Lunar Underwing *Omphaloscelis lunosa*	16 Sep	19 Sep	2	9	-	7	9	9	Common
Clouded Drab *Orthosia incerta*	1 May	1 May	1	1	-	1	1	-	Common
Hebrew Character *Orthosia gothica*	30 Mar	11 May	2	2	-	1	2	-	Common
Antler *Cerapteryx graminis*	11 Jul	26 Aug	4	11	-	6	11	39	Common
Nutmeg *Anarta trifolii*	29 Jul	29 Jul	1	1	-	1	1	-	Common
Pale-shouldered brocade *Lacanobia thalassina*	29 Jul	29 Jul	1	1	-	1	1	-	Common
Bright-line Brown-Eye *Lacanobia oleracea*	1 May	11 Jul	9	13	7	9	20	25	Common
Smoky Wainscot *Muthimna impura*	2 Aug	2 Aug	1	1	-	1	1	-	Common
Garden Dart *Euxoa nigricans*	29 Jul	16 Aug	3	5	-	3	5	58	Common
Heart and Dart *Agrotis exclamations*	31 May	31 May	1	1	-	1	1	11	Common
Dark Sword-grass *Agrotis ipsilon*	6 Nov	6 Nov	1	-	1	1	1	-	Immigrant
Flame *Axylia putris*	7 Jun	11 Jul	2	10	1	10	11	1	Common
Large Yellow Underwing *Noctua pronuba*	3 Jul	26 Aug	6	29	-	22	29	45	Common
Lesser Yellow Underwing *Noctua comes*	29 Jul	26 Aug	5	8	-	4	8	16	Common
Six-striped Rustic *Xestia sexstrigata*	8 Aug	8 Aug	1	1	-	1	1	-	Common

Species	First date	Last date	Total days	Moths Inner Farne	Moths Brownsman	Peak Count	Total moths 2019	Total moths 2018	UK Status
Setaceous Hebrew Character *Xestia c-nigrum*	29 Jul	29 Jul	1	1	-	1	1	13	Common
MICROLEPIDOPTERA									
Family: Tineidae									
Skin Moth *Monopis laevigella*	28 May	30 May	2	-	2	1	2	-	Common
Family: Plutellidae									
Diamond-back *Plutella xylostella*	18 May	21 Jun	13	-	2613	1000	2613	1	Common
Family: Oecophoridae									
Brown House Moth *Hofmannophila pseudospretella*	5 Jun	11 Sep	9	7	26	20	33	-	Common
Family: Elachistidae									
Agonopterix alstromeriana	3 Mar	29 Nov	9	44	-	25	43	39	Common
Family: Momphidae									
Mompha epilobiella	29 May	29 May	1	-	1	1	1	-	Common
Family: Cosmopterigidae									
Limnaecia phragmitella	25 Jul	25 Jul	1	1	-	1	1	-	Common
Family: Choreutidae									
Nettletap *Anthophila fabriciana*	23 Jul	15 Oct	14	2057	-	1666	2057	-	Common
Family: Tortricidae									
Agapeta hamana	11 Jul	11 Jul	1	1	-	1	1	-	Common
Aethes rubigana	11 Jul	25 Jul	2	6	-	3	6	-	Common
Celypha lacunana	11 Jul	25 Jul	3	16	-	13	16	-	Common
Eucosma campoliliana	11 Jul	11 Jul	1	1	-	1	1	-	Common
Eucosma hohenwartiana	11 Jul	25 Jul	2	21	-	16	21	-	Common
Family: Crambidae									
Scoparia ambigualis	11 Jul	11 Jul	1	3	-	3	3	-	Common
Eudonia lacustrata	18 Jul	25 Jul	2	3	-	2	3	-	Common
Chrysoteuchia culmella	11 Jul	25 Jul	2	10	-	9	10	-	Common
Crambus perlella	11 Jul	11 Jul	1	1	-	1	1	-	Common
Agriphila straminella	8 Aug	8 Aug	1	6	-	6	6	-	Common
Agriphila tristella	11 Jul	2 Aug	3	5	-	2	5	-	Common
Small Magpie *Anania hortulata*	18 May	8 Aug	18	43	7	12	50	76	Common
Udea olivalis	11 Jul	11 Jul	1	2	-	2	2	-	Common
Mother of Pearl *Pleuroptya ruralis*	29 Jul	17 Aug	6	18	-	7	18	4	Common

REFERENCES

FOX, R, PARSONS, M S, CHAPMAN, J W, WOIWOD, I P, WARREN, M S and BROOKS, D R (2013). *The State of Britain's Larger Moths 2013*. Butterfly Conservation and Rothamsted Research, Wareham, Dorset, UK.

NORTHUMBERLAND MOTHS (2019). **http://www.northumberlandmoths.org.uk/**; accessed 14 November 2019.

MAMMALS AND MARINE LIFE AROUND THE FARNE ISLANDS

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SEALS IN 2019*

In accordance with the trends of previous years, this season has seen an increase in the number of pups born in our Grey Seal *Halichoerus grypus* colony. Whilst not as substantial an increase compared to previous years, the record for the total number of pups born has been broken once again. The distribution of the colony across the islands also continues the recent trend, and how this will affect the islands in the long run, particularly the increasing number of animals, is of great importance; at the very least it is likely to require a change in monitoring, research and management of the islands during the winter months.

Ground- and sea-level counts

The first seal pups of the season arrived in early September; one young pup was scooped up by a passenger boat and taken to a seal shelter but sadly it did not survive. The first pup recorded by the rangers was a dead one, found on 4 September on the South Wamses. The first pups sprayed with dye for population counts and mortality monitoring (Figure 1) were on Brownsman and Staple Island on 16 October, and the last spraying excursion took place in the Inner Group on 3 December. Two counts from boats were carried out after the rangers left the islands, on 17 December and 19 January.

In the Outer Group islands such as Brownsman and Staple, the terrain coupled with the number and distribution of seals makes it difficult to survey on foot and during the height of the pupping season rangers spent 4 - 5 hours counting Brownsman island alone. The Inner Group was more accessible, and all islands could be covered in one day as a result of more sheltered access for the boats and less restrictions from high densities of seals.

The count for the total number of pups born this season was 2823 (Table 1), a small increase of 95 pups (3.1%) compared to the total last year of 2737. It is likely, however, that the total is an undercount: as a result of poor weather conditions and sea state there are gaps in the timeline where access to Outer Group islands to do ground-level counts was not possible.

For several years, Brownsman has held the largest

Figure 1. Spray-dyed Grey Seal pup.

Count date	Brownsman	Staple/ Scarcars	Wideopens	South Wamses	North Wamses	Inner Farne	Knoxes Reef	Northern Hares	Longstone	Big Harcar	Total
26 Oct	27	3		1							**31**
29,30,31 Oct	106	94	12	60	40		1				**313**
9,10 Nov	218	185	157		54	1	20				**635**
15 Nov			79			5	11				**95**
19, 20 Nov	331		51			11	31		2	6	**432**
26, 27 Nov	283	227	87	77		17	32				**723**
1, 2, 3 Dec		75	39	110	54	10	11	25	9	2	**335**
17 Dec, 19 Jan	132	37	35	12		33	10				**259**
Total	**1097**	**621**	**460**	**260**	**148**	**77**	**116**	**25**	**11**	**8**	**2823**

Table 1. New pups count by date and island 2019.

number of seals during the breeding season and this year retained the title with 1097 (39%) pups. This was followed, unsurprisingly, by Staple Island with 620 pups. Surprisingly though, the Wideopens had the next-highest number of pups born with 460. In previous years, South Wamses in the Outer Group has had the third largest rookery, yet even combined with North Wamses the total was only 408. This shows the continuing trend for the colony to expand from the Outer to the Inner Group islands. In the 2019 season, the Outer Group accounted for 2170 (77%) of the new pups born and the Inner Group for 653 (23%). Conversely, the previous season, the Inner Group held only 15% (410) of the new pups. This difference of 243 pups is an increase of 59% from the Inner Group total last year of 410 pups. As the Farnes colony overall has only increased in size by 95 pups, the increased numbers of pups in the Inner Group suggests that it may not just be a consequence of expansion in colony size but may also reflect a trend for animals to favour the Inner Group islands for pupping.

Counting by drone

This season, a drone was used again to take digital images of the seal colony from a height. Using the drone footage, we were able to count the total number of seal pups on each island. Whilst it easy to identify seal pups whether they have a white coat or have just moulted, it is more difficult to identify dead seals and coloured seals. Often the drone would be used on the same day and occasionally at the same time as the ground-level counts. This allowed us to compare the totals from the two different methods. Considering the size of Brownsman Island and the number of pups, it was reassuring to see that the difference in totals between the two methods was less than 20. The data (Table 2) suggest that, whilst the drone counts are higher and likely to be more accurate for the larger and busier islands, the ground-level counts continue to be viable, especially for the smaller islands.

Pre-weaning pup mortality

Spraying pups with a new colour and counting existing colours every 4 days allows us to monitor how old the pups are, and this is something that can only be done by ground-level counts. On average, seal pups reach their second coat and become weaned between the ages of 17 and 23 days old (Hickling 1962). When pups reach the age of 16 days it is presumed that they have survived to be weaned.

The mortality is calculated using the total number of pups which survived to minimum weaning age and the total number of dead or missing pups. As it was difficult to reach the Outer Group islands in challenging weather conditions during the pupping season, the 4-day protocol for spraying and counting could not be adhered to rigorously. Therefore, as a result of some lack of continuity, moulted pups had to be included in the totals considered to have survived to weaning age; in consequence, there is less accuracy in the calculated mortality for the Outer

Island	Brownsman	Wide Opens	Knoxes Reef
Drone total	801	256	56
Ground total	784	275	57

Table 2. Comparison of drone and ground counts.

	Brownsman	Staple	North Wamses	South Wamses	Wideopens	Inner Farne	Knoxes Reef	Total
Total pups counted	1097	621	148	260	460	77	116	2779
Pups survived	582	339	69	141	254	66	74	1525
Sprayed dead	90	119	26	31	18	2	5	291
Dead/missing	425	163	53	88	188	9	37	963
Mortality	46%	45%	53%	46%	44%	14%	36%	45%

Table 3. Island breakdown of pre-weaning seal pup mortality 2019.

Group simply because the age of pups could not be monitored as frequently as the Inner Group.

For the Inner Group islands combined, the mortality was around 39%. The increase from 21% mortality in 2018 is most likely due to the increase in number of pups on the Wideopen islands, and brings the mortality to a similar level as on the Outer Group islands. Knoxes Reef has had a substantial increase in mortality, which has more than tripled from the 10.6% mortality in 2018. This could be as a result of increasing competition for space, spread of disease in densely-crowded areas and less shelter from the storms and rough seas experienced during the season.

Comparing pup mortality across the Farnes overall in 2019 with last season, there was a slight decline despite the increase in number of pups. This could be attributable to a potential undercount of the Outer Group rookeries, but may also be within the margin of error expected for counts of this type. Therefore, the results may indicate a relatively constant mortality rate despite the increase in seal pups. The increase of mortality for the Inner Group islands along with the increase of pups may indicate that mortality is density-dependent as a result of competition for space, and may be a factor which limits the seal population that the islands can support.

East Coast Colonies

The Farne Island's Grey Seal colony is not alone in its continual annual increase. The largest east coast colony is at Blakeney Point, Norfolk, where 3,068 pups were born this year (BBC News 2019). Although only a small increase of 56 pups on the total last year, it still represents a positive trend. The colony at Donna Nook, Lincolnshire, has also increased, from 2,066 to 2,187 (5.4%) this year (Lincolnshire Wildlife Trust 2020). Globally, the Grey Seal population is just over 300,000 and they feature within the IUCN Red List as a result of threats from climate change, severe weather and pollution (IUCN 2020). The conservation of Grey Seals is, therefore, of global significance and the increase of colonies of the North Sea is a positive contribution to their global status.

CETACEANS AND LARGE FISH[¶]

Four species of cetacean and large fish were recorded in the waters around the Farne islands this season. Most sightings were of Bottlenose Dolphin, whilst Minke Whales and Harbour Porpoises were seen in low numbers. The highlight of the season was in September, when two Basking sharks were seen travelling north through the islands.

White-beaked Dolphin *Lagenorhynchus albirostris*, Humpback Whale *Megaptera novaeangliae* and

	2019 Recounted with moulted	2018 Recounted with moulted	2017	2016	2015	2014	2013	2012
Total Pups Counted	2779	2240	1468	2295	1876	1740	1575	1603
Surviving	1525	1242	801	1629	1360	1419	1165	1166
Unsprayed Dead	18	130	146	96	139	71	55	54
Spayed dead	273	74	55	88	79	66	78	71
Dead/Missing	963	994	524	482	298	184	277	312
Mortality	45%	49%	45.4%	29%	27.5%	18%	26%	27.2%

Table 4. Grey Seal pup mortality estimates in 2019 compared to previous years.

NOT ALL SEALS ARE GREY

While the Farne Islands are important for their breeding Grey Seals, other species can visit from time to time. A Common Seal *Phocina vitulina* (left) was photographed on the islands by Andrew Davis on 15 June 2019.

even a Sperm Whale *Physeter macrocephalus* were all recorded off the Northumberland coast this year, though unfortunately none of these species were observed within the Farnes recording area. There were several potential whale sightings from the islands, consisting of large splashes, suspected blows and a dark shape floating at the surface, but none were convincing enough for the observer to be sure that it was caused by a cetacean, let alone allow a positive identification.

Cetaceans were seen on 66 days during 2019, with a total of 95 sightings recorded (this includes the two records of basking sharks in September). Most sightings were from casual observations and records from the boat companies, and the land-based cetacean watches from the Farnes produced 12 of the 95 sightings. These watches took place from the cliffs of Inner Farne on 158 days over the course of the season, largely during the spring and summer. The first watch took place on 31 March, and the final watch on 29 November. Watches lasted for 30 minutes and were typically carried out in the mornings. Using the Beaufort scale, the sea state along with the wind direction and visibility were recorded every morning from the Lighthouse Cliffs, and the time of each sighting was recorded along with the species of cetacean.

Bottlenose Dolphin *Tursiops truncatus*

This year there were 75 sightings of Bottlenose Dolphins, which is similar in comparison to the previous two years. Most were recorded in the Inner Sound. Records from the Outer Group islands consisted of only two pods which were observed in Staple Sound towards the end of the season. On 7 July, the largest pod of the season consisting of 60 animals was recorded travelling south. Only one calf, aged 2 - 3 weeks old based on its size, was seen this year, and that was on 26 October within a pod of approximately 20 animals.

In general, pod sizes appeared similar to previous years (Table 5). There was noticeably more variation in pod size and larger pods were recorded earlier in the spring and early summer with pods of 40 individuals recorded in May and June (Table 5).

Bottlenose Dolphin have been seen particularly frequently around the mouth of the Tyne this year and are now a regular sight along much of the north - east coast. They are often seen fishing in the estuary at Berwick-upon-Tweed and have been recorded as far south as Filey on the North Yorkshire coast. This increasing range might explain their movements and absence during the start and end of the season.

Month	March	April	May	June	July	August	Sept	Oct	Nov	Dec
Max per pod (2019)	-	20	40	40	60	25	10	20	20	-
Max per pod (2018)	25	25	20	70	30	25	20	40	25	25

Table 5. Comparison of maximum pod size of Bottlenose Dolphin between 2018 and 2019.

Minke Whale *Balaenoptera acutorostrata*

There were 4 sightings of Minke Whale this season. The first of the year was on 12 May, when a single animal was seen heading north through Staple sound. There were no sightings in June and July, but single sightings in each month from August to October, all from the Inner Sound. All four sightings consisted of just a single animal.

On average, there have been 7 sightings of Minke Whale per year within the Farne Island recording area between 2003 and 2018. However, in 2013 there was a remarkable 30 sightings of Minke Whale, as a result of shoals of Herring *Clupea harengus* congregating closer inshore than usual, and this outlier has a large effect on the yearly-sightings average. Excluding 2013, the average sightings per year over the same period is 5.47, and clearly the four sightings in 2019 represents a reasonable expectation for the year based on current trends (Figure 2).

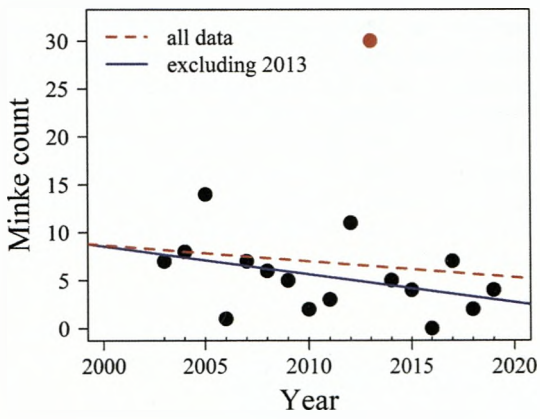

Figure 2. The number of Minke Whale sightings each year from 2003 to 2019 in the Farnes area; the 2013 count is red, all others are black. The blue line is the relationship between year and count when the 2013 data are excluded, the red dashed line is when all data are used.

Harbour Porpoise *Phocoena phocoena*

It was a poor year for Harbour Porpoise records. There were only 10 sightings all season, the lowest number in well over a decade. The first sighting of the year did not occur until 12 May when a single animal was seen travelling south through the Inner Sound. In total, 16 animals were recorded with a maximum pod size of 3 seen on 15 May. Note, however, that diminutive size and inconspicuous behaviour of Harbour Porpoise can make them difficult to see, especially from a distance, and it is possible that there were more present than the rangers were able to record.

The final sighting of the year was on 24 November, when two animals were seen surfacing briefly north-west of Inner Farne. In accordance with last year, Harbour Porpoises were never observed at the same time as Bottlenose Dolphins. Bottlenose Dolphins are known to harass and occasionally kill Harbour Porpoises. Therefore, Porpoises are likely to stay away from their increasingly more common relatives, which may explain the decline documented in recent years.

Basking Shark *Cetorhinus maximus*

Basking Sharks are an exciting and rare visitor to the islands. This year's sightings were the 7th and 8th records since 2007. The last individual was seen by rangers in 2015 feeding just off the Megstone Island. Unfortunately, this enormous fish twice evaded the rangers this year with both records coming from local boat operators (Figure 3).

The first animal was seen by one of the Serenity boats, travelling north through Staple Sound on 20 September. The second shark, a much larger individual, showed for longer and was seen by both Serenity and the Ocean Explorer rib. The shark was observed feeding near Piper's Gut on 27 September, exactly a week after the first record. Video footage from the two sightings confirms that these were indeed two separate individuals, told easily by the difference in size. The fact that two separate individuals were recorded suggests that the water must have been rich in plankton during September.

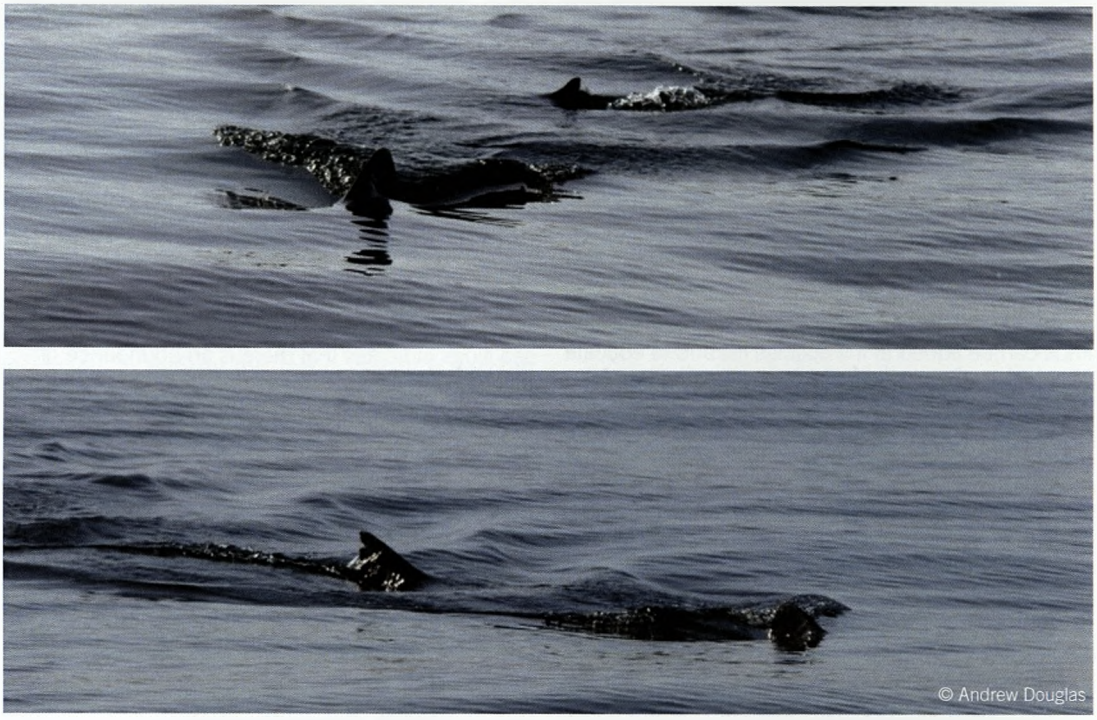

Figure 3. Basking Shark, Farne Islands, September 2019.

Species	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Humpback Whale								1		
Minke Whale	2	3	11	30	5	4		7	2	4
Risso's Dolphin		1			1				1	
Bottlenose Dolphin	1	1	13	10	27	76	18	70	78	75
Common Dolphin				1				1		
White Beaked Dolphin		1	2		2	30				
Dolphin spp.	2	1		2						
Harbour Porpoise	37	93	61	95	58	45	13	30	17	11
Basking Shark			2		2	1				2
Shark spp.									1	
Ocean Sunfish									1	
Total	42	100	89	138	97	156	31	109	100	92

Table 2. Summary of cetacean sightings around the Farne Islands over the past decade. Risso's Dolphin *Grampus griseus*, Common Dolphin *Delphinus delphis*, Ocean Sunfish *Mola mola*.

INTERTIDAL SPECIES MISCELLANY*

The Inner Farne intertidal zone is a diverse habitat which holds a variety of fascinating species. The lower shore has an extensive kelp bed which is an important habitat for thousands of creatures and an important food source. The jetty and surrounding rock formation act as holdfasts and the underside of the jetty gives shelter to sponges, cnidarians, molluscs, starfish and crustaceans. During the late summer and early autumn, the rocky intertidal shore is investigated by the rangers so that any interesting finds can be added to the species list and to educate visitors about the range of species which can be seen on the rocky shore.

Echinoderms are slow-moving invertebrates which inhabit the sea floor. They include species such as Starfish, Sea Cucumbers and Sea Urchins. Echinoderms have tube feet which are small soft projections usually on the underside. The tube feet can move back and forth passing food towards a central mouth. They can also use the tube feet to stick to surfaces and move across rocks. This year the rangers found several species including Common Starfish *Asterias rubens*, Common Brittle Star *Ophiothrix fragilis*, Edible Urchin *Echinus esculentus*, Green Sea Urchin *Psammechinus miliaris* and Bloody Henry Starfish *Henricia oculata* (Figure 4a) pictured below. A Sun Star *Crossaster papposus* was also found on the lower shore; they are bright red and orange in colour and intriguing because they can have up to twelve legs (Figure 4b).

Several species of sea slug were found this season including *Dendronotus frondosus* and *Polycera quadrillineata* (Figure 4c, d). Nudibranchs ('naked gills'), so-called due to their exposed gills, they are the largest group of sea slugs within the phylum Mollusca. They are known for their bright colours and ability to disguise themselves like their prey. The texture and colour of *Dendronotus* makes it look truly alien; this species obtains nematocysts or stinging cells from hydroids, its main source of prey, which it can use for defending itself. Sea slugs feed on a variety of different species; an abundance of sea slugs indicates that there is an abundance of prey species for them to feed on and that the marine environment is healthy.

REFERENCES

HICKLING, G (1962) *Grey Seals of the Farne Islands*, Routledge & Kegan Paul, London.

BBC NEWS (2019) *Blakeney Point Record number of seal pups born in colony*. **https://www.bbc.co.uk/news/amp/uk-england-norfolk-507458**, accessed 6 March 2020.

LINCOLNSHIRE WILDLIFE TRUST (2020) *Weekly seal update from Donna Nook*. **https://lincstrust.org.uk/get-involved/top-reserves/donna-nook/weekly-update**, accessed 6 March.

IUCN (2020) Red List Grey Seal. **http://www.iucnredlist.org/species/9660/45226042**, accessed 7 March.

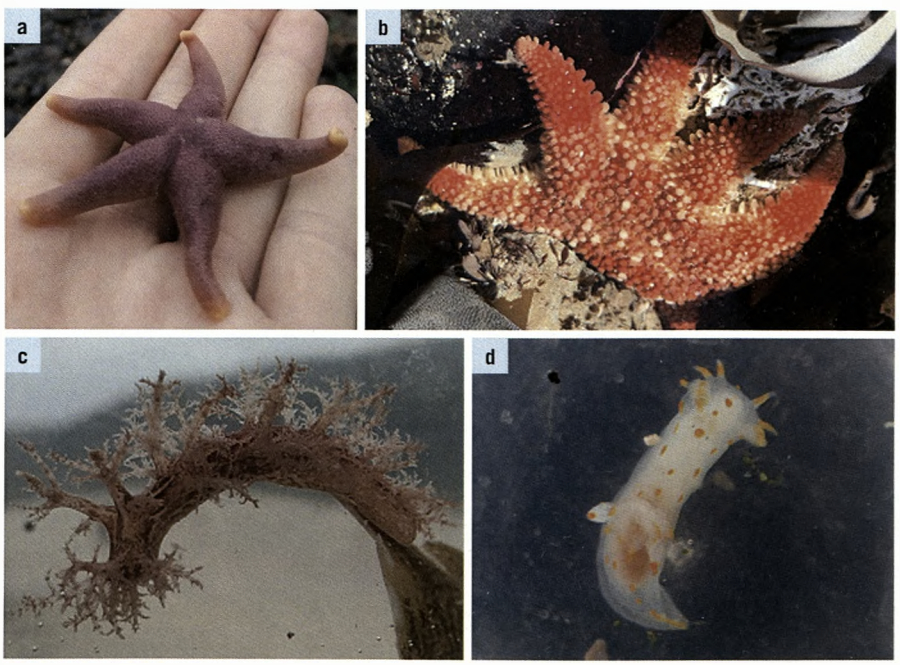

Figure 4.
a, Bloody Henry Starfish (Hayley Hodgson);
b, Sun Star (Sally Dunbar);
c, *Dendronotus frondosus* (Hayley Hodgson);
d, *Polycera quadrillineata*. (Harriet Reid).

PLANT MONITORING ON THE FARNE ISLANDS

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INTRODUCTION

The islands have seen a varied amount of effort over the years with regards to studying and monitoring vegetation on the islands, with detailed surveys across the islands in some years, and only anecdotal reports in others. To remedy this inconsistency in amount and quality of data, the islands were signed up to the National Plant Monitoring Scheme (NPMS) in 2016. This is a habitat-based plant monitoring scheme aimed at collecting data annually on changes in plant abundance and diversity throughout the UK (NPMS 2019a), and may provide a means to document Farne Islands vegetation more consistently in the future. Surveys were completed in 2016 but unfortunately no monitoring was done in 2017 and 2018 due to limited ranger capacity.

METHOD

The NPMS has designed the survey to include 1 km square areas throughout the country. These can then be allocated to a person who, within the designated 1 km square, will record plants from up to five different survey plots. On the Farne Islands a 1 km square area is positioned to cover Brownsman and Staple. Within this, there are currently three survey plots on Brownsman consisting of one 5 m x 5 m plot (Square plot 1) and two 25 m x 1 m plots (Linear plots 1 and 2; Figure 1). Plants within each plot are identified and the abundance of each species is assessed by estimating the area occupied by each species as a percentage of the total plot area. Abundance is estimated using the Domin scale for describing the cover of a species in a vegetation community (Table 1; NPMS 2019b).

The NPMS asks for two visits a year to be completed, one in late spring or early summer, and one in late summer. This year the first visit was completed on 25 June but, as a result of poor weather and logistical difficulties, rangers were unable to visit Brownsman to complete the second visit in September. Instead, the second visit was completed on 17 October when rangers moved back to Brownsman for the seal season.

The NPMS has multiple survey levels, including Indicator Level which involves recording the presence of particular species chosen to indicate different aspects of the specific habitat. The species

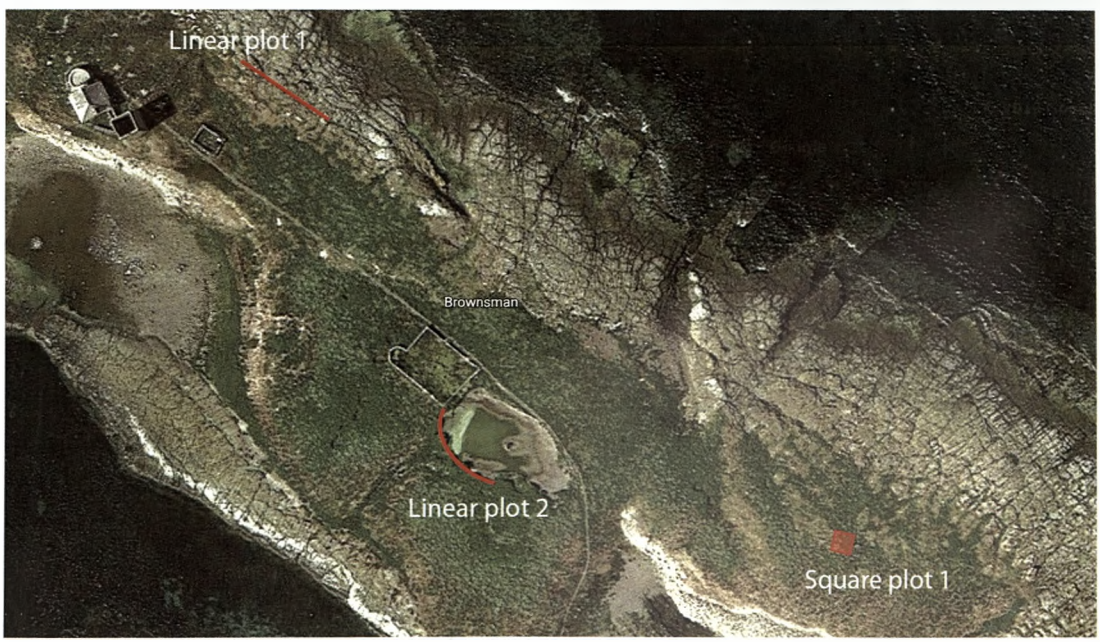

Figure 1. The location of current NPMS plots (red) on Brownsman. Satellite image from Google Earth.

have been selected because they are associated with a particular habitat, either as positive or negative indicators, which enables the quality of a habitat to be monitored over time. There is also an Inventory Level which involves carrying out the survey at Indicator Level (as above) but, in addition, also recording all other species of vascular plant present within each plot (NPMS, 2019b). In 2016, an Indicator Level survey was completed, but for the 2019 survey all identifiable species were recorded because the particular nature of habitat on the Farne Islands does not readily fit the NPMS habitat types. The species/genera recorded are described in the text and Table 2, but graphical comparisons between the 2016 and 2019 surveys (Figures 2 - 4) only show the Indicator level species surveyed in both years for the relevant NPMS habitat type.

RESULTS

Nineteen species were recorded from the three plots (Table 2). Square plot 1, located towards the south end of Brownsman (Figure 1), had lower species diversity than the two linear plots surveyed. Orache *Atriplex* was the dominant species with between 51 - 75% cover during both the summer and autumn monitoring visits (Figure 2). Sea Campion *Silene uniflora* was the second most abundant species, with Yorkshire Fog *Holcus lanatus* being the third with 1 - 4% cover. This is the reverse of what was found in 2016 when Yorkshire Fog was the dominant species with at least 70% cover, and Orache was the least abundant with 5 - 10% cover in June and 11 - 25% cover in September.

Yorkshire Fog can grow in a range of soil types and once it becomes established it usually forms a dense sward that other plants find hard to compete with; however in this location it has been overtaken by Orache. Orache is an annual which grows well in maritime habitats, particularly where the soil has been disturbed. Hirons noted that where there are large patches of eroded soil on the Farne Islands Orache is 'invariably the initial coloniser' (Hirons, 1994). This suggests the increase in seal activity at this end of the island during the pupping season could be a factor in the increase of Orache.

Linear plot 1 is located on the east side of Brownsman and follows the vegetation line where it meets the rock (Figure 1). This plot had greater species richness than Square plot 1 with seven species recorded in June and ten species recorded in October (Figure 3).

The dominant species here both in 2016 and 2019 was Common Saltmarsh Grass *Puccinellia maritima*. Saltmarsh Grass was also noted as growing copiously on the rocks and edges of tidal pools on Brownsman in 2015. During June this year Saltmarsh Grass covered 11 - 25% of the plot, increasing to 51 - 75% in autumn. This area, well exposed to sea spray, will provide ideal conditions for Saltmarsh Grass, which grows well on clay soils with saline conditions. Saltmarsh Grass is thought to be an important species for reducing soil erosion and waterlogging (Hirons, 1994). Other salt tolerant species were also present here, including Common Scurvygrass *Cochlearia officinalis* (0% in summer; 1 - 4% in autumn), Sea Campion (<1%; 1 - 4%), Knotgrass *Polygonum* (1 - 4%; 5 - 10%) and Orache (5 - 10%; 26 - 33%).

Knotgrass was the third most abundant species present on this plot (1 - 4% in summer; 5 - 10% in autumn) but has not been included in the results (Figure 3) as it is not listed as an Indicator species under the NPMS and may have been present during past visits but not recorded because of this. Common Sorrel *Rumex acetosa* was recorded on the plot and has been included in Figure 2 but it should be noted that whilst it is classed as Indicator species under the NPMS scheme, it is not classed as an Indicator species for the Coast category of NPMS habitats and may not have been recorded previously for this reason.

Linear plot 2 is located around the edge of Brownsman pond (Figure 1) and had the greatest species diversity with nine species recorded in June and fifteen species recorded in October (Figure 4). Common Chickweed *Stellaria media* (26 - 33% cover) and Sea Mayweed *Tripleurospermum maritimum* (26 - 33% cover) were the dominant species in June, with Orache (34 - 50% cover) being the dominant species in autumn. There was a decrease in the abundance of Sea Mayweed from 2016, when cover

Percentage cover	Class
<1% (1-2 individuals)	1
<1% (several individuals)	2
1-4%	3
5-10%	4
11-25%	5
26-33%	6
34-50%	7
51-75%	8
76-90%	9
91-100%	10

Table 1. Percentage cover within plots expressed using the Domin scale for describing the cover of a species in a vegetation community.

Species	Common name
Arctium	Burdock
Atriplex	Orache
Avena fatua	Common Wild Oat
Cochlearia	Scurvygrass
Holcus lanatus	Yorkshire-fog
Iris pseudacorus	Yellow Iris
*Phleum pratense**	Timothy*
Polygonum	Knotgrass
Potentilla anserina	Silverweed
Puccinellia maritima	Common Saltmarsh-grass
Ranunculus sceleratus	Celery-leaved Buttercup
Rumex acetosa	Common Sorrel
Rumex crispus/ obtusifolius	Curled / Broad-leaved Dock
Silene uniflora	Sea Campion
Sinapis arvensis	Charlock
Spergularia marina	Lesser Sea-spurrey
Stellaria media	Common Chickweed
Tripleurospermum maritimum	Sea Mayweed
Urtica dioica/urens	Common / Small Nettle

Table 2. Species (scientific and common names) identified in the three survey plots. For the purposes of the NPMS, only the genus is needed for some plant groups. *Requires verification.

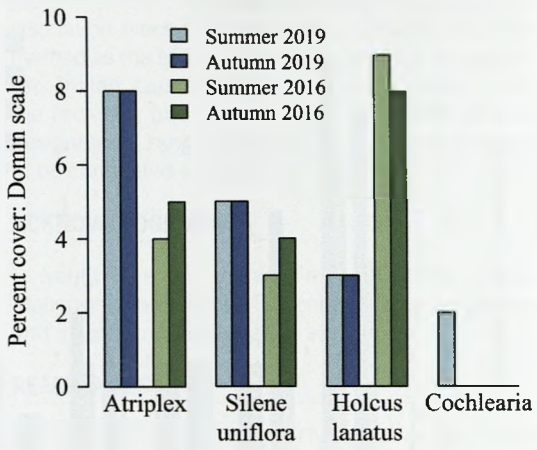

Figure 2. Square plot 1 located at the south end of Brownsman. The vertical axis ranging from 1 - 10 represents percentage cover within plots expressed using the Domin scale for describing the cover of a species in a vegetation community (Table 1). For each species (horizontal axis), data for 2019 (summer, autumn) are shown first (blue colours) and then for the 2016 survey (green colours).

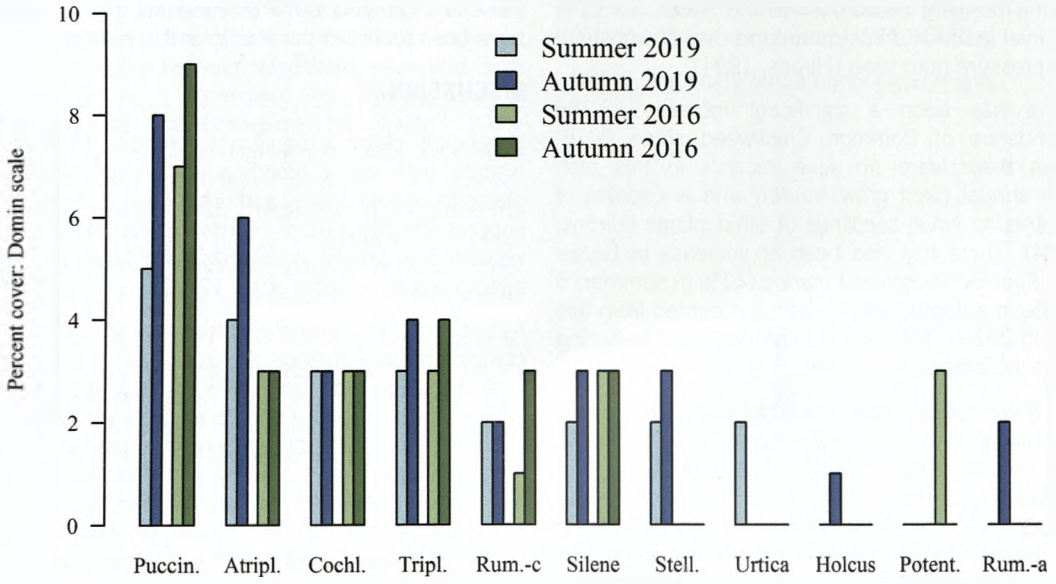

Figure 3. Linear plot 1 located on the east side of Brownsman where the rocks meet vegetation. Vertical axis as Fig. 2. Puccin., *Puccinellia maritima*; Atripl., *Atriplex*; Cochl., *Cochlearia*; Tripl., *Tripleurospermum maritimum*; Rum.-c, *Rumex crispus/obtusifolius*; Silene, *Silene uniflora*; Stell.,*Stellaria media*; Utrica, *Urtica dioica/urens*; Holcus, *Holcus lanatus:* Potent., *Potentilla anserina*; Rum.-a, *Rumex acetosa*.

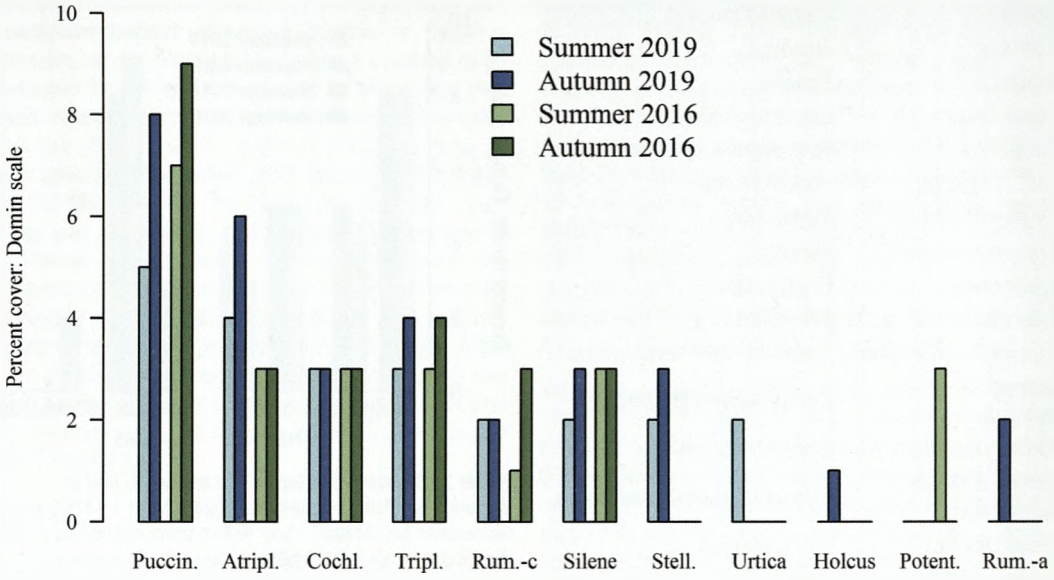

Figure 4. Linear plot 2 located around the edge of Brownsman pond. Vertical axis as Fig. 2. Stell.,*Stellaria media*; Tripl., *Tripleurospermum maritimum*; Atripl, *Atriplex*; Rum.-c, *Rumex crispus/obtusifolius*; Sperg., *Spergularia marina;* Holcus, *Holcus lanatus;* Iris, *Iris pseudacorus;* Potent., *Potentilla anserina*; Ranun., *Ranunculus sceleratus;* Silene, *Silene uniflora*; Urtica, *Urtica dioica/urens*; Arctium, *Arctium*; Cochl., *Cochlearia.*

was at least 50% and a decrease in Scurvygrass *Cochlearia* which covered 1 - 4% of the plot area in June 2016 but was not found during either visit in 2019. The decrease in Scurvygrass could also be linked to an increase in seal activity around the pond during pupping season, since the seeds from the biennial germinate in autumn and cannot withstand the pressure from seals (Hirons, 1994).

There has been a significant increase in the abundance of Common Chickweed since 2016, when there were no June records in this plot. This annual plant grows rapidly and is capable of smothering small seedlings of other plants (Hirons, 1994). There has also been an increase in Lesser Sea-Spurrey *Spergularia marina* (<1% in summer; 5 - 10% in autumn) which was not recorded from this plot in 2016. This plant is another annual favouring saline conditions.

Two grass species were identified in the plot during autumn, Common Wild Oat *Avena fatua* (1 - 4%) and Timothy grass *Phleum pratense* (<1% (several individuals)). These have been included in the species list (Table 2) but have not been included in the results (Figure 4) as they may have been present during past visits but not recorded due to lack of Indicator status. Charlock *Sinapis arvensis* was also recorded on the plot during both visits this year (11 - 25% in summer; <1% (several individuals) in autumn), but has been excluded from Figure 4 for the same reason. Burdock *Arctium* has been included in Figure 4, but it should be noted that whilst it is classed as an Indicator species under the NPMS scheme, it is not classed as an Indicator species for the Coast category of NPMS habitats and may not have been recorded previously for this reason.

DISCUSSION

Vegetation plays a significant role on the Farne Islands, with many breeding birds dependent on plants to provide shelter and nesting material, and to support the structure of burrows. Most importantly, vegetation is crucial in defending the finite soil cap against erosion (Hirons et al., 1972).

As this is only the second year that surveys have been completed, only limited conclusions can be drawn. Over the three monitoring plots, there has been no substantial decrease in Sea Campion, and increases in some plots. This plant is thought to be one of the most important for maintaining soil cover, as well as being one of the most severely affected by treading and plucking from breeding birds (Hirons, 1994). There have been severe declines in the amount of Sea Campion present on Brownsman in the past, so it is encouraging that, on our monitoring plots at least, there has been no significant decline of this important species in the past few years.

Across all plots there has been an increase in annual species, particularly Orache but also Common Chickweed and Lesser Sea-Spurrey. Orache is likely to colonise bare and disturbed soil, and where it is unable to do so evidence suggests that erosion is likely to 'become a continuous process' (Hirons, 1971). As such, the growth of this plant should be observed with great interest. Orache is also more likely to survive the pressure from seals than a perennial or biennial plant, as it drops seeds which then germinate in spring, rather than overwintering as small plants (Hirons, 1971).

There has been a dramatic increase in the number of Grey Seals *Halichoerus grypus* born on Brownsman since 2000, going from ten births to 1121 in 2018. It is thought that the hauling out of seals for breeding and moulting may be resulting in compaction of the soil, collapsing of Atlantic Puffin *Fratercula arctica* burrows and potential loss of vegetation which could lead to erosion, particularly when combined with wet weather (Steel, 2013; Hirons et al., 1972). The findings this year are broadly consistent with what we might expect as a result of increased seal numbers, i.e. an increase in annuals and a decrease in biennials. However, whilst the plants on Brownsman are undoubtedly affected by the increasing seal numbers it is worth remembering that Hirons concluded that weather was more likely to affect vegetation than seals and breeding birds (Hirons, 1971).

An experimental seal exclusion area is proposed for the next pupping season, in an attempt to alleviate and investigate the effects of the seals. However, the relationship between vegetation, seals and birds on the islands is a complex one. The exclusion of breeding seals from Brownsman and Staple in 1979-83 ultimately resulted in an increase of Scurvygrass, a biennial whose seedlings would usually be destroyed by seal pressure, and a reduction of the perennial Sea Campion. This in turn reduced the amount of soil cover when the Scurvygrass died off in late summer, leaving the area more liable to erosion (Hirons, 1994).

Arguably, how to best manage the balance between different bird species, seals and plant life on the Farnes, is the biggest issue facing the islands today. As such, consistent monitoring of the vegetation should be continued and expanded on.

It is recommended that additional survey plots are set-up next year, with at least one plot designated in the proposed seal exclusion area on Brownsman, so that changes to vegetation where seals have been excluded can be monitored specifically. Ideally another plot will be set-up in similar conditions, outside of the exclusion area, as a control plot. Survey plots could also be set-up on Inner Farne, where the vegetation faces different issues, following the same method as the NPMS. However, this report recognises the limited capacity of rangers, particularly during the breeding bird season, and plots should only be designated if rangers feel there will be time for them to be completed consistently.

ACKNOWLEDGEMENTS

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REFERENCES

HIRONS, M J D (1994). The flora of the Farne Islands. *Transactions of the Natural History Society of Northumbria* **57**: 69-114.

HIRONS, M J D and HIRONS, G J M (1972). The Farne Islands: the problem of soil erosion. *Biological Conservation* **4**: 338-390.

HIRONS, M J D (1971). *The vegetation of the Farne Islands.* MSc. thesis, Durham University.

NPMS* (2019a). National Plant Monitoring Scheme; **www.npms.org.uk**; accessed December 2019.

NPMS (2019b). *NPMS Field survey guidance notes - 2nd Ed.* **https://www.npms.org.uk/content/survey-guidance**; accessed 27 February 2020.

STEEL, D. (2013). Grey seals on the Farne Islands in 2012. *Northumbrian Naturalist* **74**: 80-82.

*NPMS, National Plant Monitoring Scheme.

BREEDING SHOREBIRD PROTECTION AT LINDISFARNE NATIONAL NATURE RESERVE – 2019 SUMMARY

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INTRODUCTION

Lindisfarne National Nature Reserve (LNNR) is managed by Natural England and consists of 65 km of coastline stretching from Cheswick Black Rocks in the north to Budle Point in the south. This season, four sites were formally managed and protected for breeding shorebirds with the 3.5 seasonal Shorebird Wardens, 2 placement wardens and our amazing volunteers on-site for the whole season.

In addition to the Shorebird Protection Scheme, LNNR initiated a county-wide study into Ringed Plover *Charadrius hiaticula* breeding territories (similar to the survey LNNR had carried out in recent seasons). We will share the results of this study in future articles.

The Wide Opens and Black Law (Figure 1), as in previous years, were the two main breeding sites for Little Terns *Sterna albifrons* and Ringed Plovers. A large growth of Sea Rocket *Cakile maritima* during the 2019 season resulted in the accumulation of small embryo dunes in the prime shorebird habitat at the Wide Opens site. This, along with the large accretion of the embryo dunes at the west of the site,

Figure 1. Map of Ross Back Sands detailing Ringed Plover territory sectors. Colours and symbols represent, from the top: yellow, Black Law; orange markers, The Beacons; purple line, Outer Old Law; pink line, Inner Old Law; blue markers and lines, Wide Opens; green line, Ross Back Sands- main beach; brown line, Ross Back Sands- Budle Bay North. Google Earth image.

Figure 2. Map of South Budle Bay. The blue line represents the Ringed Plover territory sector 'Kiln Point'. The pink line represents the sector 'Budle Point'. Google Earth image.

provided protection from tidal flooding. On Black Law, a small intertidal island, an interactive camera was installed, which sent a notification to a mobile phone when it sensed motion (Figure 3). When operating, the camera was an effective and non-intrusive tool for data collection. However, the system was very power hungry so revisions will be made for next season.

Figure 3. A nest camera proved a useful tool.

Despite Kiln Point at Budle Bay (Figure 2) being formally protected for a second year, disturbance at this site was very high during the breeding season because of the constant turnover of holiday makers from the neighbouring caravan and camping sites.

MANAGEMENT AND MONITORING

A combination of electric and non-electrified net fencing, outer buffer rope fencing, signage and warden presence was used this season to ensure suitable nesting habitat free from human and dog disturbance. Preparatory work began in late April, with electric netting being installed at Wide Opens and Black Law, and non-electrified netting being installed at Kiln Point and Goswick Sands. As in the 2019 season, public access was restricted on Ross Sands beyond the Wide Opens, which was managed by the wardens and volunteers. This kept a large area of beach and shingle free from human and dog disturbance, giving Ringed Plovers and other shorebirds a protected area for nesting, feeding and loafing.

Various signage informing the public about the presence of breeding shorebirds were placed at strategic locations across the Reserve, including at most public accessways to the beaches where birds were nesting. Signage and a map detailing the beach closure on Ross Sands were placed at the public access to the beach from Ross Farm, at the west of the Wide Opens and at Elwick hide. Leaflet dispensers were also placed at most access points to the more popular beaches which contained the leaflet 'Sharing our Beaches with Birds'. This year, the Lead Shorebird Warden held events at Waren Mill Caravan Park to raise awareness of the breeding birds and advised people how to use the beach responsibly.

As in previous years, chick shelters were used for Little Terns and Ringed Plovers at Wide Opens, Black Law and Kiln Point; these were utilised by chicks during episodes of heavy rain and high wind. However, wind caused some shelters to become blocked with sand, and wardens had to enter the breeding site to unblock them.

As Ringed Plover scrapes were discovered throughout the season, a decision was made to install chicken-wire 'igloos' over nests to protect them from predators and trampling. All adults went back to the nest when igloos were used and these proved to be a very effective tool for egg protection. Additional netting was also installed around scrapes outside of the formal protection areas to give the birds space to incubate eggs and raise chicks without being disturbed by humans and dogs.

This site was monitored mainly from the hut or the surrounding dunes. The data gathered included: nest identification, food provisioning, disturbance and predator activity. A comprehensive egg count was not conducted during the season, and so the number of eggs laid is an estimate based on the average of two eggs per scrape for Little Terns and four eggs for Ringed Plovers.

Chicks were easy to link to particular nests when they first hatched, but after a few days they were very mobile and began moving around the site to more sheltered areas. When the chicks were *ca.* 14 days old, they started to gather on the strandline with the roosting adults, and it was not possible to link chicks to their parents.

Weekly co-ordinated Little Tern counts were undertaken on Mondays between 11:00 – 11:30 am to coincide with those at the Long Nanny site (National Trust) and the Crimdon Dene / Seaton Carew site (Durham Wildlife Trust) and across the other Lindisfarne NNR sites.

Food provisioning surveys were undertaken in blocks of varying lengths of time and at different times of

	Little Tern	Ringed Plover	Eurasian Oystercatcher	Common / Arctic Terns
Total Scrape	84	36>	8	85
Peak Scrape Count/Pairs	69	34>	6	75
Total Eggs	Unknown	Unknown	Unknown	Unknown
Total Chicks	approx. 54	Unknown	>13	100>
Total Fledged	17	26>	>6	100>
Productivity	0.24	0.76	>1	1.3>

Table 1. Breeding statistics at LNNR overall in 2019.

day (depending on visitor numbers and disturbance) to determine how often and what type of prey the incubating adults and chicks were being fed. The information recorded included prey type, size, location of feeding, whether food was taken and size/number of chicks.

THE 2019 SEASON

The season began at the end of April with a period of warm sunny weather, which led to several pairs of Ringed Plovers having well established territories and even full scrapes before management infrastructure was in place on the Reserve. Little Terns were first seen over Black Law on 29 April, then on 30 April at the Wide Opens. The weather soon changed, bringing cold, windy conditions, which helped big spring tides to breech the breeding site at the Wide Opens. Warm and muggy weather dominated most of June and July with frequent episodes of strong winds. 'Storm Miguel' hit on 12 June, but the effects were not as severe as expected and most of the scrapes and chicks survived. Throughout the season, the feeding of incubating adults and chicks (Figure 4) was very good, with the main food source being sandeel *Ammodytes* species. In early July, the Wide Opens colony suffered from intense aerial predation from Kestrels *Falco tinnunculus*, a Sparrowhawk *Accipiter nisus* and a family of Carrion Crows *Corvus corone*, which significantly reduced the number of Little Tern chicks fledging successfully, with an estimated 15 - 20 chicks taken by Kestrels alone (Figure 5). A wave of late Ringed Plover scrapes at Ross Back Sands-Budle Bay North and Budle Point hatched between mid- and end of July, keeping those sites open until 14 August. Shorebird breeding statistics for LNNR in 2019 are summarised in Table 1.

Figure 4. Common Tern feeding young.

Figure 5. Kestrel predation – the Little Terns put up a good defence but a large proportion of chicks were lost at the Wide Opens area.

Little Tern

Little Terns (Figure 6) bred successfully at two sites, Wide Opens and Black Law (Tables 2 and 3), with a total of 17 chicks fledging from 69 attempts (Wide Opens: 64, Black Law: 5). Courtship began in early May with lots of display flights and sandeel presentation. The first scrape was discovered on 14 May, with 30 scrapes by 22 May and a maximum of 64 scrapes by 7 June.

The first chicks hatched on 8 June, with more chicks appearing each day. The tail-end of Storm Miguel hit the site on 12 and 13 June, with heavy rain and strong north-easterly winds creating cold conditions and fierce sandstorms. This caused a number of scrapes and young chicks to fail. Chick shelters were put out before the storm and were utilised by the chicks as a 'wind break' rather than a shelter. However, on 12 June, the shelter being used by LT6 chicks became blocked with sand, requiring wardens to intervene and clear it. Twenty-one Little Tern scrapes were lost due to sand blow, but most chicks survived.

Courtship quickly began again in the days after the storm, and eggs were laid the following week. Eggs from the surviving scrapes continued to hatch, and a peak of 40 chicks were recorded throughout the season, and were being well fed by adults (Figure 6). Chicks rapidly left the nest site and used pieces of seaweed or rocks as shelter. Older chicks (c. 10 - 14 days old) left the safety of the netting and ventured onto the shore, with most staying on the strand line to shelter amongst dry seaweed.

On 26 June, a Kestrel, presumably a female, took a Little Tern chick from the ground and flew away. This occurred several more times during the season, as well as a suspected juvenile flying in and eating chicks on site. Both Little Tern and Ringed Plover

Figure 6. Little Terns.

	Little Tern	Ringed Plover	Eurasian Oystercatcher
Total Scrape	76	12	1
Peak Scrape Count/Pairs	64	7	1
Total Eggs	Unknown	Unknown	3
Total Chicks	approx. 40	approx. 11	3
Total Fledged	14	6	1
Productivity	0.2	0.86	1

Table 2: Breeding statistics for the Wide Opens in 2019.

	Little Tern	Ringed Plover	Eurasian Oystercatcher	Common / Arctic Terns
Total Scrape	8	5	7	85
Peak Scrape Count/Pairs	5	4	5	75
Total Eggs				
Total Chicks	14	14	>10	100>
Total Fledged	3	>8	>5	100>
Productivity	0.6	>2	>1	1.3>

Table 3: Black Law breeding statistics in 2019.

chicks were taken, as well as an adult Little Tern. An estimated 15 - 20 Little Tern chicks were taken by the Kestrels.

18 scrapes with eggs were still active on 30 June. In early July, a family of crows were persistently flying into the netting enclosures and walking around; they were seen taking eggs on one occasion. By 5 July, no Little Tern scrapes were active. Kestrel attacks continued through July and the number of chicks dropped from 24 to just 6 between 4 and 8 July. During this period, 11 fledglings were recorded and were presumed to have left the colony with adults. By 10 July, no Little Terns were present in the enclosure but there were occasional sightings of adults and juveniles foraging and flying over the Wide Opens.

The nest success rate was high for Little Terns this season as a result of favourable weather and good food provisioning. However, overall productivity was much lower than expected because of the high predation rate. A total of 14 chicks fledged from the Wide Opens, and with a peak nest count of 64 this gives an estimated productivity of 0.22 fledglings per nest.

In general, it appeared to be a good year for feeding with adults bringing in food regularly and of good size throughout the season. Most chicks seemed well fed and the most prevalent food items were sandeels (Figure 7), with adults mostly seen heading out to sea to forage rather than the embayment of Fenham Flats.

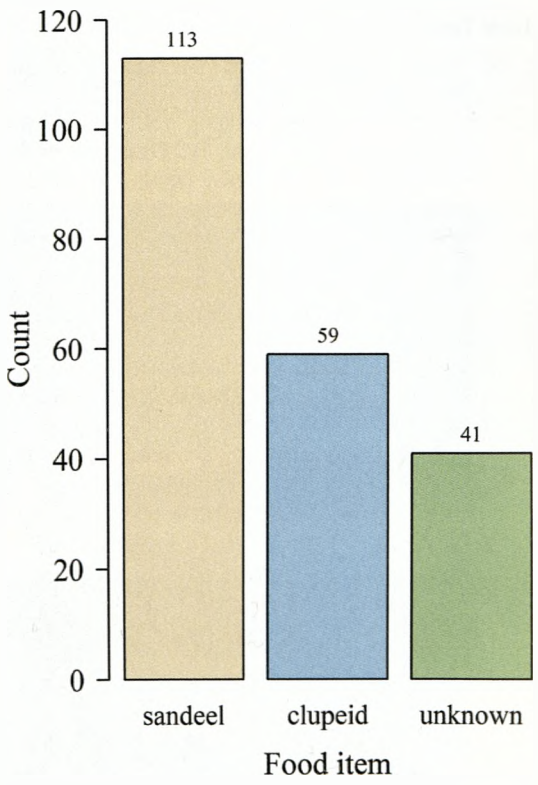

Figure 7. Food items brought back to Little Tern chicks during feeding surveys.

Ringed Plover

Ringed Plovers attempted to breed at all four formally-protected breeding sites this season (Wide Opens, Black Law, Kiln Point and Goswick Sands), as well as at various other locations between these areas. Chicks fledged successfully from Wide Opens, Budle Point and Black Law, and from a small area of embryo dunes at the south end of Ross Sands. Over 40 Ringed Plover territories were held during the season with a minimum of 22 pairs successfully rearing 26 chicks. Because Ringed Plovers breed at numerous locations across the Reserve, most of which are not intensively monitored, the total number of fledglings can never be completely accurate as adults and juveniles can easily move between sites.

At the Wide Opens, three scrapes were lost to spring tides, one of which was on the gravelled track used to access the oyster farm at the west of the site. Six scrapes were protected with igloos, but during periods of strong wind, igloos in areas of softer sand became blocked, with one pair failing on two occasions as a result. In total, there were 12 scrapes from 7 pairs at the Wide Opens, with 11 chicks hatched and six fledging successfully. Up to eight chicks fledged successfully from four scrapes on Black Law.

Eurasian Oystercatcher *Haematopus ostralegus*

Oystercatchers bred successfully at Wide Opens and Black Law (Table 2 and 3), and attempted to breed at The Beacons (Table 7). One chick fledged from Wide Opens, with one failing soon after hatching and another being predated by a Sparrowhawk. Up to five chicks fledged from five scrapes on Black Law.

Common Tern *Sterna hirundo* and Arctic Tern *Sterna paradisaea*

These tern species bred successfully at Black Law, with a peak scrape count of 75, and a fledging total for both species combined in excess of 100 (Table 3).

a) Kiln Point	Little Tern	Ringed Plover	Eurasian Oystercatcher
Total Scrape	0	3	0
Peak Scrape Count/Pairs	0	2	0
Total Eggs	0	Unknown	0
Total Chicks	0	Approx. 2	0
Total Fledged	0	0	0
Productivity	0	0	0
b) Budle Point			
Total Scrape	0	1	0
Peak Scrape Count/Pairs	0	1	0
Total Eggs	0	Unknown	0
Total Chicks	0	3	0
Total Fledged	0	3	0
Productivity	0	3	0

Table 4. Breeding statistics: Budle Bay

	Little Tern	Ringed Plover	Eurasian Oystercatcher
Total Scrape	0	1	0
Peak Scrape Count/Pairs	0	1	0
Total Eggs	0	Unknown	0
Total Chicks	0	0	0
Total Fledged	0	0	0
Productivity	0	0	0

Table 5. Breeding statistics at Goswick Sands

Ringed Plover	
a) Inner Old Law (no breeding took place at Outer Old Law)	
Total Scrape	4
Peak Scrape Count/Pairs	3
Total Eggs	16
Total Chicks	0
Total Fledged	0
Productivity	0
b) Ross Back Sands – Main Beach	
Total Scrape	1
Peak Scrape Count/Pairs	1
Total Eggs	4 (3 viable)
Total Chicks	0
Total Fledged	0
Productivity	0
c) Ross Back Sands – Budle Bay North	
Total Scrape	2
Peak Scrape Count/Pairs	2
Total Eggs	Unknown
Total Chicks	> 5
Total Fledged	>3
Productivity	1.5

Table 6. Ringed Plover breeding at other sites.

DISCUSSION

Because of the dynamic nature of Lindisfarne NNR, each shorebird site can change from year to year, and sites which had not previously been suitable for nesting birds can emerge at any time.

Any nesting bird is likely to benefit from reduced disturbance, as highlighted by the success of the Little Terns and Ringed Plovers nesting at the Wide Opens. Access restrictions to limit disturbance from humans and dogs have provided the birds with essential space for refuge, breeding and foraging. This has also provided an additional place for other birds to assemble without continual disturbance from visitors. Higher shorebird abundance was observed on the restricted side of the shore throughout the season with Sanderling *Calidris alba*, Dunlin *Calidris alpina*, Grey Plover *Pluvialis squatarola*, Curlew *Numenius arquata*, Bar-Tailed Godwit *Limosa lapponica*, Oystercatcher *Haematopus ostralegus* and Eider *Somateria mollissima* being recorded utilising the shoreline for longer periods of time.

Despite the presence of signage at the entry points to Ross Sands and the clear indication of barriers at the Wide Opens, numerous visitors would still try and continue walking up the beach, usually sticking to the lower tideline. In response to this, a sign was erected during low tide informing members of the public about the project and associated access restrictions. This was successful as many visitors would observe the sign and turn back. The additional sign was also very helpful tool if a warden is engaged in conversation with other visitors.

Visitors with their dogs off leads was a recurring issue throughout the season, despite an increase in signage. Attitudes from dog-walkers varied with some responding kindly to requests while others expressed no interest in adhering to them. Dog fouling was predominately concentrated in the dunes

	Little Tern	Ringed Plover	Eurasian Oystercatcher
Total Scrape	0	1	1
Peak Scrape Count/Pairs	0	1	1
Total Eggs	0	4	Unknown
Total Chicks	0	0	0
Total Fledged	0	0	0
Productivity	0	0	0

Table 7. Breeding at The Beacons, 2019.

and the beach entrance with some instances of this being witnessed and dog-owners failing to pick up the waste. This was not as frequent as issue as dog walkers without leads, but is, nonetheless, still unpleasant and antisocial behaviour.

Electrified and/or non-electrified netting is assumed to have been effective in protecting the nesting shorebirds and their chicks from ground predation. Fox *Vulpes vulpes* tracks were seen at Wide Opens, but never inside the protected areas. The notable exception was at Goswick (electric netting, but not activated) when Fox tracks were seen inside an enclosure when the fence posts had fallen down. In an attempt to avoid a repeat predation event on Black Law similar to 2018, netting with smaller mesh size was used. The large enclosure at the Wide Opens made it difficult for the energiser to supply high voltage to the entire length of netting, despite the batteries holding their charge for long periods of time and the use of solar panels to boost the charge. Two separate fence areas were used at the Wide Opens with independent batteries and energisers, but the position of the battery of the second enclosure will need to be changed for 2020 season as checking and battery replacement did cause some disturbance to nesting birds.

The presence of a boundary rope along the back of the Wide Opens with associated "No Entry" signs appeared ineffective in preventing people who had been walking along the private farm track from entering the main nesting area. Most people who did this were unaware of the nesting birds and were apologetic for the disturbance they had caused.

Deployment of chick shelters at the Wide Opens, Black Law and Kiln Point was a valuable tool in protecting Little Tern chicks from aerial predators and the elements. This was the case during Storm Miguel on 12 and 13 June when Little Tern chicks utilised the shelters for cover. As chicks became more mobile and predation attacks increased, many chicks would gather along the sides of the shelters to remain concealed. The only issue with these shelters was preventing them from being buried by sand build-up, which in turn presented a disturbance issue upon entering the enclosure.

Ringed Plover igloos were a useful tool in preventing predation from crows and gulls, but they were also the cause of failure for three scrapes as the doors became blocked during strong winds. As with any infrastructure that is used during the season, careful maintenance of the igloos is needed to prevent this happening in future seasons.

Of all the management techniques used on Lindisfarne NNR this season, warden presence across all sites remains by far the most effective. Having someone to engage with members of the public is essential to explain that fencing gives the birds the space they need to breed successfully and should be respected. Even when talking to people supportive of the scheme, on numerous occasions the restrictions have been unclear and needed to be clarified by staff or volunteers. There were significantly fewer negative interactions at the Wide Opens this year; however, frustration still occurred when people arrived at the boundary fence unaware of the access ban. The presence of a warden at the roadside parking used by visitors to access Ross Back Sands was very effective (though not without negative interactions) for limiting numbers of people at the colony; people who approached the site were interested in the scheme and viewing the birds.

Chick provisioning this year was very good, with feeding events remaining constant throughout the season (observed both during feeding surveys and general monitoring), including during Storm Miguel. Sandeels made up most of the Little Tern chick diet and were generally of good size, therefore a lack of food is ruled out as a cause of the high chick mortality during late June.

Aerial predation was thought to be the biggest cause of chick mortality at the Wide Opens this year, with Kestrels and at least one Sparrowhawk taking chicks. During the 2018 season, numerous Kestrels were seen hunting in the dunes surrounding the Wide Opens but did not show any interest in the colony. From studies done on the wider Reserve, small mammal numbers have been lower than average, and a lack of food in the dune systems might have led the Kestrels to look for food elsewhere. A plastic garden owl was placed on top of a high hawthorn bush to try and deter the raptors, but this had no effect. No other deterrents were used this season and attempts to chase them away by both the adult birds and wardens were unsuccessful. During the May spring tides, waders displaced from Fenham Flats congregated on the shore by the Wide Opens which attracted a Peregrine Falcon. The raptor was successful in taking a Grey Plover, but thankfully did not show interest in the Little Terns. Crows were seen scavenging for early Ringed Plover eggs at the start of May, and after constant chasing by wardens they were rarely seen near the colony again until a family group appeared towards the end of June. They landed inside the netting enclosure several times a day and were seen to take eggs. Again, wardens attempted to chase them away which they did respond to, but the

crows returned shortly after. Frequent disturbance from the predators is likely to have been the main reason the remaining scrapes failed in early July, and interference from wardens attempting to chase them away is likely to have contributed.

Conclusion

Little Terns and Ringed Plovers choose to nest in naturally vulnerable areas on the coast which are susceptible to tidal inundation, sand blow and predation. In recent years, increased human disturbance has added more pressure to the already-risky breeding sites, and has limited the areas available, for Ringed Plovers in particular, to nest. This is highlighted by the number of Ringed Plover territories at the Wide Opens alone, which would not occur in unprotected areas. Keeping the existing sites protected and staffed is essential in ensuring that the wildlife benefits are widely acknowledged by members of the public and continue to be respected.

The most powerful management technique remains, without doubt, warden presence. It is essential that a warden team remains active at the Lindisfarne NNR sites to prevent disturbance to the breeding birds, especially Ringed Plovers nesting outside formally-protected areas. As in 2018, it has been clearly demonstrated again this year that restricting public access past the Wide Opens has had a positive impact on productivity and increased biodiversity of wildlife on the protected side of the boundary. A similar approach to the spit at Kiln point is now needed to protect chicks feeding on the strand line, although the logistics of this may prove challenging.

In the UK, breeding shorebird numbers are declining at an alarming rate, and conservation efforts to improve opportunities to breed and boost fledgling success is needed more than ever. It is imperative that Lindisfarne National Nature Reserve remains a sanctuary for these birds, as the viable areas for them to nest are becoming inundated with people and dogs on most of the UK coastline.

ACKNOWLEDGEMENTS

All images in this article were taken under a Schedule 1 licence. The Breeding Shorebird Protection Scheme could not operate without the amazing support of our dedicated volunteers – thanks again and see you next season.

SMALL MAMMAL SURVEYS AT LINDISFARNE NATIONAL NATURE RESERVE

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INTRODUCTION

Coastal sand dunes are a UK Biodiversity Action Plan Priority Habitat (BRIG, 2011), as shelter for slakes, as natural defences against sea level rise, and for the highly specialised wildlife which they support. Lindisfarne National Nature Reserve (NNR), also a RAMSAR site (Natural England, 2020), is such an example, supporting internationally important populations of wintering waders and wildfowl, and a rich flora, especially in the dune slacks (Lunn, 2004).

All ecosystems are dynamic and responsive to the influences around them. Understanding the effect of all these factors is important because the flow of energy through the system ultimately affects the whole community of organisms. Small mammals contribute to the energy flow of this habitat in many ways, but particularly by feeding on plants and small animals, and themselves then providing food for bigger predators. For example, Field Voles *Microtus agrestis* are herbivorous, feeding primarily on the stems and leaves of common grasses. Mosses can contribute up to 20% of their diet, and some flowering plants, such as Willowherbs, may add extra nutrition when the leaves of grasses are tough during flowering or fruiting. Wood mice *Apodemus sylvaticus* are opportunistic omnivores and seed dispersers and Common Shrews *Sorex araneus* are opportunistic predators. The preferred diet of Common Shrews is prey of 6–10 mm length, such as small earthworms, slugs, snails, beetles, spiders, woodlice and insect larvae. They will burrow for food, and may help control parasites, for example the nematode worms which parasitise marram grass (Brinkman et al, 2005). Pygmy Shrews *Sorex minutus* are surface foragers taking small prey (2 - 6 mm in length) and focus on spiders and harvestmen, beetles and the smaller woodlice species, also small molluscs and flies.

Field Voles are prey for animals such as Grey Heron *Ardea cinerea*, Tawny Owl *Strix aluco*, Barn Owl *Tyto alba*, Long- *Asio otus* and Short-eared *A. flammeus* Owls, harriers, mustelids, Fox and feral cat. Predation takes an estimated 85% of total annual Field Vole productivity. Shrews and Wood mice are also prey, but tend to be less favoured than Field Vole.

If we are to conserve the special coastal sand-dune environment, we need to gather information about all species present and the factors which affect their abundance from year to year. This article summarises monitoring surveys of mice, voles and shrews carried out on the Snook, Lindisfarne NNR, from 2009. The objective of these surveys was to get an indication of over-winter survival and juvenile recruitment in the dune system for each of those years.

METHODS

Live trapping methodology was used for all surveys. Procedures followed were as prescribed by the shrew licence (Natural England, 2019) and detailed by Gurnell and Flowerdew (2006), as far as practicable across years and changing environmental conditions. The Grid reference and aspect of each trap was recorded and a photograph of each trap *in situ* taken to indicate the local habitat. To see if there appeared to be any preference by the small mammals for any plants or groups of plants, vegetation within 2.5 m of each trap was recorded for surveys up to 2015: a comment was recorded throughout the course of the survey period if there was any change.

Longworth traps (Figure 1) were set up along line transects and pre-baited with food and bedding with trap doors locked open for two days. Bait was selected and processed to prevent the risk of introducing alien species onto the site: chopped sunflower hearts, newly 'turned' or fresh frozen casters (blowfly pupae *Calliphora spp*) and chopped sweet apple (variety Royal Gala). Dry grass collected only on the Snook was provided for bedding. At the end of the pre-bait period in 2018, notes were made of invertebrates present in each trap to determine if some traps were in positions which were normally devoid of prey for shrews.

Figure 1. Longworth trap in position; August 2016, Transect 2.

Traps were then re-baited and set to catch over a continuous period of twenty-four hours, but checked at approximately 4-hour intervals during daylight hours and 4 - 6 hours overnight. Catches were identified, examined, weighed using a 50 x 0.2 g Pesola balance, and recorded, and new catches were marked with fur clips to identify recaptures. Some catches were photographed. They were then released at point of capture. Each trap round took about 1.5 – 2 hours. Trap fatalities were one immature Common Shrew in September 2018 (Transect 1) and two Pygmy Shrews, one in September 2014 (Transect 1) and one in September 2016 (Transect 2). Shrew fatalities were reported to Natural England, according to the terms of the licence (Licence no. GL-01).

During the surveys, temperature, wind speed and direction, weather conditions and heights of high tide were recorded. Data were transcribed onto a spreadsheet with relevant notes. At the end of the survey, traps, flags, bedding and bait were removed from the site, taking care to avoid translocation of Pirri-pirri Bur *Acaena novae-zelandiae*. For all surveys, there were enough empty traps at the end of each trap round to assume that all animals present would have encountered a trap within range.

After an exploratory survey in 2009, two transects (Figure 1) were used for subsequent surveys from 2010 to 2018:

- Transect line 1: 10 - 12 flagged traps were positioned along a line transect running southwest to northeast through the fixed and mobile dune system to the fore-shore. Grid Ref: NU102435 to NU104436. Altitude of each trap in transect 1 did not exceed 10 m asl at any point.

Figure 2. The position of the two transects on the Snook. Google Earth image.

- Transect line 2: Up to 20 flagged traps were positioned along a line transect running west-east from the end of Snook House garden towards the migrant slack, through the fixed dune system and part of a dune slack. Grid Ref: NU101436 to NU098436.

In 2019 Transect 1 was not surveyed. Transect line 2 was shortened and 12 traps were positioned along the same but shorter line transect NU100436 to NU098436. In addition, a new transect line, Transect 3, was established with six traps positioned along the slope/slack interface from NU098437 to NU099436.

RESULTS & DISCUSSION

A 24-hour small mammal trapping session on Lindisfarne, carried out in June 2009 as part of a Northumberland Wildlife bioblitz, identified the presence of Water Shrew *Neomys fodiens* in Holy Island village, and Common Shrew and Wood Mouse in the sand dunes of the NNR and in the hedgerow beside the track leading to the NNR. A similar 24-h snapshot survey carried out for Natural England in July 2009 identified small mammal species present in various pre-selected habitats on the island (Table 1).

The July 2009 survey was used to guide the placing of transects for use in subsequent years. Two transects were used consistently from 2010 until 2018; in 2019 one of the original transects was not used, the other was shortened and a new transect line was established. Species counts for the standard transects used from 2010 to 2018 are summarised in Table 2, along with summary notes of seasonal weather, with sampling efforts summarised for all years from 2010 in Table 3. Weather conditions prevented surveys in some seasons and in both seasons of 2012.

Four species of small mammal were confirmed to be present consistently in the Lindisfarne dune system over the 2010 - 2019 survey period: Wood Mouse (Figure 3), Field Vole (Figure 4), Common Shrew and Pygmy Shrew. Catch totals were generally dominated by Common Shrews, except in 2016 when Wood mice were more abundant.

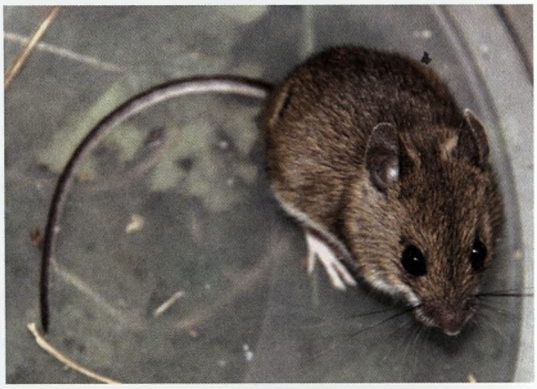

Figure 3. Wood Mouse (with fur clip), May 2016.

Figure 4. Field Vole.

Site	Field Vole	Wood Mouse	Common Shrew	Pygmy Shrew	Land use
Snook; Pyrolla/Scots Pine; NU 099433	Present		Present		NNR
Snook; Grey Fixed Dunes; NU 103435			Present	Present	NNR
Straight Lonnen; Dune slack; NU129434			Present		NNR
Straight Lonnen; Dunes 'sedge'; NU 129435					NNR
Straight Lonnen; Field; NU 1243	Present			Present	Agriculture
Straight Lonnen; Hedge; NU 128424		Present	Present		Trackside
Chare Ends; NU 124 425					Agriculture
The Lough; NU 137429		Present			NNR

Table 1. Snapshot survey in July 2009. Water Shrew was absent from all sites on this survey.

The surveys indicated that over-winter survival for all species was very low, and that populations were boosted over the course of the summer by juvenile recruitment (Table 4). Bearing in mind the differences in transects used in 2019, catch-adjusted totals for juveniles suggest that small mammal abundance, particularly of Common Shrews, was good in 2019 (Figure 5).

At the end of the pre-bait period in autumn 2018, small spiders, ants, large and small woodlouse, mites, small flies, large and small beetles, snails, and slugs were found in the traps. There was no clear indication that shrews preferred traps containing such invertebrates.

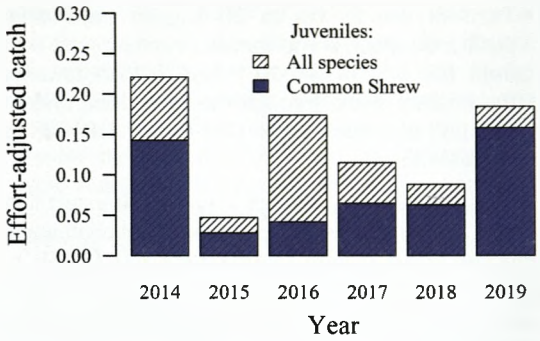

Figure 5. Bar plot of catch-adjusted totals for juveniles of all species caught in the autumn of years 2014 to 2019 (hatched bars) with catch-adjusted totals for Common Shrews overlaid in blue. Data from standard transects in 2014 - 2018 and the changed transect structure in 2019.

SPRING	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total	2	4	-	-	-	-	13	14	8
Field Vole	2	2	-	-	-	-	1	5	2
Common Shrew	0	2	-	-	-	-	4	8	3
Pygmy Shrew	0	0	-	-	-	-	2	1	0
Wood Mouse	0	0	-	-	-	-	7	0	1
Prior winter weather	Cold, ice & snow	Cold; dry then wet.	Mild; average rain	Stormy; flooding	Wet; stormy; flooding	Average temp & rain	Mild; wet	Mild; dry	°C, rain: < average; cold Feb.
Trap rounds	11	12	0	0	0	0	4	5	6
Trap hours	55	68					24	24	26
Traps	21	31					28	29	29
Traps disturbed	0	5					11	0	1
AUTUMN									
Total	13	-	-	4	15	8	43	19	17
Field Vole	1	-	-	0	1	0	6	9	3
Common Shrew	4	-	-	0	6	6	9	9	11
Pygmy Shrew	0	-	-	0	1	2	3	1	1
Wood Mouse	8	-	-	4	7	0	25	0	2
Prior summer weather	°C average; wet	°C < average. wet	°C < average. wet	°C > average; dry	°C > average; wet	Cool and wet	°C & rain > average	June °C > average; then cool	Hot & dry. Late Aug. cool & wet
Trap rounds	10	0	0	3	4	6	6	5	6
Trap hours	51			17	22	30	25	25	27
Traps	30			20	20	20	29	29	29
Traps disturbed	6			0	3	14	7	6	15*

Table 2. Species counts for the standard transects in spring and autumn surveys 2010 to 2018 with annual weather summaries sampling effort and trapping notes. Surveys were not carried out when the dune habitat might have been compromised, usually due to adverse weather conditions.

Year	2010	2011	2013	2014	2015	2016	2017	2018	2019
Trap rounds	11/10	12/-	-/3	-/4	-/6	4/6	5/5	6/6	5/4
Traps	21/30	31/-	-/20	-/20	-/20	28/-	29/29	29/29	18/19
Traps disturbed or not set	0/6	5/-	-/0	-/3	-/14	11/7	0/6	1/15	4/0
Sampling effort	231/294	367/-	-/60	-/77	-/106	101/167	145/139	173/159	86/76
Total all species catch	2/13	4/-	-/4	-/15	-/8	13/43	14/19	5/17	4/16

Table 3. Sampling Efforts 2010 – 2019; no surveys took place in 2012; Green: spring; red: autumn.

SPECIES	Age	2010	2014	2015	2016	2017	2018	2019	Weights (g)
Field Vole	Adult	0	1	0	3	3	1	1	20-32
	Juvenile	1	0	0	3	6	2	0	<20
Common Shrew	Adult	0	0	1	2	0	1	1	9-12
	Juvenile	5	11	3	7	9	10	12	4-8
Pygmy Shrew	Adult	0	-	0	2	0	0	0	6.1
	Juvenile	0	-	2	1	1	1	1	2.5 - < 6
Wood Mouse	Adult	3	1	0	5	0	1	0	>20
	Juvenile	5	7	0	18	0	1	1	≤ 19

Years 2011, 2012: no survey. Year 2013 was surveyed but no species weights taken.

Table 4. Adult & Juvenile species counts for autumn surveys 2010 – 2019.

During the surveys, small mammal signs and the presence of potential predators were recorded as incidental observations. Common Shrews were found dead on tracks through dunes in July 2009 (dune slope along the track used for transect 2) and in a dune slack along transect 2 in autumn 2017. These may be examples of voluntary displacement, when adults are displaced from prime habitat by maturing young. One was also found dead in the dune slack of transect 2 in spring 2017. In addition, Field Vole droppings were seen in vegetation in spring and autumn 2010.

Sightings and evidence of predators of small mammals were also recorded as part of survey work. Tracks and pathways used by Stoats were seen near Snook House in spring 2010, and one was seen in a dune slack near the vicinity of transect 1 in 2018. Raptors are important predators of small mammals, and Short-eared Owl (spring 2019), Kestrel *Falco tinnunculus* (2018, 2019) and Barn Owl (2010, 2011, 2019) were seen in the vicinity of transect 1.

Dominant vegetation within 2.5m of traps

Habitats varied within and between transects. On dune slopes, the dominant vegetation was Marram Grass Ammophila Arenaria, together with moss species, Pirri-pirri Bur, Rosebay Willowherb *Chamerion angustifolium* and additional common grasses (JS pers comm). The foreshore of transect 1 was dominated by Lyme Grass *Leymus arenarius*, Sand Couch-Grass *Sporobolus virginicus*, Sea Orache *Atriplex* sp. and with areas of bare sand. The dune slacks of transect 1 (Figure 6) contained Black Bogrush *Schoenus nigricans*, Creeping Willow *Salix repens*, Silverweed *Potentialla anserina*, Orchid species and common grasses. The dune slacks of transect 2 were dominated by Meadowsweet *Filipendula ulmaria*, Creeping Willow, common grasses, sedges and pond plants. 2015 was the first year that pathways through the dunes became covered with vegetation, mostly moss & Pirri-pirri Bur but later replaced by short grasses and short herbs. In all surveys, most catches were made on the dune slopes. Autumn surveys showed a small increase in catches in the slacks compared with spring. One example of a small mammal using both habitats was an immature Common Shrew caught in two habitats during the course of one survey (September 2016): in transect 1 trap 11 NU10325 43541 (dune slack)

Figure 6. Dune slack of Transect 1 (trap 11), September 2016.

and transect 1 trap 4 NU10321 43512 (dune slope).

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REFERENCES

BRIG (2011). UK Biodiversity Action Plan – Priority Habitat Descriptions. JNCC, Peterborough.

BRINKMAN, E, TROELSTRA, S, and PUTTEN, W (2005). Soil feedback effects to the foredune grass Ammophila arenaria by endoparasitic root-feeding nematodes and whole soil communities. Soil Biology and Biochemistry. **37**: 2077-2087.

GURNELL, J and FLOWERDEW, J R (2006). *Live Trapping Small Mammals*. The Mammal Society.

LUNN A (2004). *Northumberland*. Collins, New Naturalist series.

NATURAL ENGLAND (2019). GENERAL LICENCE to take shrews (Soricidae) for scientific or educational purposes, or for the purpose of ringing or marking, or examining any ring or mark. WML-GL01(version December 2019). Natural England. **https://www.gov.uk/government/publications/shrews-licence-to-take-them**

NATURAL ENGLAND (2020). **http://lindisfarnennr.blogspot.com/p/about-lindisfarne-nnr.html**, Accessed 4 March 2020.


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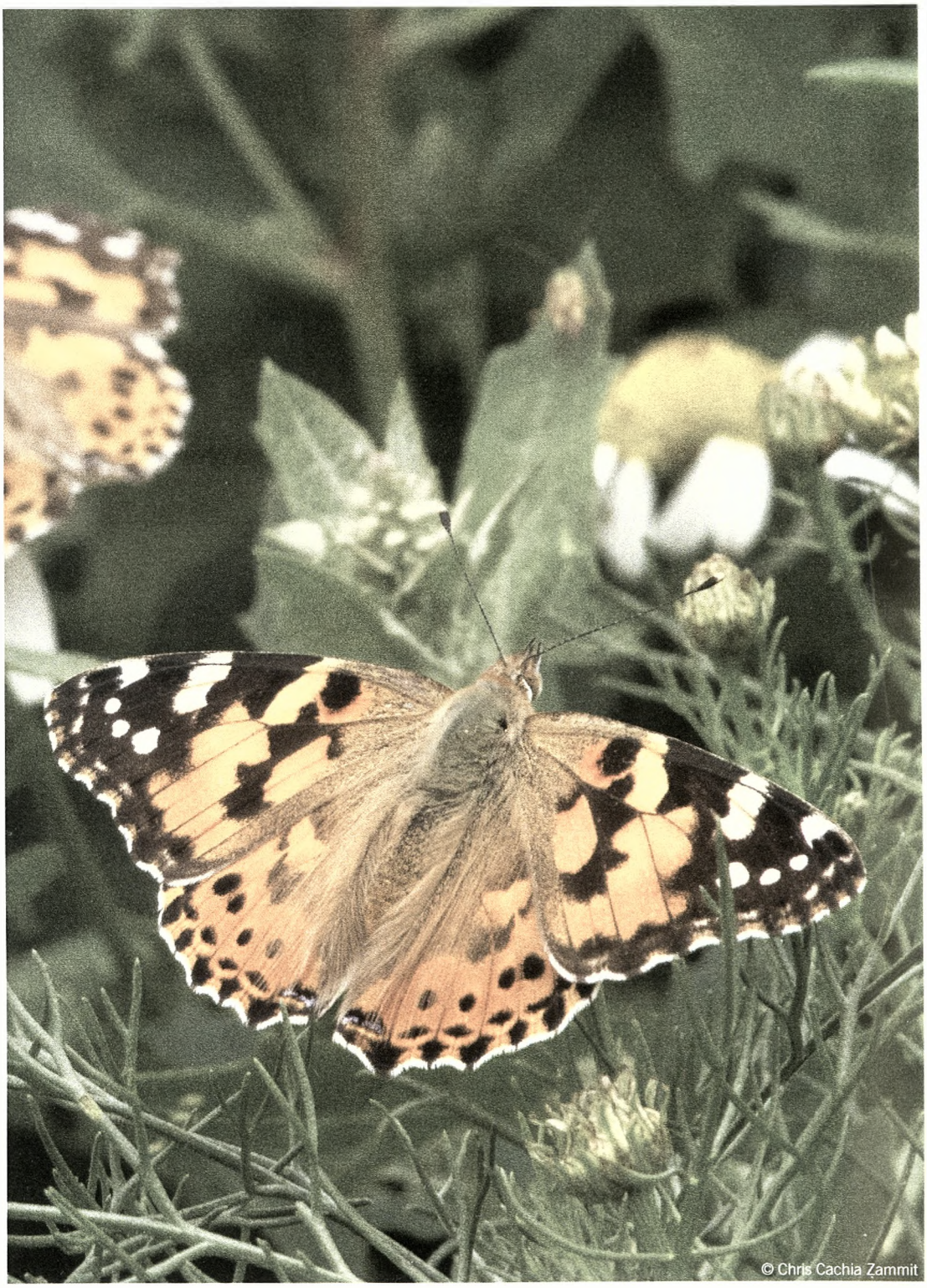
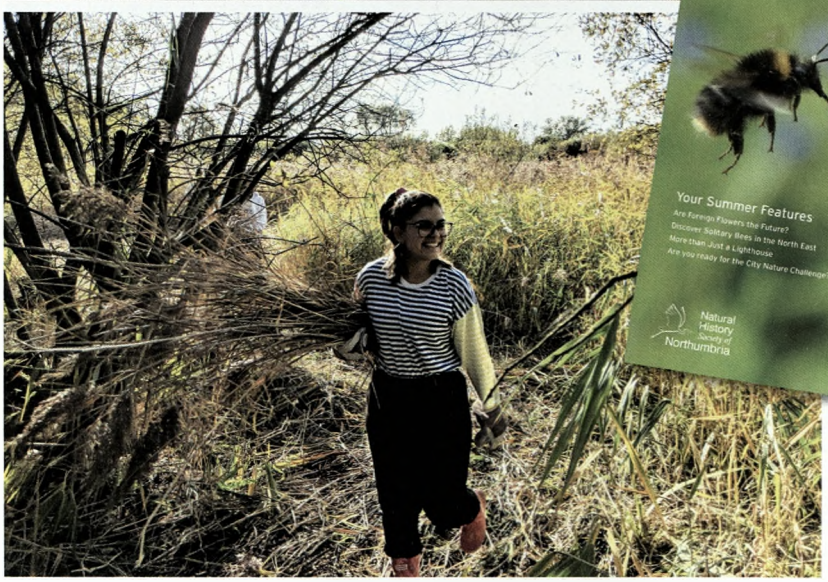
Pied Flycatcher

Goldcrest



Painted Lady

Grey Seal



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