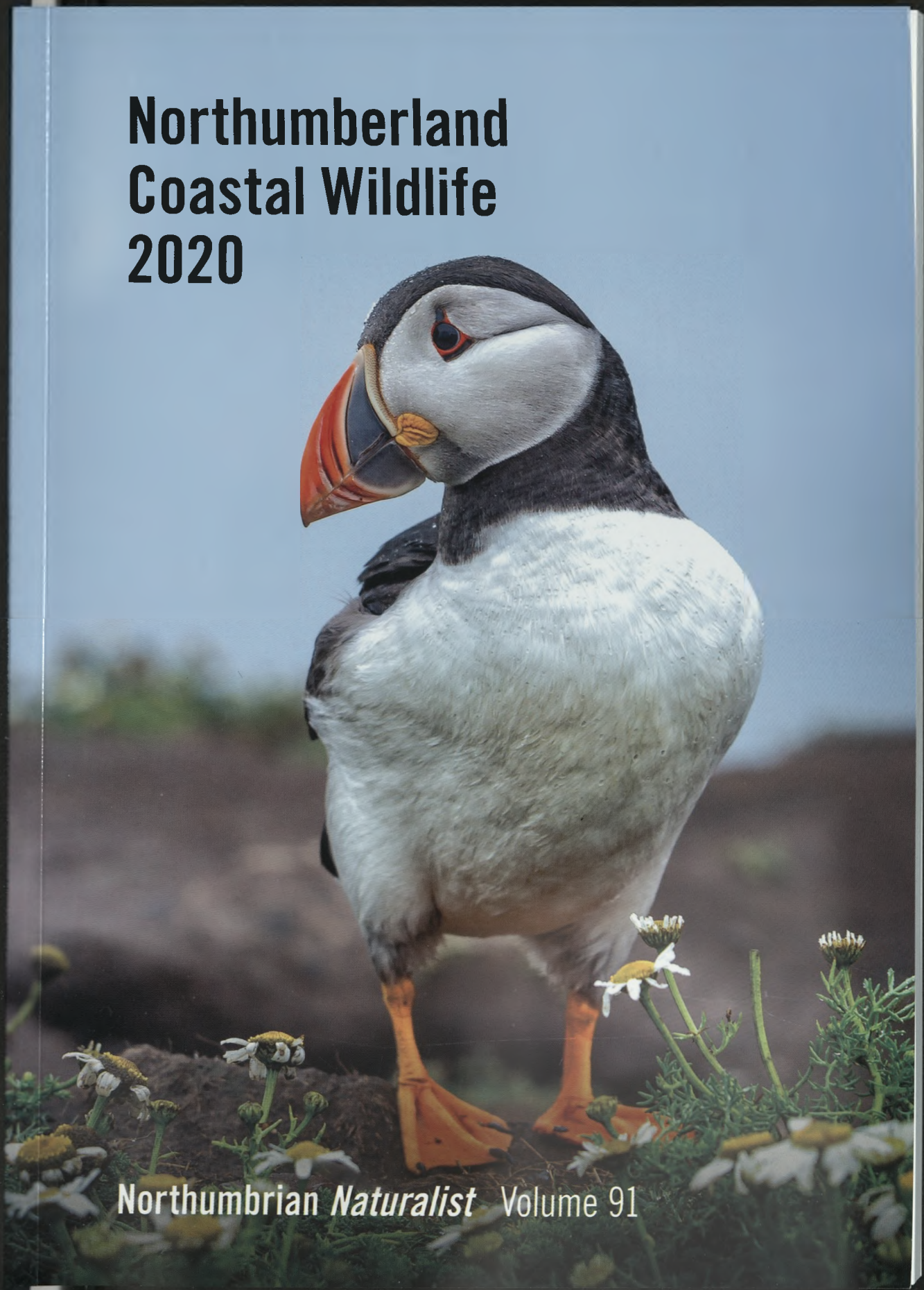
Northumberland Coastal Wildlife 2020



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Northumberland Coastal Wildlife 2020

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Eider *Somateria mollissima*.

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FOREWORD

What a year. Regulations introduced in March 2020 to curb the COVID-19 pandemic have constrained activities in all walks of life. Social distancing regulations have limited the management of some coastal sites and the impacts are still being revealed. From the technical to the emotional, it is important to recognise the need to manage the coastal environment and its wildlife for the retention and expansion of biodiversity, and its value for our emotional wellbeing.

We start this volume of Northumbrian Naturalist, Northumberland Coastal Wildlife 2020, on a more expansive theme than normal, with an important paper on geomorphological change along the northeast coast from St. Abb's to Flamborough heads. Recognising the processes of coastal change is important. At the Long Nanny and Lindisfarne, the destruction of shorebird nests because of high spring tides is a continuing problem. The techniques and monitoring approaches described in this paper could lead to solutions for better physical management of these shorebird sites to reduce tidal flooding with benefits to birds and conservation teams. From this paper I also learnt a new word: 'thalweg', in English technical use the line of lowest elevation within a valley or watercourse, derived from an older spelling of the German 'talweg' or 'valley path'.

As is usual, we continue the theme of how conservation management has fared during 2020 at the key seabird sites of Coquet Island, the Long Nanny, the Farne Islands and Lindisfarne. The COVID-19 regulations have impacted conservation at all sites but to different extents; Coquet Island has been able to keep a small team of residential staff in place for most of the lockdown period, but for other sites reduced staffing has led to problems with keeping the public and predators away from sensitive seabird breeding areas, as well as substantial reductions in monitoring activity. On a more positive note, connecting with nature driven by the pandemic lockdown has been of significant comfort to many and enabled more volunteering to help care for our coastline and its wildlife. Although this 'Coastal Wildlife' has 2020 as its focus, our content 'bleeds' into 2021 with an analysis and commentary on adverse weather conditions in early 2021 which led to significant numbers of dead birds found on beaches along the northeast coast.

Management of our coast and its islands presents a range of challenges: how to allow people and wildlife to interact in harmony, minimising a negative impact of people on shorebird breeding success, and how to retain or maximise biodiversity to enhance our enjoyment of the environment. Biodiversity is important as a biological resource for our security, and is a source of pleasure and wonder. In conservation, some may argue that we should allow the environment and its wildlife to evolve and develop naturally with minimal intervention. However, the UK is one of the most wildlife impoverished countries (Davis 2020) as a result of accelerating Human impacts over thousands of years. Our impact extends over the oceans where marine ecology is disrupted by fishing on an industrial scale. Landfill, waste disposal and fishing discards all alter the ecology of predatory large gulls, beautiful birds in their own right, which has effects on other seabirds. Without sustained management in the face of global human impact, biodiversity stands little chance — we need positive action at all levels to maintain and increase biodiversity.

Changes of seabird populations on the Farne Islands as a consequence of COVID-19 lockdown regulations have now become of significant concern with the abandonment in 2021 of Inner Farne as a breeding site by Arctic Terns. That has taught us an unexpected lesson. In the past, Arctic Terns have bred on the Farne Islands in areas intimately associated with the living quarters of National Trust rangers, who for decades have lived and worked on Inner Farne and Brownsman during the breeding season to manage and protect the seabird colonies. Who would have thought that the rangers were not actually encroaching on the breeding sites of these birds, but that these birds were nesting close to ranger habitation by choice?

However, it makes biological sense: rangers are present when Arctic Terns arrive from the Antarctic in our spring, and are present when the birds leave again for the Antarctic in autumn. By nesting in close proximity to where the rangers live, the birds get some protection from predatory birds such as large gulls, and have good breeding success as a result. That must be why the same individual Arctic Terns return year after year to the same few-metre-square plots of prime Inner Farne Real Estate, as revealed by capture-

recapture studies (Redfern 2021). This might seem surprising, given the annoyance continually directed at people by these nesting terns, but an aggressive defence of their nesting areas is a normal response to potential threats; in their Farne Island breeding areas, those threats are inconsequential because their eggs and chicks stay safe. Take the rangers out of this environment, as happened in 2020 and in 2021 because of the pandemic, and predators make the Arctic Tern breeding sites bad places to nest. No wonder, then, that the birds have abandoned Inner Farne, and have also moved away from a traditional breeding site tightly encircling Brownsman cottage. These were important, productive breeding areas for Arctic Terns in the North Sea. We hope that a return to rangers living and working on the islands during the breeding season next year will restore these colonies because they are an important component of the breeding seabird assemblage of the Northumberland coast.

Chris Redfern

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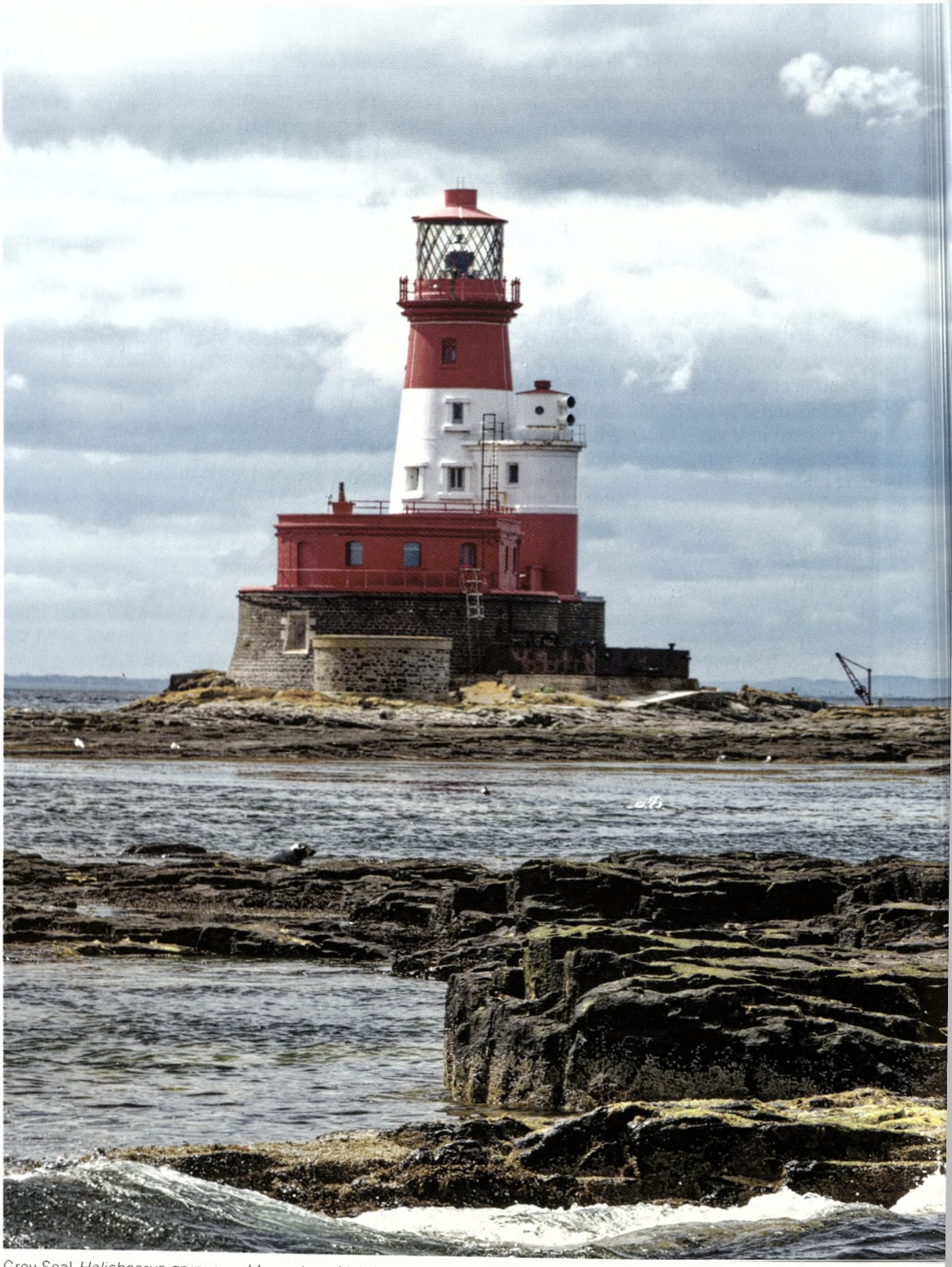
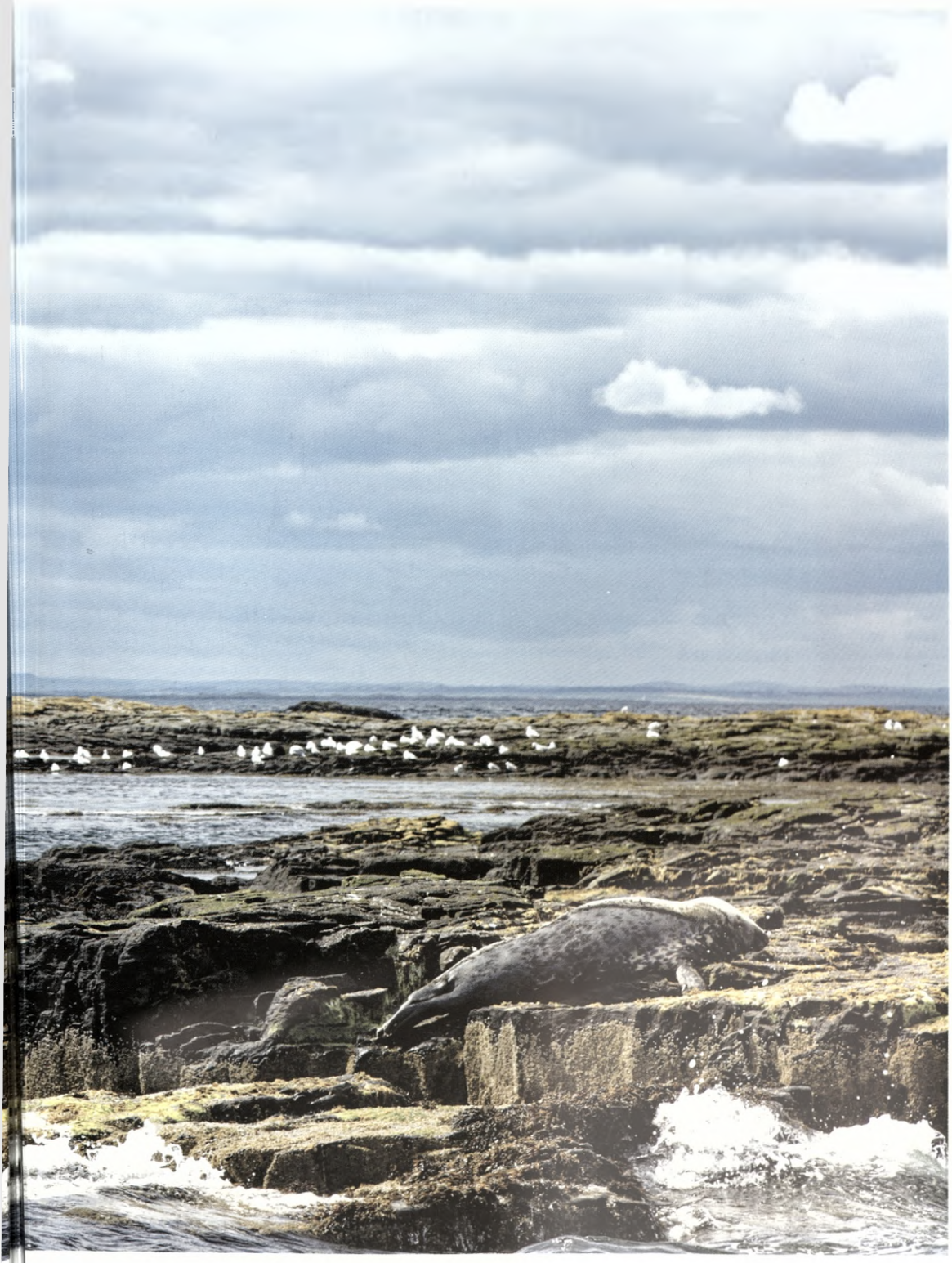


Grey Seal *Halichoerus grypus* and Longstone Lighthouse - situated in the Outer Farne Islands.

Foreword



COASTAL GEOMORPHOLOGICAL CHANGE IN NORTHEAST ENGLAND: THE ROLE OF REGIONAL-SCALE MONITORING

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SUMMARY

Regional scale monitoring is important to ensure that coastal management decisions by local maritime authorities are based upon accurate and up-to-date information on coastal geomorphological change. This helps inform ongoing management and maintenance of beaches and structural defences, as well as planning the type and timing of major capital investments in new or improved defences, or their removal for purposes of adaptation to coastal change or inter-tidal habitat creation. Data from this type of monitoring also provide understanding useful for other purposes such as exercising appropriate development control on coastal land and assessing the potential geomorphological impacts arising from the landfall of marine infrastructure, such as pipelines and cables. This paper presents the background to, and over a decade of results from, the Cell 1 Regional Coastal Monitoring Programme, which covers the coastline between St. Abb's Head in Scotland and Flamborough Head in Yorkshire.

INTRODUCTION

The Cell 1 Regional Coastal Monitoring Programme (Cell 1 monitoring) covers approximately 300 km of the northeast UK coast, from St. Abb's Head (just across the border into Scotland) to Flamborough Head in the East Riding of Yorkshire, covering Northumberland, Tyne & Wear, County Durham, Hartlepool, Redcar & Cleveland and Yorkshire. This coast is often referred to as 'Coastal Sediment Cell 1' (Figure 1), after the esteemed work that was undertaken on mapping of littoral cells in England and Wales (Motyka and Brampton, 1993).

Within Cell 1, the coastal landforms vary considerably (Figure 2). They variously comprise: low-lying tidal flats with fringing saltmarshes; wide, sweeping sandy beaches backed by coastal dunes; hard rock cliffs that are mantled with glacial till of varying thicknesses; and softer rock cliffs prone to extensive landslides.

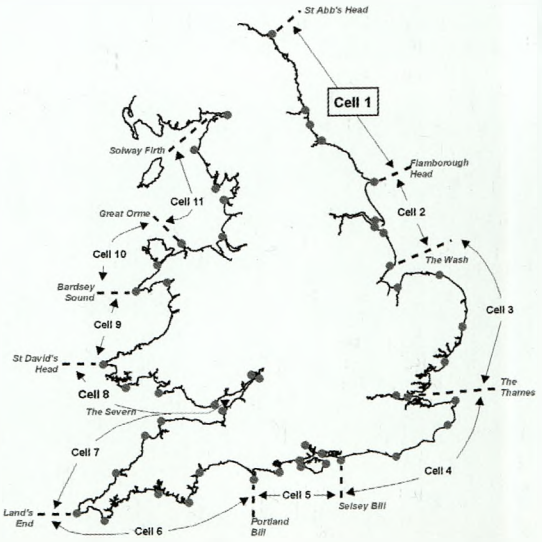

Figure 1. Coastal sediment cells in England and Wales.

There are also many different forms of coastal defence (Figure 3), including offshore breakwaters, revetments, sea walls, harbour piers, and quay walls, as well as different management activities such as beach recharge and sediment recycling, dune management, and adaptation to coastal change (e.g. abandonment and re-wilding, roll-back of coastal footpaths, etc.). Some areas in Northumberland, and through much of County Durham, have been significantly affected by historic tipping of colliery spoil, leading to 'artificial' spoil beaches and cliffs.

Cell 1 monitoring commenced in its present form in September 2008 and is managed by Scarborough Borough Council on behalf of the North East Coastal Group. Prior to 2008, coastal monitoring was undertaken on a consistent basis across Northumberland and North Tyneside as part of the (then) Northumbrian Coastal Authorities Group's monitoring programme which commenced in 2002, whilst several authorities elsewhere within Cell 1 undertook their own local monitoring programmes.

Figure 2. Coastal landforms within Cell 1:
a, coastal saltmarsh (Northumberland); **b**, coastal sand dunes (Northumberland); **c**, colliery spoil beaches (County Durham); **d**, landsliding soft cliffs (North Yorkshire); **e**, limestone sea cliffs (Berwickshire); **f**, chalk sea cliffs (East Yorkshire).

The present programme is funded by the Environment Agency, working in partnership with the eight maritime local authorities in the region (Northumberland County Council, North Tyneside Council, South Tyneside Council, Sunderland City Council, Durham County Council, Hartlepool Borough Council, Redcar & Cleveland Borough Council and Scarborough Borough Council), as well as other relevant bodies such as the Northumberland Area of Outstanding Natural Beauty Partnership, Durham Heritage Trust, North York Moors National Park, Natural England, the National Trust and local Port & Harbour Authorities.

The main elements of the Cell 1 monitoring are (Figure 4):

- beach profile surveys;
- beach topographic surveys;
- cliff-top recession surveys;
- real-time telemetered wave and tidal level data collection;
- bathymetric and sea bed characterisation surveys;
- vertical and oblique aerial photography;
- Light Detection and Range (LiDAR) surveys;
- ecological habitat mapping; and
- walk-over visual inspection surveys of built and natural assets

Figure 3. Coastal defences within Cell 1:
a, Scarborough Spa coastal slope stabilisation, North Yorkshire; **b**, Seahouses main pier, Northumberland (image courtesy Balfour Beatty); **c**, Littlehaven Promenade & seawall, South Tyneside; **d**, Trow Quarry, South Tyneside; **e**, Sandsend Road, North Yorkshire; **f**, Runswick Bay, North Yorkshire; **g**, Whitby Harbour Piers, North Yorkshire (image courtesy Balfour Beatty).

Figure 4. Survey types forming the Cell 1 monitoring:
a. beach profile survey using hand-held GPS (image courtesy Academy Geomatics); **b**, beach topographic survey using quad-bike mounted GPS (image courtesy Academy Geomatics); **c**, vertical and oblique aerial photography; **d**, multi-beam echo sounder bathymetric survey; **e**, wave buoy (image courtesy Fugro); **f**, walkover inspections.

The beach profile, beach topographic and cliff-top recession surveys are undertaken using Global Position Systems (GPS) as a 'Full Measures' survey in autumn/early winter every year. Some of these surveys are then repeated the following spring as part of a 'Partial Measures' survey. Each year, an Analytical Report is produced for each individual authority, providing a detailed analysis and interpretation of the 'Full Measures' surveys. This is followed by a brief Update Report for each individual authority, providing ongoing findings from the 'Partial Measures' surveys. In selected areas, targeted laserscan surveys are undertaken to reveal rock falls, instabilities or the formation of fissures, overhangs and caves in areas where such activity threatens cliff top assets such as coastal highways or access roads. In addition, to these 'direct response' morphological data, the programme includes collection of broader aerial

photography and LiDAR data, alongside background environmental forcing data on waves and tides and more specific bathymetric and sediment data relating to the nearshore areas.

Specifically for the bathymetric surveys, a long running memorandum of agreement (MoA) exits between the national framework of regional coastal monitoring programmes (a framework led by the Channel Coastal Observatory (CCO) and of which the Cell 1 monitoring is part) and the UK's Marine & Coastguard Agency (MCA). The aim of this MoA is to detail the arrangements for the regional programmes, individually or collectively, and the MCA to work in partnership, where funding has already been agreed for survey areas. This is in order to optimise public expenditure by sharing the costs of procurement of swath bathymetry surveys for areas of mutual interest, and to make data freely available via the CCO data management centre and the UK Hydrographic Office (UKHO) Data Archive Centre. The Cell 1 monitoring has, through this collaboration with the MCA, now captured detailed multi-beam nearshore bathymetric data for the full length of its coastline.

The overall aim of the Cell 1 monitoring is to provide a comprehensive integrated suite of information, complimented by expert observational information provided by the walk-over visual inspections on the ground. Key aspects of the programme are the need for sound quality assurance of data and the ongoing collation, storage and use of this major resource. All data and routine interpretative reports for the programme are available on the project website. This paper outlines the rationale for the programme and presents general findings to date, including demonstrations of how the data are already being used to help inform coastal management decisions in the region through four case studies.

Regional Coastal Monitoring

Coasts can be highly dynamic environments. In order to assess and appropriately manage the risks from coastal erosion and sea flooding, maritime Local Authorities and the Environment Agency, together with other organisations with related responsibilities, have recognised the need for regional-scale coastal monitoring programmes to improve the long-term and broad-scale understanding of coastal processes and shoreline change across coastal cells (Bradbury *et al.*, 2001, 2004; Cooper *et al*, 2009, 2019). This provides the necessary core data to inform coastal management decisions, including future coastal adaptation in response to sea level rise resulting from global climate change.

These data are also used to reduce uncertainty in design assessments for capital coastal defence schemes, fine-tune existing operational and maintenance regimes, and enable post-project evaluation of specific schemes to be interpreted within a broader context. These data can also support the set-up, calibration and verification of numerical models that are used in initiatives such as Tidal Flood Forecasting Systems and physical coastal processes assessment, thereby improving confidence in their outputs.

The particular advantages of a region-wide understanding are:

- Delivery of continuous improvement in shoreline management – By continually building the knowledge and understanding of how the coast behaves and evolves, the philosophy of Defra's Shoreline Management Plan (SMP) Guidance (i.e. not just to repeat 'business as usual', but to enhance the coastal processes understanding and its role in SMP production) will be delivered.
- Selection of the most suitable SMP policies or Coastal Strategy options – By providing improved coastal data more quantitative information on mechanisms and rates of coastal change will mean that uncertainties are reduced and consequently policies or options will be selected that have greater sustainability in the longer-term.
- Improved phasing of schemes – Improved understanding of the behaviour of the coastal systems will mean that schemes can be constructed at more appropriate time, avoiding implementation earlier than they need be, under an overly precautionary approach, or later than they should have been, under an otherwise purely reactive approach that often involves interim emergency works.
- Improved scheme design – Reduced uncertainties and improved measured data from the nearshore zone will mean that defences will be better designed to particular marine parameters, such as more appropriate crest levels to reduce overtopping risk, or foundation levels to reduce undermining risk from beach level fluctuations.
- Enhanced operational management and maintenance regimes – The context provided by the regional coastal monitoring data to local activities will provide opportunities in terms of operational management and maintenance regimes that are more tailored to local issues, such as seasonal beach level changes, and also the implications of wider scale changes, such as longer-term trends of erosion or accretion.

Figure 5. Microplastic fibres, fragments and beads. Image courtesy SOCOTEC.

Figure 6. Eroding refuse amongst colliery spoil cliffs at Lynemouth Bay in Northumberland.

Aims and Objectives

The aim of the Cell 1 monitoring is to provide better understanding on the coastal processes and the locations, rates and mechanisms of shoreline morphological change at key locations between St. Abb's Head and Flamborough Head. Recognising that 'one size does not fit all', rather than simply mirroring programmes from some other coastal regions of the UK, the programme has specifically been designed to gain further insight into areas of risk and uncertainty that were identified in the two SMPs which between them cover the entire Cell 1 frontage; the Northumberland & North Tyneside SMP2 (Royal Haskoning, 2009) and the River Tyne to Flamborough Head SMP2 (Royal Haskoning, 2007).

The design of the Cell 1 monitoring therefore reflects the nature and magnitude of uncertainties in the coastal erosion and sea flooding risks in the northeast region. The selection of appropriate monitoring techniques and suitable data collection frequencies during its design took into consideration the following:

- anticipated extent and mechanisms of change in cliff top position, based on understanding of underlying solid geology and overlying drift geology;
- behaviour of dunes and beaches, based on seasonal and longer-term historic observations;
- magnitude and variation in coastal forcing conditions, such as waves, tides and surges, and exposure of the shore to those;
- composition of shoreline and nearshore sediments and their dynamism;
- extent of development in areas of coastal change, recognising that much of the northeast coast is rural but that there are some key urban and industrial areas;
- the anticipated behaviour of the coastal cell under future sea level rise resulting from global climate change; and
- the availability of complementary data from other sources (e.g. Environment Agency, Port Authorities, CEFAS Wavenet).

The programme also provides a framework within which region-wide bespoke studies can be procured and undertaken to investigate emerging issues. In the northeast region, three specific recent studies of emerging topical interest have been:

- The Cell 1 Sediment Transport Study (Royal HaskoningDHV, 2013, 2014) used techniques of Historical Trends Analysis, Sediment Tracing, and Sediment Transport Modelling to characterise the key sediment transport linkages across Cell 1. One of the most notable findings was the effects of historic tipping of colliery spoil (and its more recent cessation) at key locations in Northumberland and County Durham (Cooper *et al.* 2017).
- The Cell 1 Microplastics Study analysed sea bed sediment samples collected as part of the bathymetric and sea bed characterisation surveys for the quantity and type of microplastics (Figure 5) in the marine environment (See *et al.* 2020).
- The Cell 1 Coastal Landfills Study (Royal HaskoningDHV, 2019) assessed the risks from coastal change to identified historic landfill sites within the region (Figure 6), leading to development of a capital scheme to manage eroding refuse at Lynemouth Bay in Northumberland.

Monitoring Outputs

The monitoring outputs from beach profile surveys, beach topographic surveys and wave and tide

recording have revealed that most of the beaches within the region experience seasonal changes in morphology, with lower, flatter beach profiles in winter compared to summer. Typically, this is triggered by winter storms, which remove sediment form the upper beach, causing lowering at the toe of structures or erosion at the toe of dunes, and deposit it on the lower beach or in the shallow nearshore zone. Although there is generally not a strong longshore transport of beach sediment, once drawn down to the lower beach profile fine sediment can become transported in suspension in the water column by the prevailing net southerly tidal currents or, for slightly coarser sediment, along nearshore bars such as at Whitby in North Yorkshire, before being moved back onshore during calmer periods. During summer months, the beaches typically rebuild naturally. This understanding of seasonal changes has been useful in some in areas in avoiding unnecessary and potentially damaging 'knee-jerk' reactions of intervention, sometimes driven by political expediency, upon observations of winter lowering or erosion.

It is also noticeable that in areas of Northumberland and County Durham where colliery spoil tipping has historically occurred, the backing sea cliffs, coastal slopes or sand dunes have become relict features, disconnected from marine processes by the prograding shore. However, after cessation of tipping when the regional coal mines closed (the most recent closure being in 2005) the spoil beaches and spoil cliffs have eroded, by up to 5 m per year in places. Although marine erosion of the natural features landward of the spoil has not yet commenced, it will occur once the legacy of the fronting spoil has fully eroded.

In general, cliff-top recession occurs at relatively low rates along many frontages, but, where apparent changes have occurred, they are generally triggered by periods of prolonged and/or intense rainfall coincident with high tides or stormy seas, or from freeze-thaw cycles in the groundwater within fissures of the cliff. These mechanisms can lead to local rock falls in the harder cliffs and fairly large-scale landslips in the softer cliffs (or small headscarp slippages in areas where layers of till overlay more resistant bedrock). An example of a landslip at Cresswell in Northumberland is shown in Figure 7, where the event has caused recession landward to the edge of the coastal highway. Similarly, ongoing coastal slippages along the cliffs leading to Cowbar within Redcar & Cleveland (Figure 8), has resulted in abandonment of the original access road and its relocation inland.

The captured aerial photography is also useful in understanding ongoing morphological changes. Whilst the larger estuaries of the Rivers Tweed, Tyne, Wear, Tees and Esk have breakwater and pier control structures at their mouths, many of the small river channels and becks which drain into the North Sea within Cell 1 are unconstrained at their mouths and can adopt differing courses dependent upon preceding physical conditions such as rainfall (affecting river spate) or sea storms (affecting beach changes). In some locations the changing course of these channels across the foreshore can increase, or conversely reduce, exposure to erosion processes along the toe of adjacent dunes or lead to undermining of nearby coastal structures. An example is shown in Figure 9, where the course of small beck has change alignment along a beach at Meggies Burn in Northumberland.

Figure 7. Landslip in superficial (drift) geological deposits at Cresswell in Northumberland.

Figure 8. Coastal erosion in superficial (drift) geological deposits at Cowbar in Redcar & Cleveland.

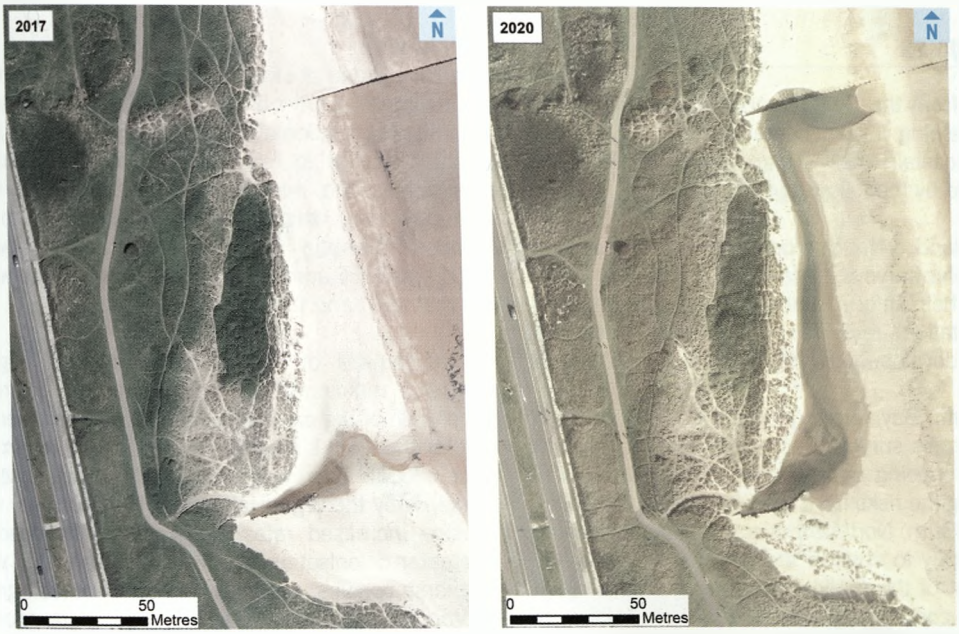

Figure 9. Changing course of a small beck across the foreshore at Meggies Burn in Northumberland, between 2017 (left) and 2019/20 (right).

Figure 10. Opening of a 'sink hole' in the cliff top at Whitburn Coastal Park in South Tyneside, between 2017 (left) and 2019/20 (right).

In some areas, the cliffs are experiencing cave formation at their bases and when these caves penetrate deep into the rock structure, it can lead to wash-out of softer material behind and the formation of 'sink holes' in the cliff top land. Figure 10 shows an example from Whitburn Coastal Park in South Tyneside, where a sink hole opened between 2017 and 2019/20.

CASE STUDIES

The data from the Cell 1 monitoring have practical uses in helping inform contemporary and planned future coastal risk management decisions, exemplified by the following case studies:

- Holy Island, Northumberland - The use of topographic surveys, aerial photography and LiDAR data to help inform landscape-scale changes in sedimentation rates and associated inter-tidal habitat development within a National Nature Reserve;
- Lynemouth Bay, Northumberland – The use of beach profile surveys and LiDAR data to quantify rates of ongoing coastal change for purposes of managing the risks from eroding coastal landfill;
- Meggies Burn, Northumberland – The use of aerial photography to observe the patterns of change in alignment of the outflow channel of a small burn and the connectivity with erosion or stability of adjacent dunes and effects on nearby coastal defence structures; and
- Marsden Bay, South Tyneside – The use of aerial photography and laserscan surveys of the cliffs to assess the risks to the existing cliff top public footpath and coastal highway from rock falls and cliff instability.

Holy Island

The Holy Island of Lindisfarne is an island which lies approximately 1.5 km off the coast of Northumberland. Prior to construction of the causeway in the mid-20th century, access to Holy Island from the mainland was across the intertidal area between the two. The causeway, which is at similar elevations to the adjacent inter-tidal flats, was constructed between 1954 and 1966 across the shortest distance between the mainland and the island.

At the request of Natural England (then English Nature), monitoring of morphological changes either side of the causeway has been undertaken as part of the Cell 1 Regional Monitoring Programme since 2004. This was instigated in response to concerns by the organisation that the causeway was causing increased rates of sedimentation, leading to greater colonisation of the muddy sandflats with saltmarsh species, especially the common cordgrass *Sporobolus anglicus* (note that after a taxonomic revision in 2014, *Spartina anglica* was re-classified as *Sporobolus anglicus*, but is still often referred to by its original name in wider parlance).

The availability of wide expansive inter-tidal muddy sandflats is seen as one of the principal features of the Lindisfarne National Nature Reserve (NNR) since

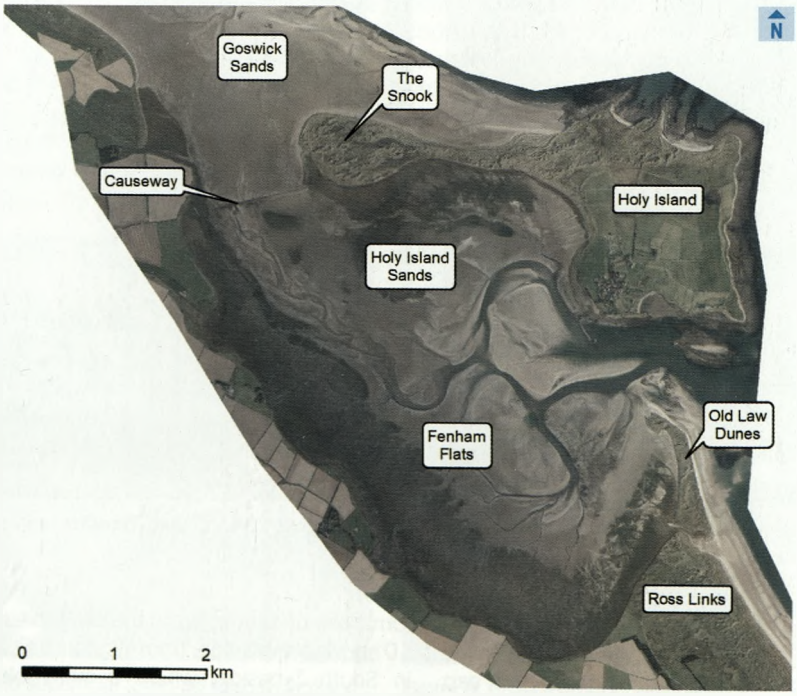

Figure 11. Geomorphological features of Lindisfarne National Nature Reserve (2020).

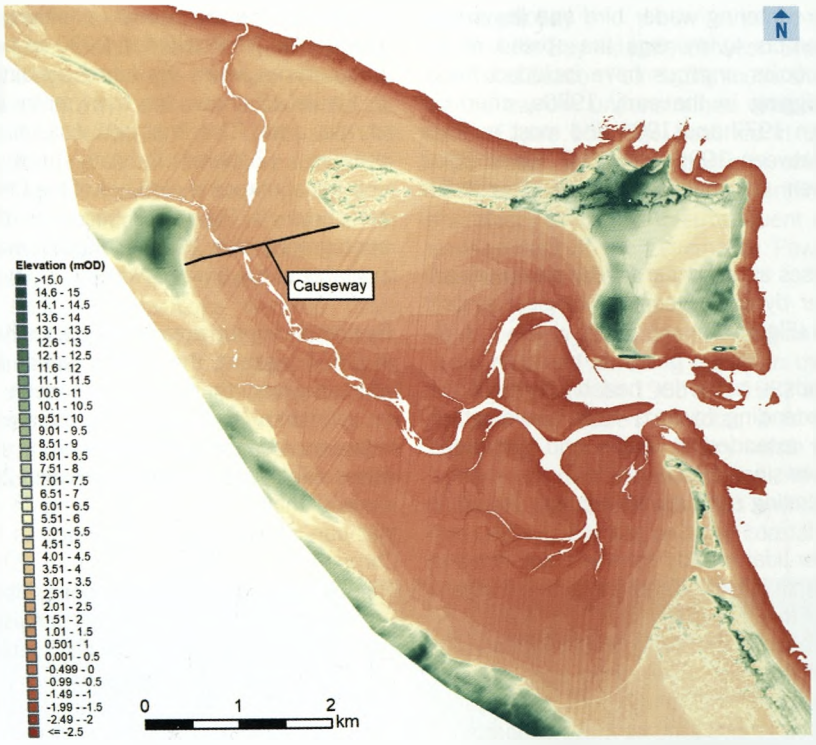

Figure 12. Bathymetry and topography of Lindisfarne National Nature Reserve (2020).

Figure 13. Ecological habitat mapping of Lindisfarne National Nature Reserve (2017).

it attracts over-wintering wader bird species in vast numbers. Attempts to manage the spread of the invasive *Sporobolus anglicus* have included hand-pulling and digging in the early 1970s, chemical control between 1977 and 1994 and most recently roto-burying between 1995 and 2002. Since 2002 there has been no management of *Sporobolus anglicus*.

Coastal processes at, and near to, the causeway are part of a wider dynamic geomorphological system that comprises (Figure 11):

- Goswick Sands – a barrier beach (north of the causeway) extending towards Holy Island which has naturally extended in length and prograded further offshore since 1860;
- Stable or accreting sand dunes on Holy Island at The Snook;
- Accreting inter-tidal muddy sandflats and fringing coastal saltmarsh of Holy Island Sands and Fenham Flats (south of the causeway); and
- Wide sandy beaches of Ross Back Sands, with backing sand dunes at Ross Links and Old Law which have been accreting and prograding seawards since the 17th century (Robertson, 1955).

Figure 11 is an aerial photographic image of Lindisfarne NNR taken in 2020 as part of the Cell 1 programme, whilst the corresponding LiDAR image in Figure 12 shows the bathymetry and topography of the area. The mapped coastal saltmarsh and seagrass *(Zostera)* habitats from the terrestrial ecological mapping element of the Cell 1 programme are shown in Figure 13 based on the 2017 aerial photography (the 2020 ecological mapping was not available at the time of writing).

By comparing the area of saltmarsh that was mapped in 2017 against the 1940s aerial photography it was observed that there had been an expansion in saltmarsh area over the intervening decades. However, monitoring the topography of the tidal flats either side of the causeway between 2004 and 2020 showed that there was no trend in sedimentation that can specifically be attributed to the causeway. Comparison of LiDAR data from 2010 and 2020 (Figure 14) showed that the deposition rates across Lindisfarne NNR were relatively consistent and there was no tendency for higher sedimentation rates in the vicinity of the causeway.

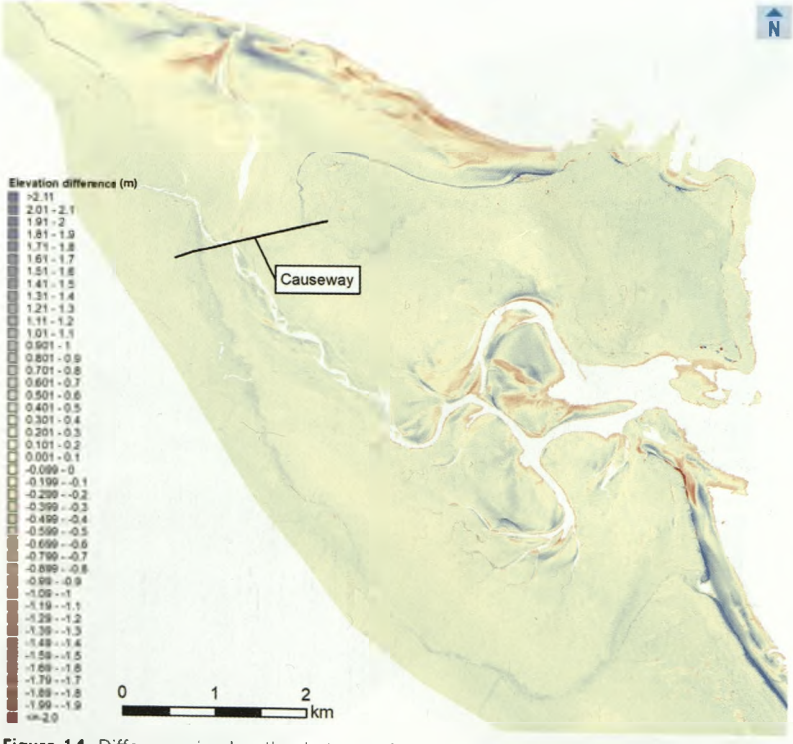

Figure 14. Difference in elevation between 2010 and 2020 LiDAR surveys demonstrating no notable increase in deposition in the vicinity of the causeway.

The evidence from the Cell 1 monitoring demonstrates that deposition across the NNR is driven by landscape-scale geomorphological change, strongly influenced by the prograding barrier beach at Goswick Sands and the prograding dunes at Ross Links and Old Law. These prograding features have reduced the tidal energy and wave exposure on backing inter-tidal flats, leading to deposition of sediments carried in suspension in the water column. As sedimentation occurs, currently at a rate that outpaces sea level rise, so the tidal flat elevations become more conducive to colonisation by saltmarsh vegetation, initially the pioneering *Sporobolus anglicus* and then a succession of other species. This natural process, coupled with cessation of management control of the *Sporobolus anglicus* in 2002, has led to the increase in saltmarsh habitat in Lindisfarne NNR over recent decades.

Lynemouth Bay

Lynemouth Bay extends between Snab Point in the north and Beacon Point in the south, and is intercepted by the narrow, unconstrained channel of the River Lyne (Figure 15). The beaches in Lynemouth Bay experienced extensive tipping of colliery spoil from 1934 to 2005, resulting in an artificially advanced shoreface, which led to subsequent land-claim and development of the Lynemouth Power Station and coal stocking yard.

At its peak in 1968, over 1.5 million tonnes of spoil were recorded as being tipped in one year, and in each year between 1965 and 1983 around 1 million tonnes were tipped. In total, it is likely that over 30 million tonnes of colliery waste were tipped at Lynemouth over seven decades. As a result of this disposal, the natural sea cliffs and coastal slopes to the north of the bay and the coastal sand dunes to

Profile	Location	First Survey	Latest Survey (at the time of writing)	Landward recession of MHWS over period stated		Comments
				Total recession (m)	Average annual rate (m/year)	
1aCMBC03	Northern end of Lynemouth Bay, near Snab Point	02/05/2002	28/11/2019	2	0.1	Stable cliffs
1aCMBC03A	Northumberland County Council land	01/10/2007	21/04/2020	29	2.3	Profiles CMBC03A and CMBC03B were added to the programme in October 2007
1aCMBC03B	Coal Authority land	01/10/2007	21/04/2020	58	4.6	
1aWDC01	Power Station Revetment	03/05/2002	22/04/2016	67	4.8	No longer surveyed as the fronting spoil beach has eroded back to the revetment
1aWDC02	Lyne Sands	03/05/2002	28/11/2019	54	3.1	Recession based on seaward berm
1aWDC03	Southern end of Lynemouth Bay	03/05/2002	28/11/2019	55	3.1	

Table 1. Beach profile surveys and erosion rates in Lynemouth Bay.

the south became detached from marine processes. They are currently stable, relict features, but the colliery spoil cliffs or colliery spoil beaches in front of them are actively eroding landwards since cessation of tipping activity in 2005.

Monitoring of coastal change in Lynemouth Bay has been undertaken as part of the Cell 1 monitoring (or its predecessor programme across Northumberland) since 2002, with aerial photography and beach profile surveys. Various profiles have been added or removed over time and the location of these profiles is shown in Figure 15. Annual average erosion rates, based upon the most up to date data, are shown in Table 1.

In four areas of the bay, various plastics, rubbers, construction rubble and assorted other refuse wastes have historically been tipped within the colliery spoil. With the ongoing erosion of the surrounding colliery spoil, these materials are becoming washed-out into the wider environment causing unwanted pollution. Waste management works are proposed at Lynemouth Bay in 2021/22 as a capital scheme to excavate and physically treat these materials, and take the unwanted polluting elements off-site for appropriate disposal, with on-site recovery of the treated colliery spoil for backfilling the excavations.

To investigate recent changes in the shoreline position and help inform the design of this capital scheme, LiDAR data for the years 2000 and 2019 have been analysed. The 2000 data were available from the Environment Agency at 2 m horizontal resolution, with the 2019 data being captured by the Cell 1 monitoring at 1 m horizontal resolution.

These data have been used to develop Digital Ground Models (DGMs) in a Geographical Information System (GIS) for each year. Output plots clearly show significant changes in coastal position over this 19-year period. Figure 16 describes the shoreline in 2000 and 2019 in the vicinity of Areas 1 and 2 of the capital scheme, where most of the plastics and refuse is proposed to be removed. The tipped colliery spoil cliffs have eroded to encroach upon areas containing the plastics and other refuse material, which is the mechanism causing its release into the wider environment.

To further support development and post-project evaluation of the imminent capital scheme within Lynemouth Bay, the scope of the Cell 1 monitoring has been enhanced from December 2020 to now also include a topographic survey (from the toe of the cliffs/slopes down to low water) and a cliff-top survey along the line of the colliery spoil cliffs.

Figure 15. Beach profile survey locations in Lynemouth Bay.

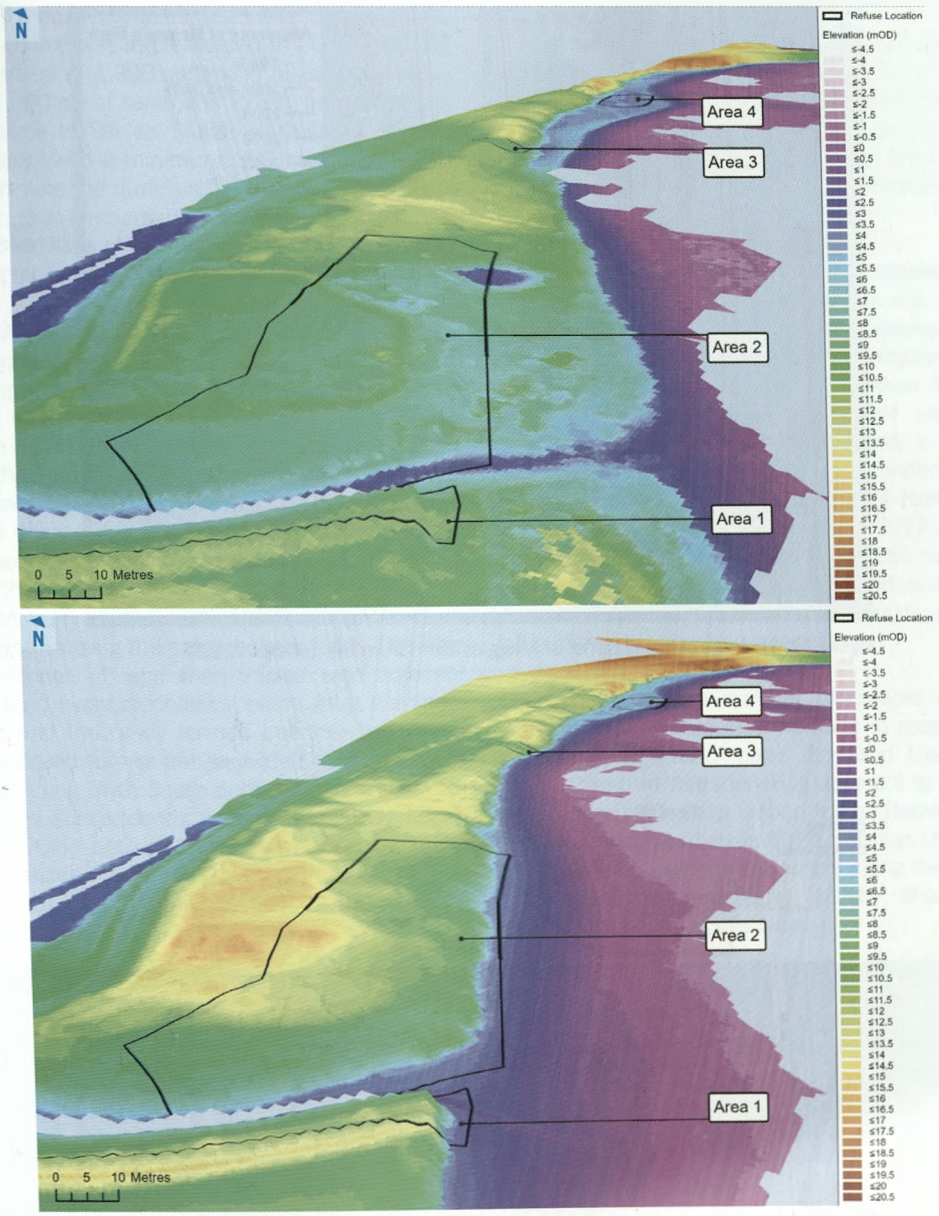

Figure 16. Shoreline position in the vicinity of Areas 1, 2, 3 and 4 in 2000 (top) and 2019 (bottom).

Meggies Burn

Blyth South Beach is located in southeast Northumberland and extends approximately 4.2 km from the River Blyth estuary in the north to Seaton Sluice Harbour in the south. The northern 1.5 km of beach is backed by hard defences (seawall and promenade), whilst the southern 2.7 km is formed of a sand dune system. The long sandy beach, dunes and (where present) promenade are of significant amenity and recreational value. The dunes have ecological value, designated as part of the Blyth to Seaton Sluice Dunes Local Nature Reserve and are located immediately adjacent to the Northumberland Shore Site of Special Scientific Interest (SSSI). A combined footpath and cycle way, which passes through the dune, is heavily used by walkers, cyclists and dog-walkers.

Surface water from the low-lying agricultural fields landward of the dunes is drained into the culverted

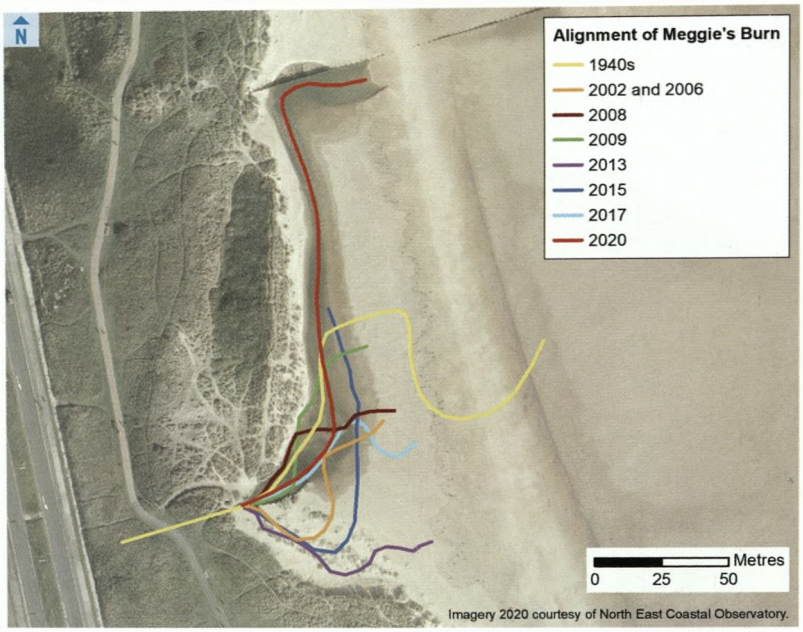

Figure 17. Thalweg of the channel of Meggies Burn from the 1940s to 2020.

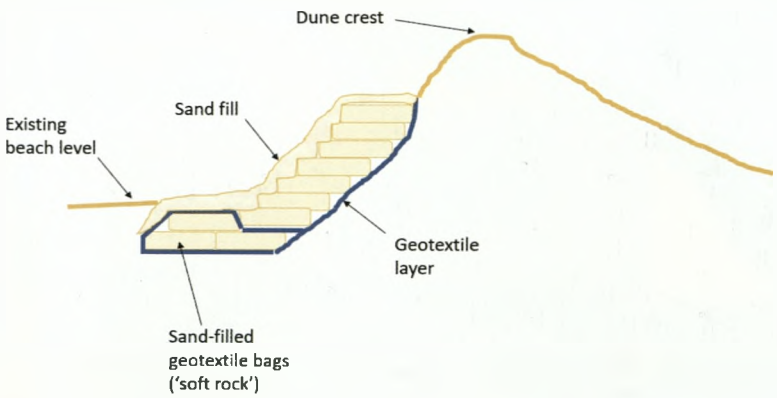

Figure 18. Dune stabilisation scheme at Meggies Burn, 2016.

Meggies Burn. The outfall of the burn is located just to the south of the end of the promenade towards the northern end of Blyth South Beach. The alignment of the unconstrained channel of the burn, as it leaves the outfall pipe and crosses the inter-tidal shore, has historically been variable.

Changes in alignment of the burn's channel between 2002 and 2020 have been well documented by aerial photography from the Cell 1 monitoring (Figure 17). In some years, the channel adopted a more central alignment (such as 2008 and 2017), whilst in other years it developed a more southerly alignment (such as 2013), and the remainder a more northerly alignment (such as 2009 and 2020). In 2002, 2006 and 2015 a more southerly alignment was initially adopted after leaving the outfall, closely hugging the dune toe to the south of the burn, before turning to adopt a more central or northerly discharge across the foreshore.

Between 2013 and 2015, the burn had persistently adopted a more southerly alignment. This caused erosion of the dune toe to the south and localised slumping in the dune face, which prompted local concerns about the erosion potentially affecting the

footpath if it was left unattended. In response to this, a small scheme was implemented in 2016 involving the placement of 1,300 geotextile bags filled with a total of 1,300 m^3 of sand won locally from dredging the entrance to Seaton Sluice Harbour. The bags were topped with a minimum 300 mm covering of sand to restore the dune profile (Figure 18). Around this time, rock armourstones were also placed along the southern flank of the channel, to prevent the flow reaching the toe of the newly 'repaired' dunes.

In late 2019, the channel of the burn had moved north along the toe of the dunes to reach the last timber groyne, causing a large scour hole to be created in the beach as the channel meandered beneath it. The scour developed following a period of very heavy rainfall over a few days which caused the burn to be in spate. When coupled with high equinox tides, the channel flow diverted north until it reached the groyne. The sand level was higher on the north side of the groyne, so the force of water from the burn washed away the sand underneath the groyne causing the scour hole to form. The hole was cordoned off and then infilled with adjacent beach sand using mechanical plant. After the spate abated, and the newly formed channel bed dried, it left exposed former anti-tank defences that were installed along Blyth South during World War II, but which had subsequently become buried by beach sand and had not previously been observed for at least a decade.

Marsden Bay

As well as collecting coastal data routinely across the Cell 1 frontage, the monitoring also provides a mechanism by which additional bespoke local surveys and studies of various types and frequencies can be undertaken. One example of this is the Marsden Bay Risk Management and Emergency Response Plan, which was completed in 2019.

Due to long-standing concerns about coastal erosion in Marsden Bay, and in particular the risk posed to the cliff top public footpath and adjacent coastal highway, South Tyneside Council requested that repeat laserscan surveys be undertaken to inform a risk assessment and subsequent emergency response plan. This work built upon a baseline of laserscan monitoring that was undertaken at monthly intervals by the University of Northumbria between February 2015 and March 2017. The Cell 1 monitoring commenced its laserscan surveys in Marsden Bay in June/July 2019 and is repeating these at 6-monthly intervals, with specific post-rock fall surveys as and when needed.

There have been a number of notable rock falls along the South Tyneside frontage in recent years, particularly at Frenchman's Bay and Lizard Point in 2010 and in Marsden Bay adjacent to the (now demolished) Lifeguard Station by the Redwell Steps. The history of rock falls in these cliffs has left a series of rock stacks, arches and caves along the frontage and this is representative of the characteristic behaviour of cliffs of this type.

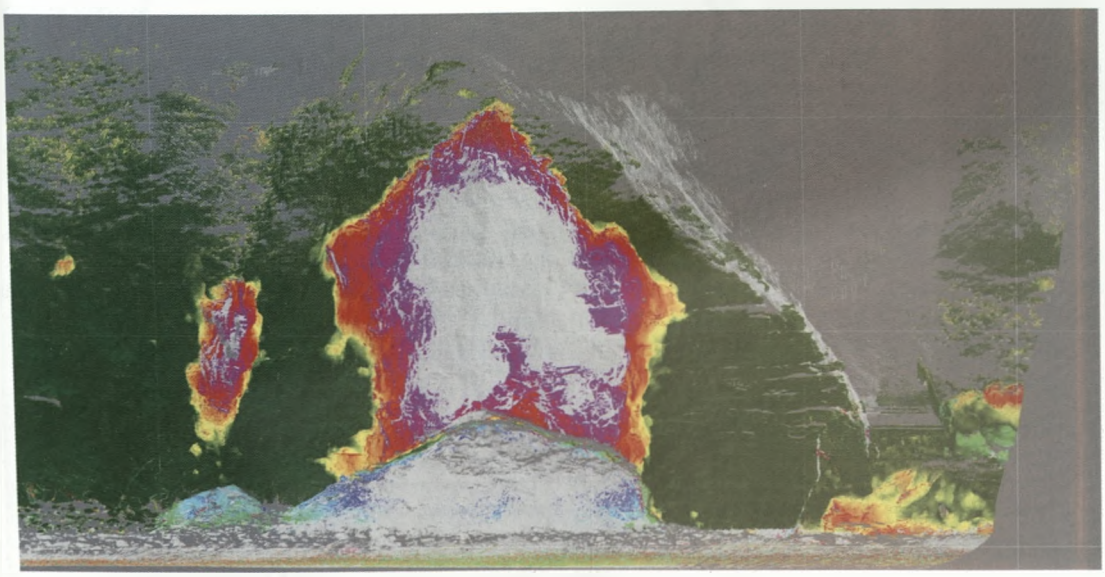

Figure 19. Normal perspective of rockfalls from laserscan imagery. Image courtesy Academy Geomatics.

The risk management approach has been to use both laserscan surveys and the Cell 1 monitoring 2-yearly walkover inspections to identify locations where caves are undercutting the cliff toe, and ensure that the cliff-top path is set back beyond the inland extent of cave penetration with a suitable buffer to safeguard the public. Where the coast road is affected by caves, a local diversion is planned in the short term, with a more permanent re-modelling of the road layout as a potential intervention in the longer-term. Suitable warning signs have been erected and the cliff-top path and existing low-level fencing have been realigned where necessary, between The Grotto and the southern end of the bay.

A further laserscan survey of this cliff area was undertaken in early February 2021, following a local rock fall which occurred on 30 January 2021. Figure 19 shows an output plot from this laserscan, showing the cliff face viewed from a normal perspective (i.e., as if standing on the beach facing the cliff). The yellow, red and purple shading show areas of material loss from the cliff face, in order of increasing magnitude, whilst the grey area in the cliff face shows where the surface change was greater than 2 m in depth. Similarly, the grey area on the beach at the toe of the cliff shows where the ground level increased by over 2 m in height due to the deposit of material from the cliff face as debris. Areas of green show little change (light green) or no change (dark green) in surface elevation compared to pre-rock fall conditions.

The rock fall event was video-recorded by a member of the public, gaining much social media and local media interest. The post-rock fall laserscan data was compared against an earlier laserscan survey of the cliffs along this frontage from November 2020 (Figure 20). This comparison revealed that two rock falls had occurred, very close to each other, with one being significantly larger than the other. The smaller rock fall moved approximately 18 m^3 of material from the cliff face to the cliff toe, cutting the cliff face back by

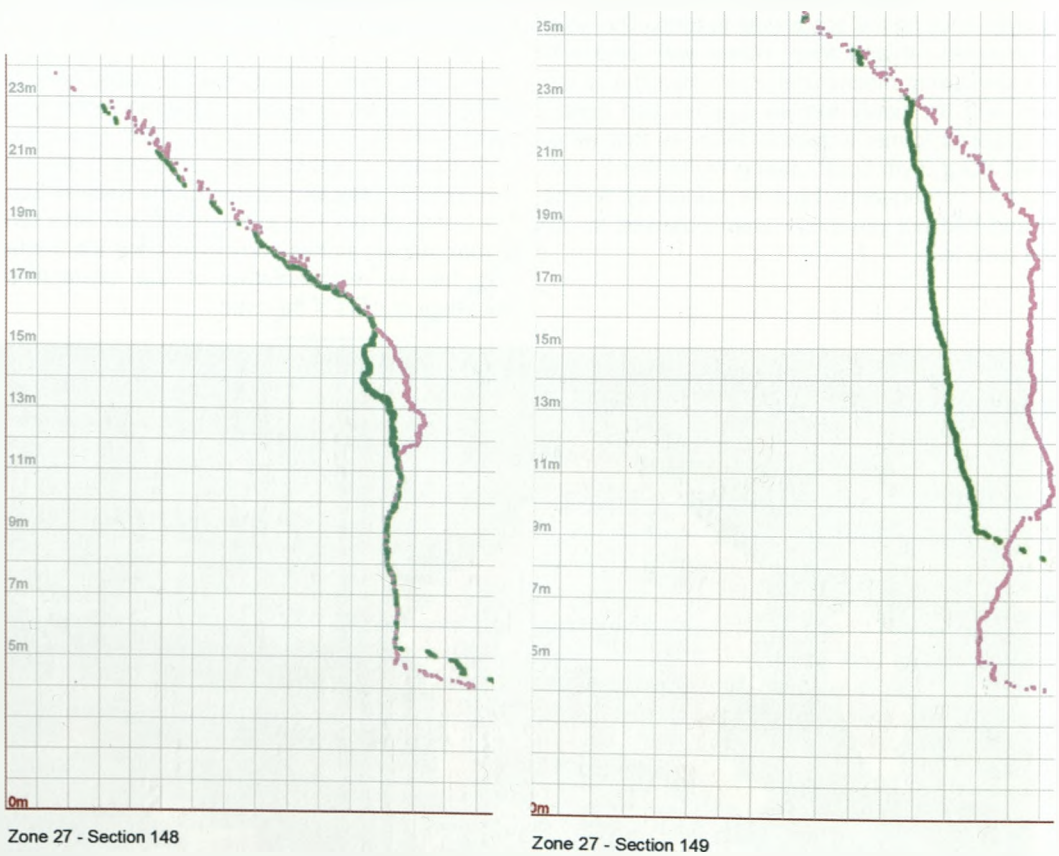

Figure 20. Small rockfall of overhanging cliff face (left) and larger rockfall of cliff face above caves at the cliff toe (right). The Pink line shows November 2020 survey, green line shows February 2021 survey. Images courtesy Academy Geomatics

up to 2.3 m at the point of deepest change. This rock fall was caused by the collapse of an overhanging section of rock mid-way up the cliff. During the larger rock fall around 311 m^3 of material dropped suddenly from the cliff face to the cliff toe, with the greatest depth of incision into the cliff face being 3.6 m. This rock fall occurred in an area where two small caves were observed in the November 2020 laserscan data, which have now become blocked by the toe debris. This rock fall involved the shearing of a larger section of cliff face from directly above the caves, with failure movement along a near-vertical plane.

CONCLUSIONS

The Cell 1 Regional Coastal Monitoring Programme has been running between 2008 and 2021. The main elements of this programme have comprised twice-yearly beach and cliff edge surveys, annual reviews of wave and tide data, and less frequent vertical and oblique aerial photography and LiDAR, bathymetric and sea bed sediment surveys and walk-over coastal inspections.

General findings have revealed the seasonal changes in beach profile morphology, and in particular the storm-related lowering that can occur on the upper beach. However, the response in calmer periods is for beach recovery, with no longer-term trends currently evident other than in areas of foreshore that have been affected by historical colliery spoil tipping which, since its cessation, have been experiencing net erosion, with rates approaching around 5 m per year in places.

Several areas of cliffs exhibit signs of activity, especially after adverse weather when rock falls or landslips can occur, depending on the geological type. In several areas of the Cell 1 frontage, understanding of the locations and rates of erosion is leading to adaptation to the ongoing change by relocating footpaths, access roads or coastal highways, removing car park infrastructure and re-wilding areas of cliff top. Other areas of cliff experience erosion at their base, leading to the long-term formation of caves and the subsequent opening of 'sink holes' in cliff top land or the long-term development of sea stacks.

Some of the most notable changes along the Cell 1 frontage are three-dimensional in nature and are best captured by the beach topographic surveys, aerial photography and LiDAR surveys. These focus around areas where channels of small rivers and burns outflow across the foreshore in an unconstrained manner, with their alignment influence by antecedent weather and marine conditions. At times, changes in channel alignment can lead to increased (or decreased) erosion pressure on dunes adjacent to the river mouth.

The walkover inspections surveys, although not covered in this paper, also lead to routine awareness of changes in condition of coastal defence structures or natural features that can be fed back to coastal managers for appropriate interventions or other risk management actions.

All data and interpretative reports derived from the Cell 1 monitoring are freely available on the project website: http://www.northeastcoastalobservatory.org.uk

In many parts of the frontage, the coastal monitoring data have proven invaluable in informing practical coastal risk management activities including:

- Selecting sustainable shoreline management plan policies or coastal strategy options;
- Developing outline and detailed design of effective schemes;
- Evaluating performance of implemented schemes;
- Planning and securing investments in capital and revenue expenditure; and
- Prioritising maintenance budgets in areas of most need.

As the programme has developed, in addition to the above, there has been an increased focus on the need for information to support discussion and engagement with stakeholders and communities, refining the understanding of SMP policy and management delivery, using new information to support ongoing adaptive shoreline management in many locations.

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MANAGING COQUET ISLAND FOR BIRDS AND WILDLIFE IN 2020

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INTRODUCTION

2020 marked the 50th anniversary of the RSPB taking on the management of Coquet Island. This was thanks to the Natural History Society of Northumbria (NHSN) and its Honorary Secretary, Grace Hickling, who pioneered the creation of Coquet as a seabird sanctuary, managed by the RSPB with the support of an Advisory Committee with representation from relevant organisations and experts including NHSN and the Northumberland Wildlife Trust. There have been some incredible highlights achieved in those 50 years, with species now nesting on the island which had never nested before, and others increasing dramatically in number. Originally classified as a Site of Special Scientific Interest (SSSI) in 1977 under the National Parks and Access to the Countryside Act 1949, Coquet Island was designated as a Special Protection Area (SPA) in 1985 to ensure protection for the nationally-important assemblage of seabirds breeding there. SPAs were initially established in the UK after ratification of the European Economic Community (predecessor to the EU) Directive on the Conservation of Wild Birds in 1979. The Coquet Island SPA is now included within the larger 'Northumberland Marine SPA' which protects the foraging grounds of the seabirds breeding on Coquet Island and was established in 2017. These legislative designation layers were introduced to enable protection of seabird breeding colonies and the foraging resources that they need to breed successfully. The island is managed by the RSPB to benefit four tern species, and Atlantic Puffin *Fratercula arctica*, Common Eider *Somateria mollissima*, Black-legged Kittiwake *Rissa tridactyla*, Northern Fulmar *Fulmarus glacialis* and recently, a few pairs of Mediterranean Gulls *Ichthyaetus melanocephalus*.

In addition to its diversity and number of breeding seabirds, Coquet Island has the only colony of Roseate Terns *Sterna dougallii* in the UK. The Roseate Tern is a species on Schedule 1 of the Wildlife and Countryside Act 1981; therefore, the RSPB has a responsibility to protect these birds from disturbance during the breeding season and manage Coquet Island to ensure the conservation of Roseate Terns in the UK. Because of this responsibility, the Roseate Tern colony is protected by 24-h watches during the breeding season, aided by a modern CCTV security system. As an important seabird breeding colony, Coquet Island also has year-round legal protection from unauthorised public access through a government Statutory Instrument *The Wild Birds (Coquet Island Sanctuary) Order 1978 No. 1074*. Although there is no public access onto the island, boat trips are run from Amble by a local boat company and allow all species to be seen and enjoyed from a safe distance offshore. Wildlife cameras pointing along nesting terraces and inside a nesting box give unique insights into Roseate Tern breeding behaviour. Livestreamed output from these cameras, as well as one mounted on a favourite perching spot for Coquet's Puffins, can be viewed remotely on the internet (www.rspb.org.uk/coquetlive) from May to August.

2020 SEASON OVERVIEW

In a year where work was impacted on so many other nature reserves due to the COVID-19 pandemic, the small RSPB team on Coquet Island and isolation from the mainland enabled work to continue relatively unhindered. A few annual monitoring tasks had to be dropped but, fortunately, work with key species such as Roseate Terns was able to continue as normal, while still ensuring social distancing. Work in early March was much the same as in previous years as COVID-19 restrictions were not in place at that time. For the first four days of the season, Coquet hosted three fencing contractors who installed a permanent electric mesh fence around the Roseate Tern terraces to safeguard the colony from mammalian predators (Figure 1). This new fence was deemed necessary after the otter incursion last season although, fortunately, in 2020 there was no evidence of the animal returning to the island. The fencers left the island on 9 March, followed a few days later by the Assistant Warden and a single volunteer on 14 March. During the next few days, new measures were put in place throughout England to reduce the

risk of COVID-19 infection, and all volunteering and work on RSPB reserves was suspended. However, special dispensation was given to continue work on Coquet Island due to its isolation from the 'locked-down' mainland, and the importance of continuing to manage and protect a reserve which holds the only breeding colony of the UK's rarest seabird. After periods of self-isolation to ensure COVID-free status, a residential team returned to the island on 7 April.

Figure 1. The north terrace fence (a) and the south terrace (b) under construction.

Weather conditions in March and April were relatively mild with deep low-pressure systems over the Atlantic largely dissipating before the new season. This meant some blustery weather in March but none of the Atlantic storms which moved across the country during the previous few months. April was glorious, with very settled weather throughout which may have contributed to the earlier arrival and first-egg dates for most breeding species compared with last season (Table 1). There was a real change in the weather in June, with strong winds and rain at the beginning of the month followed by a period of fog and very damp conditions for almost two weeks. As with last season, stormy weather at the start of the month appeared to have a similar effect on Eider ducklings, with crèche counts on the island plummeting after the storms and never really recovering. Duckling numbers were not helped by low numbers of nesting females on the island; consequently, the five-year population average for the species has now dropped below the threshold figure for favourable SSSI status of the island. The poor weather continued into July, with Arctic Tern *Sterna paradisaea* and Common Tern *Sterna hirundo* chicks especially hard hit by the wet and windy weather giving the lowest productivities for both species since 2016. However, there were also some real positives this season with Roseate Terns breaking the population record for the third consecutive year and the highest number of Kittiwakes breeding on the island since the first pair nested in 1991. Visually, Puffin numbers appeared good with some apparent expansion of the colony. Sandwich Terns *Thalasseus sandvicensis* had a good season and Fulmar numbers and productivity were the highest for a number of years. Food supply appeared to be fairly good although quantities of smaller prey may have been a limiting factor this season which may have compounded the effects of the poor summer for terns.

SPECIES ACCOUNTS

Roseate Tern

The new fencing did not appear to deter the Roseate Terns, with 130 breeding pairs recorded nesting this season. This represents the largest breeding population since the RSPB took over management of the reserve in 1970 (Figure 2); an excellent result to mark the 50th anniversary of the RSPB's involvement on the island and the end of the five-year EU Roseate Tern LIFE project. Indeed, the colony has gone from strength to strength over the last five years (Figure 3), thanks to careful management and vital funding from the European Union. After observing a number of young birds, ringed in 2017, prospecting in nest boxes towards the end of last season, a few of the 2017 cohort were confirmed to be breeding this year. 2017 was also a record year for productivity, and it was good to see birds from that year contributing to the impressive number of breeding pairs this season.

Mean clutch size remained fairly stable at 1.6 eggs laid per pair (Figure 4). A number of three egg clutches were discovered this season and even a single four egg clutch (Figure 5), but thought to be laid by two females in the same nest box. Unfortunately, only one of the large clutches was successful, possibly due to the difficulty of incubating the larger surface area. The unsettled weather throughout the summer no doubt impacted the productivity of the Roseates,

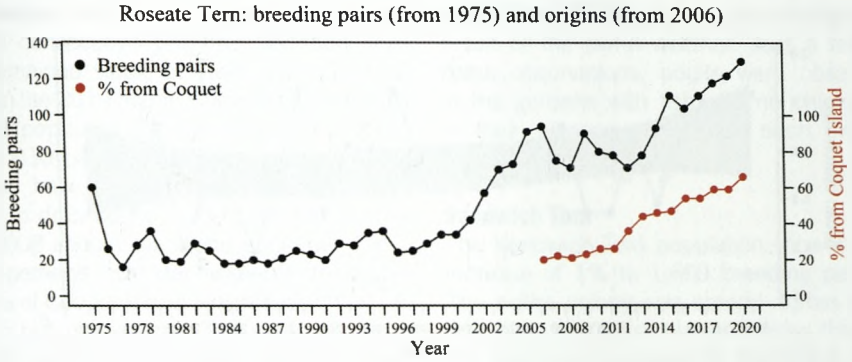

Figure 2. Roseate Tern breeding pairs (black) on Coquet Island from 1975 to 2020 and the colony of origin (red) for all adult Roseate Tern rings read from 2006 to 2020.

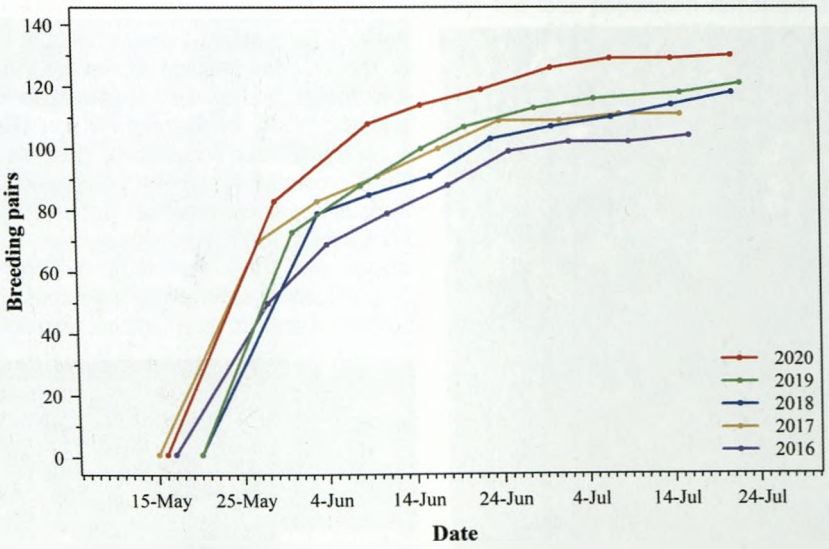

Figure 3. Roseate Tern breeding pairs by date for the last five years. Each point on the graph represents a monitoring visit to the colony.

although they were less affected than Arctic and Common Terns, highlighting the importance of the nest boxes. Despite losing almost half of all 'B' chicks, 122 youngsters still successfully fledged from the island giving a respectable productivity of 0.94 (Figure 6).

152 chicks were ringed with a single, field-readable 'Rosy Special' metal ring and 122 fledged successfully from the island; 16 chicks were discovered dead before they could be ringed. Of the 30 ringed chicks which failed to fledge, 26 were discovered dead during weekly box checks and four were missing, presumed predated or lost. The high chick mortality this season was probably due to the wet summer and possibly a reduction in availability of small prey to feed to young chicks. The work this season took the total number of chicks ringed on Coquet to 2,284.

From a total of 678 ring-reads of adult birds this year, 260 unique sequences were recorded; of these, there was a significant increase in the proportion of adults whose natal colony was Coquet, compared with last season: 66% Coquet and 34% elsewhere (mainly Rockabill Island and Lady's Island Lake in Ireland) (Figure 2). Coquet has previously been reliant on immigration of Irish birds to sustain the colony but ring-reading is revealing that Coquet is increasingly self-sustaining and may become a source for other UK sites in the future.

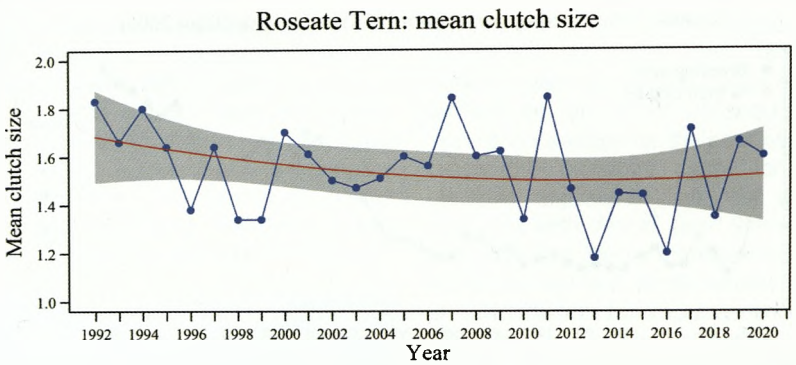

Figure 4. Roseate Tern mean clutch size (blue) on Coquet Island from 1992 to 2020. The red line is a polynomial (2nd order) linear regression to indicate the trend of mean clutch size by year over the period 1992 to 2020, with grey shading indicating the 95% confidence range of this trend.

Figure 5. Roseate Tern four-egg clutch.

New CCTV cameras were installed at the beginning of the breeding season to replace the old system. The image quality was a noticeable improvement and the clarity of the night vision (Figure 7) was such that it was occasionally possible to carry out night protection watches from the accommodation. Because of the constraints imposed by COVID-19, no Species Protection Officer was appointed this season and there was additional pressure on the Coquet team to cover all night watches. This was only possible thanks to a remarkable team effort.

Figure 7. A section of the Roseate Tern nesting terrace at night, captured with the new CCTV system.

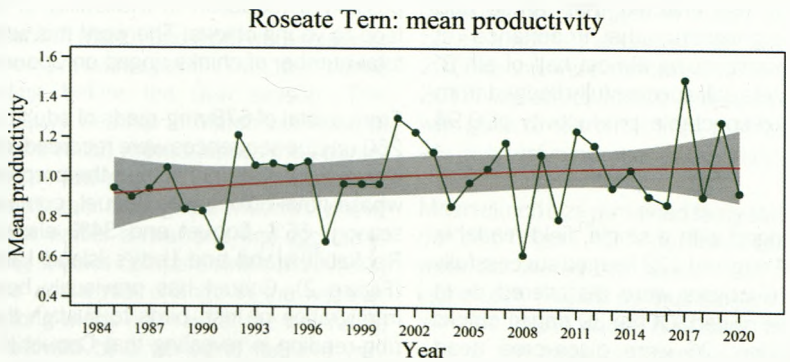

Figure 6. Roseate Tern productivity (green) on Coquet Island from 1983 to 2020. The red line is a polynomial (2nd order) linear regression to indicate the trend of mean productivity by year over the period 1992 to 2020, with grey shading indicating the 95% confidence range of this trend.

Arctic and Common Terns

For the third consecutive year the Common Tern population remained stable at 1,640 pairs, just 12 pairs less than the 2019 count. Conversely, the Arctic Tern (Figure 8) population decreased again, by 12.6% in 2020 to 1,010 pairs. In only three years, Arctic Tern numbers have decreased by around a third and look set to drop below 1,000 pairs for the first time since 2008 should this trend continue. These declines are perhaps most starkly seen in the upper intertidal area of Coquet Island which supported 298 pairs in 2015 but just two pairs this season. We can only speculate as to the reasons for such a change as most other species have fared well in recent years, but it is a priority to find out why the island has lost so much of the population.

Figure 8. Arctic Terns buffeted by hail: 6 June 2020.

Mean clutch sizes of 1.9 for Arctic Terns and 2.19 for Common Terns were down on those of last year but comparable to the five-year average for both species. The unsettled summer definitely affected productivity for both species with just 0.87 chicks fledged per pair for Common Terns and 0.74 for Arctic Terns. The weather impacted chick survival with a noticeable increase in mortality on monitoring visits after periods of wet and windy weather. Food supply may have contributed to these lower figures although fish stocks appeared relatively healthy and other species showed good productivities. It may be that there were lower numbers of the smaller sandeels which these species rely on, with larger species more plentiful but less suitable for young tern chicks.

There was a worrying change in the behaviour of the Arctic Terns in the last week of June where territorial aggression appeared to stop almost entirely. This was followed by a number of observations in the south garden of many chicks fighting for a single small sandeel which suggested a possible food shortage. Soon after this time, a third of chicks were discovered dead in monitoring enclosures, thought to be as a result of the awful weather. Just a few days after these observations, adults were observed landing in the gardens with fish and no chicks responding to their presence. We hope such events are not repeated next season.

Sandwich Tern

The Sandwich Tern population showed a very slight increase of 1% to 1,669 breeding pairs (Table 1). The entire colony was spread across the northerly tern plots and was counted across three censuses. No later colony formed on the beach of the island which has been the norm in the last few years so we don't know whether these birds nested elsewhere in the country or with the rest of the colony. The fact that the total population remained almost identical between 2019 and 2020 suggests that the latter may be more likely. Sandwich Terns appeared to fare better in the poor summer than the other tern species on Coquet, with good numbers of fledglings observed making their way down onto the beach from the nesting plots. As a larger species, they may have been better able to cope with the wet and windy conditions, or if quantities of smaller prey were a limiting factor this season.

Figure 9. CCTV image showing the code on a Sandwich Tern darvic ring.

There were 664 sightings of birds ringed with coded colour rings this season. The magnification and clarity of the new CCTV system even made it possible to read the codes on leg rings on calm days (Figure 9). The total for ring reads for Sandwich Terns was slightly down on previous years because a colony did not develop on the south beach later in the season; in

previous years, this colony has kept a large number of birds on the island until later in the season, drawing in birds on passage. Despite a smaller seasonal window for ring-reading, 203 unique coded rings were recorded (including six birds ringed only with metal rings which could be read through a telescope). Of the colour-ring codes, 63% were birds ringed from either Coquet or the nearby Farne Islands. The majority of the others were of birds from colonies elsewhere in the UK, but there were also birds from colonies in Ireland, the Netherlands, Germany and Denmark.

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

Puffin

It was not a census year for the Atlantic Puffin population on Coquet and given the COVID-19 pandemic, it would not have been possible to do while maintaining social distancing. However, visual assessment suggested that the colony overall was a similar size (approx. 25,000 apparently occupied burrows) to last year, but with noticeable expansion into areas in the south of the island. Therefore, it is important that the total area occupied by Puffins is remapped prior to the next census to ensure an accurate estimate of the population on the island. A trial of productivity monitoring was also not possible this year because of COVID-19 restrictions, but hopefully there will be an opportunity in future seasons.

Figure 10. A dead adult Puffin trapped in the wire mesh of the new Roseate Tern anti-predator fence.

Very sadly, the new fences installed around the Roseate tern terraces impacted the Puffins more than any other species. At the beginning of the season, interlocking plastic paving slabs were placed inside the fence around the north terrace to encourage Puffins to nest outside. As there was no otter present for the whole season, the gates were kept open and small 'escape holes' were cut at the base of the fence to enable trapped birds to get out safely. Despite placing narrower gauge plastic mesh at the base of the fence around the entire perimeter, excavations by Puffins exposed sections of buried wire mesh which caused ten adult birds to be killed by getting trapped partway through the fence (Figure 10). Had we not taken further measures there would likely have been more casualties. Work is already underway, and more projects are planned for the Autumn/Winter, to eliminate any risks from the fence to the seabird assemblage next season.

Eider

Eiders suffered out here for a second season in a row. In 2019, the number of breeding pairs slightly redeemed a very poor year for productivity, but the same cannot be said for 2020. The population fell by 17.2% to 269 nesting females which has meant that the five-year average (310) has now dropped below the SSSI threshold for favourable status of the island. Population and productivity were further impacted by the presence of crows and juvenile Great Black-backed Gulls *Larus marinus* (Figure 11) on the plateau for much of the season, both of which were observed predating Eider eggs. Usually, these birds would be controlled, but because of a delay by Natural England in issuing appropriate licences this was not possible. Control of such problem species is an absolute priority for next season. As with last season, stormy weather coming at the very worst time in June, and continuing throughout much of the month, decimated duckling crèches making it another very poor year for productivity. A peak of 87 ducklings were counted in the Coquet estuary on 2 June. This count was slightly down on last season's peak of 96 ducklings counted on 31 May. What both of these counts had in common was that they were followed by very wet and windy weather causing numbers to plummet and never really recover. Counts after 29 June did not reach double figures again and were stopped on 31 July when it becomes difficult to differentiate older youngsters from females at distance. With unpredictable weather events look set to become more frequent with the effect of climate change, Eiders are up against it.

Figure 11. Predation of Eider eggs by a Carrion Crow *Corvus corone* (Left) and juvenile Great Black-backed Gull (Right).

Black-headed Gull

Unfortunately, the Black-headed Gull colony was not counted this season. The census usually falls around mid-May which was a time when the COVID-19 pandemic was becoming increasingly prevalent in the UK with cases and deaths rising by the day. Because of the difficulty in maintaining social distancing during the count as the nests are so densely packed, the census was cancelled for this season. Visually, the colony appeared similar in extent to last year.

Productivity and clutch size were not monitored this year either, but for a different reason. To reduce the mortality of Puffins which were getting caught by the new fencing around the Roseate Tern terraces, the smaller-mesh plastic fencing normally used for the Black-headed Gull monitoring enclosures was attached to the base of the entire Roseate Tern fencing instead. Although new mesh for the monitoring enclosures was ordered, this only came when the Black-headed Gull eggs had started to hatch, and as a result it was decided to abandon the productivity enclosures for this season.

Mediterranean Gull

On 17 May this year, six pairs of Mediterranean Gulls were observed in amongst the Black-headed Gull colony. Two of these birds had yellow colour rings with sequences 2X2R and 2X3R, respectively. These two-year old birds were ringed as youngsters on Coquet in 2018, so it was fantastic to see them returning to the island as prospecting adults. Neither of the pairs which included these colour ringed birds had a breeding attempt. However, two other pairs did breed with one failing at the egg stage but the other successfully fledging two chicks. These youngsters were given yellow colour rings (2X5R and 2X7R) within a couple of weeks of fledging. Towards the end of July, 2X5R was observed at the Scottish Event Campus in Glasgow and in last August, 2X7R was spotted in Musselburgh, East Lothian (Figure 12). To have both colour ringed youngsters from this year seen away from Coquet is a great result and confirms that they fledged successfully.

Figure 12. 2X7R ringed on Coquet Island on 16 June 2020 (Left) and observed as a fledgling in Musselburgh on 25 August 2020 (Right; photo and observation by Ian Andrews).

Fulmar

Despite a number of species on Coquet Island struggling this summer, Fulmars had their best season for a few years. The population increased by 15.1% to 61 apparently occupied sites (AOS),

reaching our breeding target for the first time in three years. Even more impressive was productivity of 0.7 chicks fledged per breeding pair which is the second highest figure since the mid-80s. 44 youngsters were large enough to be ringed across three dates in August of which 43 successfully fledged from the island. No plastic was regurgitated during the ringing process and very little was found around nest sites which was a reassuring observation for a species which is so impacted by marine debris.

Kittiwake

Coquet's Kittiwake population continues to grow from the single pair of Kittiwakes which nested in 1991, reaching a record total of 453 apparently occupied nests (AONs) this season, surpassing by five the previous record set in 2017. The cliffs overlooking south beach once again held a quarter of the colony, with other impressive sub-colonies on the east side of the island. After observing birds prospecting on the cliffs below the south Roseate Tern terrace last season, four pairs attempted to breed there this year. The only issue with this new area attracting birds is that it is susceptible to high tides and rough seas so more ledges are to be cut on the east side of the island to try and encourage birds to more-protected areas. An impressive 37 Kittiwakes fledged successfully from 30 monitored nests this season (Figure 13), giving a productivity of 1.23; last year only 23 fledged from the same number of nests. The flooding of nests by rain was definitely responsible for lower productivity in 2019, although it was a poor summer for weather this year too. One explanation for the birds' resilience this season could be that rain did not come at key times such as the egg/young-chick stage.

Large Gulls

The breeding population of Lesser Black-backed Gulls decreased by just a single pair, with 19 active nests recorded. The Herring Gull population remained the same as last season with seven active nests. Mean clutch size was very slightly down on last year but comparable, at 2.67 for Lesser Black-backed Gulls and 2.5 for Herring Gulls. Single nests for each species were allowed to remain, and each successfully fledged two young. Egg collection and nest destruction, active human disturbance and laser hazing measures were applied according to RSPB management policy throughout the year to control the large gull population. Gull foraging activity over the Roseate Tern terrace was less than that in recent seasons, possibly due to the absence of the nearby Sandwich Tern colony on the south beach which draws in opportunistic birds. Sadly, one of the Lesser Black-backed Gull fledglings from the monitored nest (which was ringed on 1 August) was discovered dead on 1 September with wounds thought to be caused by a Great Black-backed Gull. Finally, four colour-ringed adult large gulls, ringed in previous years, were seen across the island this year.

Other Species

Perhaps the strangest observation on the island this season was the discovery of a Common Toad *Bufo bufo* just outside the courtyard, late on 14 June (Figure 14). This is the first record of a Toad on Coquet and it is somewhat baffling how this individual made it a mile across the North Sea. One possible explanation is that it was swallowed by a gull on the mainland and then regurgitated on Coquet Island when found to be unpalatable because of toxins secreted from the skin.

Figure 13. An impressive number of Kittiwake fledglings.

Figures 14. A Common Toad discovered on Coquet Island on 14 June.

Figure 15. Redstart (top left), Black Tern (top right), Curlew Sandpiper (bottom left), Yellow-browed Warbler (bottom right).

There were regular sightings of Bottlenose Dolphins *Tursiops truncatus* and an occasional Harbour Porpoise *Phocoena phocoena* throughout the season. Four Grey Seal *Halichoerus grypus* pups were born over the 2019-20 winter months with three surviving to weening age. The first pup of the 2020-21 winter was discovered dead on the beach on 26 September. Coquet remains a popular haul-out spot for the seals but there are still very few cows choosing to pup on the island with the vast majority opting for the nearby Farne Islands. The seals are not permitted on the island plateau because of the inevitable flattening of the honeycombed network of Puffin burrows that would result, potentially displacing thousands of birds. Keeping the animals to the intertidal area remains an absolute priority, and requires considerable effort.

Wintering Turnstone *Arenaria interpres* and Purple Sandpiper *Calidris maritima* numbers were similar to previous years with the Purple Sandpiper flock peaking at an estimated 150 individuals. Other bird highlights were:

- 30 April – Male Redstart *Phoenicurus phoenicurus* in Elder *Sambucus nigra* bushes in the south garden (Figure 15).
- 19 June – Two Little Terns *Sternula albifrons* in the tern roost on the beach, one of which had a blue colour ring (ringed as a chick in July 2019 at Seaton Carew, Cleveland).
- 20 June – Black Tern *Chlidonias niger* in the tern roost, with close views from the jetty (Figure 15).
- 22 August – Curlew Sandpiper *Calidris ferruginea* feeding in a rockpool near to the jetty (Figure 15).
- 31 August – Kingfisher *Alcedo atthis* flew in off the sea towards west face of the island, landing briefly, before flying over the plateau top.
- 24 September – Short-eared Owl *Asio flammeus* chased over island by a Carrion Crow *Corvus corone* towards mainland.
- 25 September – passage of Sooty Shearwaters *Ardenna grisea* along the east coast with > 50 birds flying north past the island every hour.
- 30 September – A single Crossbill *Loxia curvirostra* was heard calling over the island and seen at distance.
- 1 October – Yellow-browed Warbler *Phylloscopus inornatus* feeding in Elder bushes around the buildings for most of day (Figure 15).

INFRASTRUCTURE WORKS

The permanent mesh and electric fence was installed around the Roseate Tern nesting terraces in March. This fence replaced a small, temporary fence that was hastily installed last season after the otter incursion, to safeguard the Roseate Tern colony. Further winter works are planned to prevent the incidental mortality of other species in these fenced areas. After struggling with the CCTV image quality last season, a new CCTV system was installed in April. This included a new 360° pan/tilt/zoom camera on the north end of the workshop, an upgraded static camera recording the south beach and a brand-new static camera covering the blind spot on the corner of the beach. The new system was a definite improvement – the clarity of the night vision was such that it was occasionally possible to carry out effective night watches from the accommodation.

PEOPLE ENGAGEMENT

The 2020 season marked the final year of the EU-funded Roseate Tern LIFE project and the 50th anniversary of Coquet Island becoming an RSPB reserve. Sadly, because of the COVID-19 pandemic, the conference planned to mark the end of the LIFE programme had to be cancelled. Instead, completion of the project was celebrated with a two-day webinar which proved very successful and, as a result of being online, was accessible to ornithologists around the world. Recordings of the conference can be found at:

Figure 16. Screenshot from BBC Springwatch, capturing presenter Chris Packham pointing to the location of Coquet Island.

Figure 17. Puffins perching on and around their 'Puffin Library', installed to celebrate the 80th Anniversary of Puffin Books and to enhance the public engagement of Coquet's breeding seabirds.

http://roseatetern.org/momentum-webinar.html. As part of the Coquet contribution to the webinar, a short video was produced showing highlights from the Roseate Tern breeding season with a piece of music specially composed by Martin Price (Head of Music for Channel 5). The video is available on the RSPB national YouTube channel and has already been viewed more than 500 times: https://www.youtube.com/watch?v=6x_gx1HWqiA&t=24s.

Other highlights throughout the season included Coquet's wildlife cameras being made available to Springwatch on their website, and even a short feature on 5 June where the Puffin camera mounted on one of the hides was shown streaming live on the programme (Figure 16).

Indeed, in a year where many reserves and green spaces were closed due to the pandemic, Carnyx TV wildlife cameras streaming live from the island proved more popular than ever, providing people with a much-needed connection to nature and the outdoors. The three cameras were watched for a total of 72,573 hours, equating to an incredible 3,023 days of 'footage'. Discussions have been initiated to assess the feasibility of adding to the existing suite of cameras for the public to enjoy next season.

Contributions were made to numerous publications throughout the season including *British Birds*, the *Natural History Society of Northumbria*, the RSPB's *Natures Home* and *Impact* magazines and the *Percy News* (The Duke of Northumberland's newsletter). Along this publication theme, Puffin Books (The children's book imprint of the British publishers Penguin Books) celebrated their 80th Anniversary this year and Coquet Island helped out with those celebrations. As part of the launch of a special children's literary festival called the *Puffin Festival of Big Dreams*, a short video was produced which can be seen at: https://www.youtube.com/watch?v=GyH6dumy238&t=1523s. The video features Coquet's very own 'Puffin Library', which was built and placed on the cliff edge and quickly became a favourite perching point for the inquisitive Puffins (Figure 17). Coquet's Puffins went down an absolute storm of course! And finally, regular Tweets were made on the Roseate Tern LIFE Twitter page with the most successful being one about breaking the breeding pair record, generating more than 34,000 impressions (times people saw the Tweet on Twitter) and 1,200 total engagements (times people interacted with this Tweet).

ACKNOWLEDGEMENTS

We have been highly fortunate to have continued working on Coquet Island this season, despite the COVID-19 pandemic. However, this has only been possible thanks to some incredible people who regularly give their time to the reserve. Coquet is immensely fortunate to have the support of Hilary Brooker-Carey who devotes so much of her time to the running of the island. Without Hilary's knowledge and dedication, it is hard to think how the reserve would function. Stephen Lunn's skill and innovation were once again invaluable for keeping the reserve running in the harsh North Sea environment. We thank Tom Cadwallender for his assistance in censuses and ringing Roseate Tern chicks throughout the season, and to Ibrahim Alfarwi for his vital PhD research looking into Coquet's large gulls (as well as being a wonderful island-housemate!). And finally, in a year where volunteering was largely suspended across RSPB reserves, we are so grateful to Janet Fairclough for her assistance at the beginning of the season, and Mike Matthewson towards the end, without whom we would have struggled to complete important works on the island.

Species	Pairs 2019	Pairs 2020	% Change	1st egg 2019	1st egg 2020	Mean Clutch 2020	Fledged 2020	Productivity 2020	Notes
Fulmar	53	61	15.1%	18 May	15 Mar	na	44	0.72	
Eider	325	269	-17.2%	14 Apr	20 Apr	na	na	na	
Mediterranean Gull	0	2	na	na	na	2.50	2	1	6 pairs seen 17 Apr; only two nested.
Black-headed Gull	5,293	*	na	22 Apr	14 Apr	na	na	na	* Census not carried out this season .
Lesser Black-backed Gull	20	19	-5.0%	11 May	13 May	2.67	2	2.00	1st egg date estimated; productivity from single nest. Clutch, mean from 19 nests in census.
Herring Gull	7	7	0.0%	11 May	13 May	2.50	2	2.00	1st egg date estimated; productivity from single nest. Clutch, mean from 7 nests in census.
Kittiwake	439	453	3.1%	21 May	18 May	1.93	37	1.23	
Sandwich Tern	1,652	1,669	1.0%	05 May	02 May	1.23	Na	Na	Census 1 (1,448); from increase in colony area (CCTV images), additional pairs 195 (census 2) and 26 (census 3). Clutch, mean of 10% sample of census 1.
Roseate Tern	122	130	6.6%	21 May	16 May	1.60	122	0.94	
Common Tern	1,652	1,640	-0.7%	11 May	10 May	2.19	27	0.87	1st egg between 9/11 May. Census date 24 days after 10 May. Productivity and clutch from 31 enclosed nests in Heligarden.
Arctic Tern	1,155	1,010	-12.6%	12 May	10 May	1.90	23	0.74	1st egg between 9/11 May. Census date 24 days after 10 May. Productivity and clutch from 31 enclosed nests in South Garden.

Table 1. Seabird breeding statistics for Coquet Island in 2019 and 2020. Cells with a green background are record breaking numbers; declines are emphasised with red text, and increases with green text. Because of staff absence and availability, some 1st egg dates are estimates.

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SHOREBIRDS OF THE LONG NANNY 2020

James Porteus

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INTRODUCTION

The Long Nanny tern site is situated in the middle of Beadnell Bay at the mouth of the Long Nanny burn. The dunes, beach and saltmarsh support significant breeding populations of Little Tern *Sternula albifrons*, Arctic Tern *Sterna paradisaea* and Ringed Plover *Charadrius hiaticula* and the area has been protected by the National Trust since 1977. A raised area of sand, known as the 'spit', extends northwards from the dunes south of the burn and is the favoured nesting area of the amber-listed Little Tern. This exposed location is susceptible to tidal inundation (Figure 1) and open to predators, two of the most influential factors in determining breeding success at the site. In more recent years the site has also had to contend with pressures from recreational beach users as the popularity of Northumberland as a tourist destination increases.

2020 was a challenging season as the COVID-19 pandemic restricted operations at the site. For the first time since the National Trust started managing the site, dedicated seasonal assistant rangers were not able to be recruited to protect the breeding colony at the Long Nanny. Despite this, a team of skeleton staff worked extremely hard between May and August and were pleased to see six Little Tern chicks successfully fledge from 38 pairs. Sadly, the season will be remembered for being the first season since Arctic Terns first started breeding at the site in 1980 that this species has failed to fledge any chicks. Ringed Plover had another steady year with a minimum of nine pairs successfully fledging six chicks.

Figure 1. The sand spit at high tide.

MANAGEMENT AND MONITORING

Site setup

National Trust rangers arrived to set up the site on Monday 4 May. Site setup lasted two days, with shifts then commencing on 6 May. The usual rope fencing was erected along the beach and predator fencing checked around the inland perimeter. The 'tern garden', an area of marram roughly 425 to the seaward side of the tern hut, was strimmed to create nesting habitat for Arctic Terns.

Erosion of the dunes over the winter months meant that access from the beach into the dunes via the Miller's Nick footpath was not viable this year. A discussion was had about whether or not to close the north side, given the disappearance of the only obvious diversion route. After some deliberation, it was decided that the north side should be closed as in recent seasons. This was initially to avoid a 'pinch point' during the pandemic which would have put people in close proximity in uncertain times, but the closure of the north side also minimises disturbance to the nesting birds on the sand spit and provides undisturbed habitat on the north side which we hope will eventually be colonised by nesting Ringed Plover or terns. Signage was erected outlining a new diversion route to be used at high tide through Northumberland County Council land and was in place in late June (Figure 2).

Staffing

Because of the COVID-19 health pandemic, it was not possible to recruit a team of seasonal assistant rangers this year. For the same reason, volunteers, who would usually provide valuable support, were also unable to assist with the running of the site. The site was closed to visitors, and as a result, duties were limited to monitoring, nest management, predator control and directing beach users and dogs away from the nesting area. A skeleton staff worked 8 hour shifts to staff the site. From 6 May - 30 June, the site was manned for eight hours each day, except for 11, 23, 24 & 25 May, when rangers were on site from 6 am – 8 pm. The timing of these shifts was chosen to cover key times, for example, dawn and dusk when predator activity was likely to be highest or around high tide on the larger spring tides. From 1 July until the final shift on 6 August, rangers worked two eight-hour shifts so that the site was manned for 16 hours daily (either from 6am – 10pm or 7am – 11pm).
One night shift was conducted on the night of 26 June, otherwise, it was not possible to conduct regular night shifts this season.

Monitoring

Whereas in previous years, rangers have entered the colony with the specific purpose of collecting nest data, it was decided to keep disturbance to an absolute minimum this year and to carry out only limited monitoring remotely. On the infrequent occasions that rangers did enter the colony, some nest data were recorded. Observations were made from a vantage point in the dunes, just north of the tern hut, using binoculars and a scope. The number of both roosting and nesting birds were recorded where possible, as well as the number of chicks later in the season. Clutch counts were not conducted.

Figure 2: 2020 Site map.

SPECIES ACCOUNTS

Little Tern *Sternula albifrons*

Maximum count of adult Little Terns (individuals)	70
Maximum number of pairs (first round of nesting)	38
Maximum number of pairs (second round of nesting)	16
Maximum number of fledglings	6
Productivity	0.16

Table 1. Key summary data for Little Terns from the 2020 Little Tern breeding season

Little Terns were first observed on site by rangers on Monday 4 May, although unconfirmed reports from members of the public suggested that Little Terns had been on site since Friday 1 May.

At first, Little Terns were present in only low numbers. It was not until the end of May that rangers started to observe larger numbers regularly using the site. Numbers peaked on 30 May, when 70 Little Terns were recorded across the site. While rangers observed courtship, mating and scraping throughout May, birds did not appear settled and it was assumed that they were yet to lay. It was not until 1 June that Little Terns appeared to be sitting on active nests, at which stage rangers believed that there were up to 38 pairs (Table 1).

The beginning of June saw the first notable spring tides of the season. A 5.1 m tide on 5 June and 5.12 m tide on 6 June coincided with low pressure and strong winds, causing the sand spit to flood. All Little Tern nests were washed out as a result.

For the next 10 days or so, only a handful of birds were seen on site each day. By 15 June, five birds were seen sitting on scrapes, indicating the start of the second round of nesting. On 17 June rangers discovered five active Little Tern nests - four with one egg and another with two eggs. The number of Little Terns observed sitting rose steadily over the next week to a maximum of 16 on 23 June.

With another set of spring tides due at the end of the month, it was decided that pre-emptive measures would be taken to protect the new nests against flooding. 13 nests with eggs were identified and raised onto fish boxes. Nest raising was carried out over two 20-minute sessions on 23 and 25 June (Table 2). We do not know whether there were originally 16 nests which contained eggs, or whether there were only ever 13 active nests. Rangers did not observe any predation of Little Tern nests, though it is possible that predation occurred overnight when rangers were not on site.

An additional raising of nests onto wooden pallets took place on 2 July. Only eight of the 13 nests raised onto fish boxes were raised onto pallets. Of the five nests that were not raised onto pallets, some contained eggs which had clearly been abandoned, while others were totally vacant. It is not clear whether the vacant nests were predated prior to abandonment. The Rangers suspected that abandonment preceded predation, most likely caused as a result of the adults being unsettled by the original round of nest raising.

Between 4 and 8 July, spring high tides once again threatened the colony. On the afternoon of 5 July, the tide was splashing over the side of the two most-easterly nest boxes (Figure 3). Fearing for the survival of the eggs, the ranger on shift decided to temporarily remove the eggs from the two affected nests. Each nest contained one egg; these eggs were removed from the nests for a total of 40 minutes and kept inside a labelled egg box wrapped in a fleece to keep them warm. While one of these nests was certainly active, the other may have been abandoned prior to the high tide as rangers observed that adults were only sporadically present at this nest. After returning the eggs to their nests, the adults from the active nest returned to incubate the egg, while the adults from the other nest were not seen.

Figure 3. Tidal inundation on 5 July 2020.

On 7 July, a ranger went into the colony to re align some of the nest boxes which had been moved slightly by the tide. During this disturbance, the ranger recorded the first hatched Little Tern chick. There appeared to be only six active nests remaining.

On 12 July, two loose dogs ran into the colony. The ranger ran down onto the spit to intervene. Once the dog was safely back with its owners, the ranger took the opportunity to record the progress of the

nests while the adult birds were already lifted, and recorded five active nests, two nests each with two eggs, and three nests with chicks: one with a single chick, a nest with two chicks and a nest with one or two chicks. Two days later, a ranger went into the colony to put out chick shelters (Figure 4) and recorded one nest with two eggs, a nest with one egg and one chick, and three nests with chicks (two, one and one, respectively).

Figure 4. Little Tern chick using shelter.

Observations from 14 July onwards were all made remotely. Seven chicks were present on site between 20 and 25 July. From 25 to 29 July, only six chicks were seen, and then from 29 July onwards only five chicks were seen by rangers. By 3 August, all five chicks were capable of flying and were observed using the beach roost.

Therefore, a minimum of five Little Tern chicks successfully fledged this year. However, assuming that chicks are capable of fledging at 21 – 24 days old, six chicks may have fledged: on 29 July, when six chicks were present, the oldest would have been at least 22 days old because the first Little Tern chick was seen on 7 July; on 28 July, a chick was seen practising flying and so it is possible that the oldest chick fledged on 29 July, with the other five chicks fledging five days later on 3 August.

Arctic Tern *Sterna paradisaea*

Maximum count of adult Arctic Terns (individuals)	615
Estimated number of pairs	400 - 450
Date of first observed egg*	17 May
Date of first observed chick*	21 June
Number of fledglings	0
Date of site abandonment	30 June

**these dates could be quite different to the actual dates since rangers did not proactively enter the colony to search for eggs or chicks.*

Table 3. Key dates and summary data for Arctic Terns in the 2020 breeding season

Arctic Terns were observed on site by rangers on Monday 4 May, but reports from members of the public suggested they may have arrived earlier. On 6 May, 312 individuals were recorded on site. The number of birds on site fluctuated greatly throughout

Date	Length of disturbance	Intervention for protection against high spring tides
23 June	20 minutes	4 nests raised onto fish boxes
25 June	20 minutes	9 nests raised onto fish boxes
2 July	20 minutes	8 of the boxed nests raised onto pallets
5 July	40 minutes	Eggs removed from 2 nests for 40 minutes
5 July	20 minutes	nest boxes stabilized after high tide
5 July	20 minutes	nest boxes stabilized after high tide
7 July	20 minutes	nest boxes stabilized after high tide
		Additional measures
14 July	10 minutes	Put out chick shelters
20 July	5 minutes	Put out chick shelters
5 August	5 minutes	Buried abandoned egg

Table 2. Summary of interventions carried out by rangers under license in the 2020 breeding season

the season, with a maximum of 615 (Table 3) on 31 May. This count was much lower than in recent years and the low number of birds on site was noticeable throughout the season. This could be a consequence of the high disease-related mortality of adult birds within the colony last season (Henson *et al.* 2020).

The first Arctic Tern egg was recorded in the tern garden on 17 May. By 21 May, rangers, had counted 28 eggs in the tern garden, but only two eggs remained three days later on 24 May. This drastic loss in a short space of time was attributed to predation by rats and Stoat *Mustela erminea*. Losses may have been similar in other nesting areas on the beach and on the sand spit, although this cannot be confirmed because rangers did not enter the colony to check.

Spring tides at the beginning of June had a significant impact on the Arctic Tern colony. Rangers estimate that, after the spring tides, only 50% of the original number of nests remained intact. Unfortunately, we have no definitive count of the number of nesting pairs from before this flooding event. On the morning of 24 June, 147 pairs were recorded on the spit. The number of terns nesting along the beach were not recorded, but casual observations suggest there were fewer than in previous seasons. While there was no count of the peak number of pairs at the site this season, using the data of 24 June and assuming that 50% of nests were lost to flooding at the beginning of June, a rough estimate is that c. 300 pairs of Arctic Terns were nesting on the spit early in the season. The maximum number of pairs recorded in the tern garden was 57 on 24 May; together with a conservative estimate of 50-100 pairs nesting on the beach, 400-450 pairs of Arctic Terns may have nested at the Long Nanny this season.

On 26 June, rangers conducted the only night shift of the season. By 10.30 pm, almost all of the nesting Arctic Terns had left the site. The terns were absent from their nests overnight and did not arrive on site again until an hour before sunrise. This behaviour of leaving their nests overnight may have been going on for some time during the season, but rangers had not been consistently on site in the evenings to observe it. A walk through the colony in the evening revealed that there were only around 10 active nests and that many of the terns would have been sitting on empty scrapes. With high numbers of ground predators seen and trapped on site this year, the terns may have felt particularly vulnerable overnight and consequently deserted their nests outside daylight hours.

By 30 June, Arctic Terns had completely abandoned the site. Only one chick was recorded to have hatched this season; it was seen in the tern garden on 21 June but not seen again and may have been predated. It would appear that this year, the vast majority of nests were predated or lost to flooding before eggs had hatched. Furthermore, many of the birds which made scrapes may have abandoned nests before they had even laid.

Rangers were not able to provide 24-h protection this year due to COVID-19 restrictions and it is believed that disturbance from people, dogs and predators when the rangers were not on site greatly impacted the breeding success of Arctic Terns this season. Although footprints were rarely found on site and people were not seen when reviewing camera trap footage, the cameras were deployed mainly for predators and with the potential for human and dog tracks to be washed away by the tides, dogs and people may have entered the colony when the rangers were absent. One occasion when footprints were discovered was on the night of 26 June; human and dog footprints were discovered on the sand spit and appeared fresh, providing evidence that people and dogs had been in the colony when rangers were not on site. Rangers were absent from the site for the 24 hours leading up to the night shift on 26 June, providing a lengthy window for people to walk through the site unchallenged. There were also multiple cases of loose dogs running into the colony when rangers were on shift, though in these cases the rangers were able to intervene quickly and return the dog to its owner.

This is the first season since Arctic Terns first started breeding at the site in 1980 that the species have failed to fledge any chicks. The lowest figure recorded prior to 2020 was two fledglings in 2016 (Dorman *et al.* 2017). As with this season, the rangers in 2016 reported a constant presence of stoat, assumed to be the main contributing factor to the low productivity, and the majority of Arctic Terns left their nests overnight (Dorman *et al.* 2017). In that year, the rangers reported that at first the Arctic Terns would only leave their nests for a couple of hours, but by the end of the season it was not unusual for the birds to depart at 10 pm and not return until 4 am (Dorman *et al.* 2017). These timings are consistent with what rangers observed this season when conducting the only night shift.

Ringed Plover *Charadrius hiaticula*

Ringed Plovers were first observed scraping on 11 May. On two occasions in early June, predated or washed-out eggs were discovered on the saltmarsh. Ringed Plovers were frequently seen using the saltmarsh all season and previously this has been a favoured nesting area for them. While no nests were discovered in that area this year, it is possible that the predated and washed-out eggs were from nests on the saltmarsh.

In late May, Ringed Plovers were regularly observed using the dune edge on the north side of the burn. Rangers investigated to see whether a nest could be located, but despite numerous searches, no evidence of a nest was found. Ringed Plovers have nested on the north side in previous seasons (Brosnan *et al.* 2019) and a pair could have attempted to nest there this season but any nests would have been washed out by spring tides in early June.

Two nests were located on the beach front in early/mid-June. Both were tucked under the lip of the dune edge; one had 4 eggs, but the number in the second nest was not recorded. Neither nest could be relocated after a couple of weeks and were either predated or buried in sand as a result of erosion of the dune edge.

18 June saw the discovery of two other nests, one far out on the sand spit (RP1) with four eggs and the other (RP2) at the start of the sand spit with just one egg. Both nests had a cage placed over them to provide protection from avian predators. Sadly, RP2 was flooded on 22 June, but RP1 hatched a chick on 11 July which later fledged successfully.

On 19 June, a single egg was discovered on the beach front on the seaward side of the rope fence; this was not in an obvious scrape and may not have been part of an active nest. The boundary fence was moved to include the egg and a cage placed over it as a precaution, but no adult was ever seen sitting on the egg and it was later washed away by the tide. A new nest (RP3) was discovered on the spit on 21 June, in a similar area to RP2 and at risk of flooding from high spring tides. RP3 contained two eggs and was caged on discovery. In previous seasons, plover nests in danger of flooding have been raised by creating a large mound of sand, stabilized with seaweed (Kevin Redgrave, pers. Comm.). This allows the adults to walk up the steep sides of the mound to access the nest, but such sand structures are not as stable as fish boxes and risk being destroyed by the tide. Therefore, the use of fish boxes for raising Ringed Plover nests was trialled for the first time this year and nest RP3 with eggs was initially raised on a fish box as a precautionary measure against high tides. However, this appeared to disorientate the adults which were having problems finding their nest. As there was a chance that the nest in its original position might survive a high spring tide, the fish box was removed and the nest lowered to its original state. Fortunately, the parents carried on incubation duties as normal, a nice demonstration of how resilient to disturbance Ringed Plovers can be. On 19 July, RP3 hatched two chicks; these were seen regularly until rangers departed the site on 6 August and were counted as fledged.

A second nest towards the back of the sand spit (RP4) was discovered towards the end of June, though the exact date was not recorded. RP1 and RP4 were both in situations susceptible to flooding by high spring tides. After caging, these nests were raised onto fish boxes and then onto pallets, and wooden ramps were put in place to allow the adult birds to walk up to the raised nests rather than having to fly. This arrangement was successful and the adults from RP1 and RP4 returned to sit on their raised nests and were seen using the ramps to gain access. Eventually, RP1 fledged 1 chick but the eggs from RP4 disappeared and were presumed to have been predated.

On 4 July, the last nest of the season (RP5) was discovered on the beach front and contained two eggs. This was caged the same day, and then raised onto a fish box and pallet with a ramp on 5 July. In the last week of July, two chicks hatched and were seen until rangers left the site on 6 August (Figure 5). By this stage, the chicks were highly mobile and assumed eventually to have fledged.

A single Ringed Plover fledgling of unknown origin was seen in the middle of the season. It was seen on multiple occasions on the beach around the end of June, and presumably came from a nest on site that was undetected by rangers. The chick was assumed to have originated from the same nest as the washed-out/predated eggs discovered on the saltmarsh in early June and was included in the summary data (Table 4) on that basis.

Minimum number of pairs	9
Number of fledglings	6
Productivity	0.66

Table 4. Summary of data for Ringed Plover from the 2020 breeding season.

Figure 5. Ringed Plover chick.

PREDATION

Rats *Rattus norvegicus*, Stoat and Weasel *Mustela nivalis* were all seen regularly on site this season. Stoat and Rats were seen walking around the Arctic Tern nests on the sand spit in the middle of the day and many nibbled and broken egg shells were discovered as well as eggs cached in the dunes. Rats were reportedly more widespread in the countryside this summer with lockdown restrictions leading to a depleted food source in the towns and cities (Gwen Potter, pers. comm.). This phenomenon was certainly evident at the Long Nanny this summer, with multiple sightings of Rats on site throughout the season. Fox *Vulpes vulpes* prints were also discovered on the saltmarsh on numerous occasions.

Kestrel *Falco tinnunculus* and gulls were a constant presence around the site throughout the season, though neither were ever recorded predating eggs or chicks. Both caused disturbance to the colony when they were present and both Arctic and Little Terns were observed mobbing them whenever they came too close.

On one occasion, a Peregrine *Falco peregrinus* was seen to take an adult Arctic Tern. The entire colony was then observed to leave the site and had not returned by the end of the shift (45 minutes after the event took place). This illustrates the level of unease felt within the colony this year.

Carrion Crows *Corvus corone* were a problem at the beginning of the season and may have been responsible for taking a substantial number of Arctic Tern eggs. Although rangers never witnessed crows taking eggs, they were often seen on the saltmarsh in areas where predated egg shells were later discovered. They were regularly seen perched on posts around the site or flying over in groups of three or four and always provoked a reaction from the nesting terns.

OUTLOOK

In 2021 we hope to regain a full complement of staff and volunteers which will allow us to man the site 24 hours a day once again. Issues around access and signage in 2020 meant that many beach users were unaware of the high tide diversion route and this resulted in numerous instances of people walking into the site. We hope to improve our messaging next season and to engage with visitors at the site boundaries, helping to raise awareness of the site and reduce human disturbance events.

We are also hopeful that we will see a recovery in the number of Arctic Terns breeding at the Long Nanny in the coming years. The high mortality of birds in 2019 undoubtedly reduced the number of birds breeding at the site in 2020. Arctic Terns often return to breed at the same site at which they hatched (Møller *et al.* 2006) and so we hope that as recent fledglings reach reproductive maturity, we will see the number of breeding pairs gradually increase.

ACKNOWLEDGMENTS

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THE FARNE ISLANDS 2020

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MONITORING BREEDING WILDLIFE DURING THE PANDEMIC

The Farne Islands and the rangers who manage them faced a formidable challenge when the worldwide COVID-19 pandemic hit in early 2020. Access to the islands was greatly affected and for a time it was feared that there may be no access at all. Luckily, this was not the case and with great enthusiasm and relief the rangers carried out the season despite restrictions imposed to ensure ranger safety. Time is always a precious resource and this season it was stretched to the limit; to ensure safe working under COVID-19 restrictions, rangers were unable to live on the Islands as they would normally do and a depleted ranger team was required to work on other National Trust sites such as the Long Nanny Tern colony.

The Coastal team consisted of the Countryside Manager, two rangers, four assistant rangers and one volunteer. Unfortunately, at the start of the season one of the rangers was furloughed, further depleting valuable staff resources. As rangers were not living on the islands, the powerboats were not used and visits to the islands were provided by a private boat company. The islands were checked two to three times a week; during these visits, rangers monitored breeding birds whilst checking security camera footage and biosecurity surveillance boxes.

At the beginning of the season, vital nesting areas for Arctic Tern *Sterna paradisaea* and Eider *Somateria mollissima* were strimmed. However, as the season continued it was difficult to keep on top of vegetation in the tern nesting areas; in a normal year, rangers would be allocated individual plots to monitor and manage.

The rangers monitored productivity samples of the following species: Arctic Tern, Eider, Kittiwake *Rissa tridactyla*, Shag *Phalacrocorax aristotelis* and Fulmars *Fulmarus glacialis*. To provide consistency with previous years, cliff counts were conducted over all the islands and a nest count carried out for all islands except Big Harcar. A Puffin *Fratercula arctica* census was done on the three largest islands: Inner Farne, Brownsman and Staple.

Boardwalks covered with vegetation because of the lack of visitors. © Harriet Reid.

Monitoring cliff-nesting birds by boat. © Harriet Reid.

A small number of biosecurity surveillance boxes containing flavoured wax cake to detect the presence of invasive rodents are now always present on the islands. On 1 October, half a Brown Rat *Rattus norvegicus* carcass was discovered on the cobbled path leading from the Inner Farne jetty. Appropriate monitoring boxes and traps were put in place and were frequently checked. No evidence for the presence of rats was found, but nibble marks on a chocolate wax cake did cause some panic until it was realised that these were caused by an inquisitive Rabbit *Oryctolagus cuniculus*.

The sighting of an Otter *Lutra lutra* off Inner Farne was reported by kayakers early in the season. The rangers did multiple checks of the beach after this sighting and, fortunately, no Otter footprints or evidence of predated birds were found.

Camera traps were used to capture any activity from people on the islands whilst the rangers were absent. Kayakers were common visitors but mostly stayed on the beach or rocky shore. There was only one incident of visitors venturing further and people were recorded on video within the Inner Farne Courtyard; luckily this trespass occurred before Arctic Terns were nesting.

Due to their limited presence the rangers were unable to keep a weather log and no cetacean watches or butterfly transects were conducted. Migratory birds were recorded as often as possible in conjunction with other island tasks.

Towards the end of the season, rangers cut back nettles *Urtica dioica* and unwanted vegetation from the tern nesting areas on Inner Farne and treated areas with saltwater to keep vegetation in check. Rangers had assessed the utility of saltwater treatment for reducing vegetation growth on Brownsman Island the previous year and found that it had a promising effect. We are hoping to continue such treatment over the next couple of years and review results on a yearly basis.

Seal monitoring also differed from previous years. Only a couple of ground counts were conducted at the beginning of the pupping season. These initial counts were towards the end of October and only recorded the first wave of births. Subsequent counting was performed using a drone; this was planned to be done every ten days but was frequently prevented or constrained by poor weather.

This report describes the status of breeding birds on the Farne Island in 2020, observations of bird migration and a note on unusual mammals seen during the year.

BREEDING BIRDS OVERVIEW

Twenty-five bird species nested on the islands this year (Table 1); the most noticeable difference for many of them is likely to have been the lack of people. The absence of people would have led to an increase in the presence of predatory gull species over seabird nesting areas, reduced vegetation management and reduced the overall interruptions to nesting activities caused by people. Rough weather prevented rangers from carrying out cliff counts at the beginning of June and only five were carried out in total. Nest count day was delayed because of severe weather conditions until 9 June, and this delay is potentially a factor why fewer nesting Eiders and Arctic Terns were recorded. Productivities for five key species of seabird are summarised in Table 2.

Arctic Terns had a disappointing year, with an overall 19.8% decrease. This is similar to the 18% decrease recorded last year, and the largest decrease since 2015. It is possible that the population is still suffering repercussions of the potential botulism outbreak recorded in 2019 (Redfern *et al*, 2020). Sandwich Tern *Thalasseus sandvicensis* numbers looked promising at the beginning of the season but only 310 nests were recorded, a 25% decrease compared to the previous year and the lowest number of nests since 1947. Common Terns *Sterna hirundo* fared a little better, only decreasing by six pairs, a 9.2% decrease on last year.

Eiders were scarcer on the islands this season with a 33% decrease; whilst this is not the biggest decrease

Arctic Tern. © Harriet Reid.

in comparison with previous years, numbers were still well below the five-year average.

Lesser Black-backed Gulls *Larus fuscus* had a small gain of 21 nests (3%) and Herring Gulls *Larus argentatus* decreased by 41 nests (*-5.5%*), giving an overall total of 1409 breeding pairs of these similar large gull species. Over the past couple of years, control of large gull species has been hampered by lack of access and issues with licensing. The Greater Black-backed Gull *Larus marinus* population appears to be stable with 18 pairs nesting on the islands. In contrast to other gull species, Black-headed Gulls *Chroicocephalus ridibundus* decreased by almost 24%.

Kittiwakes had a reasonable year despite a 2.3% decrease. Numbers had increased by nearly 40% in 2019 and the small drop this season indicates a level of stability. Shag numbers increased by 8% which may be another small step towards their recovery on the islands. In contrast, Razorbills *Alca torda* had a 7% decrease. While this may appear small, it continues a gradual decline which has been evident since 2014. In 2019, Guillemots *Uria aalge* impressively increased by 28%; this year there was a small decrease of 1%. This minimal loss suggests that the population is stable at present.

One of the winners this year has been Fulmar with an increase of 61 nests or 33%, a welcome outcome after a 25% decline in 2019.

This year a full Puffin census could not be carried out and only the three largest islands with Puffin burrows were monitored. The results indicated that estimates for the Inner Farne and Brownsman populations were broadly comparable to last year (Table 3). Conversely, the 34.2% reduction in estimated AOBs for Staple Island is of concern and it will be important to carry out a full census across all islands next year if possible.

Cormorants *Phalacrocorax carbo* decreased by five nests in 2020 and this continues the long-term decline in breeding pairs on the Farnes. Mallard *Anas platyrhynchos* and Oystercatcher were also down, at 9 and 12 nests, respectively, compared to 12 Mallard and 18 Oystercatcher *Haematopus ostralegus* the previous year. As last year, only one pair of Ringed Plover *Charadrius hiaticula* bred, on Inner Farne. Canada Goose *Branta canadensis* returned to the island this year with two nesting pairs. Red-breasted Merganser *Mergus serrator* and Carrion Crow *Corvus corone* also returned to breed this year; sadly Red-breasted Merganser was not successful; fortunately, neither was the Carrion Crow.

Species	2020	2019	difference	Percent difference
Canada Goose	2(3)	0	+2(3)	
Mallard	9	12	-3	-25%
Eider	314	472	-158	-33.4%
Red-breasted Merganser	1	1	0	0
Fulmar	245	186	+61	+33%
Cormorant	63	67	-4	-6%
Shag	523	484	+40	+8.3%
Oystercatcher	12	18	6	-33.3%
Ringed Plover	1	1	0	0%
Black-headed Gull	415	544	-129	-23.7%
Lesser Black-backed Gull	702	681	-+21	-+3.1%
Herring Gull	707	748	-41	-5.5%
Lesser Black-backed/Herring total	1409	1429	-20	-1.4%
Great Black-backed Gull	18	20	-2	-10%
Kittiwake	4301	4402	-101	-2.3%
Sandwich Tern	310	417	-107	-25.7%
Common Tern	59	65	-6	-9.2%
Arctic Tern	1135	1416	-281	-19.8%
Guillemot	63413	64042	-629	-1%
Razorbill	397	427	-30	-7.0%
Puffin[1]	29546[1]	34097[1]	-4551	-13.6%
Carrion Crow	1	1	0	0%
Barn Swallow	4	6	-2	-33.3%
Pied Wagtail	3	5	-2	-40%
Rock Pipit	7	11	-4	-36%

Table 1. Total counts of breeding pairs for the Farne Islands in 2020, except for Guillemots which are given as individuals, and [1]Puffins which were only estimated for Inner Farne, Brownsman and Staple in 2020 and are compared for the counts for those islands in 2019. Rock Dove/Feral Pigeon *Columba livia* also breed on the islands but are not monitored.

Species	Nests Monitored	Productivity	Inner Farne Productivity 2019
Arctic Tern	166	0.06	0.45
Eider	20	1.7	2.04
Shag	94	0.97	0.74
Kittiwakes	80	0.72	0.79
Fulmar	41	0.85	0.58

Table 2. Productivity for some key seabird species on the Farne Islands in 2020.

BIRD MIGRATION OVERVIEW

It will come as little surprise that reduced ranger time on the islands has resulted in a heavily depleted year list for migratory birds in 2020. It is reflective of an extraordinary year, in which the passions of all wildlife watchers, amateur and expert alike, have been limited and localised by COVID-19 restrictions.

It is in this spirit that we present the full list of migratory birds seen across the Farne Islands in 2020. Although not representative of a typical year list, the species listed nicely represent the seasonal changes on the islands that are defined by the arrival and departure of birds. The Farne Islands area is an excellent place for observing migration, with an overall list of 303 recorded species. Migration data are important to record as these broaden our understanding of the movement and distribution of birds over time.

However, the Farne Islands are not a bird observatory, and most sightings are made in the rangers' spare time. Many hours are spent searching each year, from seawatching at dawn to searching bushes at dusk, all in pursuit of birds for little reason other than passion (and at times obsession!). We will hopefully return to those days again. It is customary to select a 'bird of the year', though in light of the above, we bestow the title to every bird recorded in this extraordinary season.

SYSTEMATIC LIST

Species are listed in the order used in the ninth edition of the British List (British Ornithologists Union [BOU], 2017) and subsequent updates. The status of each species is classified using categories listed below according to Edition 8.1 of the IOC World Bird List (https://www.worldbirdnames.org/new/ioc-lists/master-list-2/). For breeding species on the Farnes, an occurrence is counted as a single nesting pair, and a five-year mean of pairs, given in parentheses in the text for breeding species, 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, slightly 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.

Two birds recorded on East Wideopen on 30 December marked the only sighting.

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

Canada Goose returned once more to the islands to breed and this time two pairs nested, one on Brownsman and the other on West Wideopen. They were first seen on 15 April on West Wideopen but the first nest was confirmed in Brownsman vegetable garden on 1 May. There was thought to be a third nest on Staple as two adults were spotted there regularly but no nest was found. Later in the season, two goslings were seen with two adults just off Brownsman jetty.

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

A flock of 24 were recorded passing over Brownsman on 12 October.

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

This is a scarce species on the island, despite the presence of a sizeable feral flock on the mainland. Birds were heard from Inner Farne on 11 September but not seen.

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

A skein of 29 flying east through Inner Sound on 29 September was the only record.

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

A group of 20 were reported flying west over Brownsman on 2 November.

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

A pair flying north over Inner Farne on 10 April was the first record and the only sighting for the Inner Group. Shelduck were subsequently present on Brownsman, with a pair recorded on four dates from 15 to 27 April.

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

The first sighting was on Inner Farne on 5 March where a male and a female were seen swimming in a rock pool. The first clutch was found on 6 April in the Lighthouse Compound. Unfortunately, it was a failed nest. The first ducklings were seen on the Inner Farne Central Pond on 28 May. Overall, there were 9 (14.6) nests as follows: Inner Farne 2 (6.2), West Wideopen 1 (3.2) and Brownsman 6 (3.4).

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

A male flushed from Brownsman pond on 20 March was the first spring record, with a pair flushed from the Churn Pool on Inner Farne being the second record on 6 April. On five further spring dates from 10-27 April, 1-12 Teal were recorded, all on Brownsman pond. After the first autumn record on 31 August, 1-20 were seen on four subsequent dates across Brownsman, Staple and Inner Farne, with five on the Central Meadow Pond of Inner Farne on 5 October being the final sighting. As is typical, a flock wintering in the Outer Group, with over 40 birds was seen on 30 December around the Wamses.

Eider *Somateria mollissima.* A common breeding resident.

It was a very poor year for Eiders on the islands with only 314 nests recorded. The first Eiders were seen on Ladies Path, Inner Farne on 5 March. The first clutch, which had three eggs, was found on 15 April in the Inner Farne Courtyard. The first ducklings were discovered on 4 June, nestling beside their mother in the Lighthouse Compound. Because of limited visits, the rangers were not able to monitor the Eiders as closely as in previous years. This change in methodology and the delayed nest count may have caused earlier females to be missed. Nests were distributed as follows: Inner Farne 152 (272.8), West Wideopen 18 (13.6), East Wideopen 2 (3.2), Knoxes Reef 2 (2.25), Staple 32 (39.4), Brownsman 96 (143), North Wamses 2 (1.75), South Wamses 1 (6), Longstone 8 (7) and Longstone End 1 (3.5). Twenty nests on Inner Farne were monitored regularly to sample productivity. The outcome was 1.7 ducklings leaving the nest (2.38), slightly down on the 2.1 for 2019.

Eider with duckling. © Harriet Reid.

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

The first spring record comprised two males and two females heading north through Inner Sound on 20 March; two flocks of three birds passed south and north respectively on 6 April. The first autumn records involved 15 heading south on 9 July and 14 north on 17 July, both through Inner sound; 4-21 birds were seen on three further autumn dates, until at least 50 birds passed north across Staple Sound on 22 October. This was the peak count of the season.

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

A female was spotted off Longstone from a Serenity boat.

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

A rafting male drifted south into the Kettle on 9 March.

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

There was only one sighting this year, which was of a male and a female on Inner Farne Beach on 7 May. A nest was discovered during nest count day in the usual nesting area; the eggs were cold, and the nest uncovered when the rangers found it, so failure was assumed.

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

Seven were observed flying west towards the mainland from Longstone on 22 August from a Serenity boat.

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

Fewer Oystercatchers nested compared to previous years. They were first seen on 5 March roosting on the South Rocks of Inner Farne. Later in the season a juvenile was seen on Ladies Path, Inner Farne. In a normal year, rangers would come across nests whilst going about the island, as well as on the nest count; given the fewer visits this year, the rangers had less time to identify potential breeding pairs. This year, 12 were known to have nested, just less than half the five-year average of 22.6. They were distributed as follows: Inner Farne 2 (4), West Wideopen 1 (1), East Wideopen 1(1.6), Staple 4 (4) Brownsman 2 (6.6) Staple 4 (4), North Wamses 1 (1) and Longstone 1 (1.5).

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

After breeding on the mainland, impressive roosts of Golden Plovers typically congregate on the Outer Group. This season was no exception, with over 300 observed from a visitor boat on 14 August. A flock of 40 was observed circling around West Wideopen on 29 September.

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

The first sighting of these persevering waders was on 15 April and throughout the season between two and three adults were often seen on the beach. Disappointingly, only a single nest, on Inner Farne Beach (3.6), was found this year. Sadly, it was apparently washed away by high tides at the beginning of June.

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

Single birds were recorded from Longstone on 17 July and 5 October.

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

This species is present all year round, with numbers typically increasing after the breeding season. Curlews were recorded regularly throughout the season on both the Inner and Outer Groups.

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

A roosting flock of 23 birds in non-breeding plumage was recorded on the Inner Farne South Rocks on 9 March; they subsequently flew over to Knoxes Reef.

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

Present all year round, with the largest roosts

typically occurring on West Wideopen, Knoxes Reef and Longstone. Peak passage occurred in October, with 100 birds present on Brownsman on 9 October.

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

The only records this year came from Longstone. Two were present on 9 July and three on 17 July.

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

Two individuals on Inner Farne South Rocks on 19 June were the only spring record. In autumn, five were present on 6 October: two on Inner Farne and three on Brownsman.

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

The islands hold nationally important numbers of this sandpiper, supporting 1% of the UK wintering population. The most notable record was of five birds on Brownsman on 19 June, a month in which birds are typically absent from the islands.

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

An individual was flushed from near Central Meadow Pond on Inner Farne on 6 April; the bird landed a few metres away from the observer and offered superb views.

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

The first bird was flushed from Inner Farne Central Meadow Pond on 5 March. In autumn, single birds were recorded on 1 and 6 October, both on Staple.

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

This vocal wader was present throughout the year with the bulk of records recorded during the autumn passage. Peak counts of four were recorded on 20 March and 21 September on Inner Farne and Brownsman, respectively.

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

Kittiwakes had a reasonable year with a total of 4301 breeding pairs; despite the small decrease on last year of 101 nests (2%), this is a positive outcome when compared with the five-year mean of 3959. Their first appearance at nesting sites was recorded on 6 April and the first eggs on 26 April. The first chicks were recorded on 15 June at St Cuthbert's Gut, Inner Farne. Birds nested as follows: Megstone 3 (4.5), Inner Farne 1280 (1350.2), West Wideopen 175 (230), East Wideopen 240 (205), Staple Island 1421 (946.4), Brownsman 1046 (1015.4), North Wamses 36 (29.2), South Wamses 25 (4.5), Roddam and Green 13 (10.8) and Big Harcar 37 (50.75). In some of the Outer Group islands, such as both the Wamses there was a healthy increase of Kittiwakes. Productivity of a sample of 80 nests monitored on Inner Farne was 0.72, a result comparable to the estimate of 0.79 for 2019.

Kittiwake with chick. © Harriet Reid.

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

A group of 20 Black-headed Gulls were spotted on 5 March just off Inner Farne. The number of breeding pairs of this frequently-kleptoparasitic species was down by 129 on the previous season. The first eggs were discovered on the Inner Farne Vegetable Garden wall on 4 May. On 28 May, chicks were spotted in the Cemetery on Inner Farne. In total, 415 (499) nests were counted, Inner Farne hosted 413 (497) pairs, the majority nesting in the Central Meadow. Brownsman hosted 2 (1.2) behind the small Vegetable Garden wall.

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

As in previous seasons, an adult Mediterranean Gull was present among the Black-headed Gulls on the Inner Group. First seen on Knoxes Reef on 10 April, it was then recorded on the Inner Farne Central Meadow on 24 April and 1 May. The last sighting was 5 May.

Common Gull *Larus canus.* A common visitor.

The only record this season was of a second-winter bird roosting with Sandwich Terns and Black-headed Gulls on 6 April.

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

This year, the largest of our breeding gull species nested on Inner Farne as well as the smaller Inner Group islands. The first sighting was on 5 March when 5 five were seen on West Wideopen . The first eggs were found on 27 April and the first chicks in late May on Staple Island. There were 18 pairs spread across the islands as follows: Inner Farne 2 (0), West Wideopen 1 (1.4), East Wideopen 3 (3.6), Brownsman 2 (1.6), Staple 5 (3.6), North Wamses 3 (3), South Wamses 2 (3.2), Northern Hares 0 (0), Longstone End 0 (0.4). The Inner Farne nests were situated near the Quarry and on Lighthouse Cliff. The Quarry nest was discovered when the adult began dive bombing a ranger walking along the boardwalk.

Glaucous Gull *L. hyperboreus.* Uncommon winter and passage visitor.

On 19 January, a first-winter bird was spotted amongst wintering gulls and hundreds of moulting seals on Brownsman. This was the first record since 2018.

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

In total, 707 (686.2) nests were found during the breeding season, a small decrease from 2019 but compared to the five-year mean numbers appear to be stable. They were first seen in March; eggs were found in mid-April and chicks followed soon after. Breeding pairs were distributed as follows: Inner Farne 49 (30), West Wideopen 129 (92.6), East Wideopen 81 (161), Knoxes Reef 72 (51.8), Staple 68 (37.4), Brownsman 25 (16.8), North Wamses 106 (94), South Wamses 119 (61.4), Northern Hares 19 (11), Longstone 11 (4.2) and Longstone End 28 (14). Most islands had an increase compared to their five-year average apart from East Wideopen which decreased by 80 nests. In 2017, Herring Gulls increased to 847 pairs, a big increase compared to the 433 pairs in 2015; the total this year would suggest their numbers are still high.

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

This predatory species had another stable season on the Farne Islands. During the season, 702 (580.6) nests were counted across the islands. The first sightings were on 5 March and the first eggs found in late April. Breeding pairs were distributed as follows: Inner Farne 66 (40.6), West Wideopen 171 (117), East Wideopen 63 (58.6), Knoxes Reef 48 (54.4), Staple 95 (94.4), Brownsman 22 (8.2), North Wamses 98 (43), South Wamses 83 (76.8), Northern Hares 24 (13.8), Longstone 8 (4) and Longstone End 24 (12). Compared to their five-year average most islands had an increase in breeding pairs, a similar trend to Herring Gull. Over the past couple of seasons, attempts to keep the gull population within reasonable limits have been hampered and this could have contributed to their success.

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

This year, 310 (555.2) nests were recorded; disappointingly, the species is still in decline on the Farne Islands. Since 2014, Sandwich Terns have declined from 959 pairs to their current status on the Islands. There is a possibility that many are being recruited to nearby Coquet Island, which has had increased numbers of breeding pairs in recent years. On 24 April, 54 were seen on Ladies Path, Inner Farne, and a week later good numbers returned to their breeding area on the Central Meadow. Despite good numbers of adults counted, the nest count was low. In past seasons, a nesting area has been cut for the Sandwich Terns but because of weather and lack of resources only part of that area could be cut this year. In previous years, two groups have congregated in the Central Meadow but this season the majority congregated in a single area near the pond. The first eggs were recorded on 7 May and the first chick on 9 June.

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

Four were present around Longstone on 22 August, along with over 70 Arctic Terns and 12 Sandwich Terns.

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

Once again there was a decline in the number of pairs on the Farne Islands. The first adult was seen on Knoxes Reef on 10 April. Later in April, more were seen congregating on Ladies Path and soon after in the Central Meadow. The first egg was found on 12 May, with the first chick discovered on 9 June. During the season 59 (78.4) nests were counted on the peripheries of the Sandwich Tern colony. This is a decrease of 6 nests compared to last year's total of 65 which was the lowest record since 1975.

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

For the Arctic Terns, having Inner Farne to themselves, for the first time since the National Trust acquired the islands in 1925, would have been an unusual experience. The first two returning adults were seen on 24 April on Inner Farne; the first eggs were found on 18 May and the first chicks on 8 June. However, because of the rangers limited access to the islands, these might have been present a couple of days before. While monitoring of the Courtyard and Cemetery breeding areas did take place, rangers were limited to three day visits a week. The 1135 (1646) nesting pairs were distributed as follows: Inner Farne 491 (1197), Brownsman 643 (444.2), Staple 1 (4.2). In the past Arctic Terns on Inner Farne have nested alongside the boardwalk from the jetty to the Courtyard and adjacent Vegetable Garden. These areas are close to buildings open to visiting public and to the ranger accommodation. Whilst there was still a substantial number nesting in the Courtyard, there were very few outside. The lack of people seems to have greatly affected their nesting preference. After noticing fewer nests on Inner Farne, it was realised that there had been an influx of approximately 350 pairs to a nesting site on Brownsman which usually has no more than 30 pairs.

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

One was seen in the tern roost on Brownsman beach on 27 July.

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

The first record involved a single passing south through Staple Sound on 8 July, with two seen during a visitor boat trip around the islands on 14 August. An individual passing north through Inner Sound on 17 September was the last record this season.

Arctic Terns at an expanded nesting site on Brownsman. © Harriet Reid.

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

Two pale-morph birds were observed flying north past Longstone on 13 October.

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

A dark morph and a pale morph were seen from a visitor boat on 14 August.

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

Another good year for Guillemots, in keeping with their success of the previous year. During March and April many were seen rafting in the Sound and around Inner Farne and the Wideopen Islands. They were seen on the cliffs from the end of March and the first egg was found on 27 April. Chicks were heard in early June and jumplings were seen leaving the islands on 19 June. There was a noticeable increase in numbers on Inner Farne, especially around St Cuthbert's Gut, which were the highest on Inner Farne since Guillemot counts began in 1996. In total, 63413 (52949.2) individuals, a small decrease of 629 on the total last year, were counted during the June cliff counts, and were distributed across the islands as follows: Inner Farne 14,947 (10826.2), West Wideopen 3473 (2577.2), East Wideopen 4646 (3903.6), Megstone 215 (261), Staple Island 25946 (21031.8), Brownsman 12533 (9990.8), North Wamses 580 (829), South Wamses 468 (435.4), Roddam and Green 100 (153.4) and Big Harcar 505 (446.5).

Surrounded! Guillemot chick. © Harriet Reid.

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

This year produced the lowest count of breeding pairs since 2011 with 397 (458.6) recorded, a disappointing decrease of 35 nests which brought the total below 400 pairs for the first time in nine years. The first sighting was on 5 March, when a group of 15 were seen at the Lighthouse Cliff on Inner Farne; later in March pairs were seen scattered amongst the Guillemots there and at St Cuthbert's Gut on Inner Farne. The first egg was found on 4 May, and chicks at the beginning of June. Their distribution over the islands was as follows: Inner Farne 199 (223.2), West Wideopen 52 (58.8), East Wideopen 32 (32), Staple Island 62 (78), Brownsman 18 (14.4), North Wamses 8 (9.6), South Wamses 12 (15.6), Roddam and Green 1 (1.75), Big Harcar 8 (12.25) and Longstone End 5 (3.3). Productivity was not monitored for Razorbills this year.

Razorbill family. © Harriet Reid.

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

The first record was a single off Inner Farne on 1 September, followed by two in Staple Sound on 24 October. The final record was a bird rafting north of Inner Farne on 30 December.

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

The first Puffins were seen rafting off the Inner Farne in early March. The first eggs were discovered

Island	2018	2019	2020	Difference 2019-2020	Percentage difference 2019-2020	Difference 2018-2020	Percentage difference from 2018-2020
Staple	12380	11829	7772	-4057	-34.2%	-4608	-37.2%
Brownsman	6868	6414	6514	+100	+1.5%	-354	-5.1%
Inner Farne	16541	15854	15260	-594	-3.7%	-1281	-7.7%
Total	**35789**	**34097**	**29546**	**-4551**	**-13.3%**	**-6243**	**-17.4%**

Table 3. Puffin Census Results 2020: estimates of Apparently Occupied Burrows (AOB).

in late May, Puffins were seen carrying fish to burrows soon after in early June and confirmation of pufflings came during the first day of the Apparently Occupied Burrow (AOB) census. Because of limited access the census was only carried out on the three largest islands: Inner Farne, Brownsman and Staple. The results were as follows: Inner Farne 15260 AOBs, a slight decrease of 594 on the 2019 estimate (Table 3). Conversely, the estimate for Brownsman in 2020 was 100 more than in 2019. However, estimates for Staple Island were poor with a decrease of 4057 AOBs, a reduction of 34%. Fewer data were collected in comparison with last year, and only 30 quadrats were done on each island in contrast to the 50 conducted in each of the previous two years. Therefore, the error ranges are wider for 2020 and this should be borne in mind. Nevertheless, for Staple Island the reduction in estimated AOBs between the 2019 and 2020 surveys is notable.

Puffin. © Harriet Reid.

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

Two individuals in non-breeding plumage were seen passing north through Inner Sound on 20 March.

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

One passing north through Staple Sound on 19 January was the only record this season.

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

These handsome birds had a successful season. They were first recorded on land during early visits in March. The first eggs were found during nest counts in early June and the first chicks in early July. In total, 247 nests were recorded, a 32.7% increase compared to the previous year. They were distributed over the islands as follows: Inner Farne 24 (27.2), West Wideopen 12 (12), East Wideopen 13 (17), Knoxes Reef 14 (11.8), Staple 53 (40), Brownsman 37 (47.8), North Wamses 52 (29.5), South Wamses 42 (23.5), Big Harcar 0 (12.25) and Longstone End 0 (6.25). During late July 41 nests nest were monitored and the nest success of 0.85 was well above the average proportion of 0.58.

'Blue Fulmar' *F. glacialis*. A rare visitor.

The most compelling bird of the year was a dark morph Fulmar that was found by Andy Douglas of 'Serenity'. It was recorded off Inner Farne on 14 August and was seen on several further dates until 8 September. The 'Blue Fulmar' as it is commonly known, usually breeds in the high arctic, but is not a

Fulmar with chick. © Harriet Reid.

different sub-species to the light morph form usually seen on the Farne Islands. It was last recorded on the Outer Group in 2013.

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

Five were observed flying south off Longstone on 18 June. A group of 38 were also recorded from a visitor boat on 14 August.

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

Europe's largest seabird is practically a daily sighting around the islands. A notable record concerned over a hundred individuals seen from Inner Farne on 29 September.

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

The presence of Cormorants on the islands was recorded during the first cliff count on 1 June; at this point they had spread to a higher level than usual on East Wideopen and nested closer to breeding Shags. During the cliff count, 63 nests were distributed approximately equally between East Wideopen and Big Harcar: East Wideopen 32 (36.6) and Big Harcar 31 (45.2). These totals are below the five-year average and together are less than half the recorded total of 139 in 2010 and continue the long-term decline in breeding pairs.

Shag *P. aristotelis*. A common breeding resident.

In cliff counts over all the islands, 524 Shag nests were counted, a welcome increase of 40 nests compared to 2019 and reverses the drop to less than 500 pairs which occurred in 2018. Shags are usually one of the first species on the Farne Islands to commence nest building, and this was seen from late March, with the first egg discovered on 6 April and the first chick on 24 April. Nests were distributed thus: Inner Farne 207 (244.4), West Wideopen 61 (71.6), East Wideopen 46 (46.8), Megstone 2 (6), Staple 63 (95), Brownsman 51 (73.2), North Wamses 36 (14.4), South Wamses 16 (12.4), Rodam & Green 8 (6.4), Big Harcar 10 (18), Longstone End 24 (14). These results indicate that Shags are favouring some of the smaller islands as totals for the larger islands, in contrast to those for the smaller ones, are all below the five-year average.

Shag with chicks. © Harriet Reid.

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

Singles were observed on Knoxes Reef on 25 May, 24 July and 29 September, with two present on 24 September. There were three subsequent records of individuals on Staple during October, with the final record from Longstone on 20 October.

Sparrowhawk *Accipiter nisus.* An uncommon visitor.

A female was flushed from the Inner Farne Central Meadow on 5 March, which proceeded to fly towards the North Rocks.

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

An individual was recorded on Brownsman on 15 September. A bird was also spotted near Big Harcar by a 'Serenity' boat on 22 October.

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

Two birds were observed on Inner Farne on 6 October.

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

An individual was recorded on Staple on 9 October; a male was seen hunting over Brownsman on 27 October.

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

A female flying over Ladies Path on Inner Farne was the first spring record on 9 March, with a further single at the Inner Farne South Rocks on 14 April. After the seabird breeding season, one was seen on five autumn dates from 7 September to 20 October.

Rook *Corvus frugilegus.* A well represented visitor.

Two were seen flying southwest over Inner Farne Central Meadow on 6 April.

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

Rangers witnessed the presence of the species continuously on Brownsman from early April. A

camera trap revealed an adult gathering nesting material and later a nest was found at the top of the Beacon Tower on Brownsman. After a strong northerly storm, remains of the nest were discovered at the bottom of the tower and sightings were no longer frequent.

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

There were two records this season comprising four birds, both in autumn. Three were present on Inner Farne on 6 October, and a single was on Brownsman on 9 October.

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

The first sighting was on 6 April and a pair were seen on top of the Information Centre on Inner Farne on 20 April. Because of limited access, the Chapel had to be locked as the rangers were not living on the island, but this did not stop a pair nesting in a hole in the chapel wall. A further three nests were found in the Lighthouse Store giving a total of four (6.6). As in 2019, no nests were found on Brownsman; it is possible that nesting attempts could have been missed because of the limited time that rangers were able to spend on Brownsman, but sightings of Swallows on the Outer Group Islands were scarce.

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

The first sighting was a bird passing north through Inner Sound, close to the mainland on 6 April. Individuals were subsequently seen on Brownsman on 10 April and 8 June.

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

This Siberian leaf warbler was recorded near the 'Fishe' House on Inner Farne on 12 October.

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

There were 10 records this season, all of which involved single birds. One in the Inner Farne Vegetable Garden on 6 April was the first spring record. This was followed by five additional sightings until 19 June. The first autumn bird was seen on Inner Farne on 17 August, with further sightings on 21 and 29 September on Brownsman. The final record was of an individual at St. Cuthbert's Cove, Inner Farne on 20 October.

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

Three on Inner Farne on 6 April were the first spring records. A single was then present in the Brownsman Cottage sticks on 24 April, and one was seen on 27 April and 1 May in the same location. A single was then seen on the Inner Farne Dock Bank on 15 May, followed by two more, one on 25 May and the other on 19 June, both in the Inner Farne Vegetable Garden. Sightings increased in autumn with records on six dates between 15 September and 16 October across both groups. Records of two birds on 21 September and 6 October were the only multiple records.

Blackcap *Sylvia atricapilla*. A common passage visitor.

A male flitting between the Elder *Sambucus nigra* bushes in the Vegetable Garden on Inner Farne was the first sighting on 6 April and was still present on 10 April. A single on Brownsman on 21 September marked the first autumn record, and five birds seen on 6 October was the peak count. An individual on Brownsman was the final record on 9 October. The final record was of an individual on Brownsman on 9 October.

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

A single was seen in the Brownsman Vegetable Garden on 17 September.

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

A bird was present in the Brownsman Vegetable Garden on 16 September.

Common Whitethroat *C. communis*. A common passage visitor.

One was present in the Brownsman Vegetable Garden on 7 May.

Goldcrest *Regulus regulus*. A common passage visitor.

It was an irruptive year for this kinglet, with many mainland sites inundated with exhausted and

confiding migrants in the autumn. There were no spring sightings this season, and birds were recorded on six dates between 11 September and 20 October. Peak passage occurred on 6 October, with at least 22 across the islands. The journey across the North Sea was unfortunately too much for some Goldcrests, as deceased birds were also found on Inner Farne during October.

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

A minimum of four Wrens were present on Inner Farne throughout March until 6 April, after which a single bird lingered until 15 May. 1-2 individuals were also recorded on Brownsman from 20 March until 27 April. In autumn, 1-2 were seen on Inner Farne on six dates between 29 September and 26 October with up to four birds present on Brownsman during this time.

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

Roaming groups of 4-20 were recorded on Inner Farne Central Meadow during March. Numbers fluctuated over the course of the season with a peak count of 33 on 20 October on Inner Farne.

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

After the first spring record of two males and a female on Inner Farne on 5 March, 1-3 were recorded on three further dates until 6 April. One in the Inner Farne Courtyard marked the first autumn sighting on 1 October, with 1-4 then seen on four subsequent dates until the last record on 20 October.

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

The only record was of an individual on Inner Farne Central Meadow on 10 April.

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

Singles present on Inner Farne on 5 March and 6 April were the only spring records. Autumn was somewhat busier, with a maximum count of 21 recorded over seven dates from 29 September to 20 October across the Inner and Outer Groups of islands.

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

The only spring records were of singles present on Inner Farne Dock Bank on 5 and 20 March. After the first autumn record from Inner Farne on 2 October, a maximum count of 12 birds were logged on four dates until 20 October.

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

Two Robins were present on Inner Farne on each of 5, 9 and 20 March, with singles seen on five spring dates until 15 May. Individuals were also noted on Brownsman on 20 and 24 April, with a pair seen on 27 April. After the first autumn record on 11 September, Robins were recorded on 11 further dates until 20 October. Eight on Inner Farne on 2 October was the peak count.

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

A female was seen in the Inner Farne Vegetable Garden on 17 September.

Redstart *Phoenicurus phoenicurus.* A common passage visitor.

One was seen on Staple on 6 October.

Whinchat *Saxicola rubetra.* A common passage visitor.

A female on Staple on 7 May was the only spring record. One seen on Inner Farne Dock Bank on 17 August was the first autumn record, and the second and last record was on Staple on 17 September.

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

A very secretive male and female were present in the Inner Farne Vegetable Garden on 9 March.

Wheatear *Oenanthe oenanthe.* A common passage visitor.

The first sightings were on 10 April with a male and female on Inner Farne, and a separate male on Brownsman. 1-2 were then recorded on four further spring dates until 25 May. After the first autumn record of one on Staple on 21 August, 1-4 were seen on six further dates until the last sighting on 16 October.

Dunnock *Prunella modularis.* A common passage visitor.

One in the Inner Farne Vegetable Garden on 5 March marked the first spring record. This was followed by sightings of two and one on 27 April and 1 May, respectively. The autumn migrants occurred in October, with 1-2 present on the 6, 9 and 16 of the month across Inner Farne and Brownsman.

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

Pied Wagtails were seen on Inner Farne on 5 March, and on Brownsman on 10 April. In total, three (6.2) nests were counted on the islands, two were found on Inner Farne, in the Courtyard and Cemetery walls, and one on Brownsman near the cottage.

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

A rather bedraggled and confiding individual was the first spring record on Inner Farne on 20 March, followed by 1-4 birds on five additional spring dates until 8 June across Inner Farne, Staple and Brownsman. The last sightings were records of singles on Brownsman and Inner Farne on 7 July.

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

It was a quieter year for this species which was first seen on 5 March. Pairs were soon observed in their usual haunts and seven nests recorded in total. Of these, 4 (4) were found on Inner Farne, 2 (4.8) on Brownsman and 1 (2.2) on Staple. None were recorded on the smaller islands, but access by the rangers was limited.

Chaffinch *Fringilla coelebs.* A common passage visitor.

With no spring records, this popular garden finch arrived in style in 6 October, with 24 seen across Inner Farne, Brownsman and Staple. This was the highest count since 2012, when 28 were recorded on 15 September. On 9 October, five and one present on Brownsman and Inner Farne, respectively, marked the final records.

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

An individual was present on Inner Farne on 2 October.

Arctic Terns in flight. © Harriet Reid.

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

As is typical for early spring, 1-4 were seen flying around Inner Farne on 5, 9 and 20 March. Numbers increased in the autumn, with flocks of 18 seen on 6, 8 and 9 October. On 20 October, a single on Inner Farne was the last sighting.

Siskin *Spinus spinus*. A common passage visitor.

After the first record of one in the Brownsman Vegetable Garden on 21 September, a flock of seven were seen over Inner Farne on 2 October. This marks the highest count for this finch since 2016.

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

A female was found on the Inner Farne South Rocks on 29 September and was again present on 1-2 October.

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

An individual was present around the Brownsman Pond on 6 October.

ADDENDUM TO 1995 REPORT

Pechora Pipit *Anthus gustavi*. An extremely rare visitor.

In an extraordinary development, a 25-year-old record of this Siberian vagrant was submitted to and accepted by the BBRC. Originally presumed to be a Red-throated Pipit *A. cervinus*, it was resubmitted by the observer with subsequent description and knowledge of its diagnostic call (McElwee, 2020). We are therefore delighted to report that a Pechora Pipit was present on Brownsman on 16 September 1995. This is the first accepted record for the Farne Islands and Northumberland.

MAMMALS OF NOTE

The cast of mammals that inhabits the Farne Islands and surrounding waters is undoubtedly small, with irregular visits restricted to species that can fly or swim. There is no Cetacean Report this year, though Bottle-nose Dolphin *Tursiops truncatus* and Harbour Porpoise *Phocoena phocoena* were seen throughout the year from visitor boats. However, this season, the waters around the islands hosted two very special visitors.

Eurasian Otter *Lutra lutra*

This aquatic mustelid was observed in the Kettle at the height of the seabird season. On 1 June, Kayakers captured video showing this distinctive carnivore as it swam and played in calm waters. This extraordinary record is only the second for the islands, and the first in which the animal itself was seen. On 30 April, a mainland-based Ranger filmed an Otter running from the Bamburgh dunes into the sea, closely adjacent to the islands. The location and behavior raise the possibility that this is the same individual. The previous record occurred in 2008, when footprints were found on Brownsman in November.

Fin Whale *Balaenoptera physalus*

The crew and passengers aboard a 'Serenity' visitor boat were awestruck by the emergence of the world's second largest animal on 11 July. A Fin Whale was videoed breaching in Staple Sound in close proximity to a boat of delighted observers. This is the first confirmed sighting around the Farne Islands.

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LINDISFARNE NATIONAL NATURE RESERVE SHOREBIRD PROTECTION SCHEME 2020

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Lindisfarne National Nature Reserve (NNR) in Northumberland comprises 65 km of coastline, and is managed by Natural England. The Reserve stretches from Cheswick Black Rocks in the North to Budle Point in the South.

THE IMPACT OF COVID-19

Lockdown in the UK started on 23 March, when the government announced that all social interactions with others outside of your home should cease, and that people should remain in their homes other than to conduct necessary trips such as shopping for essentials, exercise, travelling for work or medical treatment. Because of these restrictions, and to ensure staff were socially distanced from each other, AC and AD had to work from home, and the two seasonal wardens, SR and FY, were unable to commence work until 20 July. The senior reserve manager and reserve manager made regular trips to the protected sites from mid-May once strict lockdown measures were slightly relaxed. These regular trips continued until the seasonal wardens began to ensure that there was some level of site presence throughout.

Figure 1. Lindisfarne NNR signage.

Towards the end of May, the government declared that people in England could travel as far as they wanted to take their daily exercise. Although signage (Figure 1), boundary ropes and electric fences had been erected at the key Lindisfarne NNR breeding areas, without a regular sustained presence from early in the season to implement measures such as beach closures and reminding visitors to keep dogs on a lead, it is most likely that the signs were ignored, which is evident from the actions of people visiting the Reserve in late July that has been witnessed by the seasonal wardens.

Figure 2. Budle Bay - Kiln Point.

After the easing of lockdown, Budle Bay (Figure 2) received many hundreds of visitors which caused a number of serious disturbance events resulting in the two Ringed Plover *Charadrius hiaticula* scrapes failing during incubation.

One of the most important breeding areas on the Reserve is the Wide Opens, where in recent seasons Little Tern *Sternula albifrons*, Ringed Plover and Oystercatcher *Haematopus ostralegus* have bred. In late April – early July, site staff and volunteers (not officially authorised by Natural England) who lived locally would visit the sites as part of their exercise regime, to find it largely devoid of any human activity and covered in birds (Figure 3). However as soon as lockdown restrictions were lifted and the beach started being frequented by the public again, human and dog footprints were seen past the beach closure signs and in the Wide Opens.

Because of the on-going mass influx of visitors to all corners of the NNR it was finally agreed that two Shorebird Wardens could be appointed to assist site staff and that contracts would be extended to early

September, to cover the summer school holidays. Three main broad areas were patrolled, Budle Bay, Wide Opens/Ross Sands and Goswick, with the Wide Opens and Ross Sands receiving the majority of coverage.

Figure 3. The benefit of creating human- and dog-free refuges: this mixed flock of Grey Plover, Golden Plover, Ringed Plover and Bar-tailed Godwit were enjoying the cordoned-off area north of the Wide Opens.

Many of these visitors had never been to Lindisfarne NNR before, and unfortunately did not often read signs when entering areas of the Reserve. This resulted in a greater number of dogs being off leads, with a further surge in wild campers and picnickers (Figure 4) using disposable barbeques or lighting open fires.

SEASONAL SUMMARY

This season, four sites were formally protected with a daily warden presence only from 20 July because of the coronavirus pandemic: Ross Back Sands (protecting Wide Opens and Black Law), Budle Bay and Goswick. A combination of signage, electric and non-electrified fencing, outer buffer rope fencing and warden presence was aimed at preventing disturbance by humans and dogs in nesting habitat.

As a result of the massive increase in visitors to the NNR the formal protection areas were maintained until early September. Visitor numbers were notably higher compared to previous seasons due to travel bans and the increasing prevalence of 'staycations' (holidays at home). Ross Back Sands was incredibly busy in periods of good weather, and incidents of camping and litter were frequent despite signage. The narrow lane at Ross Farm used for car parking saw 96 cars parked on a particularly busy day in July, with visitors parking on both sides of the lane obstructing farm traffic. Budle Bay also had regular periods of high visitor numbers from the campsite and the public, particularly on weekends.

Little Tern

It is thought that storms along the Little Tern's migratory route may have resulted in a depleted and late arrival to the site in spring 2020. Breeding and laying were further delayed by high spring tides, preventing birds from successfully nesting. Little Terns were seen from 9 May with 40+ terns flying over the Wide Opens while it was inundated. Up to

Figure 4. Camping and caravans at Budle Bay, looking towards Waren Mill.

10 individuals were seen regularly flying over the Wide Opens but the numbers slowly dwindled until courtship behaviour was confined to Black Law. They bred successfully at Black Law with a total of 15 chicks fledging (Table 1). Birds were still observed feeding close to shore along Ross Sands throughout the season.

Common Tern and Arctic Tern

Common Terns *Sterna hirundo* and Arctic Terns *Sterna paradisaea* bred successfully at Black Law, with a peak scrape count of 100 (both species combined), with a minimum of 100 fledglings (Table 1).

Ringed Plover

Ringed Plovers made nesting attempts at the Wide Opens, Black Law, Budle Bay spit (Kiln Point), Budle Point, Goswick and several locations on Holy Island. Fencing was erected at the Wide Opens on 14 May and at Budle Bay and Goswick on 15 May.

At Ross Sands a high tide on 9 May completely inundated the Wide Opens, and almost reaching the sand dunes along most of Ross Sands. This high tide likely washed out several early nests and scrapes. High tides plagued the Wide Opens throughout much of the early season with inundations occurring on 6 June and 7 July. It is likely this, coupled with a massive increase in human disturbance once lockdown restrictions had eased, that resulted in just four Ringed Plover fledglings from two nests across the whole of Ross Sands. There were a further seven nesting attempts but these were all lost at an early stage.

At Goswick, Ringed Plovers were late in nesting. A pair secretly nested near the Little Dune, not being discovered until newly hatched chicks were observed on 14 July. Another pair nested on the seaward side of the big dune away from the netted-off area. Both these nests fledged a total of three young.

At Budle Bay, Ringed Plovers initially showed interest in the enclosure at Kiln Point but by early July it was clear that they had either failed or had moved on. At Budle Point, a nest was discovered on 3 July with three eggs but this failed shortly after, likely a result of a large increase in human disturbance as seasonal tourists coupled with 'staycationers' flooded the area.

Oystercatcher

Oystercatchers successfully fledged three chicks from two nests at Ross Sands with a further pair that attempted at the tip of Old Law but this soon failed, likely due to human disturbance

ACKNOWLEDGEMENTS

We were unable to officially deploy our amazing band of volunteers this season, but many did provide (as part of their daily exercise regime) valuable data and intelligence – thanks again.

	Little Tern	Ringed Plover	Eurasian Oystercatcher	Common/ Arctic Tern
Total scrapes	25	Min 20	10	Minimum 100
Total fledged	15>	27	15	Minimum 100
Productivity	0.6	1.3	1.5	Minimum 1.0

Table 1. Summary Lindisfarne NNR shorebird breeding statistics in 2020 (no data for total eggs or total chicks as a result of COVID-19 restrictions).

Cheese - Several trail cameras were installed at key breeding areas before lockdown, which greatly assisted our monitoring during a very challenging season.

WEATHER INCIDENT AND BEACHED BIRDS IN NORTHEAST ENGLAND, FEBRUARY TO MARCH 2021

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SUMMARY

Poor weather during late January into February 2021 led to many birds being beached in Northeast England. The Northeast England Beached Bird Surveys (NEBBS) group and additional volunteers carried out surveys in February and March to assess the extent of seabird mortality across beaches within 160 km of coastline from Skinningrove, North Yorkshire, to Berwick in north Northumberland. A minimum of 462 individuals of 35 species were identified; just over a third were Woodcock *Scolopax rusticola*, and a similar proportion were auks Common Guillemot *Uria aalge* and Razorbill *Alca torda*; Black-legged Kittiwake *Rissa tridactyla*, Common Gull *Larus canus* and Herring Gull *Larus argentatus* represented just over one-tenth of the casualties with other species, including thrushes, forming the remainder. The range of species affected may relate to interactions between unusual weather conditions and species-specific life styles: Woodcock and thrush casualties may be birds in the process of returning to Fennoscandian breeding grounds or seeking better conditions elsewhere, whereas seabird casualties may be birds wintering locally in the North Sea.

INTRODUCTION

The Northeast England Beached Bird Surveys (NEBBS) volunteers have performed monthly beach surveys in Northeast England since December 2002, mainly recording bird corpses. These data complement similar long-term beach surveys in Orkney and Shetland. Our group monitors oiling on beached birds and we collect specimens, particularly Fulmars *Fulmarus glacialis* and other species, for laboratory study in relation to marine pollution. We are involved in the European Union's Interreg-funded campaign 'Save the North Sea' (SNS) which is aimed at reducing marine litter in the North Sea by creating awareness (Save the North Sea, 2004). The collection of beached Fulmar corpses is part of a long-term study into levels of marine pollution and working towards cleaner oceans. Fulmars ingest floating plastic particles when feeding at sea and the extent of accumulation of plastics in Fulmar stomachs is used by European governments to formulate policies to reduce marine debris (Van Franeker et al. 2011 and 2021). During 2003 to 2020 our Northeast England group has collected 127 northern fulmar corpses from beaches for research purposes.

On Saturday, 6 February, the NEBBS group coordinator (the author) prompted surveyors to visit their beaches to monitor weather conditions and to record any impact on bird mortality along the coastline (Figure 1).

Extract from my personal journal for Sunday, 7 February 2021:

The cold spell, strong easterly winds and rain of the past two weeks or more was beginning to show an impact with bird remains appearing at the coast. Last night I prompted my beach surveyors to check their beaches over coming days and weeks if they felt it was right under the current rules of [COVID-19] lockdown. There was a clause which allowed people to go out and travel further than in a restricted local area if what they were doing was a voluntary service. That was how I classified our beach checks, so on this basis I told our surveyors they ought to be able to continue to survey if they wished and were able. It was important we monitored this weather incident to determine its impact.

As a footnote… *the sea had been very rough for many days up to this point, for up to two weeks or more.*

By Friday 12 February there was still a good covering of snow in North Shields (Tyne and Wear).

On Friday, 19 February, my journal recorded (after a beached bird survey at Druridge Bay, Northumberland):

... but the snow had melted and gone from the coast once the temperature started its rise last Sunday as a flow of air had eased in from the southwest bringing

Figure 1. Druridge Bay (Northumberland), 11 February 2021. © Daniel M Turner.

rain. From a low of -2 °C a week ago we were now enjoying a temperature up to ten degrees and many people headed to the coast to exercise and savour the sea air. Looking west from Druridge Bay, snow was still apparent on the Northumberland hills near Rothbury.

On Saturday, 27 February, after a bird survey my journal noted: *The temperature was around eight degrees and many* [people] *walked in the sun as a breeze sailed gently from the west.*

The temperature continued up to around ten degrees during daylight over the next fortnight, though by 14 March there were still patches of snow on the Northumberland hills. During my Druridge Bay survey of 28 March, I recorded a temperature of 11°C, while on 30 and 31 March the country experienced a mini heatwave. At Tynemouth, the temperature rose to 17 °C on 30th when the beach was very crowded with visitors, leading to a postponement of my beach survey on that occasion.

METHODS

The beached bird survey methods adopted by NEBBS group surveyors in February and March 2021 followed standard NEBBS protocols (available from https://www.nhsn.org.uk/north-east-beached-bird-surveys/), although instead of the more-usual monthly surveys additional surveys were performed during this period. Some extra reports are included, from non NEBBS members who were not necessarily aware of the standard NEBBS protocols and are therefore included with appropriate care. There are some gaps in beach coverage along the coastline which it is hoped to fill in future.

RESULTS AND DISCUSSION

Table 1 summarises the beached bird data recorded as a result of surveys performed mostly by NEBBS group surveyors along the coastline from Skinningrove, North Yorkshire, to Berwick in north Northumberland. Additional details are given in the

online Appendix (Table S1; https://www.nhsn.org.uk/wp-content/uploads/2021/07/Appendix.pdf). This is an overall length of approximately 160 km (100 miles) from which approximately 61.5 km of beaches were surveyed (see online Appendix Table S2). Considerable stretches of shore are composed of rock and cliffs difficult to access and therefore unsuitable for survey. Dates and further details of corpses are given in the online Appendix. The concentrations (corpses per km) for the most numerous six bird casualties are summarised in Table 2.

Species	Total corpses	Notes
Greylag Goose *Anser anser*	1	Remains (Druridge Bay, 14 March)
Pink-footed Goose *Anser brachyrynchus*	1	Remains (Saltburn to Redcar, 10 February)
Whooper Swan *Cygnus Cygnus*	1	14 February, Ross Back Sands (Figure 2), frozen into sand.
Mallard *Anas platyrhynchos*	1	Drake, 10 February (Saltburn to Redcar)
Common Eider *Somateria mollissima*	2	1 adult drake (S Shields, 12 February), 1 drake (imm?, 7 February)
Common Scoter *Melanitta nigra*	1	12 February (a drake, South Shields)
Possible duck sp	1	6 March (Newbiggin, JB & NP)
Goosander *Mergus merganser*	1	2 March (Blackhall Rocks to Crimdon beach, ML)
Great Northern Diver *Gavia immer*	1	3 March (Ross Back Sands)
Northern Fulmar *Fulmarus glacialis*	6	Four stored frozen for 'Save the North Sea' fulmar project: mid-Druridge Bay to Birling Carrs (7, 13 and 26 February). Two unsuitable for collection (ML, Marsden 22 March; MAB, 13 March).
Great Crested Grebe *Podiceps cristatus*	1	27 February (North Blyth, fresh, collected and stored frozen)
Grey Heron *Ardea cinerea*	1	14 February (Druridge Bay - North)
Gannet *Morus bassanus*	1	Adult, 9 February (South Shields)
Shag *Phalacrocorax aristotelis*	8	One colour-ringed (North Blyth, collected). Another colour-ringed first-year (Redcar to South Gare, MAB, 13 March), ringed as chick on Isle of May, June 2020.
Cormorant *Phalacrocorax carbo*	3	1 adult (6 February), 2 immature (14 February). Figure 3.
Oystercatcher *Haematopus ostralegus*	1	15 February (Whitburn)
Lapwing *Vanellus vanellus*	3	7 February (Druridge Bay and S Shields), 28 March (Druridge Bay)
Curlew *Numenius arquata*	2	10 February (Saltburn to Redcar) and 13 February (Redcar to S Gare)
Eurasian Woodcock *Scolopax rusticola*	172	Mostly comprising wings and sternum.
Common Snipe *Gallinago gallinago*	4	11, 13 and 14 February (Hartlepool, Redcar to S Gare and Seaburn)
Redshank *Tringa totanus*	1	3 March (Ross Back Sands)

Species	Total corpses	Notes
Kittiwake *Rissa tridactyla*	24	Includes 16 first-year (15 of which were incomplete), 1 adult wing, 7 further adult remains. One adult and one first year stored frozen.
Black-headed Gull *Chroicocephalus ridibundus*	7	One immature, 6 adult.
Common Gull *Larus canus*	17	10 adult, 4 first-year, 3 second-year.
GBB Gull *Larus marinus*	3	Adult (wings, sternum and head) + 2 adults.
Herring Gull *Larus argentatus*	16	Third-year (1 specimen), second-year (1 specimen), first-year (4 specimens), 9 adults, one immature.
Large gull remains	4	First-year (Druridge Bay, HW & JD, 7 February), 2 first-year (Druridge Bay, PG, 9 March, likely Herring Gull), 1 immature (Sand Haven, ML, 22 March, likely Herring Gull).
Guillemot *Uria aalge*	80	One stored frozen (WTips+). At least 4 were adults in summer plumage.
Razorbill *Alca torda*	63	Four stored frozen (all first-year). 34 examples of first year in total; three 'adult' (one with leg ring); one W+?; one W+2. Remains of at least twelve could not be aged.
Auk sp.	3	Guillemot or Razorbill: wing remains (HW & JD 07.02.21); missing head (PG 09.03.21); remains, bones and headless (MD 27.03.21);
Puffin *Fratercula arctica*	7	1 adult bird, 1 second-year, 4 first-year – all incomplete specimens. One of unknown age – one wing only found.
Short-eared Owl *Asio flammeus*	2	7 February (Druridge Bay North and South Shields)
Carrion Crow *Corvus corone*	1	3 March (Ross Back Sands)
Skylark *Alauda arvensis*	1	13 February (Redcar to South Gare)
Starling *Sturnus vulgaris*	1	13 February (Redcar to South Gare)
Blackbird *Turdus merula*	7 (+)	7, 11 and 13 February
Fieldfare *Turdus pilaris*	10	7, 11 and 13 February
Redwing *Turdus iliacus*	1	10 February (Saltburn to Redcar)
Thrush sp.	1	2 March (Blackhall Rocks to Crimdon beach)

Table 1. Summary of beached bird corpses recorded in **Northeast England** during 3 February to 30 March 2021. Surveyor initials are defined in Acknowledgements; other abbreviations are defined in the online Appendix.

Surveyors also record corpses other than birds found on the shore and during the period these included (see online Appendix Table S1): Common Seal *Phoca vitulina* or Grey Seal *Halichoerus grypus:* three on 2, 6 and 30 March; Harbour Porpoise *Phocoena phocoena:* four sightings (of likely three individuals) on 6, 9 & 10 February and 2 March; Humpback Whale *Megaptera novaeangliae:* one on Blyth Beach, 19-22 March (seen alive in the region from 31 January but confirmed dead on 5 March). This Humpback Whale was a juvenile, 11 metres in length, but too decomposed for a full necropsy; the North East Cetacean Project arranged for samples to be taken for testing.

Figure 2. Whooper swan frozen into sand, Ross Back Sands (Northumberland), 14 February 2021. © Brian Ward.

Figure 3. Immature cormorant at Ross Back Sands (Northumberland), 14 February 2021. © Brian Ward.

Remains of other marine animals were also recorded, including Sea Gooseberry *Pleurobrachia pileus* (7 February), Common Spider Crab *Maja squinado* (28 February and 30 March), cuttlebone of Common Cuttlefish *Sepia officinalis* (6, 7, 16, 23 and 26 February), octopus species (*Octopodidae;* 10, 11 and 23 February), starfish species (possibly Common Starfish *Asterias rubens;* 11 February), sea urchin sp. (*Echinoidea* species; 16 February), Sea Potato *Echinocardium cordatum* (16 February and 30 March).

Eurasian Woodcock

The vast majority of the Woodcock specimens found on Northeast England beaches in February and March 2021 (Figure 4) were 'remains': pairs of wings with sternum or single wings (Figure 5). There were very few Woodcocks reported as complete carcases; five were noted, representing 2.9% of the 172 casualties recorded. Most Woodcock remains were found over a short time frame, 5 to 17 February (Figures 6 and 7). By 17 February, 157 (91.3%) of the 172 casualties had been found. The remains were unaged and not sexed. The NEBBS group coordinator collected several wings and sterna during his surveys – the sterna were all very clean and without any remaining muscle as if the birds had died some days previously and the muscle had been scavenged or degraded. Monthly beached bird surveys started in Northeast England in late 2002 and this was our first experience of a 'wreck' of Woodcock.

Most British Woodcock are thought to be sedentary (Wernham et al., 2002), and numbers of Woodcock in the UK are substantially augmented by birds arriving from Fennoscandia and Russia during the autumn. In Scotland and northern England, the arrival of mainly Fennoscandian birds begins in the second week of October and continues into the UK until late December. Because 68% of British and Irish Woodcock have been recovered within 30 km of their natal or breeding sites during winter (Hoodless & Coulson, 1994), it seems unlikely that large numbers travel to the coast in hard weather. Migratory Woodcock are much more mobile and some are known to move further south and west within Britain as winter progresses, perhaps as the weather worsens.

The Migration Atlas (Wernham et al., 2002) suggests that the majority of migrant Woodcock in the UK depart during late February and early March. Therefore, the Woodcock remains in Northeast England may relate to birds in the process of

Figure 4. The coastal distribution of Woodcock mortality (number of individuals), Northeast England, February-March 2021. ArcGIS Online.Ocean basemap; sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, HERE, Geonames.org, and other contributors.

Figure 5. Illustration by Rose Di Mascio of typical Woodcock remains (wing and sternum) found along the Northeast coast in February and March 2021.

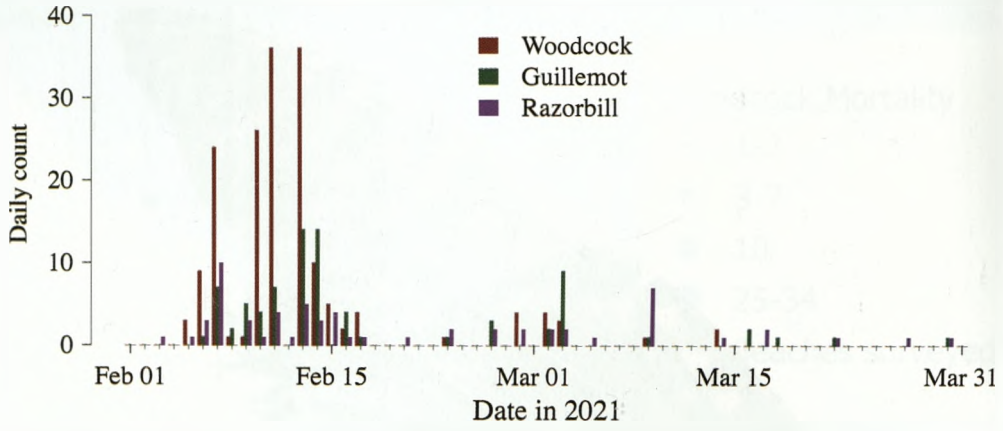

Figure 6. Daily total of corpses and remains of Woodcock, Guillemot and Razorbill found in Northeast England in February and March 2021.

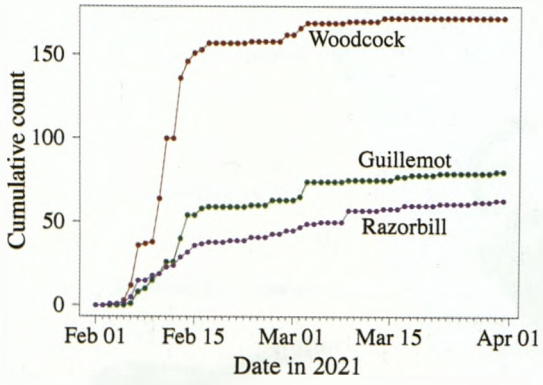

Figure 7. Running totals of corpses and remains of Woodcock, Guillemot and Razorbill found in Northeast England in February and March 2021.

returning early to breeding grounds in Fennoscandia and further east, but affected by the northerly and north-easterly winds with many dying in the process. It is also possible that these were wintering birds from northwest Europe arriving in the UK in search of milder conditions or displaced by wind conditions during return migration. In addition to Woodcock, up to 20 thrushes were also found during beach surveys, particularly Blackbirds (7+) and Fieldfare (10). The Fieldfare, and probably the Blackbirds too, are likely to be Scandinavian immigrants, either UK wintering birds moving out, or wintering birds from northwest Europe coming into the UK, and caught up in the same weather conditions as the Woodcocks.

It is, of course, possible that some of the Woodcock remains were of British birds, residents from Northeast England, making their way to the coast in search of better feeding than available in the snowy conditions persisting inland. However, the number of Northeast England Woodcock found in this 'wreck' may be in the minority compared to continental wintering visitors.

Species	Number of corpses	Corpses per km
Eurasian Woodcock	172	2.80
Common Guillemot	80	1.30
Razorbill	63	1.02
Black-legged Kittiwake	24	0.39
Common Gull	17	0.28
European Herring Gull	16	0.26

Table 2. Frequency of corpses per km along 61.5 km surveyed for the most numerous bird casualties, Feb-March 2021

Figure 8. Guillemot (aged as WTips+ though with silvery fringes to underwing greater secondary coverts), Druridge Bay (Northumberland), 9 March 2021. © Pauline Gilbertson.

Common Guillemot

Guillemots (Figure 8) are often dispersive rather than migratory, and many breeding in northeast Britain remain within the North Sea outside the breeding season (Wernham et al., 2002). Galloway and Meek (1980) noted that Guillemots can be seen throughout the winter near the important Farne Islands colonies and a proportion of birds in Northeast England at this time will likely include local breeders. The remains of dead Guillemots are regularly found on beaches in Northeast England but significant wrecks were noted in January to March of 1970, 1978, 1983, 1986, 1994 and 1996 (Day and Hodgson, 2003); oiling was a considerable factor in some incidents in earlier years. In March-April 2013 and 2018, the NEBBS group recorded poor-weather events leading to many beached Guillemots, 467 in 2013 (Turner, 2014) and 491 in 2018 (Turner, 2018), for which starvation was a common final cause of death.

February is the peak month for ring-recoveries with many such recoveries from this side of the North Sea likely to be of adults moving back towards their colonies; immature birds travel further than adults from their ringing colony (Wernham et al. 2002). During the February-March 2021 incident the bulk of the Guillemots were unaged, but from fifteen examined eight were reliably identified as first-year and six as immature or adult, with one unknown; at least a further four were recorded as summer-plumage breeding adults with full black heads and neck. Compared to 2013 and 2018, the number of casualties in the current incident was 17% or less, but occurred a few weeks earlier and this difference in timing might have accounted for the lower numbers. The majority were found between 6 and 16 February (58 birds; 72.5% of total; Figure 6). As with the Woodcock, there was a steep initial climb in numbers of casualties, followed by a shallow and protracted increase (Figure 7). The distribution of Guillemot findings along the coast is summarised in Figure 9.

Razorbill

Wernham et al. (2002) wrote that relatively little was known of Razorbill movements away from the breeding colonies and that ringing recoveries were indicative of heavy winter mortality of young birds. A large wreck of Razorbills (Figure 10), mainly suffering starvation after storms, was recorded in Northeast England when 1,453 corpses were washed ashore in February 1983 (Day and Hodgson, 2003; Bowey and Newsome, 2012). During this February 1983 weather incident, over 17,000 auks were found dead from Scotland to Kent, with 16% of casualties recorded from Northumberland to Cleveland (Hume and Allsopp, 1983). Unusually, twice as many Razorbills (nearly 8,000) were found compared to Guillemots (over 4,400). Such events indicate the numbers of birds that must be wintering offshore, far from sight of land based on the records of only 42 live birds counted during surveys for the Northumbria winter atlas (Day and Hodgson, 2003).

Dean et al. (2015) noted, from ringing recoveries, that our coastline hosts Razorbills from Scotland and further afield and the breeding population in Northeast England is relatively low with 32 pairs at Needles Eye (north Northumberland) and 427 pairs at the Farne Islands in 2019, 56 pairs at Marsden (Tyne and Wear) in 2005 and 2006 and 23 pairs between Boulby and Cowbar (County Cleveland) in 2005 (Barrett et al., 2020; Hendry et al., 2020; Bowey and Newsome, 2012; Joynt et al., 2008). In comparison, the number of Guillemot individuals recorded on the Farne Islands in 2019 was 64,042 (Hendry et al., 2020).

The numbers of beached Razorbills recorded in the 2013 and 2018 Northeast England poor-weather incidents were reported as 276 (Turner, 2014) and 52 (Turner, 2018), respectively. Not only do the smaller number of Razorbills affected suggest smaller numbers wintering in the region compared to Guillemots, but also the smaller population size compared to its fellow auk. During the current weather incident, from the total of 63 Razorbills it was possible to age 39 of them; of these, 34 (87%) were first-year birds and five (13%) were older. This indicates a marked impact on birds in their first year of life. The main peak of finding Razorbill casualties fell between 3 and 17 February (38 birds; 60% of total) in a similar fashion to Guillemot and Woodcock (Figures 6 and 7). A higher percentage (72.5%)

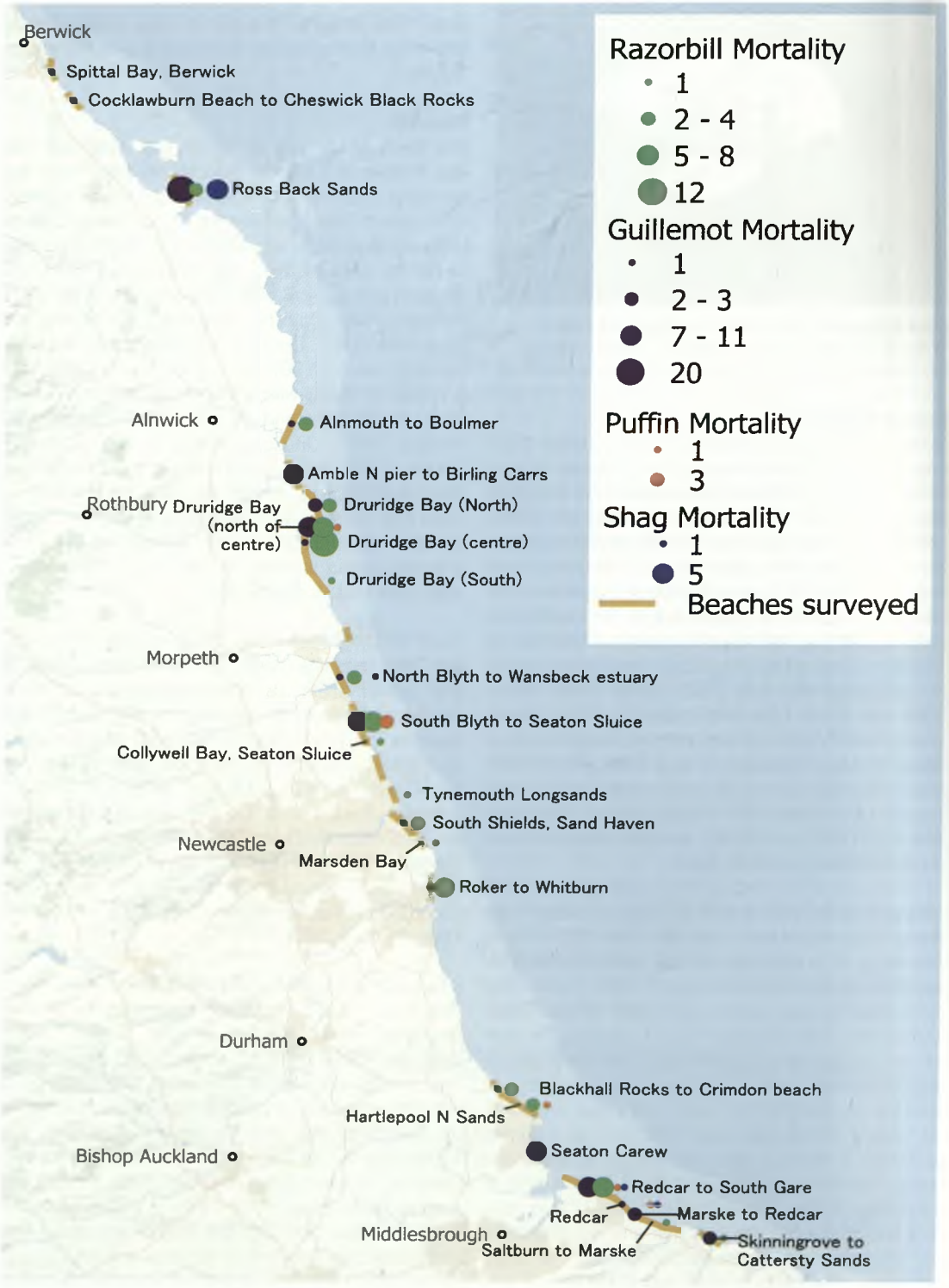

Figure 9. The coastal distribution of Guillemot, Razorbill, Puffin and Shag mortality (number of individuals), Northeast England, February-March 2021. ArcGIS Online Ocean basemap; sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, HERE, Geonames.org, and other contributors.

Figure 10. Razorbill (aged as 0+0 i.e. first-year), Whitburn to Roker (Tyne and Wear), 7 February 2021.
© Peter Collins.

of Guillemots were retrieved in the early period compared to Razorbills, but the general pattern in findings for each species was similar. The distribution of Razorbill findings along the coast is summarised in Figure 9.

Black-legged Kittiwake

It may be the case that the majority of the European breeding Kittiwakes spend their winter in the North Atlantic, though there is undoubtedly also a presence in the North Sea. On the River Tyne, in Tyne and Wear, the first Kittiwakes to return to river nesting sites after the winter have done so, in recent years, from late February. In 2021, the first sightings at Newcastle-Gateshead were on 21 February, and over the following weeks into March and April numbers progressively built as these small gulls returned from the sea.

During this weather incident the remains of 24 Kittiwakes (Figure 11) were found and recorded. Sixteen (67%) were of first-year birds and the other eight (33%) were adults. Only two of the 24 were complete specimens, one adult and one first-year, and both of these were collected and stored frozen for future study. Do these proportions of corpses show something about the age composition of birds wintering off our coastline, and also mortality? From the 24 specimens, 20 (83%; including 13 first-year birds) were found between 5 and 17 February in a similar way to the other species discussed, though showing a slightly faster rate of finding for Kittiwakes during the early survey phase.

During the 2018 weather incident, 42 beached Kittiwakes were found (Turner, 2018). During that incident from 40 aged gulls, 28 (70%) were in first-year plumage, a percentage comparable to that in the current incident. The records for the 2013 incident need a full review in order to reveal the complete Kittiwake casualty figures. The distribution of Kittiwake findings along the coast is summarised in Figure 12.

Other species

The mortality and coastal distribution of European Shag and Atlantic Puffin are summarised in Figure 9, Northern Fulmar in Figure 12, and Black-headed Gull, Common Gull, Great Black-backed Gull and European Herring Gull in Figure 13.

Figure 11. Adult Kittiwake, Druridge Bay (Northumberland), 22 March 2021.
© Pauline Gilbertson.

Figure 12. The coastal distribution of Kittiwake and Fulmar mortality (number of individuals), Northeast England, February-March 2021. ArcGIS Online Ocean basemap; sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, HERE, Geonames.org, and other contributors.

Figure 13. The coastal distribution of gull mortality (number of individuals), Northeast England, February-March 2021. ArcGIS Online Ocean basemap; sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, HERE, Geonames.org, and other contributors.

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CARING FOR THE COASTAL ENVIRONMENT

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INTRODUCTION

With all the hardship that the coronavirus pandemic has thrown at us this year, the benefits of being out in nature and the importance of caring for our natural world have never been so clear. During these unprecedented times it has been reassuring that many people have connected to nature and perhaps in a deeper and a more meaningful way than ever before. These sentiments fit perfectly with Coast Care's aims and ideals. Set up three years ago as a partnership between the Northumberland Coast Area of Outstanding Natural Beauty (AONB), Northumberland Wildlife Trust and Seahouses Development Trust, Coast Care supports volunteers to help care for the beautiful Northumberland coast. With support from the National Lottery Heritage Fund, our volunteers work together to look after the sweeping sandy beaches, rolling dunes, village greens and community spaces, farmland and grasslands, which make up our coastal environment.

Spending time outdoors, contributing to the protection of our landscape, learning new skills and socialising with like-minded people are important benefits of volunteering for our wellbeing, and Coast Care delivers them all.

Volunteering with Coast Care can mean many different things. 1,556 people have given their time. Some we have only met once when they helped to remove plastic, fishing line and other litter during a beach clean. Others regularly commit time to undertake wildlife surveys or help with large practical conservation tasks. Our most dedicated volunteer has given over 2,500 hours; that's akin to having a full-time member of staff working along the coast for almost a year and a half! We don't expect a minimum commitment from anyone, which has allowed us to welcome huge numbers of volunteers of all ages and abilities, whether they only have an hour to spare or are able to give their time regularly.

Great British Beach Clean. Image © Em Witcutt.

Practical conservation. Image © Rob Drummond.

OUR ACHIEVEMENTS

The contribution of our volunteers began back in September 2017 with Marine Conservation Society's Great British Beach Clean, an annual survey of the state of our beaches which we have been helping with every autumn.

Since then, our volunteer team have given over 30,000 hours of their time to the conservation efforts along the coast. Of this inspiring contribution, 9,655 hours have gone towards practical conservation tasks and beach cleans and 4,685 hours have been spent on a variety of ecological surveys. A further 9,494 hours have been given by our Site Wardens and Footpath Monitors, each of whom care for a particular stretch of coast or footpath. We have also given our regular volunteers a wide range of training so that they can be of even more value to the AONB. So far, we have delivered 66 formal training sessions, which 771 people have benefitted from. 28 young people have been recruited into the Young Rangers programme and three graduate trainees delivered specific projects.

THE CHALLENGES OF 2020

As it has for everyone, 2020 has been a peculiar year and presented many unforeseen and unique challenges. This year has also shown just how important the environment is, and the Coast Care team have worked hard to provide new ways for our volunteers to engage with our natural world, and each other, during what has been such a difficult and isolating time for many.

During the months of lockdown when we were not able to run volunteering sessions, it was heartening to see our volunteers continuing to engage with the natural world. Many used their daily exercise to pick up litter from the coastline, check footpaths and take part in citizen science projects to increase ecological recording in the region. Others found that it was a perfect time to focus on the Wildlife Trusts' *30 days wild* campaign in June, and completed a random act of 'wildness' each day from their own gardens or local green spaces. Once back from lockdown, we celebrated our volunteer lockdown achievements in a series of blog posts on our webpage, in the hope

that their stories would encourage others to do the same. Some volunteers utilised their skills they have learnt through Coast Care's formal training sessions; one rebuilt a dry stone wall in their garden, while another created a wildlife pond and scythed their paddock. A particularly crafty volunteer depicted native biodiversity through knitting and crocheting, and from another we heard about the highs and lows of monitoring an Oystercatcher's nesting attempts.

The staff team were back up and running and engaging with volunteers from July and some amazing achievements have been made since then. In conservation, work can be time sensitive and ecological monitoring is very much influenced by seasons, so the team had to work quickly to get organised and encourage volunteers back out to help on our priority tasks. Our first job was to complete a pollinator survey on a local farmer's potato field.

The farmer had been planting Phacelia as a cover crop over the last two seasons to produce a green manure and create a nitrogen rich soil. This has increased the potato yield so is great news for the farmer, but it also seemed to be having a positive effect on local biodiversity by providing food for Honey Bees from local hives and also for the wider pollinator community. To test this theory the group, led by retired Professor John Hobrough, had conducted a survey during the previous summer. It was important to repeat this survey this summer to give John more data, and we had to move quickly to make the most of what remained of the summer. We look forward to the official findings being released very soon.

One of our largest projects since lockdown has been assisting Northumberland Wildlife Trust at Annstead Dunes, a hidden gem of a reserve on the coastline between Beadnell and Bamburgh. Through Coast Care, funding has been provided to make the site more accessible and to reduce the impact of visitors to the site. Pathways have been improved and steps along the dunes and onto the beach made from recycled plastic have been installed, giving easier, safer access to visitors and protecting the vulnerable dune system from further erosion. Coast Care volunteers dedicated 85 hours to this project, working through all weathers and tackling the demanding practical

Phacelia survey. Image © Becky Bass.

Scything on Holy Island. Image © Becky Bass.

work with a smile on their face. Since finishing this project, we've organised beach cleans where needed to tackle litter in problem areas and have also been removing invasive species such as Pirri Pirri Bur, Sea Buckthorn and Himalayan Balsam across the region. Our volunteers have also been involved with some much needed vegetation management and clearance at Embleton Quarry Nature Reserve. The staff team even had a day working at RAF Boulmer to assist personnel from the base with the management of their wildlife pond and wildflower meadow.

It is not just environmental work that our volunteers have been helping with. Over the course of the project, we have helped to monitor and maintain historic buildings and other important elements of heritage along the Northumberland Coast. For example, 12 volunteers were trained in dry-stone walling and have been using their skills to repair a stretch of dry-stone wall in Craster, headed by one of our specially-trained Lead Volunteers.

Dry stone wall repair. Image © Em Witcutt.

Big Seaweed Search. Image © Joyce Clayton.

The team spent many hours at the wall last winter, but had to abandon their task due to the pandemic. They were very happy to return to the wall in September and are hoping to complete all 120 m this winter. This is a really impressive goal because dry-stone walling is a difficult task which takes patience and precision.

We have also focused on getting our ecological surveys and recording back on track. Our priority has been to return to sites where Coast Care has previously assisted in conservation efforts to conduct plant surveys. This project took in Bamburgh Castle, Beadnell Dunes, Boulmer wildflower meadow and Embleton Quarry Nature Reserve. The data

Countryfile with Anita Rani. Image © Em Witcutt.

collected will be used to evaluate the impact that Coast Care has had and can also inform future conservation work at these sites. Elsewhere, we took part in Sea Watch Foundation's National Whale and Dolphin Watch again this year. Unfortunately, there were no sightings during these surveys but a group of around 16 Bottlenose Dolphins put on a great display for volunteers during a beach clean at Cocklawburn days later, and we also spent a lovely hour watching Harbour Porpoise off Stag Rocks in Bamburgh during a shore-watch session later in the summer. Volunteers have also built Barn Owl boxes, completed mammal surveys along the River Coquet and 14 surveys were completed for this year's Marine Conservation Society's Great British Beach Clean. We have also been training volunteers in the Natural History Museum and Marine Conservation Society's Big Seaweed Search.

Volunteers headed out and completed these surveys individually through the winter months. The data they collected will feed into studies of three key environmental changes; sea temperature rise, ocean acidification and the spread of non-native species.

A well-deserved spotlight was shone onto Coast Care when we featured on BBC Countryfile in their August episode at Bamburgh. Volunteers were interviewed by presenter Anita Rani to tell viewers all about the conservation work we have been doing to assist the Bamburgh Estate. Anita and viewers heard all about the importance of removing the non-native Pirri Pirri Bur from the dunes and the ecological benefits that are already being seen in the area of the ramparts where we removed the Ivy that had taken over.

THE FUTURE

Our support from the National Lottery Heritage Fund, and the partnership we have been working in is due to end in 2021. After this, the Northumberland Coast AONB will be taking Coast Care forward into its next phase. We will be working to pave the way for this transition over the winter months and it will be exciting to see what the Coast Care volunteers will achieve in the future.

To find out more about the project please visit ***www.coast-care.co.uk****. On our website you'll find our legacy film, which a team of our volunteers made together with local filmmaker, Alan Fentiman.*

Coast Care

NORTHUMBERLAND COAST

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GOING PADDLING

Gary Billington

11 Wentworth Drive, Crofton, West Yorkshire, WF4 1LH

When my wonderful and inspirational wife, Pam Billington was told in 2016 that she had terminal bowel cancer and had maybe only a few months to live, she decided she didn't want to define the rest of her life as a battle with cancer. Rather, she chose to see her remaining time as a celebration of the people, things and places that she loved.

High on the list of things Pam wanted to do was to spend as much time as possible on the Northumberland coast. We had planned to retire there, but sadly that was not to be; however, it was the place she loved the most in the world and she wanted to see again the Farne Islands, Bamburgh Beach, Holy Island and all the other wonderful places that we had enjoyed over the years.

As it turned out, thanks to wonderful help from our NHS, Pam lived for another two and a half years and we managed many more trips to visit these places and enjoy seeing the wildlife, especially Puffins, terns, Gannets and Pam's favourite Eider Ducks. Initially, we walked for miles, but as her physical strength failed and walking became too painful, she still enjoyed sitting and watching the endless waves lapping, and sometimes crashing, on the shore.

As the end approached, she made a plea for family and friends to honour her life by visiting a beach and spending some time picking up litter, especially plastic waste. It is a source of comfort to me that many people have taken up this challenge and sent me photographs of the mounds of 'stuff' that an hour's effort can remove from our lovely beaches. It is especially pleasing that lots of children are inspired by Pam's story and enthusiastically join in with the clean-up.

Shortly before she died, Pam wrote a poem called "I am Sunshine" which she intended as a rebuke to cancer and an affirmation of her spirit. She knew that the cancer would diminish her body, but she would not let it destroy her love of life. In the poem she envisaged herself paddling on Bamburgh beach (with me staying dry and carrying her towel), and the cancer as a storm that would pass while her love carried on.

Pam planned the arrangements for her own funeral, which she named *"Operation Going Paddling"*. In August 2019 I scattered her ashes in the sea at Bamburgh, in sight of the Farne Islands, and every time I walk there, I know she is paddling along beside me and I hear the words of her final poem:

I am Sunshine

By Pam Billington

I am sunshine
I am not rain
I am sunshine
I will shine again.

I will shine when I choose be it day or night
I did not lose, there was no fight
For I am paddling now and the water's warm
You were nothing but a passing storm.

A tiny part of a life lived full
A perfect love, you did not rule
You could never take all the love I've known
For it comes with me, you're on your own.

I am sunshine
I am not rain
I am sunshine
I will shine again.

Pam Billington © Gary Billington

INSPIRING WONDER IN THE NATURAL WORLD

The Natural History Society of Northumbria (NHSN) works to protect, study, and celebrate North East nature. We're one of the longest running natural history societies in the UK and thanks to the support of our members, have published a journal, *Northumbrian Naturalist*, since 1831. This contains scientific papers and research on wildlife in the North East and is the only publication of its kind in the region.

Since 1829, NHSN has encouraged engagement with nature. Almost two centuries later, we remain committed to this mission, working with our dedicated volunteers and over 2,000 passionate members to inspire wonder in the natural world right across the region.

We manage and protect Gosforth Nature Reserve, an urban oasis on the outskirts of Newcastle, and provide a home to naturalists and enthusiasts from all corners of the North East - from the Tees to the Tweed. In doing so, we encourage discussion and discovery, and provide opportunities for people of all interests and backgrounds to explore and enjoy the natural world.

As an NHSN member, you and your family can:

- **Explore** Gosforth Nature Reserve, the North East's longest running nature reserve.
- **Be inspired** by talks, videos and articles sharing the secrets of North East nature.
- **Discover** new places, friends and opportunities through exclusive events and courses.
- **Uncover** the history of natural history through our regional library and archive.

Your support makes a world of difference for North East nature. Without it, the research, conservation, and education carried out by NHSN volunteers would not be possible. For that, we cannot thank you enough.

You can join NHSN and find out more by visiting:
www.nhsn.org.uk

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Natural History Society of Northumbria

Northumbrian Naturalist

Northumberland Coastal Wildlife 2020

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Grey Seal, *Halichoerus grypus*

Natural History Society of Northumbria

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