Dragonflies & Damselflies

of Northumberland & Durham

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Dragonflies and Damselflies of Northumberland and Durham

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INTRODUCTION

The Odonata – dragonflies and damselflies – are some of the most popular insects. Their bright colours, relatively large size and active flight make them conspicuous, and it is with some justification that they have been dubbed "the bird watchers" insects'. Odonata are also of interest to ecologists for several reasons - for instance they can be used as indicators of water quality - and as a result their behaviour patterns have been widely studied. Thus, although there are few species of Odonata in Britain, there is much interest in the group and we know more about their distribution and ecology than we do of most other insects.

In terms of distribution, several species are at the northern extreme of their British range in Northumberland and Durham, and this may be of interest to those entomologists monitoring the spread and decline of insect species. Just over half (24) of the 43 or so species found in Britain have been reported from the North East, but several of those 24 are rare migrants or other aliens that are likely to be seen very infrequently. In fact no more than a dozen species are common enough to be frequently encountered in the North East. Ironically, although there are published studies of the regional distribution of much larger groups of insects, such as Coleoptera (beetles), Lepidoptera (butterflies) and Diptera (flies), and despite the interest of Odonata to naturalists and ecologists, the dragonfly and damselfly fauna of the North East has not previously been reviewed other than briefly. Lucas (1901) listed the fauna of north Northumberland based on Bolam's records, and Ball (1985) mapped the species by 10 km squares and summarised their distribution.

The aim of this publication is to review the distribution of dragonflies and damselflies in the former counties of Northumberland and Durham in a way that is of use to general naturalists. Summaries are provided of the distribution of all species reported from the area together with maps of the more common species arranged by tetrad (2 km x 2 km square). The distribution of each species is described in relation to its national distribution, but as this publication is not intended as a general introduction to the Odonata, no information is included on ecology or morphology, although some comment on habitat preference is included.

DRAGONFLY NATURAL HISTORY

Dragonflies and damselflies are amongst the most ancient of aerial creatures: fossils are known that date back 325 million years, to the Upper Carboniferous Period when the oxygen content of the atmosphere was far higher than today and the air considerably denser. These early dragonflies had wingspans of up to 75 cm; one theory about the reason for how they grew to such a gigantic size is that it was due to the oxygen levels present. Adult insects breathe differently from mammals: they have no lungs but breathe through a series of holes called spiracles, there being two of these on each segment of their abdomen, and the air is passed around the body of the insect via tubes that permit oxygen to be absorbed into the cells of the insect. A rather imperfect way of breathing, but it apparently works for these and all other insects.

These large early dragonflies, Protodonata, eventually died out, but not until smaller species had started to evolve. Odonata ruled the skies for 175 million years until the first flying reptilian competition emerged. Fossils of currently extant genera have been found in Triassic strata and all modern species appear to have evolved from them. These insects must therefore be considered as amongst the greatest survivors of all this planet's living creatures.

Dragonflies and damselflies, along with mayflies, true bugs, cockroaches and a few other insect orders, can thus be traced back over an immense period of time. All of these have a three-stage metamorphosis: the egg, the nymph and the adult. Odonata and other early insects evolved from crustacean ancestors, having an external armoured body (exoskeleton) with all the soft body parts contained within. This means that as the nymphs grow they have to moult in order to grow larger, just like a modern-day crab or lobster. Eventually the fully grown nymph climbs out of its aquatic environment up a reed or stem and moults for a final time.

The creature emerging is pale and lacking most of its final colouration, and is obviously very weak. Once the adult has emerged, like almost all other insects, it has to expand its wings and let them harden. At this time the insect is at its most vulnerable, as it cannot fly to escape predators. This is why most emergences take place at night when they are less visible. Nevertheless predation can still be high in species that have mass emergences such as the Emperor Dragonfly *Anax imperator*. Once their wings have expanded and dried they waste little time in getting airborne and leaving the immediate area where they bred. Damselflies tend to stay within 50-100 metres of their birthplace during their maturation period. Darters and other medium-sized specimens move further away – perhaps several hundred metres – and the largest species may fly many dozens of kilometres from their birthplace during the time it takes for them to mature into breeding condition.

Today it is known that there are some 3,000 species of dragonfly and damselfly to be found throughout the world, wherever conditions are suitable for them to complete their life cycle. That is not to say that all of the species have been discovered: new species are found every year.

AREA COVERED BY THIS PUBLICATION

The area covered by this guide lies between the Rivers Tweed and Tees, and comprises the historical administrative areas of County Durham and Northumberland. Northumberland is almost twice the size of County Durham, their respective areas being Northumberland 5179.97 km^2 and Durham 2589.99 km^2. These counties comprise 107 x 10 km or part 10 km squares on Ordnance Survey maps.

The area comprises three Watsonian Vice-Counties (VCs): 66, 67 and 68 (Figure 1). VC66 (Durham) consists of the land between the Rivers Tees and Tyne/Derwent. VC67 (South Northumberland) lies between Tyne/Derwent and Coquet (for most of its length), and VC68 (North Northumberland) between Coquet and the Scottish Border.

The VC system was introduced in 1852 by Hewett Cottrel Watson who was attempting to develop a system of similar sized areas of land where the recording of items of botanical interest could take place. Using existing and stable county boundaries he split the larger counties into parts of approximately equal size. It was in its time a satisfactory system of recording, but gradually fell from favour during the late twentieth century. It is however the case that the VC numbers are still used to save authors writing out full county names every time they are needed, two letters and two numbers being more easily handled than the 19 letters contained in both South and North Northumberland.

Figure 1. Watsonian Vice-Counties for Northumberland and Durham

Although the area south of the River Tees is technically outside our traditional recording area, records in some recent local atlases have included the fairly recently created county of Cleveland. Unfortunately, such political creations tend to be rather short-lived and eventually end up as mere postal districts. Therefore I have retained the names of the traditional counties of Northumberland and Durham as used by local naturalists for nearly 200 years.

The topography, climate etc., of the North East in relation to its natural history have been described in detail elsewhere, such as by Graham (1988) and Swan (1993). The geology of VC67 and VC68 was described by Johnson (1972) and of VC66 by Robson (1965). Eyre, Ball and Foster (1985) discussed water bodies of the North East.

Topographically, there is broadly speaking high ground to the west of the area and low-lying land to the east, with river systems draining west to east. This trend is complicated in County Durham by a raised mass of limestone called the East Durham Plateau which causes the River Wear to flow northeasterly and the Skerne to flow to the south. In Northumberland it is complicated by a complex of raised ground among which the River Till and the Tyne tributaries Rede, North Tyne, South Tyne and Allen lie in north-south trending valleys.

The highest altitude in the area is found in The Cheviot (815 m.a.s.l.), while peaks of 600 m.a.s.l are not uncommon among the North Pennines. The East Durham Plateau averages 100-150 m.a.s.l and is 215 m.a.s.l at its highest point. Much of the high ground is not particularly steep-sided; indeed the broad hump of the summit of The Cheviot is often a disappointment to those who have made an effort to climb it. The innumerable peat hags and small pools that form in such conditions are not known to support a large dragonfly population, but it is not impossible that boreo-montane species such as Azure Hawker *Aeshna caerulea*, Northern Emerald *Somatochlora arctica* and White-faced Darter *Leucorrhina dubia* could occur at altitude in our area, although there are still no valid records of these species despite extensive survey work in the uplands of both counties in the past 25 years.

The low-lying ground forms a north-south trending band in the eastern part of the area, comprising, from the south, the lower part of the Tees basin, grading into the Wear Lowlands (lying between the Pennines and East Durham Plateau) which are practically continuous with the low coastal plain of Northumberland, extending as far north as Berwick. This lowland band is no more than about 25 km wide at its greatest extent, and narrows somewhat northwards.

ODONATA HABITATS

Dragonflies and damselflies occupy a range of aquatic habitats most of which occur in our area, the exceptions being canals and fens of which we have none. Otherwise every other aquatic habitat from rivers to garden ponds to upland peat bogs are worthy of examination by an enthusiastic Odonata recorder between April and October. The more remote some of these sites are, the greater is the chance of discovering a species new to these counties. Ordnance Survey maps of both counties will show a large number of lakes, ponds, rivers and streams, bogs and mires, all of which hold some species. Operational reservoirs tend to be devoid of breeding Odonata because of the fluctuating water levels which prevent water weed growth, but many reservoirs do have small ponds around their periphery and these can sustain several resident dragonfly species and occasionally accommodate migrant visitors, which with luck may breed.

The farm ponds of my youth, in the late 1940s and early 1950s, have nearly all gone today, most having been drained or otherwise filled in. Cattle, sheep and pigs now have mains fed water troughs which are automatically regulated as to water height. A careful study of the Ordnance Survey maps available for both counties will show a considerable number of lakes and ponds still extant. Some of these are natural, for example the loughs along the line of the Roman Wall which are several thousands of years old. Others were formed by land subsidence especially in former coal mining areas. Quarrying has created additional ponds. The Ministry of Defence on the Otterburn Ranges in Northumberland has for over a century been creating large shell and bomb craters which naturally fill up with water fed by the surrounding wet peat bogs. These hold several Odonata species, both large and small, but not many in species numbers. It should be pointed out that accessing these "impact areas" is very dangerous indeed, and civilians are not usually permitted access to them because of the considerable amount of old and very sensitive unexploded ordnance present.

The Forestry Commission has created numerous ponds throughout its extensive land holdings in both counties, although access to these can be difficult. Another large company with numerous landholdings throughout the North East is Northumbrian Water which has created ponds for Odonata around many of its reservoirs, water treatment and sewage treatment works. I was

fortunate to work on most of these ponds during my long and very happy association with the Conservation Department of this company. Apart from ponds there are a small number of species that are riverine in habitat. Some common damselflies can occasionally be found in small backwaters out of the main river current. The most beautiful river dweller locally is the magnificent Banded Demoiselle *Calopteryx splendens*. The large Golden-ringed Dragonfly *Cordulegaster boltonii* is another local species, although it likes slow moving streams rather than rivers.

Some specimens of all species can be found a large distance from where they bred. These, it is presumed, are expanding their range or looking for new habitats to colonise. Migratory species may fly several thousand kilometres, often in large swarms that split up on reaching a new destination. Migration also accounts for some species being recorded many miles from their usual habitat. For example the Black Darter *Sympetrum danae* is a natural inhabitant of acid bogs and mires, yet it has been found, sometimes in numbers, around ponds on magnesium limestone ground and in coastal ponds, apparently totally unsuitable habitats for breeding purposes. These are today considered as migrant specimens.

The possibility of successful breeding of these migrant species in such unsuitable places has not however been studied, and would make an interesting project for postgraduate research or work by an enthusiastic amateur entomologist. Not all new scientific discoveries are made by professionals; amateurs can still make names for themselves in this field. There is still much we do not yet understand about Odonata.

The breeding of nymphs to the adult stage in an aquarium at home is an excellent way of involving and instructing children into some of the mysteries of the natural world.

SPECIES IDENTIFICATION

Prior to the 1930s there were few publications in Britain on dragonfly and damselfly identity, but in 1937 Cynthia Longfield (affectionately known to older Odonatists as "Madam Dragonfly") published the first colour-illustrated book on British dragonfly identification in the Fredrick Warne *Wayside & Woodland* series of volumes on various forms of British wildlife. The publication of this book and the lack of records in our region prompted Dr J W H Harrison, then a sub-editor of *The Vasculum*, to write to Longfield complaining about this matter and listing a number of species which he said were recorded in *The Vasculum*. This letter and the replies were published in the letters section of *The Vasculum* volume 25 and continued in a couple of later editions.

Longfield's book spurred an interest in Odonata and was followed by *Dragonflies* (Corbet, Longfield and Moore 1960) published in the *New Naturalist* series. Since then there has been a plethora of books on British Odonata, their identification, biology, flight period and habitat preferences. Someone wishing to learn about Odonata identification today has a vast choice of books to select from as well as online guides and apps.

As of 2016, there are 43 resident species of Odonata in Britain, records of three species that are now extinct in Britain, and occasional records of 19 vagrant species.

COLLECTING

Many visitors to museums who have an interest in dragonflies and damselflies are rather disappointed to find little, if anything, on display of local Odonata. This is because sadly they are rather delicate, and their colours do not preserve well if specimens are pinned and set like many other insects; usually after a week or two on a setting board they lose their natural colours and turn black. Preservation of the specimen in absolute alcohol will keep the colours for a few years if stored in the dark, but even then they fade eventually. The only successful way of preserving most of the colouration is to use the "freeze drying" process. This is usually outside the realm of the amateur naturalist due to the expense of the equipment needed.

In 1963 I was given access to a piece of early such equipment for a single day at Newcastle University. The specimen (in this case a teneral Southern Hawker *Aeshna cyanea)* had been kept alive for over 24 hours to let it evacuate its gut. It was then instantly killed by a lethal injection, and set on a short length of setting board. The sternites on the underside of the abdomen were punctured by a fine pointed needle and the set insect was placed in a deep freeze. After a couple of hours the setting board was rapidly placed into a vacuum desiccator containing a moisture-absorbing acid and the air in the dessicator was immediately evacuated using an oil vacuum pump. When no further air could be extracted the taps were closed preserving the vacuum. After several hours air was very slowly admitted to the dessicator until the pressure inside the desiccator was equal to the outside atmosphere. The specimen was removed from the setting board, given a data label and is still in my collection. No loss of colour was noted except a change in the colour in the compound eyes. Today it looks as good as when first preserved.

Collecting specimens has of course fallen from favour in recent decades, having been replaced by photography using digital cameras, especially those with a macro or double-macro capability. These are very useful when taking pictures of adult specimens in the wild and can be used to verify the identity of the species. Digital photography can produce large numbers of pictures, which makes for easier identification and verification by experts if necessary.

A newcomer to Odonata recording may run into problems of identification because some species of teneral damselfly have several different colour forms, but these are generally described in good books of identification. Help can also be obtained from the Odonata County Recorders and also from The British Dragonfly Society, the national recording organisation.

RECORDING ODONATA IN THE NORTH EAST

It is possible that the earliest records of dragonflies and damselflies in Northumberland and Durham are the earliest published records of Odonata in Britain. The first list of insect species in Northumberland was published by the Rev Wallis in 1769, but many of his records did not include precise localities. Wallis did not use binomial nomenclature, but he gave a short description of each species. His Odonata are:

> Number 9: The large bluish-black and yellow Libella is frequent by brooks and rivers in June and July. It is a beautiful insect. The face is of a bright yellow, with two narrow transverse lines of black, and one larger of black on the upper part. The *scutellum* is black, with golden specks. The wings are of a yellowish-white, transparent, and full of nerves. The body is thick and cylindric, of a bluish black on the upper part, and yellow underneath: the two colours meeting on the sides in elegant denticulations.

In a footnote, Wallis equated this dragonfly with a species in Linnaeus's *Fauna Svecica* that is now known as Downy Emerald *Cordulia aenea*. This is plainly a misidentification: the most likely species to fit Wallis's description is Golden-ringed Dragonfly *Cordulegaster boltonii*, or (less probably) Common Hawker *Aeshna juncea*. The footnote gave the common names "Dragon Fly" and "Adder Bolt".

> Numbers 10, 11 & 12: The bluish-green Libella with yellowish-brown wings; the mazerine-blue Libella with bluish-black wings; the green Libella with yellowish-brown wings with a white spot at each of the apices, are common by shadowy running streams in the warm summer months, with many others of considerable beauty.

These "three" species are clearly males and females of a *Calopteryx* damselfly species, but we cannot be certain which: probability favours Banded Demoiselle *C. splendens* rather than Beautiful Damselfly *C. virgo*, which is today not present in our area. In the footnote Wallis gave us a common name "Peacock's Neck".

Organised national dragonfly recording in Britain started in the 1960s when the national Biological Records Centre was set up in Cambridgeshire. The early way of recording was by using computer punch cards. These were filled in by the recorder and submitted. The card went into a device that punched holes in the card and thus converted the data from handwritten information into a form that a computer could read. These were then fed into the computer in batches. It was very labour intensive for both the recorder and the computer operator. Fortunately, rapid advances in computer technology have made things much simpler. Today the British Dragonfly Society is the national organisation for the recording, conservation and preservation of dragonflies and damselflies.

Both Northumberland and Durham have a very long history of recording different sorts of life forms present in both counties. One of the exceptions however was Odonata. No one apparently considered collating the record data that existed, simply because so little was known about them. Local records of Odonata were very intermittent. Many early naturalists were members of the clergy, who had enough spare time to indulge in such matters and who also had a grounding in Latin, which was helpful in understanding natural history texts at that time. It was not until the twentieth century that attempts were made to record these species more systematically.

In 1995 Leslie Jessop, working at the Hancock Museum, wrote an article in a museum-issued news sheet called *Recording News*. He appealed for records of local Odonata to be sent in and I and others sent our records. I believe he had some 3,000 records in total (including the historical data I had located) and shortly afterwards he wrote up a provisional local list. But he was working full time and trying to study for a doctorate in his spare time, so as the County Recorder for Northumberland Odonata I volunteered to take the work over. County Durham was covered by Ian J Waller who a few years later moved out of the area and passed his data on to me. I also inherited his mantle of Recorder for County Durham. Interest was growing in Odonata and many bird watchers took up recording them. The Durham bird watchers in particular have been very helpful in gathering records.

It is a part of the Recorder's job to verify any unusual or rare specimen sightings, if the record comes in quickly enough. If no specimen is available and no identifiable photographs were taken, a decision has to be made based on the experience of the Recorder and the quality of their

identification notes. There exist records of several species in both counties which I believe are erroneous. I have listed these after the species which are known to occur and explained why I find them unacceptable; this is usually from the lack of positive evidence of their occurrence.

In 1995 Leslie Jessop had 3,000 records to deal with. Today the Environmental Records Information Centre (ERIC) North East has a database of over 31,000 dragonfly and damselfly records, gleaned from many sources, many hundreds of which were previously unknown to me. These took a considerable time to sort out and verify where possible. It is the records held on the ERIC Recorder database that have been used to generate the distribution maps in this publication. These maps show the presence of a species in a 2 km x 2 km square (tetrad).

Despite a massive increase in records of Odonata over the past 20 years there are still areas of the North East where there are no records and where species are most likely present. It is probable that some readers of this publication will have Odonata records that could add to our knowledge, and I would encourage them to submit such records to the British Dragonfly Society or to the Environmental Records Information Centre North East. This can be done online, by email or on paper.

Common Darter (teneral), Newcastle by Christopher Wren

Banded Demoiselle *Calopteryx splendens*

Male Banded Demoiselle at Bellasis Bridge by Christopher Wren

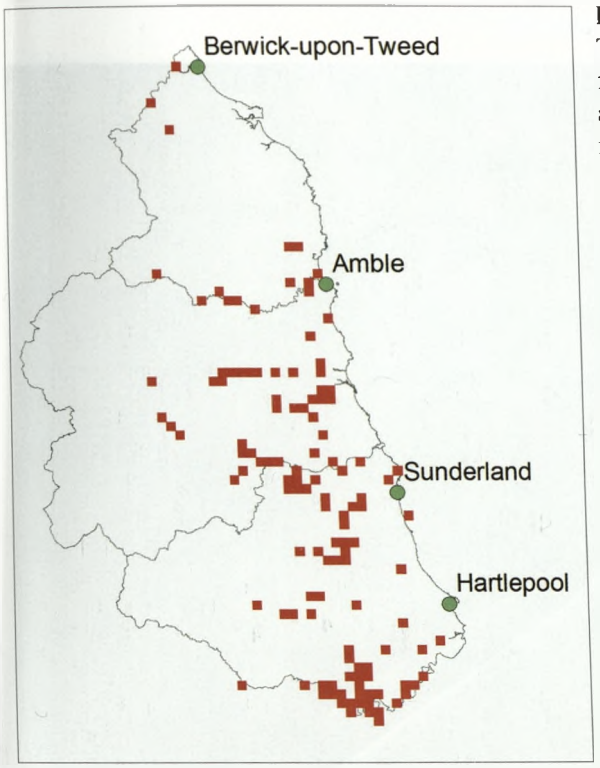
Regional status

Common where it occurs in unpolluted lowland rivers and streams. This species is currently the only one of the two *Calopteryx* species to occur within our two counties. Because of its size and distinctive colouring, the Banded Demoiselle is one of the easiest of all dragonflies to identify. The males have a broad deep blue band across all four wings, with a metallic green/blue thorax. The females lack the blue bands on the wings and tend to be a slightly lighter shade in body colouring.

Habitat and life cycle

Banded Demoiselle is a riverine species which needs a flowing water environment in the nymphal stage. The nymph also prefers a sandy or muddy bottom to the river bed. Nymphs are most easily found in and around emergent vegetation at the river's edges. The need for slow flowing water precludes them from occurring in the uplands, where there are high water flows. Small streams are prime habitat and should not be overlooked as long as they have a constant flow of water. Durham and south Northumberland have a host of such streams but they are sadly lacking in Northumberland north of the River Aln. Certainly there are several small rivers coming off the Cheviot Hills but these swing northwards, eventually combining to form the River Till, which at the end of its journey flows into the mighty River Tweed. The nymphal stage lasts usually two years.

Flying from May to the end of August, males are to be seen searching tall emergent vegetation along the sides of slow moving rivers and streams throughout both counties where it occurs, seeking out mature females. It is one of the few dragonfly species in which the males do a pre-mating aerial dance display.



Distribution

The Banded Demoiselle is currently found throughout the UK as far north as southern Scotland. It has expanded northwards in the last six decades especially on the eastern side of Britain, and is now found throughout the lowlands in our area wherever there is suitable habitat.

History

If we accept the description by Wallis (1769) as being *C. splendens,* his is the earliest known record of this species locally, but this is supposition. The next known record was made by Mr J B Nicholson on 22 June 1940 at Middleton One Row, County Durham. The same recorder took it again in 1946 at Skerningham, VC66, on two different dates. There was a lapse in records for 39 years until it was found at Aislaby, VC66, on 13 July 1985 by a Mr J P Warbrook.

Present status

After its rediscovery in the mid-1980s the Banded Demoiselle spread rapidly throughout County Durham appearing on most suitable water courses.

The first VC67 record came on 31 July 1988 from Marlish Farm close to the River Wansbeck, near Middleton. This was a considerable jump northwards and the author suspected that it was to be found in suitable waters south of this location. This proved to be correct once streams and the upper reaches of some lowland rivers and streams had been examined.

In 2003 came the first two records from north of the River Coquet, from Wagtail Farm to the east of Rothbury on 26 June 2003 by Mr S Hackett and from Rothbury itself by Dr Mike Jeffries, unfortunately just giving the year as a date. After that it took until 30 June 2010 for this species to reach Newton Braes, Fouldon, in the north of VC68, when the Berwick Wildlife Group recorded it there. Later on 4 August 2012 it was reported by the same group at the confluence of the Rivers Till and Tweed.

It has taken this species 76 years to travel from the River Tees to the River Tweed, a very slow progression northwards compared to other species that are recent arrivals in our counties. Nevertheless it is perhaps the first species whose move northward into our region was triggered by global warming.

Future outlook

This species is close to the edge of its northern range in our area and so its future here may depend on the climate; a return to cooler conditions could see a retreat, while with further warming the population could consolidate/increase. This species is also vulnerable to pollution, so the continued health of our rivers and streams is also important.

Emerald Damselfly *Lestes sponsa*

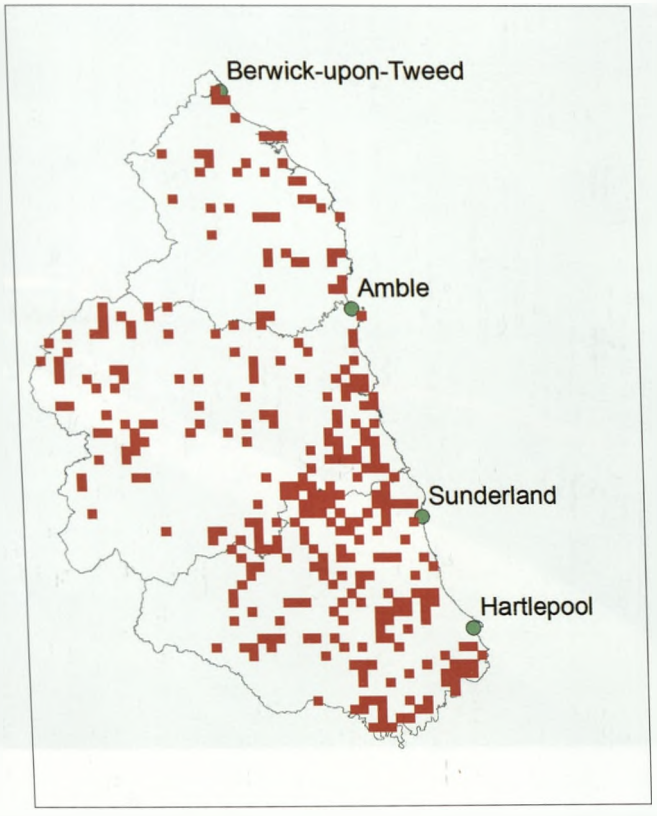
Male Emerald Damselfly at Cragside by Christopher Wren

Regional status

Very common. A pond and lake dweller. It is the only one of the four British "Emerald Damselflies" to occur within our boundaries, therefore identification is easy; the three other species are distinctly southern in their distribution, and two of them are recent additions to the British List. A very easy species to identify, as like all the "Emerald Damselflies" it perches with its wings slightly open at approximately 30-40 degrees to the side of the abdomen, whereas all other British damselflies hold their wings closed over the top of their abdomen.

Habitat and life cycle

As with most of our local damselflies, this species is to be found in almost every well-vegetated pond throughout both counties, but its occurrence appears to decrease with higher altitude. The nymphs usually have an annual life cycle, but a long and cold spring may delay the reproduction of their food and this may lead in some areas to nymphs taking an additional year to become adults. The adults fly from very late May through to late September locally. This species is very tolerant of a range of water types, from very acidic to alkaline.



Distribution

A very common species throughout Great Britain from Lands End to John o' Groats wherever suitable habitat occurs. In our region the exception is apparently the North Pennines and Cheviot Hills, though this may be due to the lack of recording in these mountainous areas where upland ponds are very few and far between. As will be seen from the distribution map it is widespread over both counties.

History

First recorded from Gibside, VC66, in 1919 by J W H Harrison, it was only occasionally reported until the 1950s, since when there has been a slow but steady flow of records from Northumberland and Durham.

Present status

A common species throughout both of our counties. Currently records of this species' occurrence total around 1,800 individual reports.

Future outlook

This is a species that is widespread and under no threat. It is found in a wide variety of habitats from ponds on open moorland to ponds in dense coniferous forests, gardens and within a short distance of the North Sea. As ubiquitous a species as one is ever likely to find.

Large Red Damselfly *Pyrrhosoma nymphula*

Male Large Red Damselfly at Winlaton Mill by Michael Eccles

Regional status

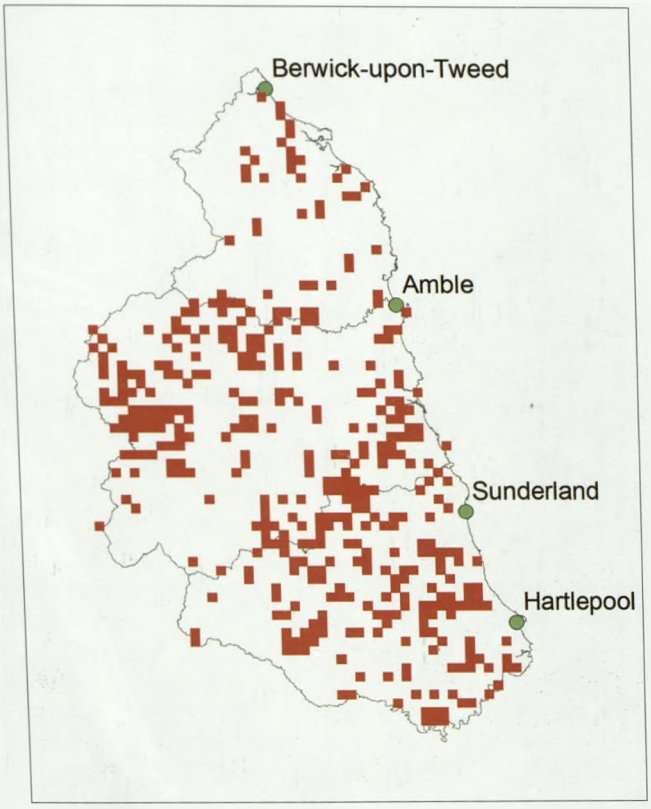
Very common on ponds and open still waters. It is very occasionally found in backwaters along streams and small rivers. It is often one of the first of the dragonflies that will be seen by a beginner, but identification can be somewhat difficult for the learner as there are several colour forms of the female. These are well described in *Britain's Dragonflies* (Smallshire and Swash 2014). This book is very helpful to the beginner as an inexpensive aid to identification and it covers all of our local species.

Habitat and life cycle

Currently the only red-bodied damselfly to occur in Northumberland and Durham. Usually the first Odonata of the year to appear, often in April in a warm spring, and it is on the wing until August. Like the Emerald Damselfly it is to be found almost everywhere. It usually has an annual life cycle but this may occasionally change to a two-year cycle according to the weather conditions prevailing during the nymphal stage.

Distribution

It is found throughout the UK and is perhaps the most commonly found of all the local damselflies with over 2,000 individual local records. Records are sparse in the higher Pennines and Cheviot Hills, where ponds are few, but elsewhere it is to found wherever there is suitable habitat. Like most of our damselflies it can handle a large range of water on the Ph scale.



History

The first mention of this species locally is to be found in *The Vasculum* for 1916; no author's name was given. Subsequent records were fairly sparse until after World War Two when records appeared more frequently. By 1950 records were available from all three of our Vice-Counties. I have little doubt that, like its fellow damselfly species, it has been a resident breeding species here for centuries, and it was only the lack of manuals of identification that kept the records at a low level.

Present status

Possibly the commonest of all the damselflies in our two counties.

Future outlook

The Large Red Damselfly is under no threat currently or in the foreseeable future. Dragonflies are persistent, which perhaps explains to some degree why they have been such great survivors over hundreds of millions of years.

Azure Damselfly *Coenagrion puella*

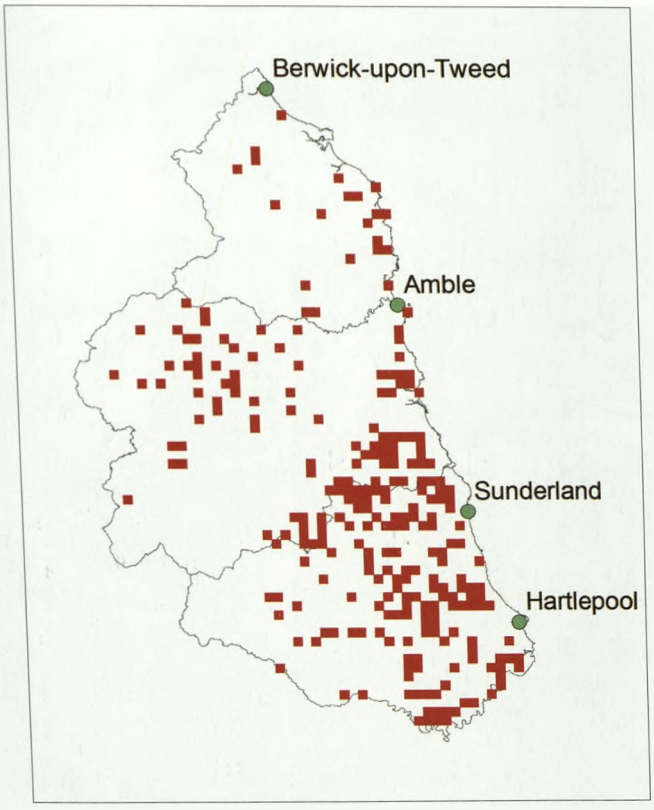
Male Azure Damselfly at Kibblesworth by Michael Eccles

Regional status

Very common except at higher altitudes. At lower altitudes it frequently shares ponds with several other species of damselfly including the Common Blue Damselfly with which it is sometimes confused. Beginners should learn the differences between these two species as soon as possible to avoid incorrect identification.

Habitat and life cycle

One of two mainly blue and black damselflies to be commonly found in Northumberland and Durham although records from higher altitudes in both the North Pennines and the Cheviots are lacking. Those that exist in these areas tend to be from ponds in valley bottoms. Like most of the damselflies, this species likes a well-vegetated pond where there is an abundance of the very small life forms they feed on. When present on a large pond (which is seldom) they stay close to the margins and apparently do not like to fly out over open water, and ovipositing also takes place in close proximity to the sides of the ponds. Locally it is to be seen flying from May to August. It has an annual life cycle.



Distribution

This species is to be found throughout both counties except at the highest altitudes, and it is usually found in large numbers wherever it occurs. It is a common species throughout Britain up to central Scotland but it is not currently found north of the Great Glen.

History

One of the earliest of the damselflies to be detected, it was first reported by the Rev Ornsby (1846) in his *Sketches of Durham*, although unfortunately without giving a specific locality. Additional records did not appear until the 1930s after which the numbers of sightings grew with some rapidity.

Present status

A very widespread and abundant species in our area but it is absent from ponds at higher altitudes. There are well over 1,400 individual site records in our counties, some of which include good numbers.

Future Outlook

The Azure Damselfly is under no threat currently or in the foreseeable future.

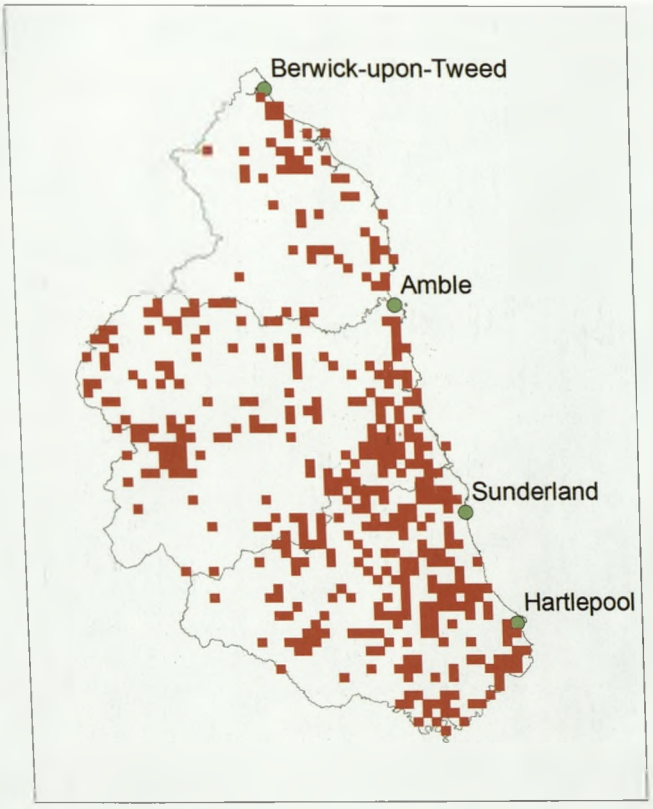
Common Blue Damselfly *Enallagma cyathigerum*

Male Common Blue Damselfly at Kibblesworth by Michael Eccles

Regional Status
Very common in Northumberland and Durham. This is a species that is occasionally confused with Azure Damselfly, but with a little experience it can be easily identified.

Habitat and life cycle
This is a damselfly found in a large variety of habitats ranging from small ponds to very large lakes, slow moving streams and even farm drainage ditches, where it seems able to cope with certain low levels of pollution from agricultural chemicals applied to adjacent fields. Locally there is apparently only a single brood a year. In warm springs it starts emerging in April and can continue emerging until early October. The eggs are deposited into weed wherever these plants can reach the water's surface. The males are particularly aggressive to others of their species especially when seeking a mate. As its name implies it is a very common species indeed throughout both counties wherever there is suitable habitat.

Distribution
Very widespread throughout both counties, only absent from the very highest ponds in north Northumberland and County Durham.



History

Amazingly it was unrecorded until the 1930s, after which this common species was rapidly found throughout Northumberland and Durham.

Present Status

This is the commonest of the damselflies to be found in Northumberland and Durham, with over 2,700 records.

Future Outlook

The Common Blue Damselfly is under no threat currently or in the foreseeable future.

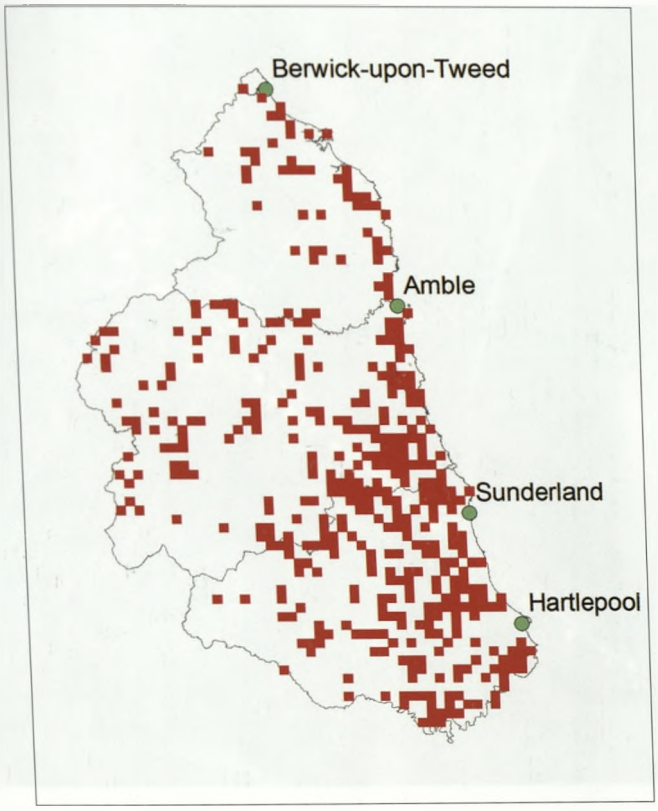
Blue-tailed Damselfly *Ischnura elegans*

Male Blue-tailed Damselfly at Dowdale Pools by Chris Castling

Regional status
Very common throughout Northumberland and Durham. It will be one of the first damselfly species encountered by a beginner. It is almost impossible to misidentify the mature adult form of this beautiful species, but beginners should be aware that there are several colour forms in the immature females. These colour forms are given specific names and they change with the specimen's age; reference to a good book on identification is therefore recommended.

Habitat and life cycle
An inhabitant of almost every pond and lake in both counties provided they are well vegetated. This species usually has an annual life cycle provided climatic conditions permit it. The eggs are laid into aquatic plant material, as with almost all damselfly species. Locally it flies from May to early September. It can tolerate some degree of pollution in its habitat that may not suit other damselfly species.

Distribution
One of the commonest of the damselfly species throughout both counties. Its presence does thin slightly with altitude although it is uncertain whether this is due to the more acidic waters of the uplands of both counties, or if records are less forthcoming from these areas because the uplands are less well visited.



History

This species was first reported by George Bolam (1901) from Chathill in north Northumberland (VC68). Bolam was an expert naturalist from the early twentieth century who published extensively on Northumbrian wildlife until the late 1920s and who recorded insects widely in north Northumberland. Unfortunately, without readily available books on identification, little work took place on any of the dragonflies until Longfield (1937) published *The Dragonflies of the British Isles*. After this there was a steady increase in the reporting of all dragonflies and the Blue-tailed Damselfly was found to be almost everywhere people looked for dragonflies. The author has little doubt that this species was as widespread in the nineteenth century as it was in the twentieth.

Present status

Very widespread locally, and very common over virtually all of both counties. There are currently well over 3,000 individual records of this species on local record databases; this makes it the most recorded of all our local damselfly species.

Future outlook

The Blue-tailed Damselfly is under no threat currently or in the foreseeable future. That it can tolerate a higher level of pollution than other species means that it is least likely to be affected by any decline in water quality.

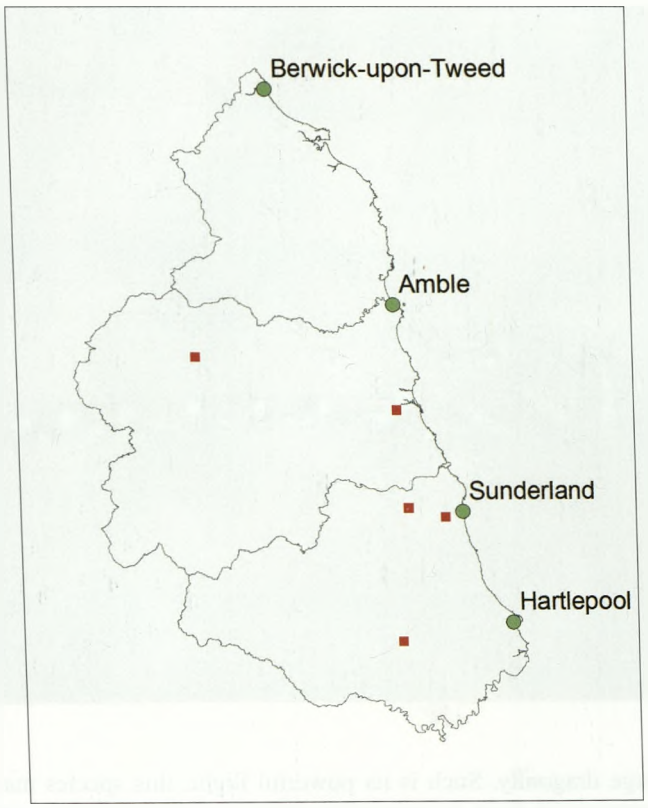
Hairy Dragonfly *Brachytron pratense*

Male Hairy Dragonfly by David Kitching

Regional Status
Scarce; most records unverified or outside the accepted flight period by several weeks. The common English name comes from the fact that it has a hairy thorax. These hairs are short and sparsely distributed but are apparently easily seen. This is the only hairy dragonfly found in Britain.

Habitat and life cycle
A dweller of very slow-moving water which is well vegetated. It also likes broad drainage ditches, again with floating vegetation, into which its eggs are laid. It occasionally turns up at ponds, but it is not known if it only breeds in these if there is a flow of water feeding into the pond and an overflow drain to carry away water surplus, thus regulating a constant head of water in the pond. This species is the smallest of the larger dragonflies and it flies early in the season, from April through to June, disappearing in early July. The males set up a territory which they are reported to defend with great vigour, even attacking larger dragonflies that invade their airspace.

Distribution
A species with a very scattered distribution, being commoner on the English east coast, south of the Wash. North of this there is just a scattering of records in Yorkshire and in Durham and Northumberland. There are no known local sites where this species has a breeding population. Currently the most northerly records on the east coast are from Northumberland, but on the west coast it has advanced up to and beyond the Great Glen in Scotland. This species appears to favour the Atlantic-influenced weather climate of the west coast of Britain rather than the east coast.



History and present Status

Prior to the early 1990s this was a scarce British species mainly confined to the south of England; since then it has extended its range northwards, although its progression has been slow. Its status in Northumberland and Durham is uncertain with two sightings well into August, long after its supposed flight period is over. The author has yet to hear of local specimens being captured for examination or of photographs being taken.

The first local record was published in volume 5 of *The Vasculum* in 1919 in which it was reported from Gibside, VC66, although no recorder's name or a date was given. The next record was not until 1983 when one specimen was reported from Hauxley Nature Reserve, VC68, which was included in Ball (1985). Then in August 1991 there was a report from a pond in St Aidan's College Durham by S Goodyear. The late date of this record makes it somewhat uncertain, but the North East has much colder weather than southern England and so the local flight period may be later; this is something that we may be able to establish if there are more records in the future.

Future Outlook

The Hairy Dragonfly is seemingly extending its range northwards in response to climate change. Provided there are some unpolluted slow-moving, well-vegetated streams that provide the habitat they require we are likely to see more of this species locally if the climate continues to warm, although a return to cooler conditions would make future records in our region unlikely.

Common Hawker *Aeshna juncea*

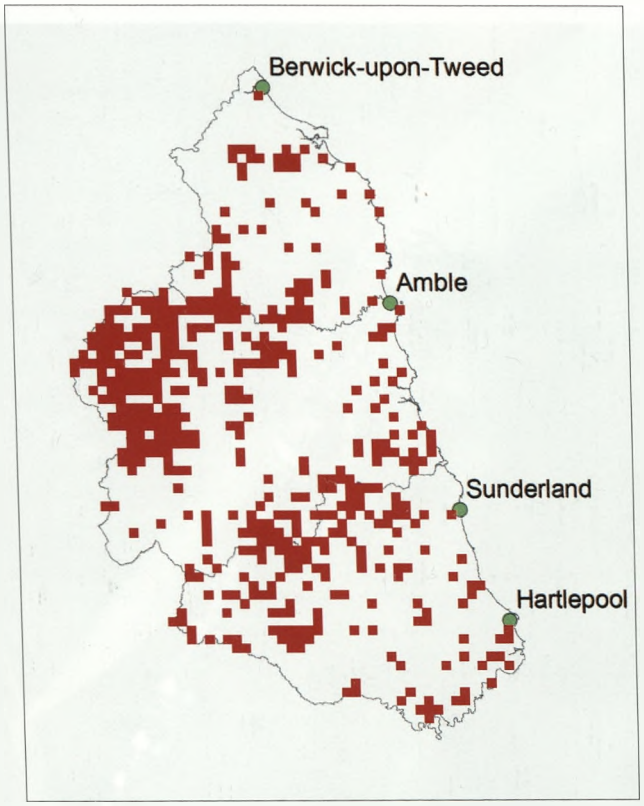
Male Common Hawker at Cragside by Christopher Wren

Regional status
A very common large dragonfly. Such is its powerful flight, this species may turn up almost anywhere, but it seems to be more partial to the uplands of both counties as this is where the majority of records have been made. It is a very wary species and is difficult to net for examination.

Habitat and life cycle
In our region the Common Hawker breeds in natural and fire ponds in and around forests on acidic soils. These are typically pine forestry plantations on former peat-based moorland. The nymphs can spend three or possibly four years in this stage depending on temperature and on food supply. If food is scarce they will not hesitate to become cannibalistic. Emergence takes place very early in the morning. It is equally at home in moorland ponds where it is the dominant species.

Forestry rides and firebreaks are used by immature specimens of both sexes for feeding purposes. Hanging from the branches of pines, they await suitable prey to pass along these open spaces; anyone who has been in these pine forests will know from experience just how prolific the small fly life is! The adults fly from late June until October.

Distribution
A common species in the upland pine forests, for example the Wark, Kielder, Redesdale, Harwood, Simonside and Hamsterly Forests, and in many other pine woodlands throughout both counties. As already mentioned it is a powerful flyer and can turn up unexpectedly anywhere, but as the distribution map shows, it is biased in its preference for pine forests and partially wooded acid moorland.



History

This species was first recorded by George Bolam in 1913 from the Cheviot Hills, VC68. This was followed by a record from the Rev J E Hull from West Allen, VC67, in 1918, and in 1919 by J W H Harrison at Birtley in Gateshead, VC66. Records were sparse until 1980 with only 40 in total; since then they have become much more frequent.

Present status

The commonest of our larger dragonflies with currently 3,560 individual records.

Future outlook

The Common Hawker is under no threat now or in the foreseeable future. Although the pine forests where it breeds are subject to felling and replanting this work does not seem to disturb these magnificent insects. Peat bogs are now a recognised and protected habitat, so it is unlikely that future permissions would be granted for the peat extraction that has caused so much damage in the past. This will benefit all the upland acid water-loving dragonflies.

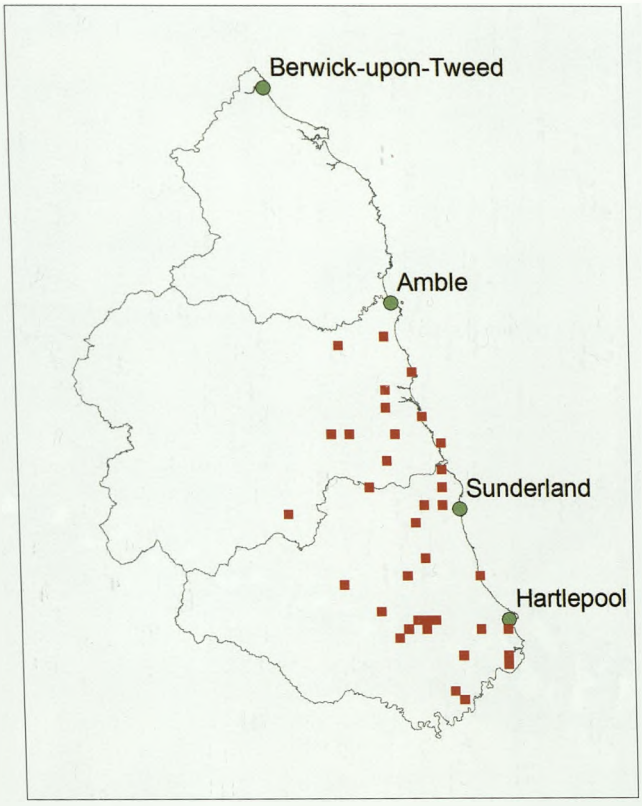
Migrant Hawker *Aeshna mixta*

Male Migrant Hawker at Saltholme by Christopher Wren

Regional status
Not at all common in most of the areas where it is found.

Habitat and life cycle
This is a smaller species of *Aeshna*, but unlike the Common Hawker it is not put off by the presence of humans. It breeds preferably in ponds but is also typically found in slow-moving but well-vegetated rivers and streams. Locally all the records appear to be pond based. Little is recorded about its breeding locally but elsewhere it appears to have an annual life cycle. It flies from August into November and so may be one of the last dragonfly species seen each year. It is not tolerant of acidic waters and so is not found breeding in the uplands of either county.

Distribution
It is to be seen commonly in the Teesside marshes and elsewhere in County Durham, VC66. Virtually all the records are towards the coast and not the western uplands of either county. It is not yet recorded from north Northumberland, VC68. It is another species that may be expanding its range northwards in response to global warming, wherever it can find suitable ponds in which to breed, and in 2003 it crossed into Scotland on the west coast. Not by any means a common species with only 387 records, many of which are from the same ponds.



History

A fairly recent arrival to our area, the first acceptable record was from C Simms, who found it while undertaking a survey on Roman Wall farms, VC67, in 1994. There is an earlier report of several individuals of this species seen flying in the Team Valley, VC66, by J W H Harrison (1936), but these records have been discounted (see page 62).

Present status

Best described as uncommon at present. It seems to have a firm foothold in County Durham but it is less well distributed in south Northumberland and is currently absent from north Northumberland, although this may be due to a lack of recording.

Future outlook

This species is close to the edge of its northern range in our area and so its future here may depend on the climate; a return to cooler conditions could see a retreat whereas further warming could see the population consolidate/increase.

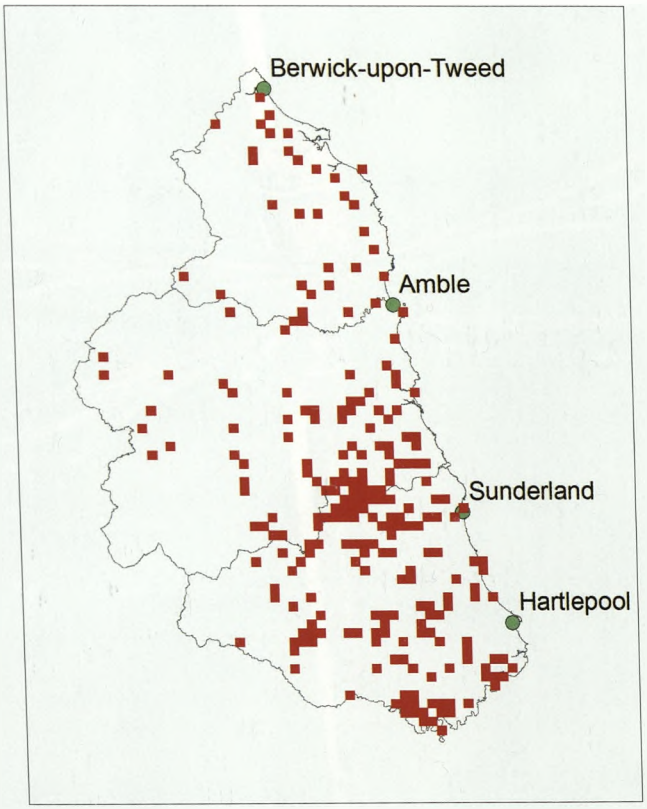
Southern Hawker *Aeshna cyanea*

Southern Hawker at Cragside by Christopher Wren

Regional Status
A fairly common species here in the north, despite its name.

Habitat and life cycle
A pond dweller, preferring ponds with neutral to alkaline water. It can often be seen even in very small garden ponds of just two square metres. It is absent or scarce in the uplands where the waters are more acidic. Ova are laid into moss or vegetation overhanging the water's edge so that emerging nymphs can drop into the water below. On one occasion a female tried to oviposit into the end of the author's suede shoes that were slightly overhanging a garden pond.

The nymphal stage can last two or three years depending on temperature and food present, and like other large dragonfly nymphs they can be cannibalistic when food is in short supply. They appear to be unafraid of humans and will fly up close and examine us with interest. On occasion they will use humans as a perching place while they look for flying prey to catch, and as long as one remains still they will return time and time again. The adults fly from late June through to October and occasionally early November.



Distribution

In Britain it is found throughout England and Wales and its range extends well into Scotland. There is an indication, as seen on the map, that this species is commoner in the eastern half of both counties. When seen in the uplands these specimens may be looking to expand their range, but most of the water to the west of both counties is a lot more acidic and the author has not heard of it successfully breeding in such waters.

History

This insect was unknown in our counties until it was reported by George Bolam (Lucas 1901) from north Northumberland, VC68. It was 31 years until the next record on 9 July 1932 from Birtley, VC66, by J W H Harrison. It was next seen by Dr Statton in Chopwell Wood bomb ponds – also VC66 – in 1950, 1951 and 1952 (ERIC 2016). Thereafter sightings increased rapidly with records coming in from all three vice-counties.

Present status

Generally a common species wherever suitable neutral or alkaline ponds and small lakes occur, which is mainly the eastern areas of both counties. There are 1,437 local records.

Future outlook

The Southern Hawker is under no threat currently or in the foreseeable future.

Brown Hawker *Aeshna grandis*

Male Brown Hawker by Roger Hatcliffe

Regional status

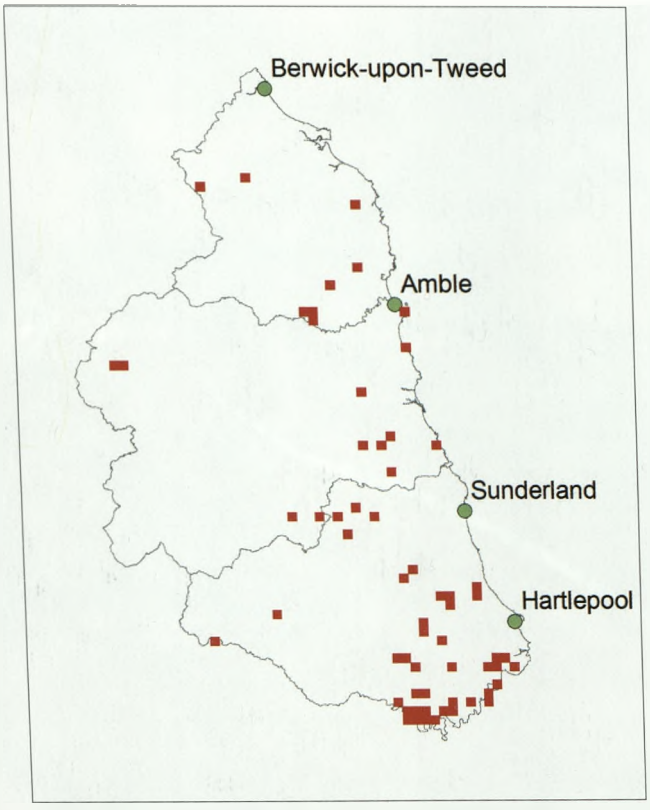
Sparse and thinly distributed with most records coming from County Durham and south Northumberland. The adult is predominantly dark brown with fewer markings than most *Aeshna* species. It is readily identifiable as its wings have prominent golden-brown veining.

Habitat and life cycle

This species can be found in lakes, large ponds and slow-moving water. It ranges widely away from water, but this may be just during its maturation period. Larval development depends much on food supply and can be between two and four years. Ova are laid into vegetation just below the surface and the nymphs feed in vegetation or debris on the bottom of the pond. Its main food is reportedly "midge" larvae. Emergence is at night and the adults fly at first light, before the sun breaks the horizon. It flies mainly from June to the end of September.

Distribution

The Brown Hawker is relatively common in central and eastern England to the south of mid-Yorkshire but is absent from much of Wales and the West Country. In the North East we are close to its northern limit and it does not appear to be expanding its range as so many other species are. It can be found at both low and high levels in our counties; perhaps it is currently most numerous in the Tees Valley area.



History

One of the earliest dragonflies to be discovered, it was noted by the great local naturalist John Hancock at Prestwick Carr in 1827, VC67, and at Gibside, VC66, in August of the same year (Hancock 1826-27). It was to be 129 years before it was reported again, in Durham City in 1966 by Dr J H Lawton; after that records were more forthcoming, if somewhat slowly. The author netted nymphs in lakes at Cragside, VC68, on 14 January 1968, which were bred out so that their identification was not in any doubt.

Present status

As can be seen from the distribution map of this species, it is not common anywhere, but its presence is apparently fairly constant, if at a fairly low level of concentration. Where it is found it forms small breeding groups and is never abundant, but this does not appear to diminish its ability to maintain a constant, if small, breeding population. Some sites have been known to have been occupied for over a century. Only 308 local records are known in total.

Future outlook

Given that this species has been known to be present in our counties for at least 189 years and has apparently survived through industrial pollution and some of the effects of global warming, it seems likely that it will keep its presence here well into the foreseeable future.

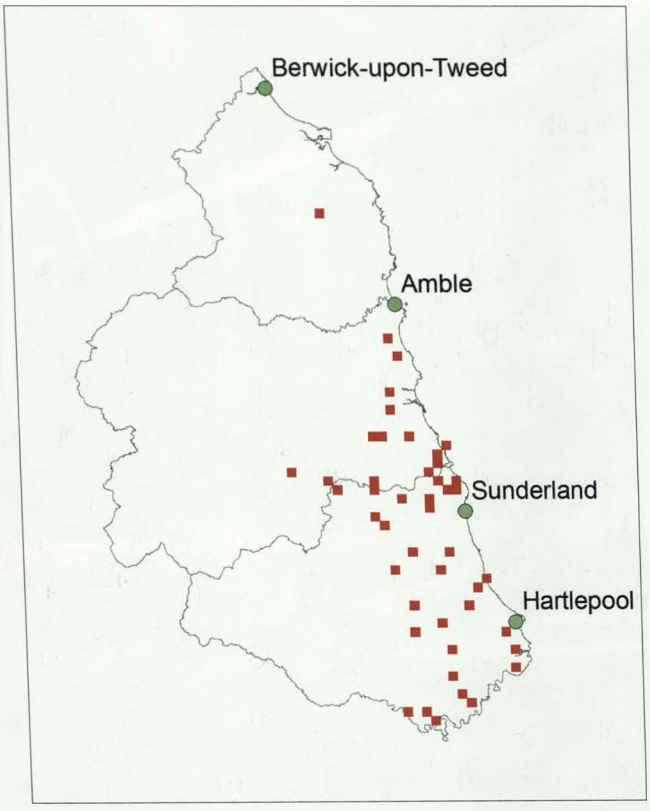
Emperor Dragonfly *Anax imperator*

Male Emperor Dragonfly at Kibblesworth by Michael Eccles

Regional status
Thinly distributed on the eastern half of both counties with only one record in VC68. The largest of the British species, this is a difficult dragonfly to misidentify because of its size and colour.

Habitat and life cycle
The Emperor seems to prefer large ponds that are very well vegetated with a variety of pondweeds. Emergent vegetation is also important in the pond margins for use as emergence posts. In our area it is likely to have a two-year life cycle. It can stand brackish and alkaline waters but not, apparently, acidic waters, hence the easterly bias in Northumberland and Durham. Although emergence of the adult specimens has not been recorded locally, in the south of England the nymphs leave the water *en masse* during the hours of darkness and depart from the area of the pond if at all possible before there is enough light for their predators to find them easily.

Distribution
During most of the author's lifetime it was never seen north of the River Humber; then in 2000 it suddenly started to expand its range northwards at a very rapid pace and is now to be found in central Scotland. It also managed to establish itself in Ireland for the first time in 2004. Not all ponds are suitable for its breeding purposes; those that are suitable tend to be occupied permanently and the rest are ignored, although they may be used temporarily by adults for feeding purposes before moving on.



History

Previously unknown in our area until 25 August1980, when one was seen at Neasham Brickworks, VC66, by M Rebane. After that no other specimens were seen until 25 June1999 when I J Waller saw a female at Stillington Pond, VC66, after which records became more frequent. It was first recorded in VC67 on 4 July 2003 at Cramlington Pond by D Feiger. The first VC68 record was made by M Thurner who saw it at Quarry House Moor on 2 July 2009; this currently remains the only VC68 record.

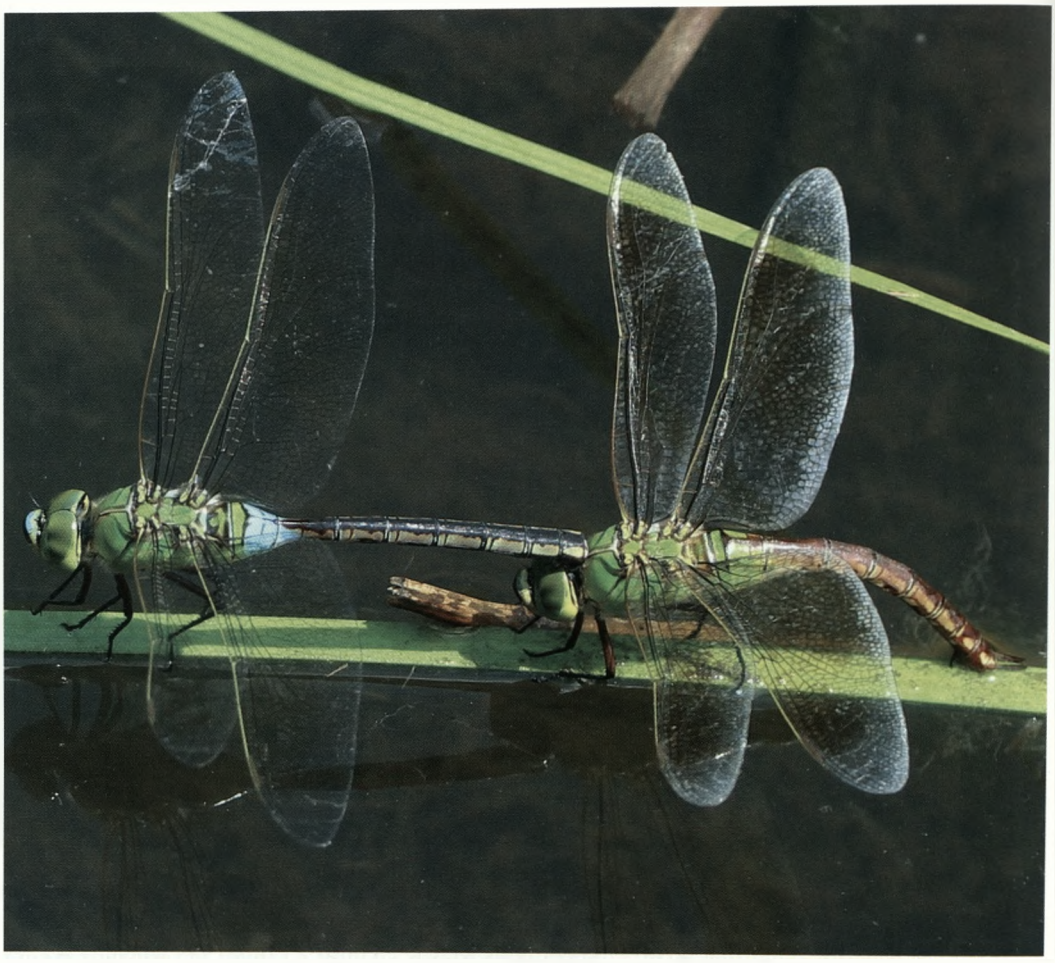
Present Status

A breeding species locally, but not at all common; it may just need more people to be looking for it. Currently we have 203 local records for this species.

Future outlook

The Emperor Dragonfly has seemingly extended its range northwards into our area as a result of global warming. If recent climatic trends continue then this magnificent species could establish itself over a larger area of both counties, but a return to cooler conditions could see it decline; in 2010 a very cold winter apparently killed off all the nymphs in certain ponds in Scotland at the most northerly extent of its range.

Lesser Emperor *Anax parthenope*

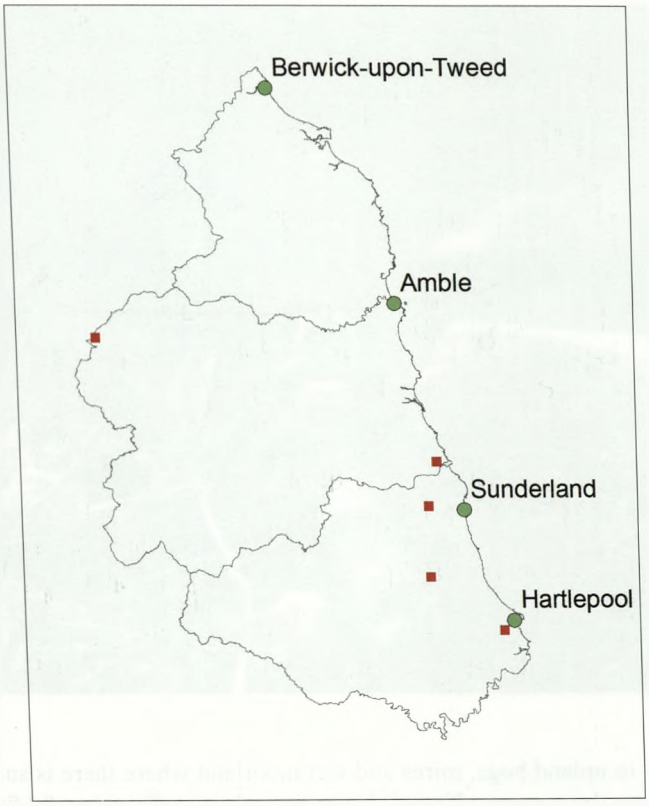


Lesser Emperors mating by Alpsdake, Wikimedia Commons

Regional status
A very occasional and rare migrant.

Habitat and life cycle
An inhabitant of well-vegetated ponds and small lakes during its nymphal stage. The nymphs can tolerate brackish water. It has been reported as breeding in Cornwall but there is no evidence of this occurring in the North East. Ovipositing was observed in County Durham but unfortunately this was apparently not followed up in the following year to see if any developing nymphs were present. The nymphs reportedly have a two-year life cycle.

Distribution
The Lesser Emperor is widely distributed in the south of Europe, most of the countries surrounding the Mediterranean Sea and parts of Africa and Eurasia. It is likely that migrants arriving here came from the Mediterranean area or North Africa. It is by no means an annual migrant to Britain and its visits are very sporadic. It can turn up anywhere unexpectedly, as is the case with most of the migrant species, and seeing them is often a matter of luck, especially in areas where dragonfly recorders are thin on the ground.



History

This species was totally unknown locally until 27 June 2000 when a specimen was recorded at Boldon Flats, VC66, by D Foster. In 2001 it occupied a small number of ponds in VC66, virtually all at Rainton Meadows Nature Reserve, but out of the six ponds present here only "Joe's Pond" was mentioned twice by name. Specimens remained present for some three months. Apparently no record was kept of where oviposition took place. The author has only seen one specimen, which was in a pond at Kittythirst above Kielder Village, VC67, not far from the Scottish Border on 30 August 2003.

Present status

A rare migrant that could turn up anywhere when weather conditions are suitable. It is not however a regular visitor. In all we have 31 records for this species but a good percentage are repeat records from the same sites, and are likely of the same individuals. Its numbers are so low that finding one is very much a matter of luck. It is not to be seen every year by any means.

Future outlook

The future status of any occasional migratory species is difficult to gauge. We may have an influx in any year, or a decade or more may go by before we see any. In reality we must wait and see what the future holds. Should this species visit us again and females are seen to oviposit then there would be an opportunity to research their progress and see if it can successfully breed in the North East.

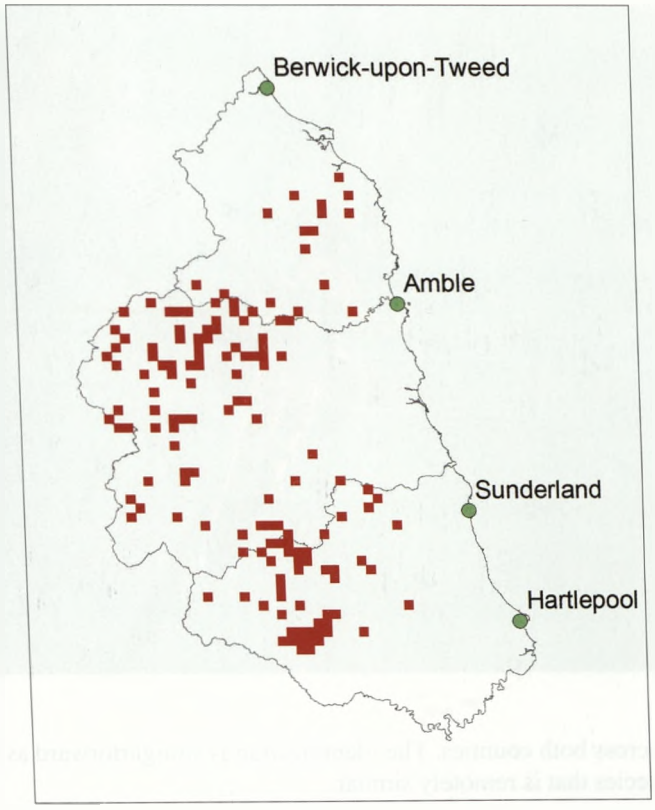
Golden-ringed Dragonfly *Cordulegaster boltonii*

Golden-ringed Dragonfly near Combs by Mike S Hodgson

Regional status
Relatively common in upland bogs, mires and wet moorland where there is suitable habitat but uncommon away from these areas, although being an exceptionally powerful flyer it can turn up anywhere during its maturation period.

Habitat and life cycle
Acidic mires of all types wherever there is some flowing water leaving the site; in our region this habitat is found in the uplands. Natural food in streams and ditches is sparse in the uplands and this may lead to an extended nymphal life span. Nymphal life is often quoted as being between two and five years, but having worked for many years on the Northumberland mires the author believes it is possible that an eight-year nymphal stage may occur in some areas. The nymphs bury themselves in fine gravel or silt with only their heads showing and wait for anything edible to be swept by them. Emergence is at night and the adult insects are ready to fly by first light provided the temperature is high enough. Unfortunately in our uplands it is seldom warm enough before mid-morning for flight to take place, but the adults are well hidden from above being low down in the heather. In our counties the adults fly from early June until early October although these flight times are very dependent on weather and temperature.

Distribution
Nationally the distribution of the Golden-ringed Dragonfly closely matches the distribution of bogs, mires, heaths and moors. It is absent in eastern England from central Yorkshire south to the River Thames. It is common in Scotland, Wales and along the south coast of England from Dover to Land's End. As can be seen on the map, most of the local records are from areas of upland bog in both counties. Those records outside these areas are stray specimens, usually in their maturation period.



History

The author believes that this was the species described by the Rev Wallis in 1769 for Northumberland, VC67/68, although he did not give a specific location. If so, this must be one of the earliest dragonfly records in Britain. In the mid-nineteenth century it was reported from Durham, VC66 (Ornsby 1846), but not again until the beginning of the twentieth century, when it was recorded from Carlington Moor, VC67, by Mr Woodcock on 3 July 1911 (Bagnall 1913). Records were scarce until after World War Two, when they became more frequent as dragonfly recording increased.

Present status

Widespread in both counties on suitable habitat, there are currently 472 local records.

Future outlook

There are few mires in Northumberland which the farmer has not made some attempt to drain in the past, but many of our local mires are now designated in order to protect them. This magnificent and very large dragonfly is widely distributed on the bogs and mires of both counties and under no foreseeable threat.

Four-spotted Chaser *Libellula quadrimaculata*

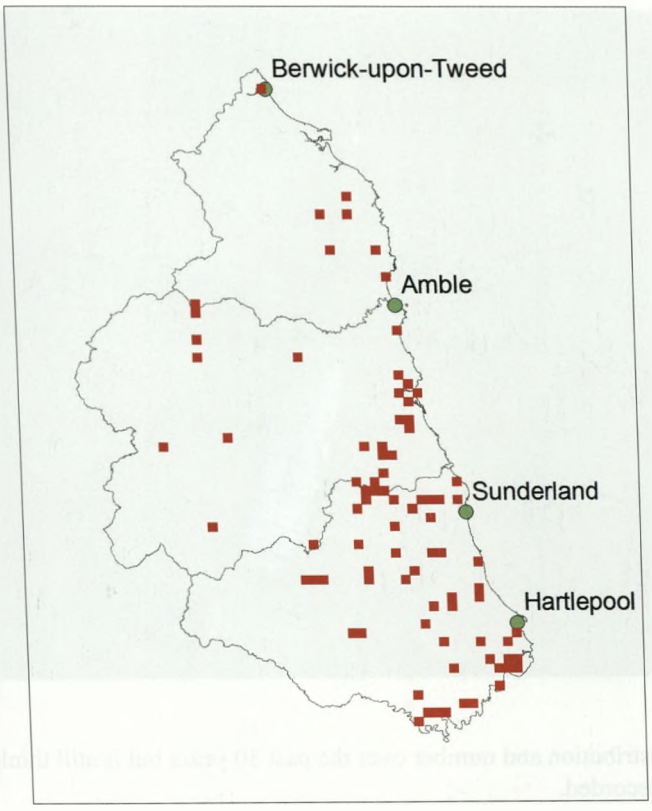
Four-spotted Chaser at Far Pasture by Michael Eccles

Regional status
Thinly distributed across both counties. The identification is straightforward as there is no other British dragonfly species that is remotely similar.

Habitat and life cycle
This species occurs at a wide range of ponds with the largest number of records coming from acidic waters, although locally it can be found in non-acidic waters. In our area the nymphs have two years in this stage before emerging. Teneral specimens take some time to develop the full adult wing and body colouring. The males are very defensive of their chosen territory, although they roost communally on tall reed stems at the edge of the pond. To see several hundred grouped together in just a few metres is a sight that one never forgets. Locally the adults can be seen from May to August.

Distribution
This species is thinly distributed in all three vice-counties with a bias towards south Durham in site numbers, although this may be due to the preponderance of birdwatchers in the Teesside area who also record dragonflies.

History
One of the earliest dragonfly species recorded in our area, it was found by John Hancock at Prestwick Carr, VC67, on 18 July 1826; Axwell Park, VC66, on 10 June 1827, and Marsden, VC66, on 13 July 1827 (Hancock 1826-27). Other records from County Durham occurred in the mid-1800s. The first record from north Northumberland, VC68, was from Berwick-upon-Tweed in 1901 by George Bolam (Lucas 1901). There was then a gap in the records until 1961 when it was reported from Wolviston, VC66, by J W H Harrison (1961). Since then it has been reported in most years.



Present status

Somewhat thinly distributed but with annual repeat records from most of the ponds where it is known to occur. Currently there are 284 records of this species but it may well be found further afield if looked for.

Future outlook

The current population is apparently fairly stable and under no known threat.

Broad-bodied Chaser *Libellula depressa*

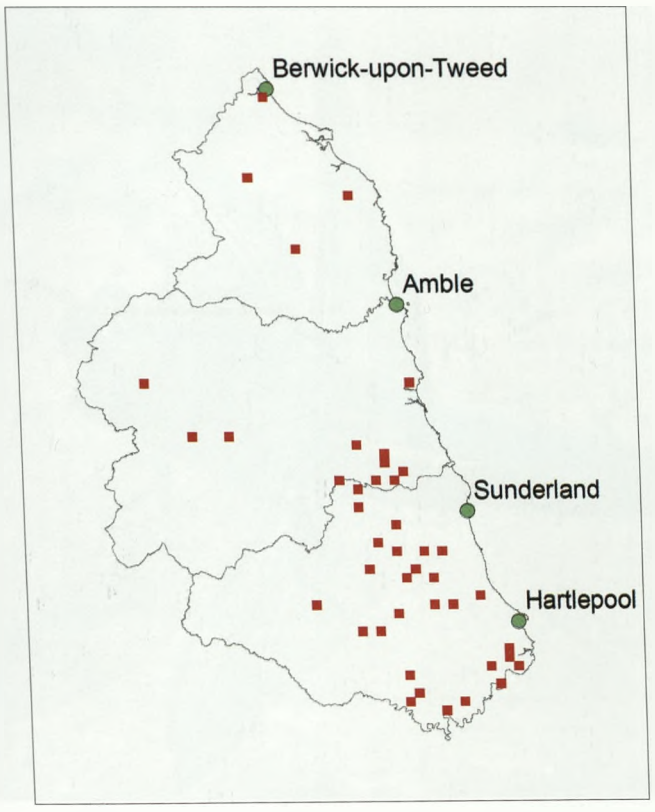
Male Broad-bodied Chaser at Stargate Ponds by Michael Eccles

Regional status
Has increased in distribution and number over the past 30 years but is still thinly distributed and is probably under-recorded.

Habitat and life cycle
An inhabitant of ponds and small shallow lakes. It is said to occur in and along slow-moving ditches but no such records have been reported locally. It is often one of the first species to adopt a newly dug pond. The larvae have a two-year life underwater before emerging. The adults fly from May until August after which sightings rapidly taper off.

Distribution
The Broad-bodied Chaser has expanded its British range northwards in recent decades and has reached the River Forth in Scotland. It is found in both our counties and is widely but somewhat thinly distributed. It is found from the coastal lowlands to the western uplands. It would appear from the records that it is still expanding its range in our area.

History
The earliest record we have dates from 1833 when it was reported from Castle Eden Dene, VC66, but it is not known by whom, or where the record appeared; unfortunately, during the movement of record files between various recording agencies some historic data seems to have been eliminated. The next record in the files was from Newham Bog, VC68, in 1982 and finally from a pond in the grounds of Whickham View School Newcastle upon Tyne, VC67, on 25 August 1996. Since 2000 records have increased but somewhat slowly. It is likely that this species is under-recorded and only needs to be looked for in areas where it has not been reported for its records to increase.



Present status

It has been sparsely recorded, but despite the small number of local records the population appears to be increasing and expanding, and further recording effort is required to give a better idea of its current distribution and status in Northumberland and Durham. There is a total of 96 local records for this species.

Future outlook

The Broad-bodied Chaser has seemingly expanded its range northwards through our area in response to global warming. If recent climatic trends continue then this species could establish itself over a larger area of both counties, but a return to cooler conditions could see it decline.

Black-tailed Skimmer *Orthetrum cancellatum*

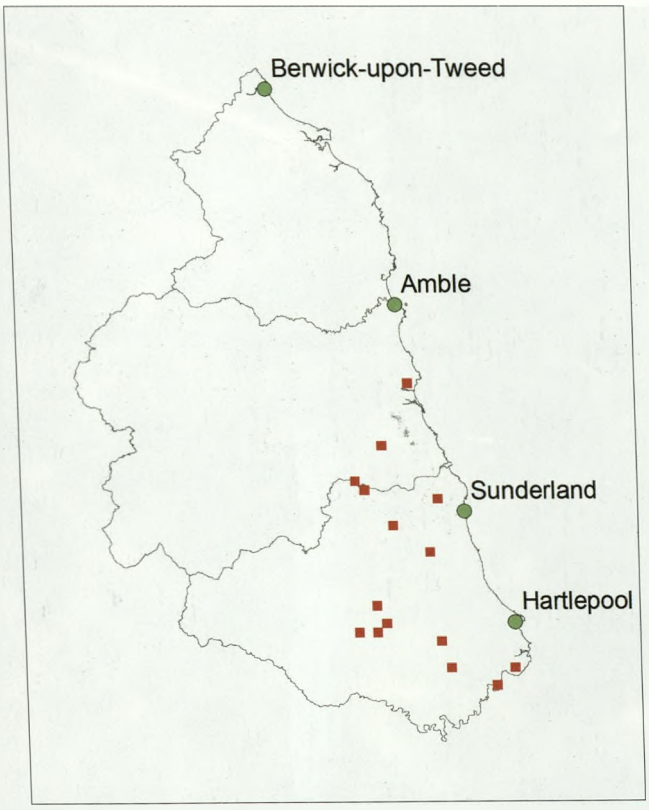
Male Black-tailed Skimmer at Kibblesworth by Michael Eccles

Regional status
A recent addition to our region, it is very scarce.

Habitat and life cycle
This species seems to favour sites at low altitude but it occupies a wide range of habitat types from peat bog to sand and gravel pits, and slow-moving rivers and streams. The nymphal stage is two or three years in length before the adult emerges. The adults like to bask on horizontal places such as boardwalks over ponds or on stones, particularly in places that hold and radiate heat, where it needs to spend less time between flights (dragonflies are reliant on external heat to raise their body temperature to an optimal level for flight). Adult specimens fly from May through to the middle of August.

Distribution
Currently only found in the eastern halves of both counties, with records being more numerous from Durham. From Northumberland it is only known in VC67. So far it is unrecorded in north Northumberland, VC68, but it has been found across the border in Berwickshire and there are recent records as far north as Fife in Scotland.

History
This species was first recorded locally on 26 August 1984 at Witton-le-Wear Nature Reserve, VC66, by R L Quigley. The first south Northumberland record appears to be by S Sexton, who found it at Summerhouse Lane Pond at Newbiggin-by-the-Sea, VC67, on 13 July 2009.



Present status

A scarce species over most of both counties, with a total of only 58 local records. It must surely be found in VC68 if significant recording effort was devoted to this area.

Future outlook

The Black-tailed Skimmer has extended its range northwards into our area and beyond over the past 30 years, seemingly in response to global warming. If recent climatic trends continue then this species could establish itself, but a return to cooler conditions could see it decline.

Keeled Skimmer *Orthetrum coerulescens.*

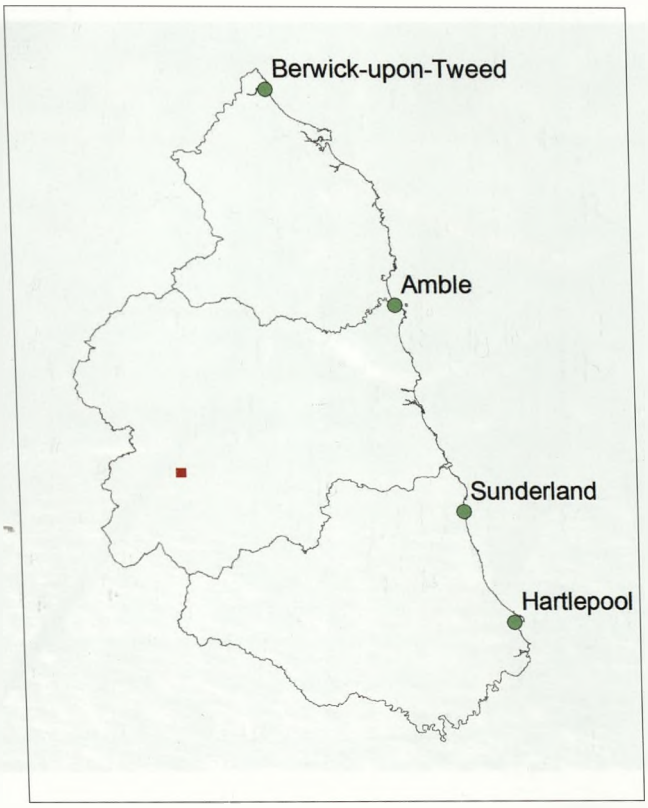
Male Keeled Skimmer by David Kitching

Regional status
Extremely rare; its status in our area is not yet understood.

Habitat and life cycle
A species of peat bogs and mires where there are pools, ditches and runnels, especially when bog mosses are present. Teneral specimens disperse widely and are to be found 20 km or more from their breeding site (Smallshire and Swash 2004). This puts the single specimen recorded from the west of our region well within flight range of breeding sites in Cumbria where this species can be regularly found.

Distribution
This is a species that has a western bias in Britain, although there is a sparse distribution on the east coast as far north as South Yorkshire. On the western side of Britain it is to be found as far north as the Flow Country in northern Scotland.

History
Locally there is a single record from Muckle Moss, VC67, by A J Richards on 31 July 1982 (Ball 1985).



Present status

Not currently thought to be present in either county although a search of the Northumberland border mires may be productive, as well as additional visits to the original site. Muckle Moss is a Site of Special Scientific Interest and access permission should be sought from Natural England's local office as it is also on privately owned land.

Future outlook

It is possible the Keeled Skimmer may be occupying quality mires in western Northumberland where all the species' habitat requirements can be very easily met. The difficulty is generally one of access, as a long trek or mountain bike ride is required to reach these remote sites. Further recording effort is needed to give a better idea of its present status in our region.

Common Darter *Sympetrum striolatum*

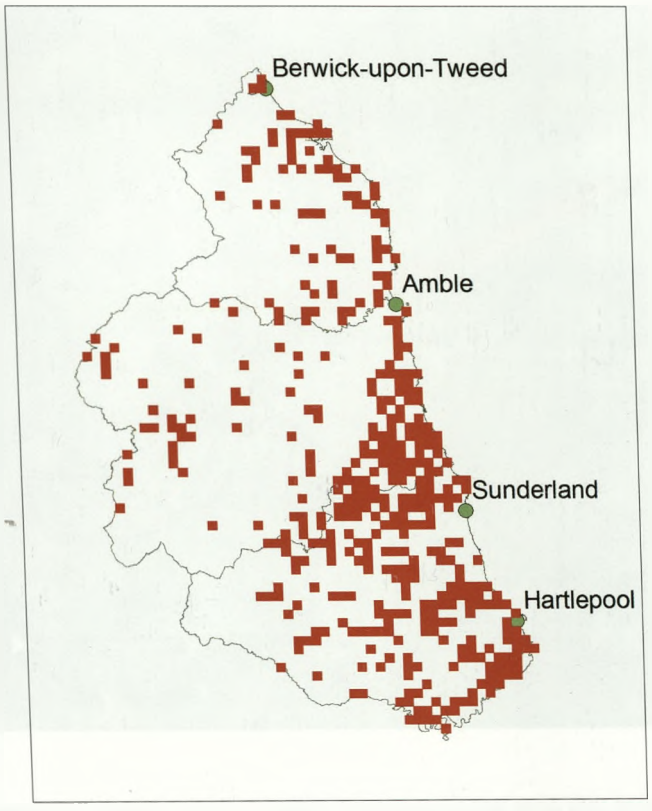
Common Darters mating by Christopher Wren

Regional status
Common over both counties.

Habitat and life cycle
This species has a catholic view of habitat, being found in all kinds of ponds, lakes and slow-moving water in ditches and streams. Even small garden ponds are used for breeding. Locally adults fly from late May through to October. Where they occur, especially on larger ponds, it is not unusual to see dozens of pairs in tandem, flying low over the water with the female flicking her tail into the surface film to wash off eggs she has extruded from the tip of her abdomen. The nymphs can complete their life cycle in a single year.

Distribution
Very common across our region, with a recording bias towards the eastern half of both counties. It is recorded on the western side except from the very highest hills; it is not known if the lack of records from these hills is due to an absence of Common Darters or an absence of dragonfly recorders.

History
John Hancock found it at Tynemouth on 13 August 1826, and at Prestwick Carr the same year, both in VC67. He also found it at Marsden on 13 July 1828, VC66. It was recorded by George Bolam at Chathill, VC68, in 1901 (Lucas 1901). Over the next 70 years only an additional nine records were made, but in 1980 records really took off and have increased in number virtually every year since.



Present status
Common almost everywhere in both counties, wherever recorders have ventured. Currently there are 2,995 local records.

Future outlook
The Common Darter is under no threat currently or in the foreseeable future.

Red-veined Darter *Sympetrum fonscolombii*

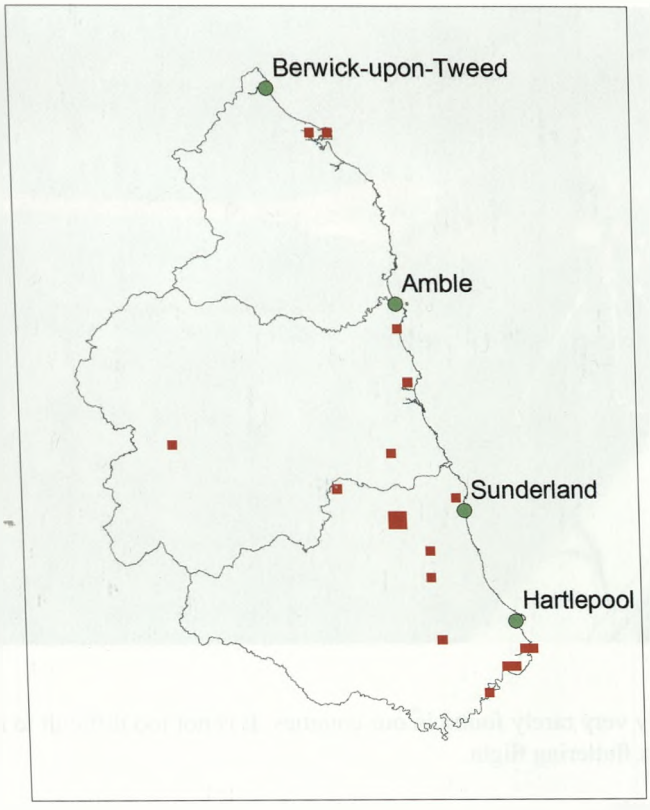
Male Red-veined Darter by Alvesgaspar, Wikimedia Commons

Regional status
An occasional migrant that does not appear every year. Counties on the east coast from the Wash to the Forth benefit from these beautiful visitors when they do appear.

Habitat and life cycle
An inhabitant of ponds, preferably those that are well vegetated, but occasionally found at ponds with little pond weed present. There are records from ponds on acid, neutral and alkali ground. Breeding has not been proven, although ova have been seen being deposited; no one has followed this up locally by checking for nymphs or adults the following year. Adults can be found from late May through to October.

Distribution
The Red-veined Darter is well established in all countries bordering the Mediterranean Sea and it seems likely that this is the origin of the migrants that reach us. When migrations of this species occur it travels to much of western Europe and has been found as far north as Denmark and Finland. Being a migrant species it can turn up anywhere but it is more likely to be seen on ponds and lakes near the coast, although it does turn up inland sometimes many kilometres from the sea. The map of records of this species show where it has been found, but there is no guarantee that others will appear in subsequent years on the same site.

History
The first local record is dated 1945 from Ouston near Birtley, VC66. The name of recorder and source is not given. It was not reported again until 24 August 1998 when it was seen on Holy Island, VC68, by P Davey. The first VC67 record was made by the author, who netted one on the



Causeway Pond on Bell Crag Flow, on 10 July 1999. This is an unlikely site, but with migrant species it should not be surprising as they can turn up anywhere. Since 1998 this species has been seen in small numbers in most years at ponds predominantly near the east coast, from the south of VC66 to Holy Island in VC68. Numbers of specimens present on any site can be difficult to count if they are in flight as they could be recorded more than once.

Present status

This is a migrant species whose presence in our counties varies from year to year. Seeing one is perhaps a matter of waiting until a migratory swarm of these magnificent dragonflies arrives in Britain and distributes itself around the country. The east coast of Britain is a popular migration route for many insect species, so we are likely recipients whenever a migration takes place. There are 71 local records, although some of these are duplicates coming from the same location over several consecutive days.

Future outlook

If the climate continues to warm, then it is possible that this species could become a permanent breeding resident in Britain and a more regular migrant to our counties; however a return to cooler conditions would likely see it become rarer. As a migrant, the number found in our area also depends on suitable weather conditions and so any changes in climate could also have a bearing on this.

Yellow-winged Darter *Sympetrum flaveolum*

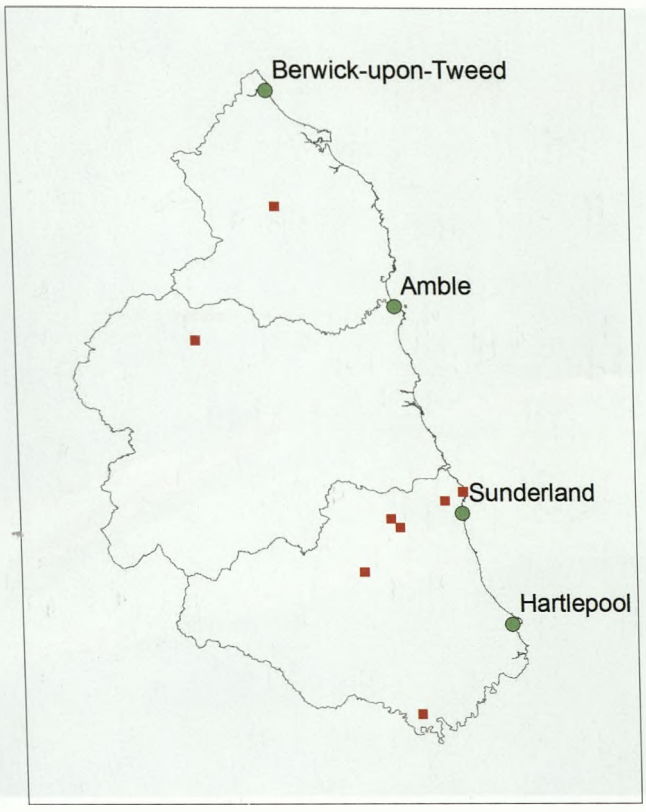
Yellow-winged Darter by AndrC Karwath, Wikimedia Commons

Regional status
A migrant dragonfly very rarely found in our counties. It is not too difficult to identify due to its small size and weak fluttering flight.

Habitat and life cycle
This species has a range of habitats: bog pools, marshy pools, ditches and occasionally rivers. It is tolerant of acidic waters. It is supposed to have an annual life cycle but the author understands that it has only been found breeding in southern England, where it is considerably warmer. On the northern limit of its range this may well extend to a two-year life cycle.

Distribution
Unlike most other migrant dragonflies the Yellow-winged Darter is not found over southern Europe or the western Mediterranean. The nearest breeding sites are in eastern Europe and it seems likely that this is where those specimens turning up in Britain probably originated. Its range extends eastwards to encompass Turkey, western Siberia, Mongolia, China and then south to Korea and Japan. In Britain, Northumberland is probably the northern recorded limit of its distribution; there are two records from Scotland but some people regard these as misidentifications. In our area it is very thinly spread with only one site in VC68, another in VC67 and six sites in VC66. It is much more common further south in Britain where it is to be found in most years.

History
Our first record, of three specimens, was from the Rev J E Hull (1932) who found them at Coldmartin Lough in VC68. The first VC66 record came in 1945 from J W H Harrison (1946) who claimed it for Birtley where he lived. The first record for VC67 came from C Simms, who found one on the Redesdale Experimental Husbandry Farm in 1988. Three males appeared at Malton Nature Reserve near Lanchester in VC66 from 18-21 August 1995.



Present status

This is a very rare visitor to our counties with just 15 records. It would appear that finding one is really a matter of luck. Ideally any reports of Yellow-winged Darter should be accompanied by photographs in order to help validate the record.

Future outlook

With so few records in our counties this is hard to assess. As with other migratory species it may come here more often if temperatures continue to rise but could become scarcer if there is a return to cooler conditions.

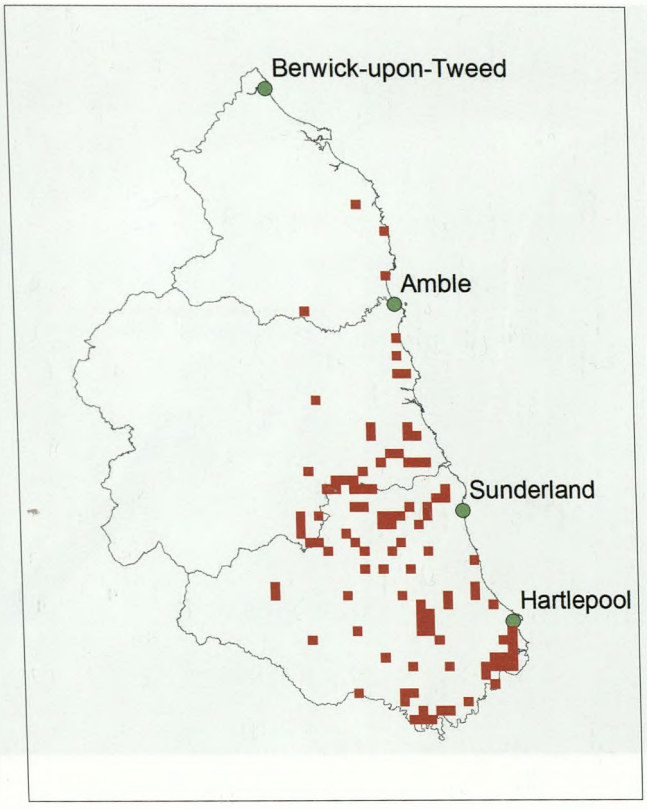
Ruddy Darter *Sympetrum sanguineum*

Male Ruddy Darter by Christopher Wren

Regional status
Fairly common in the lowlands of both counties but thinning out in north Northumberland due to the lack of ponds.

Habitat and life cycle
Found in the eastern half of both counties, it is not currently known from any upland areas of either county. A dweller in well-vegetated ponds, slow-moving streams and ditches. It is not averse to breeding in woodland ponds provided the pond is not heavily shaded. Eggs are laid, like most of the darter species, by the female flying low over ponds and ditches dipping the tip of her abdomen in the surface film, mostly in tandem with the male, but occasionally alone. The adults can be seen from mid-June until October but most commonly from July to September. It is reported to be able to tolerate acidic waters but there are currently no local records from such a site.

Distribution
In Britain the distribution of the Ruddy Darter reaches its northern limit in Northumberland in the east and Cumbria in the west. There is a single isolated record from Berwickshire in 2003 which has not been repeated. It is apparently absent from mountainous areas such as the Cheviots, Pennines and much of the higher parts of the Lake District. It is scarce in western Wales and the West Country. There has been a northerly expansion in range in recent decades and since its local rediscovery in 1992 it has spread rapidly though the eastern half of County Durham and south Northumberland. It is found in a few localities in north Northumberland.



History

First reported as a local species by George Bolam (Lucas 1901) for Chathill, VC68. It was not seen again until it was rediscovered by J Hope at a small pond in Burnopfield Wood, VC66, on 27 August 1992. The first record for south Northumberland, VC67, was made in Priestclose Woods on 17 August 2000 by I J Waller and J Hope.

Present status

Since its rediscovery in 1992 it has expanded through the eastern halves of both counties and is apparently increasing in numbers every year. It is most often seen when flying over ponds ovipositing, and where it occurs it can sometimes be seen in numbers. Ponds to the west of both counties need examining to establish if it has expanded its range to those areas. Currently there are 611 local records.

Future outlook

The Ruddy Darter has extended its range northwards into our area and beyond over the past 30 years, seemingly as a result of global warming. If recent climatic trends continue then this species could establish itself, but a return to cooler conditions could see it decline.

Black Darter *Sympetrum danae*

Black Darter at Cragside by Christopher Wren

Regional status

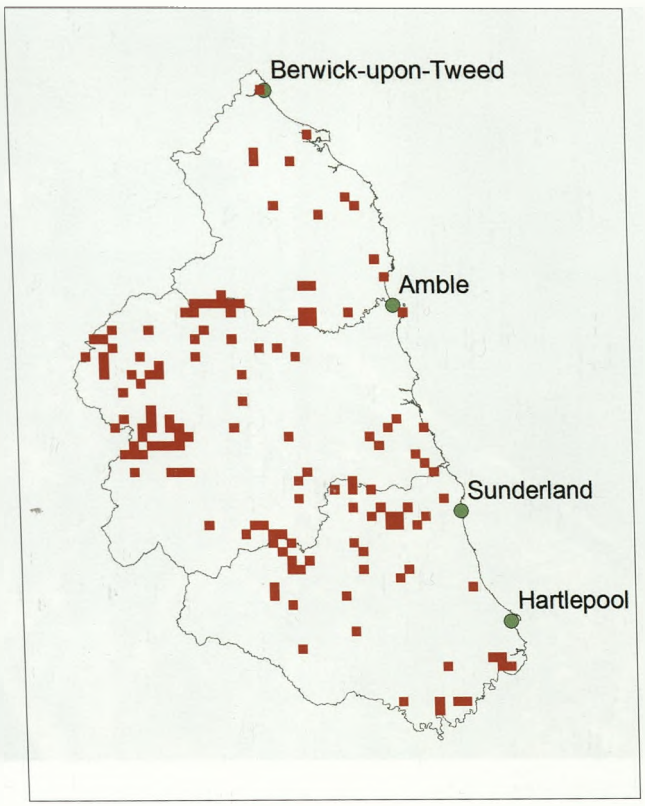
Widespread over bogs and mires in both counties it was until recently unrecorded in the eastern half of either. This has changed in the past 20 or so years with specimens turning up in coastal areas where there are no acidic ponds. So far no one has tried pond dipping for nymphs in the coastal areas to establish whether breeding is taking place.

Habitat and life cycle

The true home of this delightful, predominantly black and yellow dragonfly – the smallest of the British *Anisoptera* – are the acidic bogs and mires in the west of both counties; all the early records of this species come from these areas. Ova are laid in typical "darter" style by the female dipping the tip of her abdomen into the surface water film, not over open water but instead in sphagnum margins around the pond where the water may just be seen in small patches between the moss clumps. The nymphs hatch in the spring and have a very rapid development; adults can emerge just two or three months later. Adults are to be found from late June until late October.

Distribution

The distribution map shows that the vast majority of records are from the west side of the counties, but some come from north Northumberland where there are suitable bogs and mires within a mile or two of the coast. In southeast Durham acid moorland does not exist, and the surface geology is Magnesian Limestone which is a totally unsuitable breeding habitat for this species. Currently the coastal records are believed to be migrants originating from European countries that border the North Sea. A flight of 300-400 miles is well within the ability of a darter dragonfly.



History

First recorded in Chathill, VC68, by George Bolam in 1901 (Lucas 1901). It was not recorded again until 1941, this time at Newton Hall, Stocksfield, VC67, by H Tully and by J W H Harrison for Birtley, VC66, both reported in *The Vasculum* in 1946. Since the ending of World War Two there has been a slow but steady flow of records from the uplands.

Present status

A relatively common dragonfly in acid moorland ponds in the west of Durham and south Northumberland, and on mires within a mile or so of the coast in the north of Northumberland. Specimens seen on coastal sites on unsuitable habitat are almost certainly migrants. There are 560 local records.

Future outlook

There are not considered to be any immediate threats to this species in our region. There are a large number of bogs and mires in Northumberland and the Black Darter is to be found on the great majority of them. Durham has very few bogs although plenty of acidic moorland where ponds have formed. A known site for this species, the Dodd Terrace Pond on the outskirts of Annfield Plain, VC66, was reported to have been destroyed during building works, but when this was checked in 2016 the site was still present, along with Black Darter (L Moore, pers. comm., 2016).

Vagrant Darter *Sympetrum vulgatum*

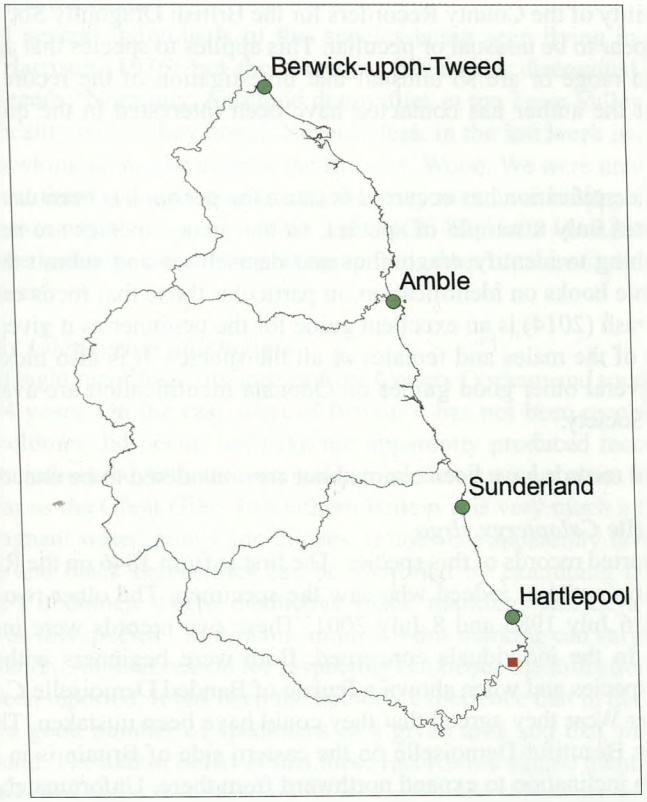
Vagrant Darter by Jirg Hempel. Wikimedia Commons

Regional Status
Unknown but probably currently absent. It can be easily mistaken for a Common Darter; photographs should accompany any claims that this species has been found.

Habitat and life cycle
An inhabitant of ponds and slow-moving streams.

Distribution
This is an exceptionally rare migrant only recorded once in our area. Unlike most other migrant dragonflies the Yellow-winged Darter is not found over southern Europe or the western Mediterranean. From eastern Europe its range extends eastwards to encompass Turkey, western Siberia, Mongolia, China, Korea and Japan. In Europe it has been slowly extending its range westwards in recent years and is now found in Scandinavia, southern France, northern Italy and the Balkans. It has recently expanded its range into the Netherlands and in future there may be further migrants found. The record from our area is the most northerly of the very few known British records.

History
The first mention of this species is from J W H Harrison (1939). This was an unspecific second hand record and is now discounted. In 2001 a single specimen was found and photographed by J Duffy at Dormans Pool, North Tees Marshes, VC66; the pictures have been seen and the record accepted by the British Dragonfly Society and the record published in the latest National Atlas.



Present status
A very rare migrant that could turn up anywhere along the eastern coasts of England.

Future outlook
The Vagrant Darter appears to be expanding its European range in response to global warming, potentially bringing it closer to the UK. If this trend continues it is possible that this species could occur more frequently in the future, although at this stage we do not know if it is commonly prone to migration. A reversal of global warming could see it retreat into Europe, away from the UK.

RECORDS OF ODONATA NOT ACCEPTED

It is the responsibility of the County Recorders for the British Dragonfly Society to pay attention to records that appear to be unusual or peculiar. This applies to species that appear far from their normally accepted range or are so unusual that investigation of the record has to take place. Those people that the author has contacted have been interested in the query regarding their record.

In most cases misidentification has occurred because the person has been using an identification guide that illustrates only a sample of species, so that many species are not illustrated at all. Those people wishing to identify dragonflies and damselflies and submit their records should use the best possible books on identification, in particular those that focus entirely on Odonata. Smallshire and Swash (2014) is an excellent guide for the beginner as it gives very good details of the colouration of the males and females of all the species. It is also inexpensive compared to other books. Several other good guides on Odonata identification are available through the British Dragonfly Society.

The following local records have been claimed but are considered to be unacceptable.

Beautiful Demoiselle *Calopteryx virgo*

There are three reported records of this species. The first is from 1846 on the River Wear without data on where it originated or indeed who saw the specimen. The other two records are from the River Wear on 6 July 1985 and 8 July 2001. These two records were investigated by the author who spoke to the individuals concerned. Both were beginners without any previous experience of this species and when shown a female of Banded Demoiselle *C. splendens* that is present on the River Wear they agreed that they could have been mistaken. The nearest known breeding colony for Beautiful Demoiselle on the eastern side of Britain is in South Yorkshire, and it has shown no inclination to expand northward from there. Unfortunately, the River Wear records reached the British Dragonfly Society via a route that bypassed the County Recorder and appeared in the 2014 National Atlas before the error could be picked up. There are also records of this species in Ornsby (1846) from the River Browney Valley, but the author is not at all sure that the identification is correct given the lack of detailed description or other evidence of its occurrence, the lack of subsequent records and the known current national distribution of this species.

Azure Hawker *Aeshna caerulea*

There are four records of this species – in one instance of over 20 specimens – made in 2008, 2009, 2011 and 2013. Three are from sites in the vicinity of Newcastle upon Tyne and the other from between Hauxley Nature Reserve and Amble, on the Northumberland coast. The Azure Hawker is a boreo-montane species, an upland acid bog dweller that is confined to northern Scotland with a very small outlier on Silver Flow, Galloway. It is not known for being a free moving species and essentially belongs to the colder regions in Britain and Europe. It is believed that the Galloway population may possibly have been lost to forestry operations. There are however similarities in colouring with the Common Hawker and the author considers that a misidentification with this species has occurred in these instances. With rarities like this species, or any unfamiliar insects, photographs must be taken or a specimen obtained before the identity can be positively established.

Migrant Hawker *Aeshna mixta*

There is a report of several individuals of this species being seen flying in the Team Valley, VC66, by J W H Harrison (1936) but these records have been discounted (see page 62 for reason). His record reads "Normally, Aeschnid dragonflies in the Team Valley are great rarities, and I know of no locality where they breed. Nevertheless, in the last week in August, my father and I saw several hawking along the edge of the Brooms' Wood. We were unable to catch any as they kept so high, but there is a strong suspicion that they may have belonged to the immigrant horde of *Aeschna mixta* reported for that week.- GEORGE HESLOP HARRISON.". As there is no mention of a close sighting, capture or photograph this does not constitute a valid record of a positive identification.

Variable Damselfly *Coenagrion pulchellum*

There are reports of eight records of this species from County Durham and south Northumberland over a period of 84 years. On the east coast of Britain it has not been recorded north of south Yorkshire where colonies did occur, but have not apparently produced records since 1991. It favours the western influenced Atlantic type weather, so that it occurs close to the west coast all the way north as far as the Great Glen. In southern Britain it is very much a fen-loving species, but it also likes stagnant water, ponds and ditches. It does not apparently favour moving water. Many of the blue and black damselflies can be identified by examining the second segment of the adult male's abdomen where distinctive black markings can be a positive guide to identification, but on this species – as its name implies – this marking can vary, and this may have led to misidentification. Another reason for suspecting erroneous identification is that only single specimens have been reported. It has been the author's experience that in damselfly populations there are usually a good number of specimens in a given area and that singletons of another species are not found. The author believes that these records are simple identification errors, and would like to stress once again that photographs or a specimen should accompany any records.

Yellow-legged Club-tail *Stylurus flavipes*

There is only one British record, of a male near Hastings, East Sussex, in 1818, and no other records have been accepted since. One was reported to the Eye Project website by a Year Six student on 9 July 2008 from the Morpeth area. There is no evidence to back up this record and the author believes the student made an error in identification.

Highland Darter *Sympetrum nigrescens*

A species long believed to be different from the Common Darter *Sympetrum striolatum* and confined to northwest Scotland has now been genetically proven to be simply a colour variant of the Common Darter (Pilgrim and Von Dohlen 2007). A specimen was reported by the national Biological Records Centre for the NZ 26 O/S grid square (Newcastle area) in 1955. The record is now invalid, and is included here for information. There is even doubt about its locality, as this was given as "Newcastle, Durham". As Dr Jessop (1996) pointed out there are many places in Britain that are named Newcastle. There is obviously some confusion here which will never be satisfactorily sorted out since the original author of the record passed away many years ago.

THE RECORDS OF HESLOP HARRISON

This subject, usually discussed by northern naturalists in hushed tones, concerns John William Heslop Harrison (1881-1967), who was born in Birtley, County Durham, and lived there all his life. Academically a brilliant scholar, he was awarded a degree for his work on sallows and willows in 1916 and the following year a doctorate for his work on wild roses. Made a Fellow of the Royal Society in 1928 he later became Professor of Botany at what is now Newcastle University. He was very active in the publication of *The Vasculum*, a journal of the Northern Naturalists Union, and led many field trips over several decades.

His work on one of his theories was carried out on the Scottish island of Rum, which he believed was ice-free during the last glaciation, and he set out to prove it. Records started to appear of plants allegedly found on Rum that were only known from alpine areas of Europe, all claimed by Harrison as his discoveries. These were added to the British List. However, no one else could get access to Rum, which was privately owned, except for Harrison and a small party of students who were given sole access during the summer months. An investigation produced evidence of fraudulent records and justifiable suspicion of plants being introduced. All of this can be read in detail in *A Rum Affair* by Karl Sabbagh (1999); the story is as gripping as any detective novel and the conclusions as dramatic. Botanists were not the only people to have doubts; many of his entomological records were being queried by the author and several other local entomologists as early as the 1970s. As a consequence, there is a reluctance to give credence to any record of scarce or rare dragonflies and damselflies claimed by J W H Harrison. In this publication the author has accepted his records of common species, as they were no doubt present, but not his records of rare species, judging that they are not to be trusted.

John William Heslop Harrison

ACKNOWLEDGEMENTS

The compilation of a database of records requires a large input of data from over a wide area accumulated over many decades, as well as archive records covering perhaps a couple of centuries. The larger the number of records, the larger the number of people contributing records. Given the number of records involved here, it is not possible through space restrictions to name every single contributor; some have added a small handful of records, others in excess of 1,000 or more. While the author's grateful thanks go to every contributor, he has had to restrict personal names to a those of a few recorders who have made major contributions to the records data, some over several decades. These are: S G Ball, T Coult, P Davey, I Douglas, J Durkin, H A Ellis, M D Eyre, D Green, D I Griss, J Hope, M Hunter, D Hutt, M Jeffries, J H Lawton, D McCutcheon, J A Morton, R Norman, B Pollinger, M Rebane, G Simpson, M Thurner, D Wainwright and I D Waller.

The author's thanks are also due to the staff of the Environmental Records Information Centre North East (ERIC) for the production of the maps, and access to the ERIC database, in particular to Paul Stevens.

The author is grateful to Leslie Jessop for his permission to use some of his initial writing from his provisional atlas in the introduction to this publication, as I could not improve on what he had written.

The wonderful photographs of damselflies and dragonflies, most of which were taken locally, have been kindly supplied by Chris Castling, Michael Eccles, Roger Hatcliffe, Mike Hodgson, David Kitching and Christopher Wren. In addition, thanks also go to other local photographers who submitted images for inclusion.

Last, but by no means least, thanks go to the Natural History Society of Northumbria for production and editing, in particular James Littlewood.

SUGGESTED READING

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Azure Damselflies at Bellasis Bridge by Mike S Hodgson

Female Broad Bodied Chaser at Far Pasture by Michael Eccles

Emperor Dragonfly at Cramlington by Dorothy Bennett

Female Black Tailed Skimmer at Kibblesworth by Michael Eccles

Female Blue-tailed Damsefly at Dinnington by Christopher Wren

Female Ruddy Darter at Cowpen Bewley by Michael Eccles




Dragonflies and Damselflies of Northumberland and Durham describes the history, status, habitats, life cycle, distribution and future outlook of 24 species of dragonfly and damselfly found in the northeast of England up to 2016. Species accounts are accompanied by photographs and distribution maps.

Dragonflies and Damselflies of Northumberland and Durham has been written and researched by Harry T Eales and published by the Natural History Society of Northumbria as Volume 81 of the *Northumbrian Naturalist*.

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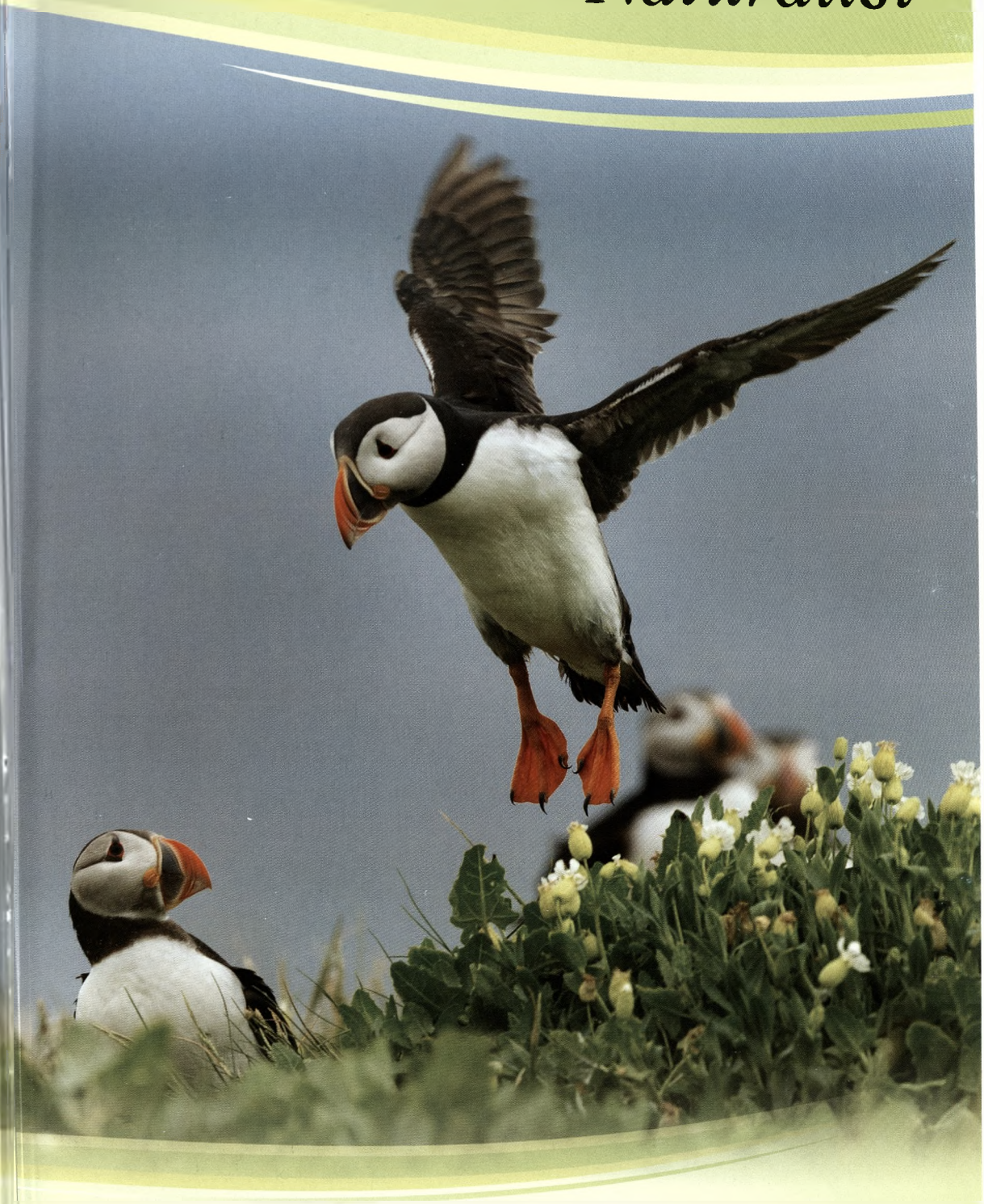

Northumberland Coastal Wildlife 2016

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Volume 82

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Natural History Society of Northumbria

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NATURAL ENGLAND

EDITORIAL

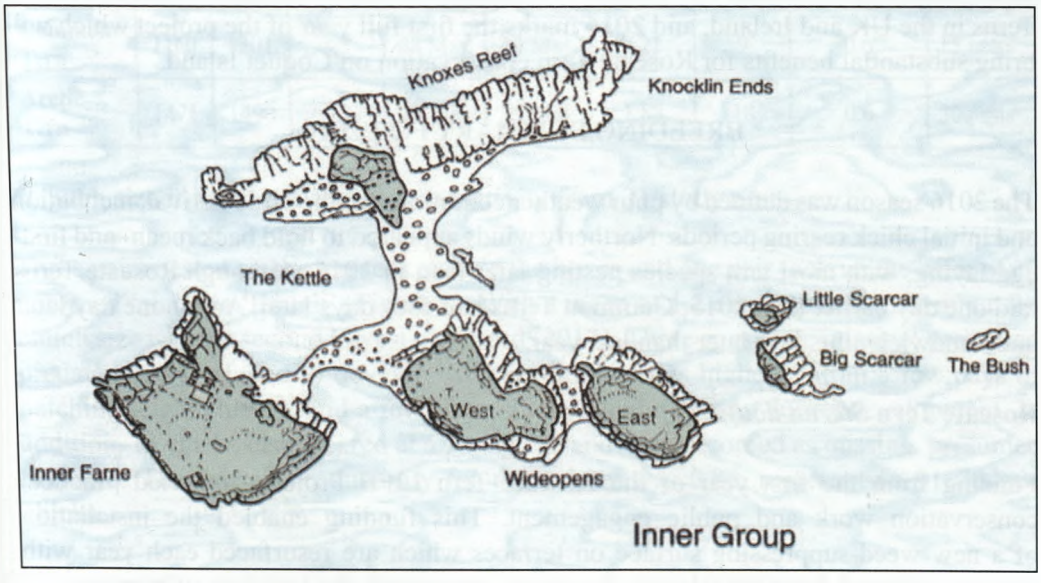
With this issue of *Northumbrian Naturalist* we have almost completed a transition from annual bird reports for the Farne Islands, published in the Society's *Transactions*, to a journal issue that can just about claim the wider title 'Northumberland Coastal Wildlife' by virtue of covering, with the addition of Lindisfarne National Nature Reserve this year, Northumberland's main seabird breeding sites and their associated wildlife. The phrases 'almost' and 'just about' are important because we recognise that there is more to the Northumberland coast than these wildlife sites alone. There are a number of smaller colonies of seabirds that are important too, with around 100 pairs* of Kittiwakes and a few pairs of Fulmars at Seahouses, Kittiwakes (138), Fulmars (up to 12), Shags (3), Razorbills (3) at Dunstanburgh Castle Cliffs, and over 450 Kittiwakes and 52 Fulmars along the coast between Howick Bathing House and Cullernose Point (counts courtesy of Jane Lancaster, Kevin Redgrave and John Steele, respectively). We aim to put these sites into context in the future. There is also more to the coast than seabirds, and we hope that our Northumbrian naturalists will be inspired to contribute papers on other sites, and other species groups and their conservation as *Northumbrian Naturalist* develops.

Chris Redfern (Editor)

*Apparently occupied nests.

Arctic Tern on Farne Island © Mike Reid

Map of the Farne Islands



COQUET ISLAND: BIRDS AND MANAGEMENT FOR WILDLIFE 2016

Wesley Davies[1], Paul Morrison[1] and Chris Redfern[2]

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INTRODUCTION

Coquet Island was established as a nature reserve in the 1970s by a partnership between the RSPB, Northumberland Wildlife Trust and the Natural History Society of Northumbria, and is leased and managed by the RSPB to protect breeding seabirds. The island is important in the UK for its colony of Roseate Terns; although public access to the island is not possible, close and live views of the Roseate Terns can be viewed in the breeding season on the internet (www.rspb.org.uk/coquetlive). Coquet Island also holds nationally-important populations of other seabirds, particularly Eiders, Puffins and three other species of terns, together with Fulmars and five species of gulls.

The presence of breeding Roseate Terns, a species on Schedule 1 of the UK Wildlife and Countryside Act 1981, brings particular demands and constraints with regards to management, and legal restrictions on public access. As an endangered species within Europe, listed on Annex 1 of the Birds Directive, it is a priority species for funding from LIFE, a European Union fund for supporting nature conservation projects. At the end of last year the RSPB, together with BirdWatch Ireland and the North Wales Wildlife Trust, launched a five-year EU-funded LIFE project to improve conservation of Roseate Terns in the UK and Ireland, and 2016 marks the first full year of the project which will bring substantial benefits for Roseate Tern conservation on Coquet Island.

BREEDING SUMMARY FOR 2016

The 2016 season was defined by poor weather conditions for the birds' arrival, incubation and initial chick rearing periods. Northerly winds appeared to hold back mean- and first-egg laying, with most tern species nesting later than in 2015. Although Roseate Terns laid one day earlier than 2015, Common Terns laid four days later, Arctic one day later and Sandwich nine days later than last year.

Roseate Tern *Sterna dougalli*

Funding from the first year of the Roseate Tern LIFE Project supported practical conservation work and public engagement. This funding enabled the installation of a new weed-suppressing surface on terraces which are resurfaced each year with shingle collected from the island's foreshore, preventing the build-up of parasites. In

addition, some new nest-boxes made of recycled plastic were bought as a trial to see how they would perform compared to the traditional wooden boxes with respect to occupancy, temperature and robustness. The new surface was successful in suppressing all vegetation, and while the boxes also appeared successful, monitoring over several seasons is needed before a decision on their overall suitability can be made.

The Roseate Tern population declined from its record high of 111 pairs in 2015 to 104 pairs this year (Table 1). Poor weather and foraging conditions may have been a factor reducing the number of pairs breeding. Two adults were discovered dead in their boxes during the peak laying period; another dead adult was discovered on the terrace with injuries to the back and wing in an area that had been targeted by an adult Herring Gull *Larus argentatus* the day before.

Table 1: Seabird breeding statistics.

Species	Pairs 2015	Pairs 2016	% Change	1st egg 2015	1st egg 2016	Mean Clutch 2016	Fledged 2016	Productivity 2016	Sample
Fulmar	54	42	-22.2	17 May	19 May	n/a	31	0.74	Island
Eider	365	329	-9.9	27 Apr	27 Apr	n/a	n/a	n/a	Island
B-h Gull	4627	5,348	15.6	16 Apr	17 Apr	2.79	33	0.97	34 nests
L B-b Gull	28	26	-7.1	16 May	15 May	2.85	4	0.19	Sample*
Kittiwake	326	317	-2.8	15 May	20 May	1.83	32	1.07	30 nests
Sandwich Tern	1624	1,349	-16.9	29 Apr	08 May	1.51	n/a	n/a	Island
Roseate Tern	111	104	-6.3	18 May	17 May	1.20	91	0.88	Island
Common Tern	1160	1201	3.5	08 May	13 May	2.21	9	0.6	15 nests
Arctic Tern	1471	1490	1.3	10 May	12 May	1.88	18	0.6	30 nests

*Clutch size from island census, productivity from 21 study nests.

Three pairs nested on the terraces outside the boxes and one pair took up the offer of an upturned monastic 'trough' (Figure 1). With a mean of 1.2 eggs per nest (maximum 2), clutch size was the second lowest on record (2013). Three eggs were missing, presumed predated and six failed to develop. Chick mortality was highest within a few days of hatching (eight chicks), and a few (four chicks) died mid-way during development. In addition, 13 chicks disappeared at a young age and were recorded as missing, presumed predated. The overall productivity for the colony was 0.88, representing 91 fledged chicks.

Figure 1: Roseate Tern nesting in an upturned stone trough on Coquet Island. Photo Wez Davies.

All except one of the chicks that fledged were ringed with BTO rings on the left leg and a 'Rosy special' ring on the right. These latter rings have a four-digit alphanumeric code which is readable through a telescope, allowing return rates, recruitment from other colonies, survival and breeding success of the Roseate Terns to be monitored. Throughout the 2016 season 197 unique rings were recorded, including a Spanish-ringed bird returning from last year. An estimated 15 adult birds were present without rings. The proportion of breeding Roseate Terns originating as chicks from Coquet Island exceeded that of birds from elsewhere this year for the first time on record, suggesting that the colony is becoming self-sustaining.

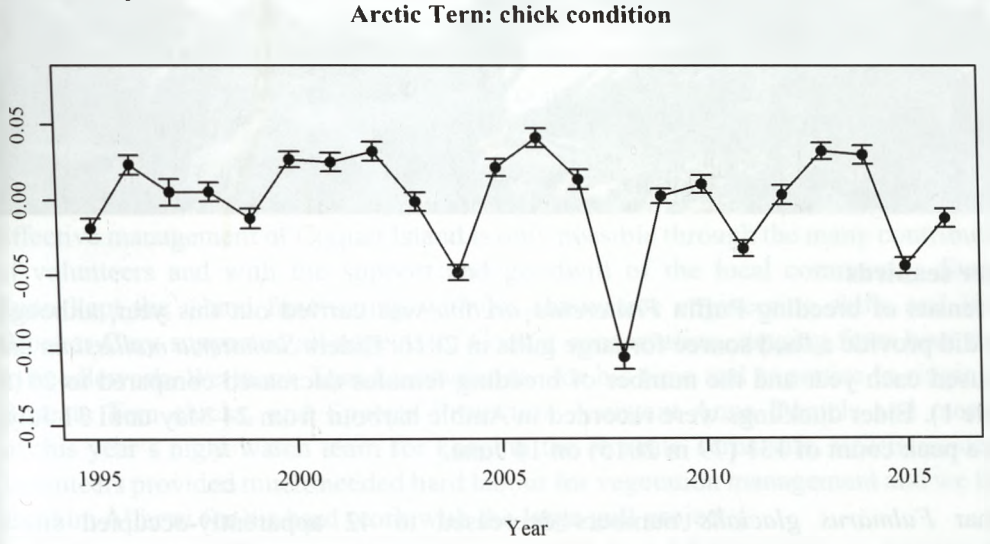
Throughout the season, 24-hour surveillance over the colony was maintained, including continuous CCTV coverage. There were many 'low level' day time incidents involving recreational canoeists approaching and attempting to land on the island, which were dealt with amicably, causing minimal disturbance to nesting seabirds.

Other tern species

The numbers of breeding Common *Sterna hirundo* and Arctic Terns *S. paradisaea* increased slightly, but clutch sizes and productivity were below average (Table 1). Despite the low productivity and poor weather conditions, the body condition of the Arctic Tern chicks was rather better than last year (Figure 2). This year, the Sandwich Terns *Sterna sandvicensis* nested in two main colonies; the first one to form was 998 pairs on the main plateau, followed by a later beach colony of 351 pairs, the total representing a decrease on last year (Table 1). The first colony was badly affected by poor weather conditions as eggs were hatching, but the beach colony appeared to be more successful. The Sandwich Tern colour-ringing project, now in its fourth year, was continued and 96 chicks were ringed with coded colour rings. Ring-reading of adult birds resulted in the identification of 142 colour-ringed individuals; these were birds colour-ringed on the Farnes or Coquet Island in previous years, or from the Ythan Estuary, Aberdeenshire,

but also included several Dutch birds. Samples of guano were collected and sent to Wouter Courtens of the Research Institute for Nature and Forest in Brussels for analysis alongside samples from around Europe.

Figure 2: Body condition index of Arctic Tern chicks derived from analyses of chick mass in relation to structural size. The vertical axis represents differences from the mean of all years.



Gulls

The Black-headed Gull *Chroicocephalus ridibundus* population increased in 2016 and the population is now at its highest ever level, surpassing the previous record in 1987. The weather also resulted in high chick mortality and 0.97 chicks fledged per pair (Table 1). These gulls nest in relatively well defined areas with little overlap with breeding terns. A pair of Mediterranean Gulls *Larus melanocephalus* began creating a nest within the Black-headed Gull colony, and at least three other individuals showed interest; however, poor weather conditions appeared to dissuade this species from nesting this year. The weather and associated poor foraging conditions may also have been a factor in the decline in breeding Kittiwake *Rissa tridactyla* numbers (Table 1) and productivity of these small gulls was relatively low for Coquet Island at 1.06 fledged per pair.

The research project to study the impact on breeding terns of the Lesser Black-backed *Larus fuscus* and Herring Gulls that also nest on the island was continued with the colour ringing of adult birds and their chicks on study nests when possible. Although the colour ringing of these birds was to enable their behaviour on and around Coquet Island to be studied, several adults and juveniles have since been seen in their winter quarters in Spain, Portugal and, recently, in Morocco (Figure 3). A new development in 2016 was the fitting of back-mounted GPS tags to five adults caught on the nest as their eggs were about to hatch. Tracks were obtained from three tags and suggest that these adults were foraging primarily over mainland areas.

Figure 3: Lesser Black-backed Gull, ringed as a chick on Coquet Island on 18 August 2016 (colour ring Green C:33) on a landfill site at El Jadida in Morocco (425 km due south from Portugal) on 9 January 2017. Photo Maarten van Kleinwee.

Other seabirds

No census of breeding Puffin *Fratercula arctica* was carried out this year, although they did provide a food source for large gulls in 2016. Eiders *Somateria mollissima* are censused each year and the number of breeding females decreased compared to 2015 (Table 1). Eider ducklings were recorded in Amble harbour from 24 May until 31 July, with a peak count of 131 (79 in 2015) on 14 June.

Fulmar *Fulmarus glacialis* numbers decreased to 42 apparently-occupied sites. Productivity was relatively high with 0.74 chicks fledged per pair. There was no sign of plastics in any regurgitates during ringing sessions as there has been in previous years.

OVERVIEW

This is the second year of poor productivity on Coquet Island due to weather conditions at critical stages of breeding. Despite this, the populations remain relatively stable and a second consecutive year of treble-figure Roseate Tern pairs is welcome. Although the productivity figures for Roseate Terns were higher than for Common and Arctic Terns, the monitoring methods are not comparable, and the provision of boxes, a controlled nesting surface and other protection measures (mollycoddling as far as is possible!) for the Roseate Terns are designed to maximise chick survival.

From a conservation management perspective for the island as a whole, vegetation growth remains the main concern, with wet weather conditions causing dense growth of Yorkshire Fog *Holcus lanatus* early in the season. New chick shelters attached to large solid bases are to be trialled in 2017 to suppress vegetation and provide shelter for Common Terns. There are also plans to test various coverings for suppressing vegetation growth in Arctic Tern areas in the forthcoming season.

Two recent colonisers to the island are Gadwall *Anas strepera* and Tufted Duck *Aythya fuligula*. These species are seldom seen on the island, apart from passage to and from their nests. There were four Gadwall nests and five Tufted Duck nests in 2016.

The island is also important for wildlife during the winter, with 28 Twite *Linaria flavirostris* present into March 2016, and the island supported roosting Turnstone *Arenaria interpres* (varying between 20-75) and Purple Sandpipers *Calidris maritima* (peak count of 123 in March 2016). Grey Seals *Halichoerus grypus* were present on and around the island during the winter and the size of the loafing population varied depending on tide and weather, with a peak count of 485 in March 2016.

ACKNOWLEDGEMENTS

Effective management of Coquet Island is only possible through the many contributions of volunteers and with the support and goodwill of the local community. Stephen Lunn kept the island functioning with his innovative engineering skills and Hilary Brooker-Cary supported all aspects of Coquet conservation, ranging from boat duties to needlework. We thank Tom Cadwallender for his time and expertise in ringing the Roseate Tern chicks, and Species Protection Assistant Anna Daniels and members of this year's night watch team for keeping the Roseate Terns safe. RSPB residential volunteers provided much-needed hard labour for vegetation management and we thank Ibrahim Alfarwi for his hard work with the large gull project.

THE LONG NANNY TERN COLONY IN 2016

Alan Dorman, Scarlett Hutchin, Rachelle Regan, Oliver Slessor and Will Whittington
National Trust, Low Newton-by-the-Sea, Northumberland NE66 3EL

INTRODUCTION

The Long Nanny tern site occupies approximately 7.5 hectares of sandy beach, saltmarsh and dunes within the Newton Links (Site of Special Scientific Interest) (Natural England, 1988) on the Northumberland coast, bordered by the Long Nanny burn to the north and High Newton-by-the-Sea to the south (Figure 1). The reserve is an important breeding site for Little Tern *Sternula albifrons*, Arctic Tern *Sterna paradisaea* and Ringed Plover *Charadrius hiaticula*. During the breeding season (May-August) a constant ranger presence is maintained there to monitor and protect these species.

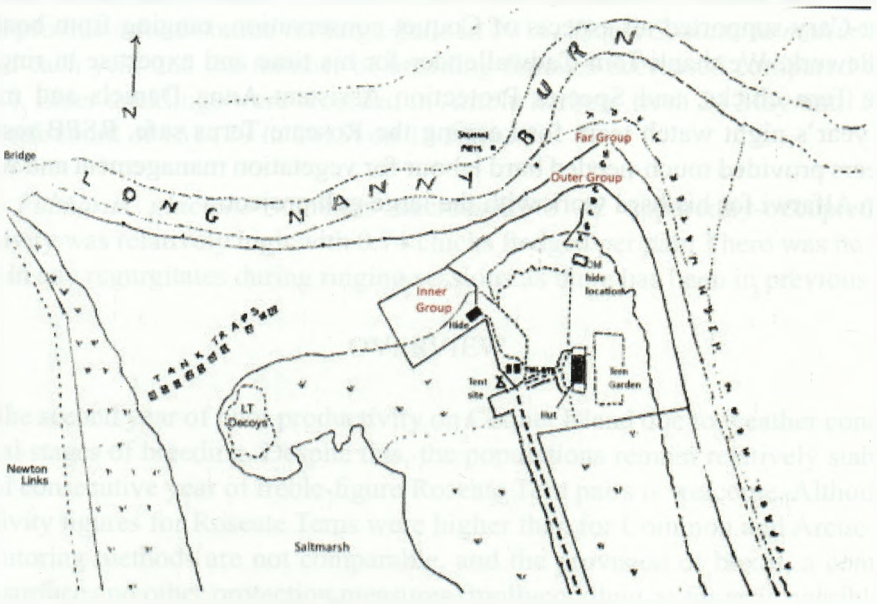


Figure 1: Map of the site (Map drawn by Will Whittington).

The Little Tern is the smallest and perhaps least adaptable British tern in terms of its breeding habitat requirements. Eggs are laid in shallow scrapes on open sand or shingle with little or no vegetation and in coastal areas which can be very close to the high-water mark (Cabot and Nisbet 2013) where there is a high risk of being washed out during high tides and storms, a perennial issue for the Long Nanny colony. Little Tern nests are vulnerable to predation, and increased beach use by people has reduced availability of suitable nesting habitat. The British population has declined between 1976 and 2005 and remains the second-rarest breeding seabird in Britain with an estimated 1900 pairs (Cabot and Nisbet 2013). The species has amber conservation status in the list of Birds

of Conservation Concern (Eaton *et al.* 2015) and is protected under Schedule 1 of the Wildlife and Countryside Act 1981.

The Arctic Tern is the most northerly breeder of any northern hemisphere tern, and in the UK is at the southern edge of its breeding range. Although less particular in nesting habitat than Little Terns, the Britain and Ireland population of Arctic Terns has declined from 80,000 pairs in 1984-1988 to about 56,000 pairs 20 years later. The species has amber status in the list of Birds of Conservation Concern (Eaton *et al.* 2015).

Ringed Plovers breed on open shores and the British population has also declined in recent years, with a 37% reduction between 1984 and 2007 (Robinson *et al.* 2015). As a result of continued declines in both breeding and wintering populations, the Ringed Plover was moved from amber to red status in the most recent list of Birds of Conservation Concern (Eaton *et al.* 2015).

Little Tern, Arctic Tern and Ringed Plover are all included in the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, with a status of least concern (IUCN, 2016). The National Trust has protected the Long Nanny Little Tern colony since 1977, when three pairs of Little Terns bred there. Numbers subsequently increased, remaining at 30-50 pairs during the 1990s and early 2000s but have declined somewhat since then. The Long Nanny site also supports a regionally important population of Ringed Plovers, with 10-15 breeding pairs. The protection of the site appears to have contributed to the large number of Arctic Terns colonising the area. The first recorded pair bred on the reserve in 1980 and since then the colony has grown to a peak of 2,443 pairs in 2014 (Bridge *et al.* 2014), making it the largest mainland colony in the UK.

The primary nesting area for both tern species is a low-lying sand spit at the northeastern end of the site. The site is extremely dynamic and subject to frequent topographical changes, particularly during the winter months. In recent years, the sand spit has eroded and now much of it is regularly covered by spring tides. Without ranger intervention, this would result in the majority of Little Tern nests being washed out and deserted. In addition, this stretch of coast is popular with holidaymakers, dog walkers and other leisure users and protecting the colony from human disturbance is a significant part of the National Trust's work.

CONSERVATION AND MONITORING METHODS

Work began at the site on 4 May this year and five assistant rangers were resident from 6 May to 27 July to manage visitors, monitor breeding birds and minimise disturbance and predation. A night shift started when the first Arctic Tern egg was laid on 15 May, and the site monitored 24 hours a day for the rest of the season. Volunteers helped the ranger team with public engagement and disturbance monitoring. To discourage people from passing along the beach at high tide, the colony area was cordoned off with a

rope-and-post fence, extending 30 metres down the beach at the southern end. Signs with the instructions "Nesting shorebirds, do not pass this point. Dogs must be on a lead" were placed 10-20 metres outside the ropes at 15 metre intervals. Other signs and access restrictions were placed to direct people to the footpath across the dunes to the Long Nanny bridge, and so divert them from walking along the beach or accessing the saltmarsh.

Habitat management

The tern garden is an area on the seaward side of the rangers' hut (Figure 1) where the vegetation is removed to provide a nesting area for Arctic Terns which reduces competition with Little Terns for nest sites on the beach. Last year, the area was strimmed (Finan *et al.* 2015) but vegetation returned quickly during the season (Kate Bradshaw, pers. comm.). The tern garden was doubled in size for 2016 and rotavated after strimming in an attempt to slow re-growth. This was partially effective but vegetation had returned to approximately 50% of the height of the surrounding vegetation by the end of the season. Other vegetation management comprised removal of Pirri-pirri Bur *Acaena novae-zelandiae* and Common Ragwort *Senecio jacobaea* where possible.

An area of approximately 150 square metres projecting into the saltmarsh was also strimmed and rotavated to provide an alternative nesting area for Little Terns. In an attempt to attract Little Terns to safer nesting habitat, life-sized decoys were placed in scrapes in the rotavated area and in an elevated area of the adjacent saltmarsh. A recording of Little Tern calls was played in the decoy area from 08:00-10:00 and 14:00-16:00 daily between 14 May and 2 June.

Breeding bird monitoring

Rangers did not enter the colony in poor weather except when essential for nest protection. Daily counts of adult Little Terns were carried out throughout the season. Nest checks were initially made by walking through the colony each day to record an accurate first egg date for Arctic and Little Terns, but as this was not done in poor weather these checks were somewhat sporadic this season. Otherwise, monitoring was from the hide or the west bank of the saltmarsh. Nest locations were marked on a map of the site and nest status was recorded on nest-history sheets

Arctic Terns were monitored less intensively. The number of breeding pairs was estimated on 5 June, during a period of dry and relatively warm weather, by four observers in a line each walking a transect about 2 metres wide over a period of 80 minutes through the colony, from the south to the west end of the spit. Each observer counted apparently occupied nests (AON), recording the number of eggs in each nest scrape; an empty but apparently active scrape (fresh material or signs of recent activity) was recorded as zero eggs. To prevent double counting, a marker (a dried red kidney bean) was placed in each nest. Ringed Plover nests were individually monitored throughout the season.

Protection of breeding birds

A six-strand electric fence was installed around the tern colonies on 10-11 June. The fence was electrified during each night shift, and turned off each morning. On occasions where the tide was predicted to touch the wires at high water, the fence was turned off, and during spring tides the wires were all lifted to the top of the posts to prevent damage or fouling. The fence was brought in on 26 July.

As in previous years, well-established Little Tern nests or nests under immediate threat of tidal inundation were raised into sand-filled plastic fish boxes. Tide heights were monitored carefully during spring tides and if water appeared close to washing over boxes, eggs and chicks were collected in labelled egg boxes and cloth bird bags, kept warm until the water receded and then returned to nests. Some nests in fish boxes were moved up to 4 metres further inland during the season to reduce the risk of tidal inundation. Small wooden shelters and spare pallets were later placed in the colony to give chicks some protection from weather and predators. For Arctic Terns, there was no attempt to safeguard individual nests.

For Ringed Plovers, a wire mesh cage to exclude predators while allowing access to the breeding birds was secured over each nest where possible. Empty cages were also placed near nests to reduce the chance of predators learning to target cages. In all cases, the incubating bird returned to the nest within ten minutes of the cage being placed.

During the season, a variety of additional anti-predator devices were employed, including strategically placed lights during darkness, the use of strong scents, two-way radios, and a radio receiver tuned to talk radio stations. Chicken wire fences were used in attempts to prevent predation by Stoat *Mustela erminea,* and orange netting was erected as a network around the colony to act as a barrier against larger predators such as Fox *Vulpes vulpes* and Badger *Meles meles*. Finally, Fenn, Doc200 traps and live traps were used to try and catch Stoat from early in the season.

Weather recording

Three temperature readings (current, maximum and minimum) were recorded during the period 2 June-27 July at 09:00 each day using a digital max/min thermometer located on the ground and protected by a wooden board to the north side of the hut out of direct sunlight. Rainfall (mm) was recorded, usually daily, at Newton Point (1.5 miles to the south) using a copper rain gauge. Cloud cover (oktas) and wind strength (Beaufort scale) were estimated daily at 09:00. Wind direction was estimated using an eight-point compass rose.

Disturbance recording

For disturbance events lasting longer than 30 seconds or more, three categories for recording disturbance intensity were used: Minor (less than 1 minute and/or any disturbance of less than 30% of terns); Moderate (any disturbance involving more than 30% but less than 100% of terns); Major (any disturbance involving 100% of terns).

Human disturbance events were split into the categories used by the EU Little Tern project: human, joggers, vehicles, loose dogs, dog walkers, kites and unknown. Any predator or wildlife disturbance was attributed to the species causing the disturbance with a comment on the success of the attack. Rangers took action to minimise and mitigate disturbance by talking to beach users and attempting to prevent predation.

Feeding surveys

Rangers selected one Little Tern brood at a time to record chick feeding attempts over a period of at least 60 minutes. The time of each feeding attempt, the prey species, the size of each prey item in relation to adult bill length and whether it was successfully ingested by the chick were recorded. Most broods were not viewable from the research hide and the majority of feeding surveys were undertaken from the west bank of the saltmarsh using a telescope. Feeding of Arctic Tern chicks was monitored by casual observation.

RESULTS

Weather

The season began unseasonably cool, with north or northeasterly winds, although dry until the end of the month when a total of 20.1 mm of rain fell in the final week. The first half of June continued cool and wet, with the lowest minimum temperature for the season (5 °C) recorded on 6 June; the northerly and easterly winds combined with the spring tides caused problems for the birds. A spell of warmer drier weather then led to warmer and muggy weather at the start of July, the warmest month.

Little Tern

The peak count of adult Little Terns was 68 on 14 May. The first Little Tern nests were established on the beach between the sand spit and the saltmarsh rather than on the sand spit where they have historically nested at the Long Nanny. Nests were later established on the sand spit, resulting in two distinct sub-colonies referred to as the inner and outer group. Late in the season, a third group, referred to as the far group, was established at the northern end of the spit, with some nests initially found beyond the boundary ropes. The first lay date in the inner group was 20 May (nest 1; Table 1), followed by the first confirmed egg in the outer group on 26 May (nest 4). Nests 5-31 were near these groups, except for nests 17 and 18 which were within the denser Arctic Tern colony. Both these latter nests deserted on 2 June. Although Little Terns were seen flying over, taking off or landing on the decoy area between 12 and 21 May, there were no nesting attempts in this area.

The outer group was at greater risk from tidal effects; all boxes were washed away during the most extreme high tide events of the season on 4-6 June while eggs were safeguarded in the hut; only active boxes were replaced after high water. Subsequently, nests at risk were incrementally moved (on their boxes) further inland and west towards the high-water mark by up to 5 metres to protect against further inundation. This reduced the impact of the tides and resulted in no further washout events, although another

consequence was that some Little Tern nests were closer to the densest area of Arctic Terns, which could have resulted in negative interspecific interactions. Nevertheless, all birds subsequently returned to their nests and continued incubating for at least 10 days, and four of these nests hatched chicks.

Little Tern eggs or chicks had to be brought into the hut to prevent them from being washed out by tides nine times throughout the season (Table 2), and all except three nests were raised for safety at some point. Two unraised nests survived to hatch chicks and one was deserted during incubation. The maximum time eggs or chicks were kept inside the hut was 96 minutes (mean 53 minutes). A maximum of three chicks were brought in at one time. The high tides on 25 May resulted from strong northeasterly winds and nests in the outer group would have been washed away without ranger intervention, despite being raised onto boxes. Four of the six affected nests were deserted the following day. One nest successfully hatched a chick on 15 June (fate unknown). The remaining nest was deserted over a week after the high tide event. The high spring tides from 4-6 July were the only occasions on which it was necessary to collect chicks (Table 2). One of these chicks fledged successfully, one was later found dead on the box and the fate of the third is unknown.

Overall, 37 nesting attempts were made by a minimum of 17 pairs (known to be active at the same time; Table 3). To maintain consistency with previous reports, productivity calculation was based on the minimum number of pairs. Hatch dates for the five Little Tern fledglings were estimated from nest histories and could have originated from six possible nests, all in the inner group. Annual variation in colony size and productivity since 2001 is summarised in Figure 2.

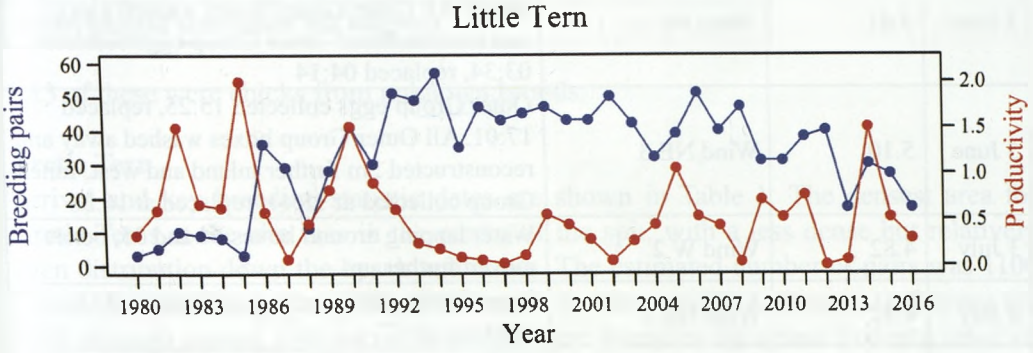


Figure 2: Annual variation in the minimum number of Little Tern breeding pairs and minimum productivity at the Long Nanny since 2001.

Prey size and rate of feeding appeared to be consistent throughout the season. Sandeels were the most common prey item (51%) and were of a similar mean size to those recorded last year (Table 4); clupeids represented 35% of the diet and unidentified fish 14%. No invertebrates were seen.

Table 1: Key events for Little and Arctic Terns.

Event	Little Tern 2016	Arctic Tern 2016
First observed at site	30 April	4 May
First seen scraping	8 May	7 May
First observed mating	15 May	7 May
First egg	20 May	15 May
First nest raised	22 May	n/a
First hatchling	14 June	11 June
First fledgling	7 July	12 July
Monitoring ended	27 July	27 July

Table 2: Summary of action taken to safeguard eggs and chicks during high tide events in 2016.

Date	Height (m)	Weather	Comments
25 May	4.62	Wind NE 4-5 Swell	Outer Group eggs collected 05:15, replaced 06:00
25 May	4.44	Wind NE 4-5 Swell	Outer Group eggs collected 17:34, replaced 18:29
4 June	5.02	Wind N 2	Inner Group eggs collected 14:56, replaced 15:11
5 June	5.01	Wind NE 3	Outer Group eggs collected 03:00, replaced 04:49. All Outer Group boxes washed away and reconstructed. Inner Group eggs collected 03:34, replaced 04:14
5 June	5.10	Wind NE 3	Outer Group eggs collected 15:25, replaced 17:01. All Outer Group boxes washed away and reconstructed 2m further inland and west. Inner Group collected at 15:41, replaced at 16:38
3 July	4.82	Wind W 2	Water lapping around boxes 34 and 35, boxes moved further up
4 July	4.92	Wind NE 2	Inner Group chick and egg collected 15:47, replaced 16:17
5 July	5.00	Wind NW 1	Far Group eggs collected 03:48, replaced 04:53. Boxes moved forward
5 July	4.94	Wind NW 1	Inner Group chicks collected 15:59, replaced 17:22
6 July	5.03	Wind W 1	Inner Group chicks collected 04:15, replaced 05:08.

Table 3: Breeding statistics for Little Tern, Arctic Tern and Ringed Plover at the Long Nanny.

	Little Tern	Arctic Tern	Ringed Plover
Minimum number of pairs/AON	17	1100*	6
Number of scrapes	37		16
Number of eggs	65	1242	52
Mean clutch size	1.76	1.63**	3.25
Number of hatchlings	24¶		16
Known egg losses		364	
Chicks lost	3-19		3-8
Adults lost	2	10	0
Number of fledglings	5	2	5
Productivity* **	0.29	0.002	0.83

¶from 16 nests.
*760 scrapes with eggs and 350 scrapes apparently active but without eggs.
**maximum was 5 eggs.
***based on the minimum number of pairs present.

Table 4: Little Tern feeding surveys.

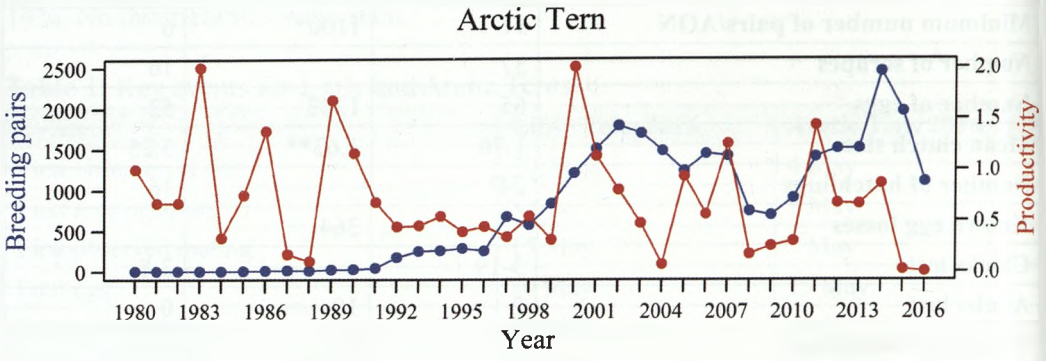
Number of observations	29*
Total observation hours	30 h 7 min
Mean feeds per hour	3.7
Successful feeding attempts	87.50%
Mean Sandeel size (adult bill lengths)	1.5
Mean clupeid size (adult bill lengths)	1

* 13 of these were chicks from unknown broods.

Arctic Tern

Arrival and key breeding-statistic dates are shown in Table 1. The densest area for Arctic Terns at the site was in the centre of the spit, with a less dense but relatively even distribution down the beach and dunes. The estimated number of pairs was 1100 (Table 2), continuing the decline from peak numbers in 2014 (Figure 3). During the walk-through census, 364 Arctic Tern eggs were found on the strand line as a result of the high spring tides on 5 June. With only two fledglings (Table 3), this is the lowest productivity of any year since the Arctic Terns started nesting at the Long Nanny in 1980 (Figure 3). No formal feeding surveys were undertaken on Arctic Terns this year. Casual observations indicated that good-sized fish (often at least three times bill length) were being brought into the colony at the beginning of the season but were smaller during June and July. Provisioning of chicks appeared poor but the frequency of feeds was not monitored.

Figure 3: Annual variation in Arctic Tern breeding pairs and productivity at the Long Nanny since 2001.



The low productivity is likely to be directly related to the presence of Stoat on site for the past two years. Most of the adult birds left their nests at night for the majority of nights this season, most often for around three hours (midnight to 03:00) but sometimes considerably longer. The time absent tended to increase towards the end of the season and in the final week adults were leaving around 22:00 and not returning until after 04:00. This behaviour was more pronounced during periods of intense Stoat activity and at these times even birds that remained would often circle extensively rather than sit on their nests. Chicks were also repeatedly abandoned at night, even in poor weather.

Ringed Plover

With the combination of intensive predator activity, poor weather, and an increasing number of non-breeding terns roosting on the beach, it became gradually more difficult to monitor Ringed Plover activity without causing an unacceptable level of disturbance to the tern colony. As a result, the status of some nests remained unknown. Sixteen nesting attempts were made by a minimum of six pairs (simultaneously active; Table 3); from the distribution of territories, nine pairs were likely to be present. Six nests were known to fail. Sixteen chicks were recorded from seven nests, one bird was still sitting at the end of the season and the fate of the remaining eight nests is unknown. Five chicks were seen to fledge and two were still on site at the end of the season; the fate of the other five is unknown. In addition, one nest was caged and monitored outside the southern boundary of the site but was subsequently deserted.

No egg predation was directly observed. Ringed Plover clutches remained intact in areas where large numbers of Arctic Tern eggs appeared to have been predated by Black-headed Gulls *Chroicocephalus ridibundus* and Carrion Crows *Corvus corone,* which suggests that the cages provided some protection against these species. There was no confirmed predation of Ringed Plover chicks, but a Kestrel *Falco tinnunculus* was repeatedly seen stooping near plovers on the spit and may have taken at least one chick from each of two nests. A Stoat was seen attacking Ringed Plover chicks in the salt marsh on 24 July but was unsuccessful due to ranger intervention.

Disturbance

Along with the 2500 visitors to the site, there are a wide variety of different beach users including dog walkers, joggers and people indulging in water sports. These various human activities have an impact on the colony and effective monitoring is important for developing strategies to minimise deleterious effects. Ensuring that the data collection methodology is robust and judging how the data should be interpreted is challenging, particularly with respect to possible differential effects on breeding and non-breeding birds, the impact of the rangers, and impacts on different species.

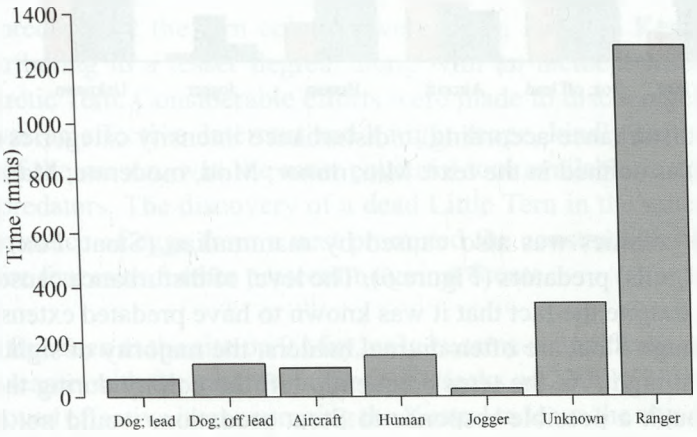


Figure 4: Total duration (minutes) of human disturbance including ranger.

Ranger disturbance, which includes visits into the colony to protect eggs and chicks during high tide events, reconstructing sub-colonies after inundation, and essential monitoring work, accounts for a greater proportion of disturbance than any other category (Figure 4). Regular ranger disturbance may also be beneficial by helping to deter predators. Total disturbance time in response to human activities apart from rangers is summarised in Figure 5. The largest category is 'unknown' disturbance where human activities were suspected but not verified. 'Human' disturbance was due to walkers who ignored the signage and disturbed the low tide roost or approached boundary ropes. Military and small private aircraft flying below the 1500 ft minimum over the site caused the highest 'major' human disturbance this year. Dogs off their leads and poorly controlled have been an issue throughout the season.

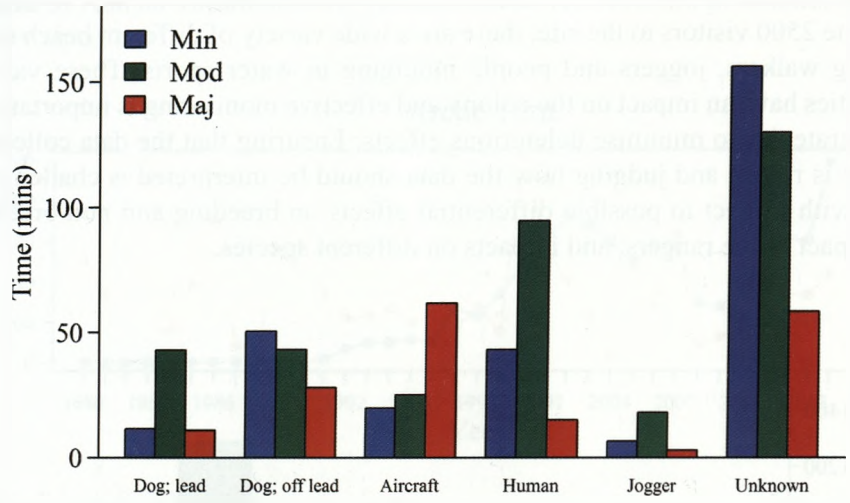


Figure 5: Human disturbance according to disturbance intensity categories (excluding ranger disturbance) as defined in the text**:** Min, minor; Mod, moderate; Maj, major.

Disturbance to the colonies was also caused by mammalian (Stoat, Fox) and avian (Kestrel, crows and gulls) predators (Figure 6). The level of disturbance caused by Stoat was relatively low, despite the fact that it was known to have predated extensively over a long period. Although Stoat are often diurnal hunters, the majority of sightings at the Long Nanny were at night. As the terns frequently left the colony during the hours of darkness this, although a possible response to Stoat predation, would not have been recorded as disturbance. Terns dreaded very strongly for Foxes in nearly all cases, but only in the earlier part of the season when large numbers were present through the night.

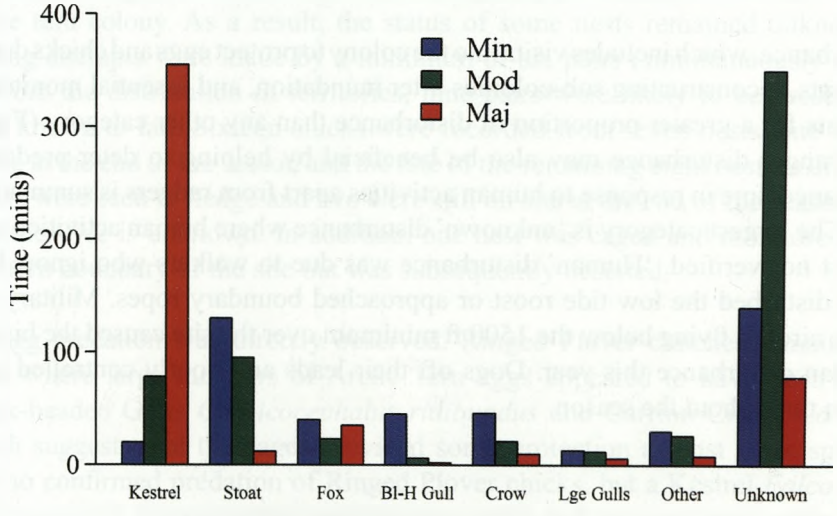


Figure 6: Duration (minutes) of disturbance by predators. Bl-H Gull, Black-headed Gull; Lge Gulls, Large gulls; Other, other wildlife.

Kestrel caused considerably more disturbance than any other predator (Figure 6). As a likely consequence of management in previous years, crows seemed wary of entering the main colony. There are many instances of crows being mobbed by terns when flying over, often driven west to the dunes by small groups of terns. Significant crow predation is impossible to extract from this data set, but there are suspicions based on footprints at the south end of the site – a large blind spot – and observations of crows flying and walking on the beach early in the season, that eggs were taken without causing significant dreads. It is recognised that Black-headed Gull has had an impact on the site but again the data show this poorly as the colony did not seem to recognise them as a threat.

Predation

The main predators at the tern colonies were Stoat, Fox and Kestrel, with gulls and crows contributing to a lesser degree, along with an incident where a domestic dog killed an Arctic Tern. Considerable efforts were made to discourage predation. Human presence was an effective deterrent and a night scope, kindly lent to the team for the latter half of the season, was the most powerful tool available to combat the effect of nocturnal predators. The discovery of a dead Little Tern in the inner group along with the disappearance of eggs from a nest prompted the construction of two 1 metre high chicken wire fences as further protection against Stoats.

A Kestrel, first seen at the site on 9 May, only became a significant problem towards the end of the season with the greatest number of attacks on 23 July. Noisy and gesticulating rangers proved effective in encouraging the Kestrel to leave the site. Crows were present throughout the season but Little and Arctic Terns reacted on most occasions when crows tried to enter the colony by mobbing and chasing; crows also responded well to noisy and gesticulating rangers. Gulls were recorded daily at the Long Nanny; of greatest cause for concern were Black-headed Gulls which were frequently seen approaching the colony on foot from the burn and flying low over the beach and spit. Although none was observed taking eggs or chicks, the presence of broken eggs suggests that they contributed to their loss. In July, Lesser Black-backed Gulls *Larus fuscus* often caused the Arctic Terns to dread, but, with the exception of an attempt to take a near-fledged Arctic Tern on 23 July, there were no observed instances of predation. A Barn Owl *Tyto alba* killed an adult Arctic Tern on 5 July.

Foxes were recorded on 27 occasions during the 81-day season. Even with the use of the night scope, detection of a fox was most reliably assisted by a Ringed Plover 'hoo-it' alarm call, especially later in the season when Arctic Terns left the colony and assembled on the beach during the hours of darkness. Despite the electric fence, the most effective deterrence, Fox accounted for the death of at least one Arctic Tern on 29 May. Badgers were also active at the site, but there was no evidence of detrimental effects on the tern colonies. An Otter *Lutra lutra* was seen on two occasions in July, and although mobbed by Arctic Terns on the second occasion, the animal did not show any interest or cause damage to nesting birds. A domestic dog killed a roosting Arctic Tern on 18 May by running into the roost from the north beach.

The Stoat became noticeably bolder during the season; having taken all living chicks from the tern garden and the east side of the spit, it turned its attention to the middle of the spit where the density of the Arctic Tern colony was greatest. Stoats also killed six adult Arctic Terns between 17 June and 18 July. Despite a total of 202 trap nights over the 81-day season, the rangers were unsuccessful in removing the Stoat. Stoat scent was used without success in the traps; 'scent-marking' around the colony was investigated as a possible way to discourage Stoat activity and there was some anecdotal evidence that this approach may be worth investigating in the future.

Volunteers and visitors

The site benefited from 13 regular volunteers who contributed a total of 522.25 hours of work, with a focus on visitor engagement and disturbance monitoring during the peak times of the day which allowed the ranger team to carry out other tasks. There were 2504 recorded visitors during the season, many of whom contributed to the work of the Trust through buying raffle tickets and cash donations. Unfortunately the current viewing platform was not ideal for visitor engagement and interpretation because of changes in Little Tern nesting areas and the movement of boxes to mitigate high tides.

SUMMARY

This has been a poor year for Little Terns at the Long Nanny, with adverse weather, intense predation and exceptionally high tides all playing a role. Despite the low productivity and comparatively small number of breeding pairs, one positive change that has come about this year is the establishment of a new nesting area for Little Terns. With the apparent increase in the severity of winter storms and uncertainty over the longevity of the sand spit, it appears that this area could offer the most sustainable nesting habitat. Continued efforts to protect and develop the area for Little Terns may prove rewarding in the future.

Ringer Plover © Peter Fawcett.

ACKNOWLEDGEMENTS

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THE BIRDS OF THE FARNE ISLANDS 2016

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The National Trust rangers sailed for the islands on 18 March and manned the islands for 262 days until 5 December. In total, 183 bird species were recorded and 82,526 pairs nested across the islands.

WEATHER

The season began warm and dry in early April, which ensured that the 2016 breeding season kicked off on time. A force 8 northerly storm blew through on 25-26 April which made many Kittiwakes depart the cliffs and the Sandwich Tern roost disperse. May was unsettled but dry; seemingly persistent winds blew from all directions and although not strong enough to do any damage to seabirds, the winds severely hampered the visitor experience, particularly on Staple Island where landing days were few and far between. Some easterly winds during this period bought some great days birding with Thrush Nightingale, Bluethroat, Red-backed Shrike, Icterine Warbler and Common Rosefinch on the Outer Group.

The beginning of June was poor, with another northerly (force 7) storm over 31 May to 1 June; fortunately, there was no accompanying rain, so most birds were able to ride it out, although some birds on the more-exposed northerly sides of the islands lost their nests. June then continued in similar fashion to May, with persistent winds which restricted the rangers to only six cliff counts.

July, August and September were fine, with higher than average temperatures and lower than average rainfall. At the end of August the wind went easterly for a few days, bringing in a Wryneck and a Wood Warbler.

In contrast, October was a month to remember. From 1 October, an unprecedented run of 16 days of easterly winds brought both elation and some disappointment for the rangers. During this period, a Common Rosefinch, Great Grey Shrike, five Little Bunting, two Pallas's Warbler, two Red-breasted Flycatchers, a Dusky Warbler, Firecrest and double figures of Yellow-browed Warblers passed through the islands, keeping the rangers in an almost-constant state of happiness, apart from the knowledge that even more-unusual birds were turning up elsewhere. The rest of October passed without incident and, in keeping with earlier months, was drier and warmer than average.

November began well, and seal-monitoring work continued unhindered by the weather. Temperatures dropped rapidly as the month progressed; the temperature averaged 4.4°C on 20 November. Two days later the islands were hit by the biggest storm of the season

with force 9 northerly winds and 42mm of rain. This caused the Pele Tower to leak in numerous places and killed a number of seal pups. Normality then resumed, and the rangers were able to leave the islands on 5 December as planned.

Overall, 2016 was a very dry year (Table 1), particularly when it mattered during the breeding season. With the largest daily rainfall at just 8.8 mm in May, 8.5 mm in June and 9.8 mm in July, burrow flooding was virtually non-existent, although some of the worst areas on Brownsman suffered a little in July, and a few soggy Pufflings were found during monitoring activities. Compared to last year, June temperatures were low, but conditions during the rest of the summer were warmer (Table 2).

Table 1: Total rainfall for Inner Farne by month during the season in 2014, 2015, 2016 and the Seahouses average.

Rainfall (mm)	May	June	July	Aug	Sept	Oct	Nov	Total
Inner Farne 2016	23	49.2	39.5	29.7	28.4	36.4	57.6	263.9
Inner Farne 2015	68	33.9	67.9	64.9	35.4	74.9	96.3	441.3
Inner Farne 2014	46.5	42.4	53.1	94.2	10.3	40.9	69.5	356.9
Seahouses Average	52	48	55	72	61	59	71	319

Table 2: Average temperatures by month for Inner Farne in 2015, 2016 and the Seahouses average.

Average temperature °C	May	June	July	Aug	Sept	Oct	Nov
Inner Farne 2016	10.1	12.1	15.0	15.5	15.0	12.8	5.6
Inner Farne 2015	10.0	13.35	14.45	14.65	13.3	10.65	7.9
Seahouses Average	10.1	12.8	14.3	14.4	12.2	9.8	6.3

BREEDING BIRDS OVERVIEW

With rain the determining factor of breeding success last year, this year it was wind. A relatively dry period made for a better season for Puffins, a species which suffered in 2015. However, those species without the luxury of an underground shelter fared significantly worse, particularly cliff-nesters. After the record total last year of 27 nesting species, only 24 species nested this year. Shoveler did not return for a third successive season, there was no evidence of an attempt from Carrion Crow, and despite considerable effort to attract Roseate Terns and the presence of a displaying pair, Roseate Tern did not breed. A notable highlight was the appearance of Red-breasted Merganser ducklings, a rare sight on the islands.

As Shags were setting up nests in late March and rangers were settling into the islands, the weather was warm and there was hope that this would turn into a fine season.

Unfortunately, the fine weather was not to last; the wind seemed relentless, and a few big storms and low average temperatures (just 8.4 °C on 1 June) seemed to put some birds off. A large storm on 25 April which washed nests off the cliffs also seemed to disperse the Sandwich Terns that had gathered, and the eventual breeding population never fully recovered.

On the positive side, Fulmar numbers increased after the crash in numbers last year, and Eider numbers rose slightly; this was also coupled with a strong breeding season for both species. Despite the cliff-nesting species suffering from low productivity, the Razorbill population rose by 15 pairs while Guillemot, Kittiwake and Shag numbers decreased. As was the case last year, the end of the summer was fine, which meant that, although the number of pairs of breeding Swallow and Pied Wagtail was reduced, many pairs managed to get second broods away.

Fulmar © Andrew Motion.

Table 3 gives a comparison of the latest population trends from the Seabird Monitoring Programme (SMP) and the Farne Islands. The SMP is run by the Joint Nature Conservancy Council (JNCC) and consists of population counts gathered from across the UK and Ireland. Seabirds face an uncertain future as climate change warms the oceans, and a shift northwards of some breeding species is predicted as a result of changes in the distribution of their main prey species towards colder waters. This, coupled with ocean pollution and human impacts, means that regular and standardised monitoring of key indicator species is essential, and the SMP provides an excellent resource for data comparisons. Overall, general trends appear similar, but the greater decline in Great Cormorant and the three tern species on the islands compared to national trends is notable; conversely, the two auk species seems to be doing better on the islands.

Table 3. A comparison of the latest population trends from the SMP compared to that of the Farne Islands.

Species	National population change (%) 1998-2002 to 2015	Farne Islands population change (%) 1998 to 2015
Northern Fulmar	-31	-11
Great Cormorant	-8	-45
European Shag	-34	-33
Black-legged Kittiwake	-44	-30
Black-headed Gull	+38	+655
Great Black-backed Gull	-11	+2100*
Sandwich Tern	+13	-65
Common Tern	-10	-46
Arctic Tern	+17	-12
Guillemot	+5	+47
Razorbill	+32	+208

*In 1998, just a single pair of Great Black-backed Gull nested on the Farne Islands, and the very large percentage increase is misleading.

BIRD MIGRATION OVERVIEW

An excellent year for migrant birds resulted in 183 species being recorded around the islands (173 for the Inner Group and 128 for the Outer Group). Spring was much more productive than last season, with a good scattering of regular drift migrants such as Red-backed Shrike and Common Rosefinch, while autumn pulled some real surprises out of the bag. Selecting a 'bird of the year' was a challenge in a season that produced three Farnes firsts in Egyptian Goose, Pacific Golden Plover and Siberian Stonechat (pending acceptance by record committees), as well as some amazing rarities such as the islands' third Kingfisher, fourth Thrush Nightingale and first King Eider since the 1920s. After much discussion it was decided that the Stonechat just edged it: it is hard to beat a rare Siberian vagrant!

A few notable 'falls' and some impressive visible migration produced several record day-counts, including the highest ever counts of Pink-footed Goose and Linnet, the second-highest counts of Chiffchaff and Bar-tailed Godwit, and the third-highest counts of Whooper Swan, Canada Goose and Goldcrest.

In order of status, notable species recorded this season included Siberian Stonechat (first record), Pacific Golden Plover (first), Egyptian Goose (first since naturalisation), Kingfisher (third), Thrush Nightingale (fourth), White-fronted Goose (seventh), Dusky

Warbler (tenth), King Eider (twelfth), Nightjar (twelfth), Great Shearwater (sixteenth), Hen Harrier (eighteenth), Cory's Shearwater (eighteenth), Pallas' Warbler (nineteenth and twentieth) and Osprey (twentieth).

As is often the case, there were several notable absences this year including Red-necked Grebe (first blank year since 1978), Grey Phalarope (second blank since 1998), Barred Warbler (second blank since 1997) and Wood Sandpiper (fourth blank since 2000). The first records of Siberian Accentor for Britain occurred this year, and, given the numbers that occurred on the east coast this autumn, including an individual on nearby Lindisfarne It was frustrating that the islands missed out on the unprecedented influx of this species across Europe as a whole.

SYSTEMATIC LIST

The status of each species is classified using the categories listed below in order of the Eighth edition of the British List (BOU, 2013). For species breeding on the Farnes, an occurrence is counted as a single nesting pair, and a five-year mean of pairs 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, but 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

For the breeding statistics in the species accounts, the 2016 figure is given and a five-year mean is given in brackets next to it.

Mute Swan *Cygnus olor*. An uncommon visitor.
As with last year, there was just a single record of Britain's heaviest wild bird, with a lone individual flying north through Inner Sound on 24 August.

Whooper Swan *C. cygnus*. An uncommon passage and winter visitor.
Spring passage was more evident than last year, with two herds totalling 63 birds north on 27 March (the third highest ever island count), followed by two birds north on 10 April. Contrastingly, the only record in autumn was five north through Inner Sound on 2 November.

(Greater) White-fronted Goose *Anser albifrons*. A rare visitor.
On 19 October, an adult flew low southwest over Inner Farne with four Pink-footed Geese, calling as it passed overhead. This was the first record since 2011, and only the seventh for the islands in total.

Pink-footed Goose *A. brachyrhynchus*. A well represented passage and winter visitor.
Spring passage produced 25 north on 9 April and 42 north on 17 April, a much better showing than last season. Autumn movements were more impressive, with 26-161 recorded on four dates from 28 September to 28 October. During this period the island day-count record was broken, with 2,061 birds heading south in 48 skeins on 29 September, including groups of 100, 120 and 138.

Greylag Goose *A. anser*. An uncommon passage and winter visitor.
Movements around the Farnes involve both feral and wild birds, and this season produced three records. One north over Brownsman on 17 May was the sole spring sighting, with autumn records of one north over Inner Farne on 28 October and three north through Inner Sound on 1 November.

Greater Canada Goose *Branta canadensis*. An uncommon passage visitor.
An early record of two north on 28 March was followed by three south on 9 April and four north on 14 April. As usual, the largest count came in June as birds made their annual moult migration to northern Scotland, with 153 north on 5 June representing the third highest ever day-count. Less usual, 65 flew south through Staple Sound on 19 June.

Todd's Canada Goose *B. canadensis interior*. An extremely rare visitor.
A lone Canada Goose amongst a flock of Barnacle Geese was identified as belonging to this subspecies as it flew north past Blyth on 19 October; an hour and 37 minutes later the flock passed north through Inner Sound. If accepted, this will represent the first record for the islands.

Barnacle Goose *B. leucopsis*. A well represented passage and winter visitor.
An even quieter season than last year, with no spring records at all. Autumn produced 3-22 on four occasions from 22 September to 2 November, with a higher count of 84 north on 19 October. A lone bird took up residence on Staple Island from 11 November, grazing amongst the seal pups until at least 19 November.

Brent Goose *B. bernicla*. A well represented passage and winter visitor.
'Pale-bellied' birds (subspecies *hrota*) were seen returning to wintering grounds on Lindisfarne from late August, with 2-25 north on six dates from 28 August to 1 November, and a higher count of 38 north on 5 September. Birds were seen on several islands in the Inner Group late in the season, with one on Knoxes Reef on 18 November and two around the Wideopens on 24 and 28 November. This year a single 'dark-bellied' bird (subspecies *bernicla*) was seen heading north on 28 October.

Egyptian Goose *Alopochen aegyptiaca*. An extremely rare visitor.
An incongruous adult on Inner Farne's South Rocks on 6 April was technically a first for the islands, as all previous records occurred before the British population became self-sustaining and so were classed as escapees. It remained for the rest of the day, much to the annoyance of the local gulls, but had departed by the following morning.

Shelduck *Tadorna tadorna*. A well represented visitor and occasional breeder.
Two pairs were spotted displaying on West Wideopens on 28 March, and were present there until mid-April when one pair moved to the Top Meadow on Inner Farne and the other to the Brownsman pond, where they remained well into June. Two juvenile Shelduck were subsequently seen on the Churn Pool on Inner Farne on 18, 19 and 21 August, suggesting that at least one pair was successful. Passage birds were seen on 19 dates between 27 March and 10 October, including a flock of eight south on 20 July that included two juveniles.

Wigeon *Anas penelope*. A common passage and winter visitor.
Light spring passage involved only two records, with a drake south through Inner Sound on 25 March and two females and a pair north on 27 April. The first autumn record was of a pair on Knoxes Reef on 25 August, after which counts of 1-85 passage birds were made on 21 dates, mostly moving north through Inner Sound or roosting on Knoxes Reef. Peak passage occurred on 17 September, when 200 moved north (85 through Inner Sound and 115 through Staple Sound). From mid-November a large wintering flock formed around Knoxes Reef, involving up to 94 birds.

Gadwall *A. strepera*. An uncommon visitor.
An excellent year for this normally scarce dabbling duck produced three records: a pair flew north through Inner Sound on 24 April, a pair roosted on Inner Farne pond late on 9 May, and finally a pair roosting on the same pond on 20 May.

Teal *A. crecca*. A common passage and winter visitor.
Small numbers were seen around the Inner Group throughout spring, with 1-2 recorded on 9 dates between 19 March and 29 April. As usual, birds were more evident in autumn, with regular records of 1-75 on passage or roosting at favourite spots such as Knoxes Reef and Brownsman Flats. Higher counts involved 184 north through Inner Sound on 5 September and 212 on 16 September (35 on Knoxes Reef, 173 north and four south through Staple Sound).

Mallard *A. platyrhynchos*. A common passage and winter visitor and well represented breeder.
This familiar duck is present throughout the year, with birds both breeding and wintering around the islands. It proved to be a bumper year, as 20 (15) pairs nested, up from 12 last year. The first nest was discovered on Inner Farne in the Courtyard under a water butt with 11 eggs on 28 March with the first ducklings were sighted on 28 April. Two late broods survived to fledging on Inner Farne, with a total of nine ducklings surviving.

Unbelievably, a brood of nine ducklings was discovered by the seal team on Brownsman on 8 November, but they were not seen subsequently. The 20 pairs nested as follows: Inner Farne 6 (6.4), West Wideopens 9 (1.6), East Wideopens 0 (0.4), Knoxes Reef 0 (0.2), Staple Island 1 (2), Brownsman 3 (2.8), North Wamses 1 (0.8), South Wamses 0 (0.4) and Big Harcar (0.4). Late autumn produced several records of birds on the move through Inner Sound, including a flock of 15 north on 6 November, whilst a large wintering flock formed around the islands that peaked at 66 on 14 November.

Pintail *A. acuta*. An uncommon passage and winter visitor.
Another reasonable showing, with autumn providing records on five dates. Two flew north with a large flock of Teal and Wigeon on 16 September, followed by a single north in another Wigeon flock on 17 September. A female was on Brownsman Flats on 20 September, with another on Staple Islanad on 7 October when a second bird flew south past Inner Farne with two Mallards. Finally, a lone drake flew north through Inner Sound on 30 October.

Shoveler *A. clypeata*. A well represented passage and winter visitor and extremely rare breeder.
There was no evidence of a breeding attempt this year and so all records related to passage birds, with spring producing a pair south on 11 April and two ducks and a drake south on 11 June. Autumn provided records of 1-4 on five dates from 17 August to 21 September, with a final female among a large Teal flock off Staple Island on 29 October.

Pochard *Aythya ferina*. An uncommon passage visitor.
A strong showing for this barely annual *Aythya* involved two records, with a flock of five north through Inner Sound on 24 August and a female north through Staple Sound on 2 November.

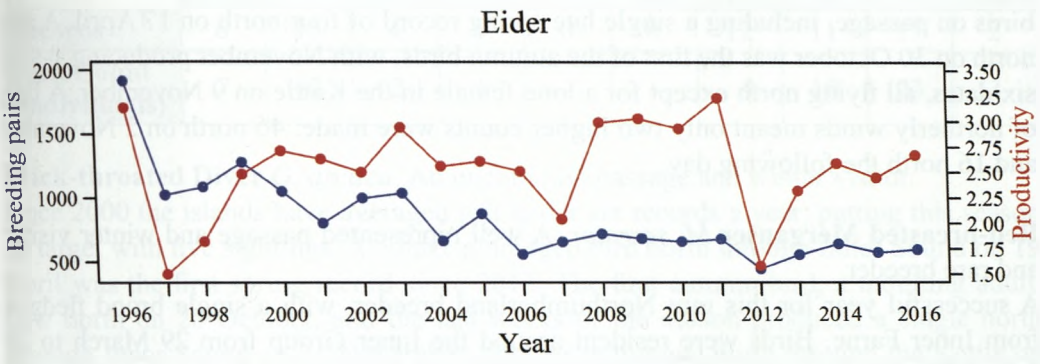
Tufted Duck *A. fuligula*. A well represented visitor.
Records on 11 dates made this one of the most productive seasons in recent years, though all but one sighting involved small numbers. The majority came in spring, with 1-2 (mostly drakes) past Inner Farne on seven dates between 10 April and 2 May. Autumn produced further singles on 5 and 17 September, with the highest count of the season coming on 2 November when seven flew north: a flock of six through Inner Sound and a lone drake through Staple Sound. The final record was of two drakes and a duck flying north through Staple Sound on 12 November.

Scaup *A. marila*. An uncommon passage and winter visitor.
Late autumn produced two records, both involving birds moving north through Inner Sound. A drake was seen on 30 October, with a pair on 6 November.

Eider © Ed Tooth.

Eider *Somateria mollissima*. A breeding resident.
Arguably the most handsome breeder on the islands, displaying was in full swing as the rangers moved out on 18 March. Birds were seen moving up onto the island on 25 March, with up to 36 prospecting the Top Meadow. A roosting flock of up to 195 birds built up on Inner Farne by early April, with the first nest found on 9 April. Thereafter numbers dropped as females took to nests and males dispersed. The first nest was discovered in the Vegetable Garden on Inner Farne on 9 April, with the first duckling appearing on 5 May. Overall, Eider had a good breeding season, as productivity was high at 2.67 (2.44) with 941 chicks fledging from 353 monitored nests (Figure 1). The population also increased slightly, with 593 (587) pairs across the islands as follows: Inner Farne 351 (345.4), West Wideopens 18 (18.4), East Wideopens 3 (4.8), Knoxes Reef 1 (3.6), Staple Island 44 (31), Brownsman 156 (151), North Wamses 2 (3.8), South Wamses 7 (6.4), Big Harcar 4 (3), Northern Hares 0 (0.6), Longstone 4 (3.8) and Longstone End 3 (4.4). Numbers then began to build again through autumn.

Figure 1: Eider population and productivity 1996-2016.



King Eider *S. spectabilis*. A scarce visitor (extremely rare in the last century).
The appearance of this most regal of ducks was one of the biggest surprises of the season, following an absence of almost a century since the last record in 1923. A sub-adult drake first seen past Whitburn, County Durham, at 08:30 on 23 October was tracked up the coast and eventually passed north through Inner Sound at 10:57, in the company of seven Common Eider. Amazingly, this is the twelfth record for the islands, though the majority came in the late nineteenth century.

Long-tailed Duck *Clangula hyemalis*. A well represented passage and winter visitor.
With no spring records, it was a long wait for the first of the season: a female north through Inner Sound on 13 October. Thereafter 1-2 were recorded on passage on seven dates until 2 December. Small numbers also wintered around the islands, with up to four birds regularly seen on the sea around the Inner Group from 7 November until the rangers departed in December.

Common Scoter *Melanitta nigra*. A common passage and winter visitor.
With records on only 67 dates it was a quiet season in comparison to the 96 dates averaged over the last five years. Unlike recent seasons, only small numbers were found on the sea in Inner Sound, with the raft peaking at just 64 birds on 17 June (2015 peak was 250). Passage produced 1-55 on 63 dates, with higher counts of 125 north on 29 June, 187 north on 5 July, 76 north 19 August and 161 north on 5 September.

Velvet Scoter *M. fusca*. A well represented passage and winter visitor.
One of the worst seasons on record for this stocky seaduck produced only three birds, all flying north through Inner Sound. An individual with seven Common Scoter on 11 April was followed by a single bird on 1 September, with the final bird in the company of two Teal on 5 September.

Goldeneye *Bucephala clangula*. A common passage and winter visitor.
As last season, there was no evidence of a wintering flock, with all records involving birds on passage, including a single late spring record of four north on 17 April. A pair north on 30 October was the first of the autumn birds, with November producing 1-9 on six dates, all flying north except for a lone female in the Kettle on 9 November. A lack of northerly winds meant only two higher counts were made: 46 north on 2 November and 16 north the following day.

Red-breasted Merganser *M. serrator*. A well represented passage and winter visitor and rare breeder.
A successful year for this rare Northumberland breeder, with a single brood fledged from Inner Farne. Birds were resident around the Inner Group from 29 March to 26 July, with two pairs seen displaying on 20 May. A female was then seen repeatedly on Inner Farne beach throughout July, prompting suspicions of a nearby nest. These suspicions were confirmed when she emerged from the vegetation on 26 July with five ducklings, leading them into the Kettle and out to sea. This was the first confirmed breeding success since 2013. Passage birds were recorded on twelve dates between 27 March and 2 November, all involving 1-2 birds with the exception of four in Inner Sound on 8 April and a flock of seven north on 18 June.

Goosander *Mergus merganser*. An uncommon passage visitor.
After the exceptional passage of the previous two seasons, in which the top two record day counts were set, this year saw a return to more typical form for this predominantly inland sawbill. Spring produced two females north on 17 April, a single drake south on 19 April and a flock of five birds north on 1 May, the highest count of the season. Autumn records proved equally scarce, with 1-2 birds seen on four dates between 17 September and 2 November.

Quail *Coturnix coturnix*. An uncommon passage visitor.
This miniature game bird surprised several rangers when it scurried onto the Inner Farne boardwalk on 13 June, pausing for a moment before flying towards the Vegetable Garden. It was seen again later in the day, flying from vegetation near the quarry and disappearing behind the lighthouse. This is the twenty-forth record for the islands, the most recent being two in 2014.

Red-throated Diver *Gavia stellata*. A common passage and winter visitor.
A reasonable season for this small diver with records of 1-5 on 58 dates, 7-12 on seven dates (one in April, two in October, five in November) and a higher count of 23 north on 6 November (Table 4).

Table 4: Records and peak counts of Red-throated Diver, Farne Islands 2016.

	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Records	6	13	4	1	0	0	12	11	17	2
Peak Count (Individuals)	7	12	2	1	-	-	5	10	23	3

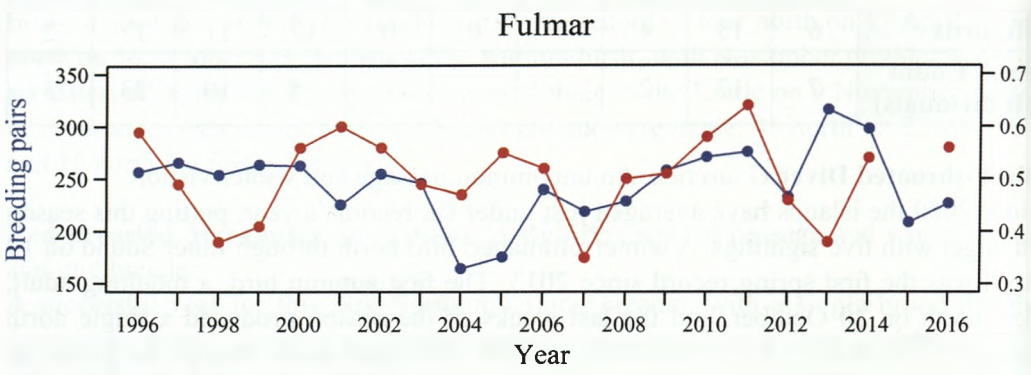
Black-throated Diver *G. arctica*. An uncommon passage and winter visitor.
Since 2000 the islands have averaged just under six records a year, putting this season on target with five sightings. A winter-plumaged bird north through Inner Sound on 19 April was the first spring record since 2013. The first autumn bird, a moulting adult, flew north on 20 October, and the last weeks of the season produced a single north through Inner Sound on 21 November, another individual north through the Kettle on 24 November and a winter-plumaged adult on the sea in Inner Sound on 26 November.

Great Northern Diver *G. immer*. A well represented passage and winter visitor.
Spring produced individuals north on 10 April, 5 May and 22 May, with the first autumn bird north through Staple Sound on 2 September. Singles were then recorded on four further dates until the first multiple count of two south on 30 October. Thereafter birds became more abundant, with 1-4 recorded on nine dates until 2 December. The only higher count involved 12 north on 6 November.

Fulmar *Fulmarus glacialis*. A common breeder, abundant on passage.
Birds were already attending nest sites when rangers moved out to the islands in late March, with the first mating pair seen on 10 April. An increase in the number of pairs and a good breeding season came as welcome relief after a poor showing last year for this magnificent seabird. The Fulmar is facing a particularly uncertain future as the North Sea whitefish industry declines and offal discarding becomes less frequent, a suggested cause for the huge range expansion that this bird underwent in the twentieth century. As with most seabirds, climate change and a decrease in abundance of its natural prey are believed to have contributed to recent declines and may well eventually lead to it becoming a rare bird in British waters. The first chick was discovered on 6 July on Brownsman. This year, 244 (266.4) pairs nested as follows: Inner Farne 30 (23), West Wideopens 15 (12.6), East Wideopens 19 (18.8), Knoxes Reef 13 (16.6), Staple Island 38 (48), Brownsman 53 (65.4), North Wamses 31 (30.6), South Wamses 31 (34.2), Big Harcar 7 (10.4) and Longstone End 7 (5.2). 168 nests were monitored this year from which 94 chicks fledged, resulting in a productivity of 0.56 (0.52*) (Figure 2). Most birds and their chicks had left the islands by the beginning of September, with the last stragglers departing by late September. Birds returned to the islands in November and many were back on nest sites by the end of the month.

*This total does not include 2015 as no productivity study was carried out that year.

Figure 2: Fulmar population and productivity 1996-2016.



Cory's Shearwater *Calonectris diomedea*. A scarce visitor.
This large shearwater was first spotted flying north past Flamborough Head, East Yorkshire, at 07:53 on 5 September. Five hours later it was found cruising lazily north through Staple Sound. This is the eighteenth record for the islands.

Great Shearwater *Puffinus gravis*. A scarce visitor.
First seen past Flamborough Head, this transatlantic tubenose arrived at the southern end of Inner Farne late in the afternoon of 17 September, during a sudden northward rush of smaller shearwaters. Travelling with a flock of five Manx and seven Sooty Shearwaters, it powered north behind the Scarcar rocks before banking away and passing behind Staple Island. This represents the sixteenth Farnes record.

Sooty Shearwater *P. griseus*. A well represented to common passage visitor.
An interesting year for this oceanic wanderer managed to combine an extremely low number of records with the highest day count since 2010. Amazingly, August failed to produce a single bird, with the first not appearing until 4 September. This was followed by an impressive 113 on 17 September, with all but one heading north. A lone bird north on 24 September was the only other record that month, whilst October produced sightings on just a single date: 11 north on 2 October. Finally, northerly winds in November produced late records of singles north on 2, 5 and 21 November, and ten north on 6 November

Manx Shearwater *P. puffinus*. A common passage visitor.
A lack of northerly winds in autumn led to a poor seawatching season, which included one of the worst showings of Manx Shearwater in years. 1-21 were recorded on 24 dates from 14 May to 2 October, with modest peaks of 32 north on 25 June and 64 (63 north, 1 south) on 17 September. A final late record involved a single bird north on 21 November.

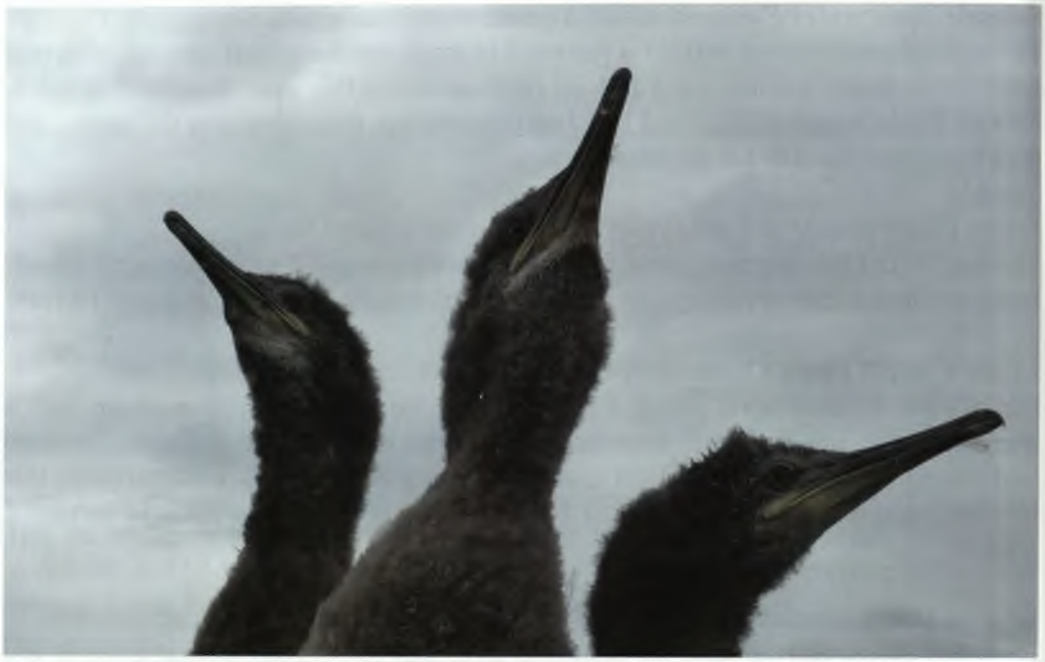
Balearic Shearwater *P mauretanicus*. An uncommon passage visitor.
This critically endangered seabird is recorded in small numbers most seasons, with two late records finally completing a full set of shearwaters this year. Singles flew north through Staple Sound at 08:21 and 15:17 on 6 November, providing only the second and third November records for the islands.

Storm Petrel *Hydrobates pelagicus*. An uncommon passage visitor.
The first bird of the year was found feeding off Longstone on 2 June. Nocturnal sound-luring sessions for ringing purposes produced five birds on 15 July and one on 19 July.

Leach's Storm Petrel *Oceanodroma leucorhoa.* An uncommon visitor.
One of these sizeable storm petrels was trapped for the third consecutive season, with a sound-luring session on 20 July attracting an adult into the nets on Inner Farne. The same bird was retrapped by ringers 40 km south at Druridge Bay on 30 July. Remarkably, this bird had been ringed on the Farnes in July 2014 and re-trapped a few days later on 1 August.

Gannet *Morus bassanus*. An abundant passage and non-breeding summer visitor.
Recorded almost daily around the islands as birds moved between feeding grounds and gannetries in East Yorkshire and Lothian. Passage peaked in spring with 1,593 moving north in one hour on 24 April, while large feeding flocks formed around the islands in autumn. This year a single adult was found standing on the south rocks of Inner Farne on 7 June, moving to the lighthouse ciffs the following day.

Cormorant *Phalacrocorax carbo*. A common breeding resident.
Present all year, with numbers increasing through spring and summer with the arrival of breeding birds. Although it is one of the species that has shown dramatic long term declines, the population showed a healthy increase this year, and 96 (103.4) pairs nested across the islands. Despite the increase of 15 pairs on last year, numbers are still just 33% of what they were 30 years ago. The shift away from the traditional site of North Wamses continued, and the 96 pairs nested as follows: East Wideopens 42 (53), North Wamses 2 (19.2) and Big Harcar 52 (31.2). The highest count of passage birds came on 28 July when a flock of 41 flew north over Inner Farne, with lower counts of 22 north on 15 August and 17 north on 16 August.

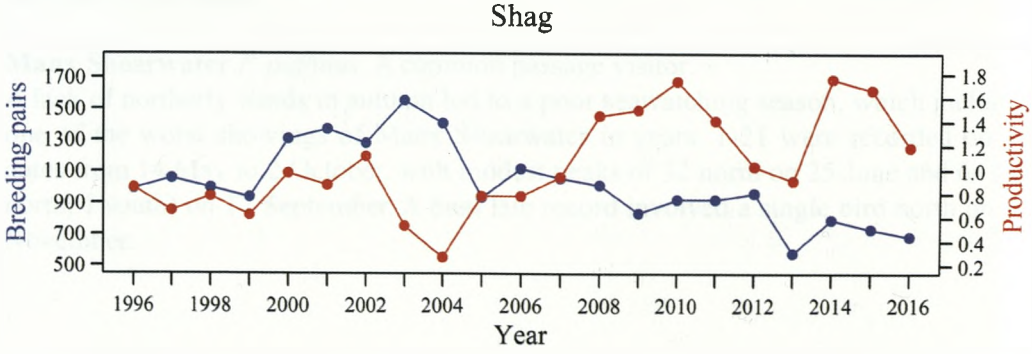


Shag © Ed Tooth.

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

Shag are present all year around the islands, with a significant population maintained throughout the winter. The Shag is another species that is showing recent declines in the breeding population, which has halved in the past 15 years (Figure 3). As well as a drop of 32 pairs on last year, productivity was poor at 1.19 (1.36). Birds were paired up and on nest sites by mid-March, with the first egg discovered on Inner Farne on 27 March. The first chicks were spotted on 1 May, with fledglings noted from mid-June. This year 688 pairs nested as follows: Inner Farne 252 (249.8), West Wideopens 93 (71.2), East Wideopens 47 (71.4), Megstone 8 (14.2), Skeney Scar 40 (46.8), Staple Island 103 (126), Brownsman 67 (86.4), North Wamses 17 (31.8), South Wamses 12 (34), Roddam and Green 9 (7), Big Harcar 23 (42.2) and Longstone End 17 (16.8).

Figure 3: Shag population and productivity 1996-2016.



Grey Heron *Ardea cinerea*. A well represented visitor; bred in 1894.
As usual, spring produced very few records, with singles reported on only four dates between 10 April and 6 July. After four records in August, birds became resident throughout autumn, with records of 1-3 almost daily from late September. The only higher count involved four west past Inner Farne on 22 September.

Slavonian Grebe *Podiceps auritus*. An uncommon passage and winter visitor.
Despite wintering in good numbers along the nearby coast, this elegant grebe rarely strays into our recording area and this year was no exception. The sole record concerned a lone bird flying south through Inner Sound on 2 November.

Great Crested Grebe *P. cristatus*. An uncommon visitor.
The best season since 1996 produced records of five birds across three dates, with all reports coming from Inner Sound. Two flew north over a visitor boat on 9 April, with another two north on 1 August. The third and final record involved a single bird south on 5 September.

Marsh Harrier *Circus aeruginosus*. An uncommon passage visitor.
The expanding British population has been well represented in Farnes records, with only one blank year since 2008 (but just 14 records from 1954-2005). This season produced a single sighting, with a handsome male circling above Inner Farne on 8 May.

Hen Harrier *C. cyaneus*. A scarce visitor.
A 'ringtail' was flushed from Brownsman's West Meadow on 28 August, quickly disappearing behind Staple Island in a cloud of agitated gulls. This is the eighteenth record for the Farnes, the first since another 'ringtail' was seen on the same island in 2014.

Sparrowhawk *Accipiter nisus*. An uncommon visitor.
The British population of this fierce-eyed hawk is relatively sedentary, but is augmented by migrants from northern Europe. A quiet season for the islands produced only three records, all from Inner Farne in the autumn months. A juvenile was on the North Rocks on 23 August, with another in the Top Meadow on 1 October. The final record was of a large immature female in the Central Meadow on 7 November.

Osprey *Pandion haliaetus*. A scarce passage visitor.
An individual was discovered by boatmen on 3 August as it flew west over East Wideopens, before passing over Inner Farne and eventually entering Budle Bay on the mainland. This represents the twentieth Farnes record.

Water Rail *Rallus aquaticus*. An uncommon passage visitor.
The best season since 2005 produced records on seven dates, all coming in autumn as migrants reached the UK. Six of the seven were on Inner Farne, and for the second year running the season's first bird was caught in the Pele Tower, with an individual found at the top of the stairs on 4 October. The Dock Bank on Inner Farne was the location for the majority of remaining sightings, with singles glimpsed on 10 and 15 October, and 15 and 29 November. The only exception was a bird that scurried past the Pele Tower window on 9 November. The only record for the Outer Group was of an individual that disappeared down a Puffin burrow on Staple Island on 28 November.

Oystercatcher © Ed Tooth.

Oystercatcher *Haematopus ostralegus*. A common passage and winter visitor and well represented breeder.
Common around the islands throughout the season, with numbers peaking in autumn. This year the population of this smart wader dropped again to 27 (38.4) pairs and they nested as follows: Inner Farne 4 (6.6), West Wideopens 1 (3.4), East Wideopens 0 (1.2), Knoxes Reef 3 (2.4), Staple Island 5 (5.8), Brownsman 8 (9.6), North Wamses 1 (1.2), South Wamses 0 (1.2), Big Harcar 1 (1), Northern Hares 1 (1.2), Longstone 2 (2) and Longstone End 1 (2.4). Normally predation is very high, but this year numerous fledged chicks were noted around the islands including 3 on Staple Island, 2 on Brownsman and 3 around the Inner Group. As usual, a large roost formed around the Inner Group, which provided all of the peak counts (Table 5).

Table 5: Peak counts of Oystercatcher abundance, Farne Islands 2016.

	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Individuals	69	95	64	66	39	139	144	63	74	63

Pacific Golden Plover *P. fulva*. An extremely rare visitor.
On 13 September an unusual sound drew attention to a lone bird flying low over Inner Farne, heading due north and calling frequently. If accepted, this will be the first ever record for the Farnes, and only the fifth for Northumberland.

Golden Plover *P. apricaria*. A common passage visitor.
Spring produced a single record, with a bird flushed from Inner Farne Dock Bank on 4 May. As usual, autumn produced the bulk of the sightings with birds recorded on 29 dates from July to October. Most of these related to the large post-breeding flock that gathered in the Outer Group, which peaked at 940 on Longstone on 20 September.

Grey Plover *Pluvialis squatarola*. A well represented passage visitor.
It was another quiet season for this bulky plover with just eight records, all from the Inner Group. Three summer-plumaged birds on Knoxes Reef on 11 May represented the first spring sighting since 2011. There were no more records until 22 September when an individual flew south over Inner Farne. Autumn produced further sightings on 26 September, 1 and 11 October, and 12, 16 and 30 November, all involving singles with the exception of 11 October when two birds flew west over Inner Farne.

Lapwing *Vanellus vanellus*. A well represented passage visitor; sporadic breeder in the past, last attempt in 1962.
This season produced records on eight dates, with an individual on Inner Farne on 14 April followed by records on 3, 6 and 7 May as another lingered around the Outer Group. The first autumn bird roosted on Inner Farne on 13 October and was still present the following day, then on 15 October a single bird was on Brownsman, whilst three flew south over Inner Farne. The final record came on 12 November, with two flocks totalling 28 birds flying west past Inner Farne, the highest count since 2012.

Ringed Plover *Charadrius hiaticula*. A common passage visitor, uncommon and declining as a breeding species.
The first birds of the season were seen on 25 March, with two on Inner Farne's south rocks. This charming and diminutive wader suffered a drop in breeding pairs to the joint lowest number on record. Just 4 (6) pairs nested this year as follows: Inner Farne 2 (1.8), Staple Island 0 (1.8), Brownsman 2 (2.2) and Longstone 0 (0.6). The first nest was discovered on 22 April near the jetty on Inner Farne, with the first chicks appearing on 8 June. Although the number of breeding pairs was low, two chicks on Brownsman fledged as did two from Inner Farne. The parents in St Cuthbert's Cove did a particularly good job seeing off any birds straying too near their chicks, including terns, Black-

headed Gulls and Eider! Post-breeding sightings were unusually scarce, with just 1-2 seen around the islands on ten dates from August to mid-November and higher counts of five in the Outer Group on 4 August, six on Knoxes Reef on 17 November and 4 around the Inner Group on 28 and 30 November.

Whimbrel *Nemenius phaeopus*. A well represented passage visitor.
A quiet season for this migratory wader produced just 29 records. Spring passage began with an individual on Inner Farne on 26 April, with one there again on 29 April when three also flew north. May then recorded 1-2 on three dates, with the first returning bird seen on Knoxes Reef on 9 July. Thereafter 1-4 were recorded on 22 dates until 29 August, with modest peaks of six on 21 July and five on 9 August. The final record of the season was of two on Brownsman on 18 September.

Curlew *N. arquata*. A common passage and winter visitor.
This long-billed wader is found around the islands all year, with a large evening roost often forming in the Inner Group. This season's peak count was 174 on 3 December (Table 6).

Table 6: Peak counts of Curlew abundance, Farne Islands 2016.

	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Individuals	137	63	9	13	75	140	62	63	156	174

Black-tailed Godwit *Limosa limosa*. An uncommon passage visitor.
A good season for this long-legged wader began with a single bird on 29 April, flying north through Inner Sound with three Whimbrel. On 30 June there was a flock of 18 south over West Wideopens, followed by a flock of nine west over Inner Farne on 23 July. A few days later Brownsman hosted the largest flock of the season when 31 landed on the Flats on 27 July, including a colour-ringed male. This bird had been ringed as an adult in the Tagus estuary, Portugal in February 2011, where it was also seen wintering each year from 2012-2015. On leaving Portugal, it typically passed through northern Holland, where it was recorded in March/April from 2013-2016, before reaching breeding grounds in northeast Iceland (present throughout June 2013). This flock is also the fifth highest day count for the islands. Final records were of an individual south through Inner Sound on 2 August and two south through Staple Sound on 30 August.

Bar-tailed Godwit *L. lapponica*. A well represented passage visitor.
Recorded on 18 dates this season (three spring, 15 autumn), with most sightings involving 1-25 birds. Large numbers roosted on Knoxes Reef in September, with a count of 64 on 4 September soon eclipsed by an impressive 300+ on 10 September – the second highest day count for the islands. Numbers dropped off afterwards, with 40 on 13 September and 32 on 21 September. There were two late records of birds in the Inner Farne evening wader roost, with a single bird on 17 November and six on 2 December.

Turnstone *Arenaria interpres*. A common passage and winter visitor.
This energetic wader is present all year, with large roosts on Knoxes Reef and Longstone (Table 7). Passage peaked in autumn, with 411 across the islands on 4 August. Rangers were not present to make a December peak count.

Knot © Thomas Hendry.

Knot *Calidris canutus*. A well represented passage visitor.
The arrival of this high-Arctic breeder is a regular feature of a Farne Islands summer, with large flocks gathering on Knoxes Reef and Longstone from May onwards. After singles on 7 and 28 May, records became more regular with 1-90 on 53 dates between 5 June and 22 September. During this period counts peaked at 123 on Knoxes Reef on 21 July, and 168 on Longstone on 7 July. The final record was of a single bird north through Inner Sound on 2 October.

Ruff *Philomachus pugnax*. A well represented passage visitor.
The best season since 2000 produced records on 15 dates, including a rare spring sighting of two north through Inner Sound on 3 May. Southbound migrants were responsible for records on 14 autumn dates between 6 July and 31 August, involving an estimated 13 individuals. A juvenile male was seen on Staple Island on 6, 12, 22, 24 and 29 July, followed by a juvenile female on Inner Farne on 4 and 5 August. A new bird was on Inner Farne on 9 August, with Knoxes Reef hosting an adult male on 14 and a juvenile male on 20 August. A different adult male on 21 August was followed by the season's peak of five west on 25 August: one ruff and four reeves. The final records were of individuals in the Inner Group on 27 and 31 August.

Sanderling *Calidris alba*. An uncommon passage visitor.
This season there were only three records of this beautiful beachcomber, all coming in May. An individual on Knoxes Reef on 19 May was followed by seven north through Inner Sound on 22 May, before the final record of another individual on Northern Hares on 28 May.

Dunlin *C. alpina*. A common passage and winter visitor.
Light spring passage produced 1-3 on six dates in May and three in June, with birds more regular in autumn as 1-29 were recorded on 47 dates from 1 July to 24 September. The only higher count in this period was of a flock of 50 on Knoxes Reef on 1 September. The final records this season were of lone birds on Longstone End on 8 October, Inner Farne on 25 November and Brownsman on 28 November.

Purple Sandpiper *C. maritima*. A common passage and winter visitor.
The Farne Islands host over 1% of the national wintering population of this hardy northern wader, with birds recorded in every month but June (Table 6). This year the largest gathering came on 9 April, with 165 around the Outer Group (Table 7).

Table 7: Peak counts of Purple Sandpiper and Turnstone abundance, Farne Islands 2016.

	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Purple Sandpiper	30	165	60	0	14	22	24	25	87	37
Turnstone	17	27	48	12	178	411	263	350	149	-

Little Stint *C. minuta*. An uncommon passage visitor.
This tiny calidrid put in two autumn appearances this season, after a blank year in 2015. A confiding juvenile on Brownsman Pond on 4 August, feeding with six Dunlin, was part of a small influx along the north Northumberland coast, with another record later that month as an individual was flushed from Knoxes Reef on 20 August.

Common Sandpiper *Actitis hypoleucos*. A well represented passage visitor.
A reasonable year included four spring records, with singles on Inner Farne on 2, 9, 11 and 12 May. The first returning bird was on Brownsman Flats on 23 July, with further singles on 25 and 27 July. Records then became more regular as 1-4 were noted on 23 dates from 1 August to 15 September.

Green Sandpiper *Tringa ochropus*. An uncommon passage visitor.
A terrible season for this distinctive wader produced only a single record, with a typically vocal individual flying west over Inner Farne on 19 August.

Greenshank *T. nebularia*. A well represented passage visitor.
With records on only four dates it was a very poor season for this wader. Autumn passage began with a vocal individual flying south over Inner Farne on 31 July, followed by singles on Inner Farne on 14 August and Brownsman on 28 August, with a final record of two south over Inner Farne on 16 September.

Redshank *T. totanus*. A common passage and winter visitor; bred in nine years 1901-1943.
This noisy wader is typically present throughout the year, although this season failed to produce a single June record. Numbers peaked in autumn, with 44 around the islands on 27 August and 36 on Knoxes Reef on 4 September (Table 8).

Table 8: Peak counts of Redshank abundance, Farne Islands 2016.

	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Individuals	1	21	2	0	15	44	36	19	14	5

Jack Snipe *Lymnocryptes minimus*. A well represented passage visitor.
A reasonable season for this small snipe produced records on nine dates, with the best spring showing since 2007. The first bird of the year was flushed from the South Rocks of Inner Farne on 1 April, followed by singles on Brownsman Flats on 11 and 15 May. As usual, October provided the bulk of the records, with 1-2 flushed on six dates. The majority of these were from Inner Farne, Brownsman and Staple Island, although individuals were seen on Longstone on 6 October and West Wideopens on 16 October.

Woodcock *Scolopax rusticola*. A well represented passage visitor.
The first bird of the season came from the surprising location of the Inner Farne Information Centre, where an individual was caught on 24 March. It was released outside and flew off strongly west. The only other spring bird was flushed from Inner Farne North Rocks on 4 April. The first autumn migrant appeared on Brownsman on 4 October, with 1-6 recorded on ten further dates that month, as well as a peak count of 12 on 15 October (five on Inner Farne, seven on Brownsman). Small numbers were seen throughout November, with 1-2 on seven dates including the last of the season on 29 November.

Snipe *Gallinago gallinago*. A well represented passage visitor.
A typical season produces around 50 sightings of this well-camouflaged wader, but for the second year in a row the islands fell well short of this total. 1-2 were recorded on four spring dates between 24 March and 18 May, and on 19 autumn dates from 25 August to 4 December. The only higher counts were three on 8 October and four on 15 October.

Pomarine Skua *Stercorarius pomarinus.* A well represented passage visitor, common in some years.
2016 proved to be a quiet year for this hefty high Arctic breeder, with three birds observed in September and October, all passing through Staple Sound. Despite weak south Easterlies, two dark juveniles were seen passing north on 4 September. The subsequent records also consisted of dark juveniles, with moderate easterlies yielding an individual heading north on 14 October. The autumn ended in spectacular fashion with 17 birds on 6 November. These included groups of 1-2 birds and a flock of seven passing via Inner Sound which was led by a stunning pale morph adult with a visible spoon tail. An intermediate adult was also observed heading north through Staple Sound. All the other birds seen were juveniles.

Arctic Skua *S. parasiticus.* A common passage visitor.
Spring failed to produce any records of this parasitic acrobat, with the first dark-phase individual heading north through Inner Sound on 18 June. Dark singles were also noted on the two following days, with no further sightings until a bird passed through Staple Sound on 20 July. August proved more fruitful, with 14 noted over six dates from 6 to 31 August, mostly passing through Inner Sound. Kittiwakes bore the brunt of the pirating, with a juvenile observed being chased by a single skua from Knoxes Reef on 12 August, and an adult Kittiwake being harassed by an individual on 16 August. Numbers increased throughout September, with groups of 1-4 birds passing predominantly via Staple Sound on 10 dates between 1 and 22 September. Passage declined in October, with two singles north through Staple Sound on 2 and 14 October, the latter a juvenile bird. November produced some late records, with birds on 2 and 6 November. Sightings for the year were overwhelmingly of dark-phase birds, with no pale-phase recorded until 4 September.

Long-tailed Skua *S. longicaudus.* An uncommon passage visitor.
As in 2015, there was only one record for the season of this slender highly-prized skua. While crossing Staple Sound in the Zodiac, the rangers observed a handsomely barred juvenile passing directly above the boat, at a distance of only 4 metres, before the bird headed north across the Sound. This unforgettable encounter took place on 1 October.

Great Skua *S. skua.* A common passage visitor.
It was a poor spring passage for this formidable predator, with a single bird passing south through Staple Sound on 21 May. This individual was observed within several feet of the west face of Staple Island and was photographed killing a gull species. It was a slow start to autumn with a single bird roosting briefly on Knoxes Reef on 28 July. The bird was mobbed by Herring and Lesser Blacked-backed Gulls and headed south. August records consisted of two on 18 and 26 August; thereafter numbers steadily increased, with 22 birds recorded on nine dates between 4 September and 2 October. Most records were of birds passing through Staple Sound, and comprised small groups of up to three birds. A notable exception was a flock of six seen on 8 September, passing north via Inner Sound in close proximity to Inner Farne. As well as a late 19 October record of an individual passing south, singles were sighted into November.

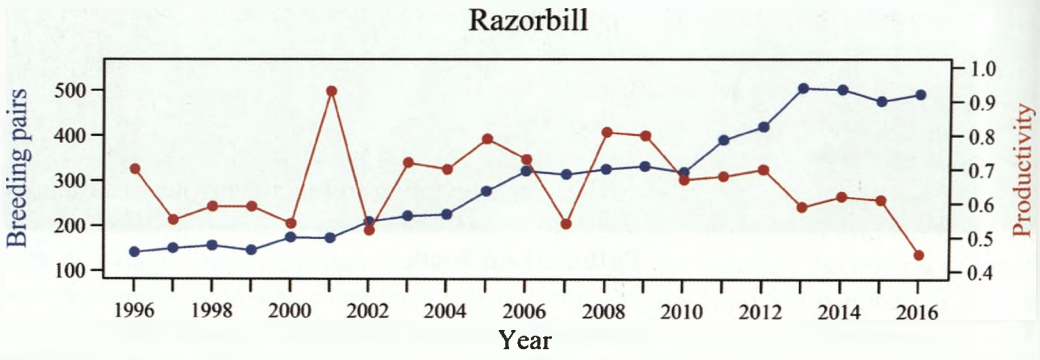
Puffins © Ed Tooth.

Puffin *Fratercula arctica.* An abundant breeding summer and passage visitor.
With the next census due in 2018, no population count was made this year. The first Puffin of the year was seen on the sea on 15 March, with the first on land a week later. Springcleaning was noted on 23 March and by 30 March numbers on land were in their thousands. The first egg was spotted with the use of the islands' new burrow cameras on 30 April, and on 1 June a Puffin being mobbed by a Black-headed Gull for its beak full of fish told us that the first chick was hatched. After the washout last year, with productivity at just 0.46, this somewhat drier year was a considerable improvement at 0.70 (0.81) with 81 Puffins fledged from 115 monitored nests. Sandeels seemed to be in plentiful supply and rangers observed Pufflings above ground from 8 July to 3 August. The autumn months provided a flurry of records, with regular sightings from mid-September into November.

Black Guillemot *Cepphus grille.* A well-represented winter and passage visitor. Bred in seventeenth and possibly the eighteenth centuries.
It proved a poor season for this secretive crevice dwelling breeder, which continues to winter in small numbers around the Farnes. The first sighting of the year was quite unusual, and consisting of a summer plumaged adult seen from a boat on Inner Sound on 7 May. The second and final bird was a typical autumn record of a single seen off Inner Farne Lighthouse Cliffs on 12 November.

Razorbill *Alca torda.* A common breeding resident and passage visitor.
Birds were present on the cliffs during an early visit to the islands on 12 March, with the first egg discovered on 4 May. It was a poor breeding season in terms of productivity with a 10 year low of 0.45 (0.64) and 32 chicks fledged from 71 monitored nests; however, the population increased by 15 pairs (Figure 4). The 491 (458.4) pairs of Razorbill nested as follows: Inner Farne 206 (214.4), West Wideopens 68 (83.8), East Wideopens 35 (25.4), Skeney Scar 23 (16), Staple Island 95 (54.8), Brownsman 23 (17.6), North Wamses 9 (9.6), South Wamses 18 (16.8), Roddam and Green 2 (0.2), and Big Harcar 12 (18.8). After the breeding season, small numbers occurred in autumn and winter around the islands. Singles were observed into November, although most birds were seen in September, with 1-10 birds recorded on six dates between 4 September and 7 October. Single birds were also seen into November.

Figure 4: Razorbill population and productivity 1996-2016.



Little Auk *Alle alle.* A well represented winter and passage visitor.
It was a very quiet season for this arctic species, with small numbers recorded on five dates in November. After the first single on 5 November, eight passing north through Staple Sound on 6 November represented the peak count. A memorable encounter occurred off Northern Hares on 8 November, when a single on the water came within 4 meters of the Zodiac, only to be disturbed by a seal coming up for air. The final record was of three birds passing north through Staple Sound on 21 November.

Guillemot *Uria aalge.* An abundant breeding resident and passage visitor.
This was only the ninth year since 1971 that the Guillemot population on the Farnes did not increase, and numbers fell from a record high of 53,461 individuals in 2015 to 49,037 (50,489). The cliffs were heaving during a boardwalk repair outing on 12 March and birds were on and off until they settled. The first egg was found on Brownsman on 19 April; the first chick was discovered on Inner Farne on 23 May, the same date as last year and jumplings were noted on the sea from 14 June. The 49,037 individuals nested as follows: Inner Farne 9,011 (7,234.8), West Wideopens 1,630 (2,216.6), East Wideopens 3,491 (2,851.6), Megstone 350 (246), Skeney Scar 1,973 (2,301.6), Staple Island 21,093 (23,739.8), Brownsman 9,594 (9,272), North Wamses 870 (1,493.4), South Wamses 542 (532.8), Roddam and Green 130 (129.2) and Big Harcar 353 (424).

Star of the show was a probable-breeder with an orange darvic, originally found on Lighthouse Cliff on Inner Farne on 24 May, and seen on five dates afterwards. This bird was originally ringed as a nestling in Gotland in Sweden on 23 June 2004, making it 11 years and 335 days old. After the end of the breeding season, small groups of wintering birds were seen from mid-August, with larger numbers passing through Staple and Inner Sounds throughout September. Strong northerly winds in early November brought hundreds of birds streaming past the islands, while singles and small flocks were present around the islands throughout October and November.

Little Tern *Sternula albifrons.* A well represented passage visitor.
The pre-breeding roost at St Cuthbert's Cove on Inner Farne attracted good numbers of this gentle tern, with the highest recorded counts since 2012. The first record of six individuals occurred on 28 April, with numbers doubling to 13 on 30 April, and rapidly building two days later to an impressive 44 roosting birds on 1 May. Numbers grew in the coming days, culminating in the peak count of 82 on 5 May. They began to fall as birds returned to mainland nesting sites, but impressive numbers still joined the roost. They dropped to a maximum of 16 birds between 15 and 19 May, but again rose to a modest 62 on 21 May, illustrating the extreme fluctuations occurring throughout May. By 28 May roosting numbers had decreased to 32 birds, and after individuals passing north through Inner Sound on 18 and 19 June, the final record was a single roosting on 24 June. On 6 May, three blue-ringed birds, originating from a colony near Hartlepool, were seen in a roost of 80.

Black Tern *Childonias niger.* An uncommon summer and passage visitor.
Compared to previous years it was a modest season for this striking marsh tern, with two records from the Inner Group of islands. The first record was a summer plumage adult which was present in the evening tern roost on south rocks on Inner Farne on 11 May. The other record was of a juvenile, which was observed passing north through Staple Sound on 16 August, just behind Knoxes Reef.

Sandwich Tern *Sterna sandvicensis.* A breeding summer and passage visitor.
The first bird of the year was seen flying west from the Kettle on 27 March, with eight birds later present in the roost on Ladies Path, Inner Farne on the same night. A peak count of 523 birds was in the roost on 20 April. Birds were first seen displaying and copulating on 14 April and started settling on Central Meadow on 28 April. The first egg was found on 16 May and the first chick on 5 June. Fledglings were seen in the colony from 11 July, with a peak count of 40 in the roost on 16 July. This year, 629 (808.6) pairs nested, which included a welcome return of a small number to Brownsman late in the season, the first since 2010. The nesting pairs were distributed as follows: Inner Farne 605 (808.6), Brownsman 24 (0). After the breeding season, small numbers were recorded on passage on 21 dates from 5 August to 25 September, with a peak autumn count of 58 birds recorded over Knoxes Reef on 13 August. The final record was a late bird sighted one nautical mile east of Longstone on 14 November.

Common Tern © Thomas Hendry.

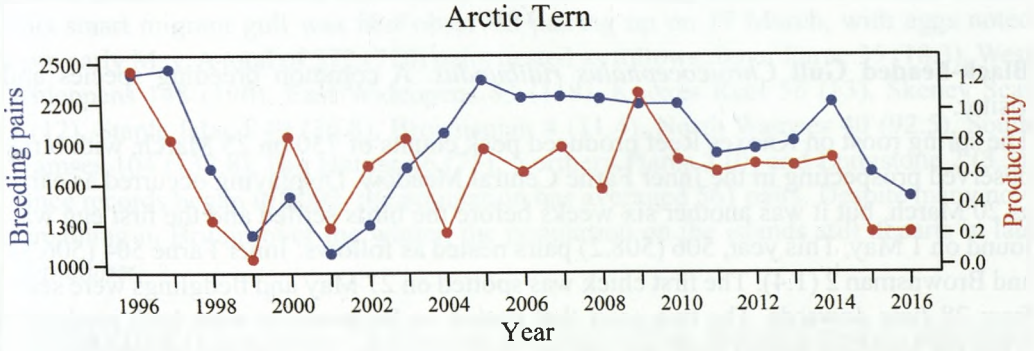
Common Tern *S. hirundo.* A breeding summer and passage visitor.
The first bird of the year was seen on Knoxes Reef on 6 April. Three were seen on the Ladies' Path roost on 18 April, which subsequently grew during the month to 40+ birds on 1 May. The first birds were seen scraping and displaying around Central Meadow pond on 1 May, but it seemed a poor year was to follow, as only one fledgling was noted on 22 July. 87 (93.8) pairs bred this year on Inner Farne, down from 98 in 2015. Numbers inevitably declined following the breeding season, with 1-8 birds observed on nine days between 31 July and 13 September. Most of these birds were recorded in August, and were observed on passage via Inner Sound and the Kettle.

Roseate Tern *S. dougalli.* A well-represented summer and passage visitor, uncommon breeder.
After the first sighting of two individuals on 17 May, generally 1-3 were present on Inner Farne throughout May, June and into July. There were no confirmed breeding attempts, but two birds were seen copulating in the roosts around the South Rocks and Ladies Path on 21 and 23 May, and again on 29 May. The pair was observed circling the Lighthouse Compound and later displaying around South Rocks on 10 June, though no further breeding indications were noted. Two pairs were also present on Brownsman from 22 June to 1 July, where despite sightings of flight displaying, courtship dancing and exploring for presumed nesting sites, no breeding attempts were confirmed. A peak count of eight was recorded on the Inner Farne South Rocks roost on 21 May, with

smaller counts of four on 23 May and 22 June. The first juvenile from Coquet Island was seen on Inner Farne on 23 July among three adults, and was seen again the following day with a single adult on 24 July. The last birds of the season were two singles observed passing south through Inner Farne on 2 and 9 September.

Arctic Tern *S. paradisaea.* An abundant breeding summer and passage visitor.
The first bird of the year arrived on 16 April on Inner Farne, and was seen calling over the Vegetable Garden before roosting on Ladies Path. The roost grew to nine birds on 25 April, and by 1 May an impressive approximately 850 were feeding throughout the day. On 4 May, the roost held over 3,300 birds over Knoxes Reef and Ladies Path, and on the following day the sight of birds scraping and mating on the island heralded the start of the nesting season. The first egg was discovered on 14 May at the weather station on Inner Farne. The first egg on Brownsman followed three days later, with chicks present on both islands from 6 June. Productivity was low and similar to last year, 0.23 (0.56) overall with 336 chicks fledged from 1471 monitored nests; egg predation in the Lighthouse Compound and Vegetable Garden on Inner Farne was a particular problem leading to low overall productivity. Brownsman fared rather better than last year, with a productivity of 0.2 from 334 monitored nests. The number of breeding pairs dropped to 1,508 (1,903.4), the lowest number since 2002 (Figure 5), which nested as follows: Inner Farne 1,164 (1,248.2), Staple Island 10 (7) and Brownsman 334 (648.2). On 24 June, 21 first-summer individuals were roosting on Ladies Path and South Rocks on Inner Farne and Knoxes Reef. After the breeding season, 1-12 Arctic Terns were recorded on eight dates during August. An off-season peak of 29 birds was counted on 23 August, which included eight feeding in Staple Sound. The final record was of eight birds in Inner Sound on 5 September.

Figure 5: Arctic Tern productivity and population 1996-2016.

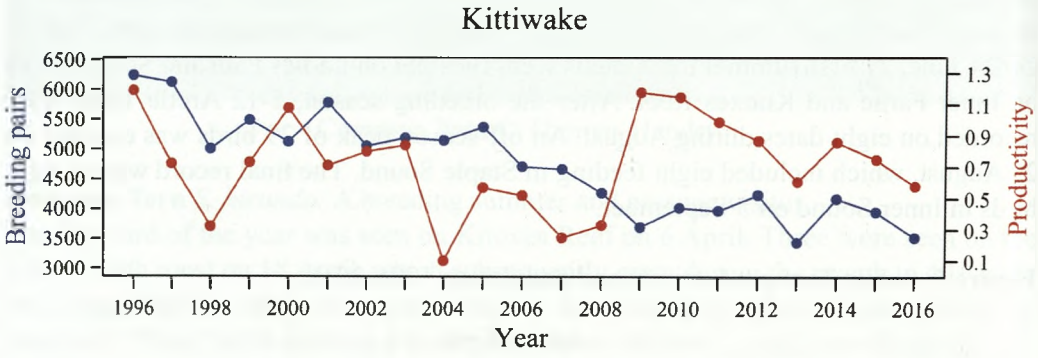


Sabine's Gull *Xema sabini* An uncommon passage visitor.
An adult was seen in Staple Sound with a Kittiwake flock at 09:40 on 6 November. This was only the 9th adult seen on the Farnes and the latest ever record.

Kittiwake *Rissa tridactyla.* An abundant breeder and passage visitor, well represented in winter.

Kittiwake was another species that seemed to suffer from the poor start to the season, and the population of this charismatic small gull declined by 11%. Birds were back on the cliffs as the rangers returned, with the first eggs discovered on 17 May. 3,527 (3,958.2) pairs nested this year as follows: Inner Farne 1,152 (1,257.4), West Wideopens 193 (190.6), East Wideopens 207 (224.8), Skeney Scar 113 (139.4), Staple Island 917 (985.8), Brownsman 869 (1,071.6), North Wamses 28 (26.4), South Wamses 0 (4.8), Roddam and Green 15 (8.8) and Big Harcar 33 (48.6). There was a marked abandonment of nests on 25 April, as many birds were forced off the cliffs during the storm. Even before this, there were many birds present on the cliffs which did not lay eggs. This contributed to a low productivity of 0.58 (0.82). The first chick was discovered on 9 June, with the first fledglings noted in the air on 15 July. After breeding, small numbers were observed on passage throughout September and October. Larger numbers were present in November, with a peak of 334 birds heading north over four hours on 6 November.

Figure 6: Kittiwake population and productivity 1996-2016



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

The spring roost on Knoxes Reef produced peak counts of 750 on 25 March, with birds observed prospecting in the Inner Farne Central Meadow. Displaying occurred as early as 20 March, but it was another six weeks before the birds settled and the first egg was found on 1 May. This year, 506 (508.2) pairs nested as follows: Inner Farne 504 (506.8) and Brownsman 2 (1.4). The first chick was spotted on 27 May and fledglings were seen from 28 June onwards. The two pairs that nested on Brownsman were both predated. After the breeding season birds are present throughout the autumn and winter months, but, unusually, there was a distinct absence of winter roosts in November, until 90 birds were observed on Knoxes Reef on 29 November.

Little Gull *Hydrocoloeus minutus.* A well represented passage and winter visitor.
Once again it was a quiet year for this dainty gull, with spring failing to produce any sightings. Summer brought the first record, with a first-summer bird on Inner Farne South Rocks on 7 July. The only other sighting concerned three first-winter birds on 24 September, observed powering south through Staple Sound in southerly winds.

Mediterranean Gull *Larus melanocephalus.* An uncommon passage and winter visitor.
There was much excitement in spring when a Polish-ringed bird was found on 23 April, roosting among the Sandwich Terns on Ladies Path on Inner Farne. The gull, in typical first-winter plumage, sported a red darvic and was ringed as a nestling on 4 June 2015, in Wojcic, Opolskie. Prior to the Farnes sighting, the bird had been reported in the Netherlands in July 2015. A different second-winter individual with a black head was present the following day on Inner Farne.

Common Gull *L. canus*. A common visitor; bred in four years 1910-1914 and possibly in 1916 with attempted breeding in 1974.
The vast majority of sightings occurred in spring, commencing with the first individual recorded on Knoxes Reef on 23 March. The spring roost yielded nine birds on 6 April, which grew to an impressive 70+ on 14 April. The highest concentration was four days later with 104 on 18 April, the largest roost for several years on Knoxes Reef. Passage continued with 42 birds heading north on 19 April. Numbers decreased as birds moved on to breeding grounds in Scandinavia, with the roost dwindling to 32 birds on 27 April. Typically, there was a string of autumn records which begun with two birds passing through Inner Sound on 25 June, and continuing two months later with three birds sighted over Knoxes Reef on 23 September. Birds were seen almost daily throughout October and November.

Lesser Black-backed Gull *L. fuscus.* A common breeding summer and passage visitor.
This smart migrant gull was first observed pairing up on 17 March, with eggs noted from early May. A total of 572 (710) pairs nested as follows: Inner Farne 35 (18.3), West Wideopens 148 (196), East Wideopens 83 (118), Knoxes Reef 56 (13), Skeney Scar 2 (12), Staple Island 49 (36.8), Brownsman 4 (11.4), North Wamses 40 (92.5), South Wamses 104 (137.8), Big Harcar 46 (75), Northern Hares 3 (0) and Longstone 2 (3.3). Since records began in 2002, the population has averaged 561 pairs. Despite many now remaining in Britain over the winter, the population on the islands still departs in late September.

Herring Gull *L. argentatus* . A common breeding species, abundant passage and winter visitor.
Present all year round, birds were pairing up as the rangers returned on 18 March, and the first eggs were discovered in late April. This year 660 (863) pairs nested as follows: Inner Farne 26 (17), West Wideopens 88 (130.3), East Wideopens 203 (125.5), Knoxes Reef 37 (102), Skeney Scar 49 (25.8), Staple Island17 (52.8), Brownsman 9 (5.8), North Wamses 113 (162.3), South Wamses 42 (59), Roddam and Green 22 (14.6), Big Harcar

43 (111.5), Northern Hares 6 (20.4), Longstone 0 (3.2) and Longstone End 5 (16.4). After the breeding season large numbers wintered around the islands, particularly at the roost on Knoxes Reef and the Wideopens.

Iceland Gull *L. glaucoides.* An uncommon passage and winter visitor.
This elegant white-winged gull was recorded four times in April within mixed gull roosts. A faded first-winter bird was seen on Knoxes Reef in the evening of 8 April, and was still present the following afternoon on 9 April. Another first winter individual was present in the West Wideopens' roost on 19 April, with a third recorded at 20:15 on 22 April.

Glaucous Gull *L. hyperboreus.* An uncommon passage and winter visitor.
A single specimen of this bulky northern migrant was recorded on Inner Farne on 22 November when a juvenile bird was discovered on the roost on Knoxes Reef in late afternoon among the large gulls, before it flew to West Wideopens just before dusk.

Great Black-backed Gull *L. marinus.* A well represented breeder, common passage and winter visitor.
The islands' top resident predator had a good year as the number of breeding pairs rose for the seventh year in a row. There were 22 (14.6) pairs nesting across the islands as follows: West Wideopens 1 (1.6), East Wideopens 6 (3), Knoxes Reef 0 (0.6), Staple Island 2 (1), Brownsman 1 (1.8), North Wamses 5 (3), South Wamses 3 (2.4), Big Harcar 4 (1.2) and Longstone End 0 (0.2). After the breeding season numbers were supplemented by wintering birds. High counts reached into the hundreds, with birds present on both the Inner and Outer Groups of islands.

Feral Pigeon *Columba livia.* A common breeding resident.
As is usual, small numbers bred around the islands. After the seabird breeding season, peak numbers grow in the autumn months to several hundred birds. Many fall victim to predation, most frequently from Peregrine and Great Black-backed Gull.

Woodpigeon *C. palumbus.* An uncommon passage visitor.
It was a fairly typical year for Woodpigeon with 14 records, predominantly coming from the Outer Group of islands. On 5 April, the rangers' first seasonal trip to Brownsman produced two adults around the cottage area, while the spring passage also provided Brownsman with single birds on 7 and 22 May. Unusually, autumn proved more productive than spring, most likely on account of the strong easterlies, with birds observed over six dates in October. An individual was seen on Staple Island on 6 October, as well as a separate bird heading to the mainland over Inner Farne on the same date. Additional singles were recorded on Inner Farne, from North Rocks on 14 October, and on Central Meadow on 16 October. On 15 October, five birds present on Brownsman made up the highest count since 2006, and proved to be the joint-third highest record count for Woodpigeon on the Farnes. The last annual record was a single on Brownsman on 21 October.

Collared Dove *Streptopelia decaocto. An* uncommon passage visitor.
This common mainland breeder was recorded over three dates on Inner Farne, all in spring. Two were present on the lighthouse on 20 April, and one was recorded in the Vegetable Garden on 7 May. Another, possibly the same individual, was present the following day in the same location.

Cuckoo *Cuculus canorus.* An uncommon passage visitor.
After an absence of sightings since 2013, there were 2 individuals on Brownsman 2015 on 24 August both juvenile. The autumn produced a single record of this scarce migrant. On 15 August, a juvenile was flushed from the North Rocks on Inner Farne and flew west towards Bamburgh.

Long-eared Owl © Ed Tooth.

Long-eared Owl *Asio otus.* An uncommon passage visitor.
There were two records of this impressive nocturnal hunter in autumn. The first sighting was from Brownsman on 27 August, when an individual was flushed from the East Rocks and flew towards the Wamses. The second consisted of a long-staying individual on Inner Farne which arrived on 11 October. After it was initially discovered roosting in the sticks in the Vegetable Garden, the showy bird relocated to other points around the island, including the Dock Bank and even on the Tower itself. After six days of offering excellent views, the owl was last seen on the morning of 17 October.

Short-eared Owl *A. flammeus.* An uncommon passage visitor.
It proved to be a superb year for this diurnal predator, with 35 individuals recorded over 14 dates. A slow spring provided three records, the first consisting of an individual mobbed by gulls before heading west over Knoxes Reef on 10 April. A single was seen on 23 May passing east over Knoxes Reef, while another bird was flushed from Brownsman on 26 May. Partly due to the generous easterlies, autumn began impressively with birds recorded on 11 dates between 1 and 17 October. Most sightings occurred on Inner Farne and Brownsman, though notable exceptions included a bird flushed from The Bridges between Knoxes Reef and West Wideopens on 5 October, and another present on Longstone End on 7 October. The second highest day count for islands was on 15 October, with nine birds recorded (including one on Brownsman). The final sightings of the season were on 17 October, with three recorded from Inner Farne.

European Nightjar *Caprimulgus europaeus.* A rare passage visitor.
After drawing a blank in 2015, a single male of this scarce and enigmatic species was found on Staple Island on 13 June. Having being flushed from rocks, it offered excellent views as it flew around the south of the island; it was mobbed by the breeding gulls around the Tower before landing in the northwest Meadow. This constituted the twelfth record for the islands.

Common Swift *Apus apus.* A well represented summer and passage visitor.
It was a quiet season for swifts on the Farnes, with small groups and singles comprising 17 birds over seven dates. After the first recorded from Longstone on 10 May, the only record in June was of three heading east past Inner Farne on 23 June. The next month proved marginally better with four passing south via Inner Farne on 27 July. Birds trickled through into August, with singles seen heading west from Inner Farne on 6 and 24 August. On the morning of 21 August, a stunned juvenile was found on the ground in front of the Inner Farne toilets. It soon recovered and flew off after a few minutes. The final record was a group of six passing south over Inner Farne on 30 August, the highest day count of the year.

Kingfisher *Alcedo atthis.* Extremely rare visitor.
A key contender for bird of the year, a Kingfisher present on Inner Farne on 9 August was the third ever record for the islands. A ranger heard the unmistakable call, and looked down Ladies Path to see the characteristic blue flash. The bird perched obligingly for 15 seconds before it flew across the Kettle and beyond the Wideopens, leaving behind several observers who could not quite believe their eyes.

Wryneck *Jynx torquilla.* Uncommon passage visitor.
There was one record of this highly sought after drift migrant. The bird was observed on Brownsman on 28 August, where it briefly perched on the southeast cliffs by the jetty. It then flew across to the north beach of Staple Island, where it was seen once more before returning to Brownsman.

Great Spotted Woodpecker © Thomas Hendry.

Great Spotted Woodpecker *Dendrocopus major.* An uncommon passage visitor. A single juvenile was found on Brownsman on 24 October. The rangers were alerted to the iconic call coming from the ground behind the Vegetable Garden wall, before the bird flew out and looped several times around the cottage. It was very active, and proceeded to feed on one of the false trees by the tower. It is likely that this bird was the Northern European race *D. m. major,* on account of the strong October easterlies, along with its whiter face and shorter, blunter bill compared to the nominate race. This exciting find marked the first island record since 2013.

Kestrel *Falco tinnunculus*. A well represented passage visitor; may have bred in 1916. Spring movement was typically light, with a female west past Inner Farne on 19 April and another over North Wamses on 10 May. Autumn passage began with a female on Inner Farne on 3 August, which was followed by three further records in August, three in September and nine in October, when a female appeared to be in residence on Brownsman for a week. All records were of single birds, with the exception of 30 August and 5 September when two were seen on each date.

Merlin *F. columbarius*. A well represented passage and winter visitor.
Britain's smallest falcon breeds in the uplands of Northumberland and winters in the lowlands, with the Farnes regularly hosting one or two overwintering birds. Spring produced six records between 20 March and 30 April, with the first autumn bird hunting Turnstones over Knoxes Reef on 18 August. Records remained scarce until October, when they became regular until the end of the season. Most sightings were of single birds, but two were seen together above Staple Island on 8 November, fighting over a Rock Pipit.

Peregrine Falcon *F. peregrinus*. A well represented passage and winter visitor; may have bred around 1925.
At least two birds were present in spring, with eight records between 2 March and 2 May, including a male and female seen together over Inner Farne. The first bird returned to the islands on 2 September, after which sightings became regular as at least two birds took up residence: an adult male and an enormous adult female.

Red-backed Shrike © Ed Tooth.

Red-backed Shrike *Lanius collurio*. An uncommon passage visitor.
The two individuals recorded this year were both seen on Brownsman on the same day. A female was discovered in the lower Vegetable Garden on the morning of 28 May and a second bird was found in the afternoon; both stayed at least until late afternoon.

Great Grey Shrike *L. excubitor.* A scarce passage visitor.
Autumn marked a brief return of this impressive shrike with the first record since 2012. On 4 October a single bird was observed on the sticks in the Inner Farne Vegetable Garden. It flew to the pond area, where it was mobbed by pipits and chased away from the island. This was the twenty-fourth record for the Farne islands.

Jackdaw *Corvus monedula.* A well represented visitor. Former breeder, last in 1966.
These Corvids predominantly visit the Farnes during spring, and this season continued the trend with the first seen on the Inner Farne Pele Tower on 22 March. The Tower hosted three birds on 8 April, two of which were seen inspecting the chimney early in the morning. An individual was recorded flying over Inner Farne Central Meadow on 28 April. The final record was of two passing north over Inner Farne on 3 May. Unusually, there were no autumn records.

Rook *C. frugilegus.* A well represented visitor.
Small numbers of Rooks visit the islands each year, and this season was no exception. Passage was light, and began with three passing east over Inner Farne on 10 April. Two birds were later seen returning west the same day. Autumn proved even quieter, with a single bird heading east over Inner Farne on 9 October.

Carrion Crow *C. corone.* A well represented visitor and rare breeding species.
Peak counts were reported at the beginning of the season with birds seen flying out from the mainland and returning west after exploring the islands. Small groups of 1-5 were seen on most days during April and May, but with high counts of 18 on 28 April, 17 on 20 April and 16 on 4 May. 1-2 birds lingered on Inner Farne during the seabird breeding season, and were seen on nine dates in June and July. There was potential breeding on the Outer Group, as a group of five birds including a juvenile was seen on Brownsman from 15-19 July. It remains unclear whether these had flown in from the mainland, or had bred on one of the smaller islands in the Outer Group. After a single August sighting, 1-4 birds were seen almost daily from 1 September into November. Exceptions were a party of 15 heading east over Inner Farne on 9 October, and six birds present on 11 September.

Goldcrest © Ed Tooth.

Goldcrest *Regulus regulus.* A common passage visitor.
It was a strong year for this irruptive kinglet, and after the first single on Inner Farne on 23 March, 1-8 birds were recorded on 16 spring dates. A peak of 11 birds was on 4 April, and the last spring record was of three birds on Inner Farne on 4 April. The first autumn bird appeared on 27 August in the Inner Farne Vegetable Garden, with 1-3 recorded on 11 subsequent dates until 3 October. Visible migration increased from 4-19 October with 13-231 birds recorded, including a seasonal high count of 265 birds on 15 October (220 on Inner Farne, 45 on Brownsman). This was the third-highest day count for the islands. Passage died down towards the end of the month, with 1-6 birds noted daily until the final record of three birds on 29 October.

Firecrest *R.ignicapillus.* An uncommon passage visitor.
Despite the sizable influx of Goldcrests in mid-October, there was just one sighting of this striking kinglet. An individual was discovered among ten Goldcrests on West Wideopens on 16 October, the first sighting since 2013.

Great Tit *Parus major.* Uncommon visitor.
On the day the rangers arrived on Inner Farne to begin the 2016 season, they were surprised to find this scarce (for the Farnes) mainland resident in the Lighthouse Compound. The single female Great Tit was found on 19 March and stayed for two days. This is only the fifteenth year since 1882 (this includes 1882 itself) in which this species has been recorded on the Farnes, and the sixth record since 2004.

Skylark *Alauda arvensis.* A passage visitor. May have bred in 1865 and around 1900. Inner Farne produced all the spring records, with singles present on 2, 12 and 22 March and from 8-15 April. Numbers increased later in the month with 11 seen over three days in April, which included a spring peak of seven birds heading north on 19 April. The autumn passage was busier, with 1-6 birds seen on most dates between 30 September and 31 October. Higher counts from Inner Farne included a passage of 13 on 6 October and 11 on 15 October, along with eight recorded from Brownsman on the same date. The peak count of the season was 27 birds observed on 14 October, compromising 21 heading west over Inner Farne and six in Central Meadow.

Sand Martin *Riparia riparia.* A well represented summer and passage visitor.
It was a typical year for this mainland breeder, with small numbers recorded predominantly in spring. The first bird of the year was seen from a visitor boat passing Big Harcar on 5 April, and represents the only seasonal record from the Outer Group. April provided most records, with singles passing north via Inner Sound on 10, 18 and 21 April. Five birds north over Knoxes Reef on 19 April was the highest count, followed by a group of four passing north on 20 April, along with a single north through Staple Sound. Sightings continued into May, with a bird passing north through the Kettle on 2 May, and the last spring record of two north on 3 May. Autumn was very quiet, the only record being one flying over Inner Farne on 8 September.

Barn Swallow *Hirundo rustica.* A common summer and passage visitor. Scarce breeder. The first spring passage bird was seen on Inner Farne Central Meadow on 4 April; subsequently, 1-5 birds were recorded on a further nine dates, generally heading north via Inner Sound and the Kettle. A spring peak passage of 31 was seen on 19 April. Representing the eighth year of continuous breeding on the islands, (since 2009; bred in both 19th and 20th C) the Farnes population remained healthy at 6 (5.8) pairs, although this represented a decrease from the 10 pairs last year. A fine end to the summer allowed many pairs to get away second broods. As usual, most of the accessible buildings were utilised and the six pairs nested as follows: Inner Farne 2 (2), Staple Island 0 (0.2), Brownsman 1 (1) and Longstone 3 (2.6). After the breeding season autumn passage birds were noted heading south or west on 14 dates. Records usually involved small groups of 1-22 birds, but higher counts of 49 and 36 were observed on 30 and 31 August, respectively. The peak count was 100 on 7 September, which comprised 26 around Inner Farne and 74 heading west over the island. The final autumn record was a late bird on 14 October.

House Martin *Delichon urbica.* A well represented summer and passage visitor. Six pairs attempted to breed in 1950 (Watt, 1950).
Spring got off to a promising start with seven passing north through Inner Sound on 19 April, but there were no further sightings until the following month when three birds flew north through the Kettle on 2 May. Singles were also seen flying north via Inner Farne on 4 and 8 May, along with an individual flying west over the Inner Farne Lighthouse on 27 May. There were just two records from the Outer Group, with a bird around the

Brownsman jetty on 26 May and the final spring sighting of an individual off Longstone End on 28 June. Autumn passage commenced with a peak count of 26 heading south past Inner Farne on 30 August, and singles were also recorded on 31 August and 1 September. A flock of 19 heading west over Inner Farne on 7 September was followed by two more on 11 September. The final late record was of a single heading west over Inner Farne on 17 October.

Pallas's Warbler © Ed Tooth.

Pallas's Warbler *P. proregulus.* A rare visitor.
This dazzling Siberian migrant was recorded on Inner Farne for the first time in three years. An individual was discovered among the Goldcrests and Yellow-browed Warblers in the Central Meadow on 5 October, where it offered close but brief views. A second bird was present on 14 October with two Yellow-browed Warblers, and lingered until the next day. These marked the nineteenth and twentieth records for the islands.

Yellow-browed Warbler *P. inornatus.* An uncommon passage visitor.
Despite a sizable influx across the rest of the UK, it was not an exceptional year on the Farnes for this Siberian gem. Nevertheless, the generous easterlies provided a sprinkling of records. The first of the year was one on Brownsman on 18 September, followed by a second bird around the picnic area of Inner Farne on 22 September. A third was found on Inner Farne Central Meadow on 1 October and showed nicely for visitors. Birds were recorded on nine further dates, with those birds on Inner Farne generally associating with Goldcrests in the Central Meadow. Most records consisted of two birds each day, but three were seen on 4 October. The last sighting of the year was a single on Longstone End in late October

Dusky Warbler *P. fuscatus* / **Radde's Warbler** *P.* schwarzi A rare visitor.
A bird thought to be a Dusky Warbler was seen and heard on West Wideopens on 16 October, before flying to Inner Farne where it was not seen again. This would represent the ninth record for the islands, but has only been accepted as either Dusky or Radde's by the County Records Committee.

Wood Warbler © Ed Tooth.

Wood Warbler *P. sibilatrix.* An uncommon passage visitor.
This gleaming woodland species remains scarce on the islands, so it was a welcome surprise when an individual graced Inner Farne on 28 August, the first record since 2013. The confiding bird offered excellent views in the Vegetable Garden for rangers and visitors, and lingered for two days until last seen on 30 August.

Chiffchaff *P. collybita.* A common passage visitor.
It was an excellent season for this subdued warbler, with the first noted on Inner Farne on 24 March. 1-6 birds were then recorded almost daily and were present on 62 dates in spring, with peak passage in April. There was a relatively large 'fall' of 12 birds on 11 April in the Inner Farne Dock Bank, followed by modest counts of eight and nine on the following two days. Singing individuals were heard on 20-21 April and also on 2 and 15 May on Inner Farne. One-2 birds lingered into June, with the last spring bird seen in the Inner Farne Vegetable Garden on 21 June. In an exceptional autumn, early singles were present on Brownsman on 6 and 11 July, followed by records on 35 dates between 18 August and 26 October. Peak passage was in early October, with 52 birds on 5 October (the fourth-highest count for the islands) and 66 on 6 October across Inner Farne, Brownsman, Staple Island and Longstone, representing the second-highest day count for the islands. The final sightings for the year were two on Inner Farne on 24-26 October. A suspected Siberian Chiffchaff (subspecies *tristis*) was seen on Inner Farne on 14 October.

Willow Warbler *Phylloscopus trochilus.* A common passage visitor.
Two birds in the Lighthouse Compound on Inner Farne marked the first arrivals on 10 April. Birds were recorded on 25 spring dates until 16 May, with generally 1-4 present on both Inner Farne and Brownsman. The first half of May brought a mini-influx, with 7 birds seen on Inner Farne on 2 and 4 May, and 13 on 5 May. A spring peak of 16 was recorded on 11 May, ten on Brownsman and two each on Longstone, Staple Island and Inner Farne. After the first autumn bird on Brownsman on 29 July there was an almost constant presence until October, with records on 52 further dates. Peak passage was in mid-August, with a high count of 31 birds on 22 August, 11 on Inner Farne and 20 on Brownsman. One of the Northern race *acredula* was discovered on 25 August in the Inner Farne Vegetable Garden. The last bird, singing briefly, was on Inner Farne on 18 October.

Blackcap *Sylvia atricapilla.* A common passage visitor
A good showing for this summer visitor with records on 16 dates in spring. The first was a male in the Inner Farne Vegetable Garden on 4 April. A spring peak of five birds was recorded on 5 May on Inner Farne. Five were also present on 8 May, comprising a first summer male, two females from Inner Farne and two females on Brownsman. The last spring records were of a male and female on Brownsman and Inner Farne respectively on 15 May. The first record of the autumn was a female in the Inner Farne Vegetable Garden on 28 September. In autumn, there were reports on 22 dates with a peak on 15 October of 42 birds (20 males, 22 females) on Inner Farne and Brownsman, the third-highest day count for the Farnes after 250 in 1981 and 129 in 2001. The final records were of a male and female on Inner Farne on 27 October.

Garden Warbler *S. borin.* A common passage visitor.
It was a poor season for this robust *Sylvia,* with three seen in spring and a further six recorded in autumn. A bird was present in the Dock Bank on Inner Farne from 5-6 May, and was followed by another bird seen in the Vegetable Garden from 9-11 May which later relocated to the Dock Bank. The third spring bird was present on Brownsman on 28 May. The first autumn birds arrived on 28 August, with one bird on Inner Farne and two on Brownsman, one of which was still present the following day. The final two records were from Inner Farne and consisted of two singles on 14 September and 5 October.

Lesser Whitethroat *S. curruca.* A common passage visitor.
The Outer Group provided all spring records, over 12 dates in spring from 4-28 May. Most were single birds on Brownsman, with the exception of two together on 11 May. A single was also recorded on Longstone on 9 May. Autumn passage was unusually productive with 14 records between 28 August and 30 October, most involving single birds, including individuals present on both Inner Farne and West Wideopens of the Inner Group on 15 September, and two on Brownsman on 8 October. Most autumn records came from the Inner Group, with only three sightings from Brownsman.

Whitethroat *S. communis.* A common passage visitor.
After the arrival of two females on Inner Farne on 1 May, birds were recorded on a further 19 spring dates across the islands with the last spring record of a female on Brownsman on 18 June. Peak counts of three were recorded on three dates. Birds favoured the Outer Group in spring, with birds noted on 16 dates across Brownsman, Staple Island and Longstone, but only eight records from the Inner Group. The first autumn bird was on Inner Farne on 13 August, followed by sightings on 17 further dates with the last on 6 October. Fifteen of 20 autumn records were of single birds from Inner Farne but on 23, 27 and 28 August singles were present on both Inner Farne and Brownsman.

Grasshopper Warbler © Ed Tooth.

Grasshopper Warbler *Locustella naevia.* A well represented passage visitor.
It has been a poor showing for this elusive warbler in recent years, with only two records in 2014 and one in 2015. The 2016 season fared no better, with the only record being one near the Vegetable Garden on Brownsman from 2-3 May.

Icterine Warbler *Hippolais icterina.* An uncommon passage visitor.
The Farnes provide a highly reliable site for this robust east-coast drift migrant, and has been recorded in 10 of the past 11 years, with only 2014 drawing a blank. This season continued the tradition, with a single bird present on Staple Island on 28 May, where it was photographed by a visitor.

Sedge Warbler *Acrocephalus schoenobaenus.* A well-represented passage visitor.
It was another slim year for this distinctive *Acrocephalus*, with the first bird of the year discovered on the Inner Farne Dock Bank on 3 May. Subsequent sightings were from Brownsman, with a single on 5 May and another seen around the pond on 10 May. Autumn proved even quieter, with the final sightings consisting of two on Brownsman on 13 September.

Reed Warbler *Acrocephalus scirpaceus.* A well represented passage visitor.
In previous years this warbler has proved elusive and often missing in spring, but this season Brownsman provided a single bird around the Vegetable Garden on 1 May. The only autumn record was of an individual present on the Central Meadow of Inner Farne on 15 October.

Waxwing *Bombycilla garrulus.* An uncommon winter and passage visitor.
Despite an invasion occurring on the mainland, it was a lean year for this irruptive visitor. Birds trickled through on two autumn dates, with three passing west over Inner Farne on 3 November. On 8 November, a single seen heading south over the Brownsman cottage was the only record from the Outer Group.

Wren *Troglodytes troglodytes*. A passage migrant and winter visitor. A rare breeder.
Spring records mainly involved overstaying wintering birds, with generally 1-7 present on Inner Farne from 12 March. Larger influxes of eight and nine were recorded across three dates in late March, with a peak of 10+ seen on 24 March on Inner Farne. The last bird of spring was a single on Inner Farne on 3 May. After the first autumn bird on Brownsman on 16 September, there was a daily presence across both groups of islands until the end of the season. The highest count was 21 on 15 October, 12 on Inner Farne and nine on Brownsman.

Starling *Sturnus vulgaris.* A common visitor; extremely rare breeder.
Small numbers were present from early spring, with 1-3 seen on seven dates during March and April on Inner Farne. Numbers increased in mid-summer, and family parties from the mainland provided frequent counts of 10-30 birds from 5 June through to July. Smaller groups were present throughout autumn, with peak passage occurring from mid to late August. A seasonal high count of 65 was noted from Inner Farne on 30 August, with smaller counts of 52 and 42 recorded on 23 and 17 August respectively. After the 44 birds seen on 7 September, the last major influx was during the peak thrush migration on 14 and 15 October, when 42 and 46 Starlings were recorded. One-7 birds were subsequently seen daily into December.

Ring Ouzel *T. torquatus.* An uncommon passage visitor.
Although another quiet year for this mountain blackbird, five individuals put on a good show. The first was a male on Inner Farne from 5-6 April, which offered obliging views to rangers and visitors in the Top Meadow. The second and last spring record was a male in the Inner Farne Vegetable Garden from 12-13 April. Autumn commenced with a single on Brownsman and a first-winter male on Inner Farne, both on 4 October. The final record was a bird on Brownsman on 13 October.

Blackbird *Turdus merula.* An abundant passage visitor. Rare historic breeder.
After the first sighting of a single on 12 March on Inner Farne, it was a quiet spring passage with 1-3 recorded on 22 dates. The last spring record was a male on Brownsman on 24 May. The first autumn bird was a female on Brownsman on 11 September, and, after a male on Inner Farne on 3 October, birds were seen daily until the end of the year. Peak passage was in mid-October, with a considerably low high-count of 56 birds on 15 October, which comprised 38 on Inner Farne and 18 on Brownsman. Passage generally slowed into November, with the exception of a mini-flux of 31 recorded from Inner Farne on 3 November.

Fieldfare *T. pilaris.* A common passage visitor.
Small numbers were recorded in spring from Inner Farne, with the first discovered behind the Pele Tower on 6 April. One-2 birds were seen on 10 subsequent spring dates, with a high count of 18 on 4 April which included 10 birds heading north. A final bird present on North Rocks from 26-27 May was a late spring record. The first autumn bird was found on Inner Farne on 15 September, and the subsequent passage was very light compared to 2015. Numbers typically remained in single figures throughout October and November, but the easterlies provided a mini-influx from 14-16 October, resulting in higher counts of 14, 37 and 19 across these dates. After a count of 35 passing west over Inner Farne on 30 October, 20 were also seen heading west on 12 November. One-2 were present on Inner Farne through to late November.

Song Thrush *T. philomelos.* A common passage visitor.
It was a poor season for thrushes, reflected by the meagre presence of this garden favourite across the islands. Spring passage was light with 1-3 birds recorded on 15 dates between 26 March and 30 April. On 13 April, an influx of 11 was the highest spring count, followed by five the next day. After a sprinkling of 1-2 birds on four dates from 1-18 September, the species maintained a constant presence throughout autumn from 20 September onwards. Peak passage was in early October, with a high count of 92 on 5 October: 29 on Inner Farne, three on West Wideopens and 60 on Brownsman. After a smaller influx of 10-33 birds from 10-17 October, 1-7 were present on the islands into December.

Redwing *T. iliacus.* An abundant passage visitor.
Small numbers of this winter migrant moved through the islands in spring, with heavy passage in autumn as a result of strong easterlies. The first record was an individual on the Inner Farne Top Meadow on 24 March, which then flew west to the mainland. 1-5 were seen on 10 additional dates in spring, with a high count of 17 from Inner Farne on 4 April, including 16 heading north, and eight on 27 March. A single on Brownsman on 29 April marked the last spring bird. After the first two autumn birds from Brownsman on 2 October, 3-101 were recorded daily throughout October, with a peak count of 506 on 15 October and large counts of 144, 129 and 118 birds on 13, 5 and 6 October, respectively. Birds trickled through into November with a peak of 18 on 12 November on Inner Farne, but generally consisted of singles as December closed in.

Mistle Thrush *T. viscivorus.* An uncommon passage visitor.
This is a scarce species for the islands. A single bird was recorded passing west over Inner Farne on 13 October at the peak of the autumn thrush migration.

Spotted Flycatcher *Muscicapa striata.* A well-represented passage visitor.
There were eight individuals recorded across 12 dates in 2016, with peak passage occurring in spring. The first bird was recorded on Longstone from 9-10 May, followed by a separate individual present on Brownsman, also on 10 May. Singles were also present on Staple Island on 11 May and around the Inner Farne picnic area on 19 May. One was also seen on the south east of Brownsman from 26-28 May. There were three autumn records, with the first appearing on Brownsman on 28 August, followed by one on the Inner Farne Dock Bank on 7, 8 and 11 September. The final bird of the year was on Longstone on 13 September.

Robin *Erithacus rubecula.* A common passage visitor. Bred in 1951.
A well represented overwintering migrant, there were 1-4 present on 33 spring dates after the first record on 12 March on Inner Farne. There were no major influxes, and the last record was a late bird that had become trapped in the Inner Farne Information Centre on 4 June. After the first autumn record of a single in the Inner Farne Vegetable Garden on 14 August, birds were a daily occurrence across the Inner and Outer Groups throughout September and into December. As usual, numbers were supplemented by migrants, with peak passage occurring from 4-18 October, when they hit double figures. The highest count was noted on 15 October, when 135 birds comprised 85 observed from Inner Farne and 50 on Brownsman.

Thrush Nightingale © Ed Tooth.

Thrush Nightingale *Luscinia luscinia*. An extremely rare visitor.
For the second year running, Brownsman hosted this eastern vagrant to the astonishment of the rangers. Unlike the 2015 individual, this one arrived in spring and was present in the sticks around the Vegetable Garden. It was particularly obliging and offered close views of only 5-10 metres, allowing the rangers to photograph and locate the eighth visible primary feather to confirm this tricky species. It was present from 10-12 May and marks the fourth record for the Farne Islands.

Bluethroat (red spotted) *L. svecica.* An uncommon passage visitor, well represented in some years.
The Farnes is perhaps the best site in the north-east to see this continental jewel, and the 2016 season did not disappoint. The rangers visited Longstone on 10 May and briefly glimpsed a distant male on Longstone End. A subsequent search among the rocks produced excellent views of the stunning bird. Two females appeared on 12 May, the first one present in the Vegetable Garden for two days on Brownsman. The second was a showy first winter bird on Inner Farne, seen well by rangers and public alike in the Vegetable Garden. It was subsequently seen on 13 and 15 May where it had relocated to the Dock Bank.

Red-breasted Flycatcher *Ficedula parva.* An uncommon passage visitor.
It was another good year for this eastern specialty, with two seen in autumn. The first sighting was a first-winter bird on 7 October, which showed beautifully in the afternoon around the Brownsman cottage. The second was another first-winter bird, which was present at St Cuthbert's Cove on Inner Farne on 15 October.

Pied Flycatcher *F. hypoleuca.* An uncommon passage visitor.
It was a quiet season for this woodland favourite with seven noted across the islands. The only spring record was a showy male on Brownsman, which stayed from 7-8 June and offered close views on the upper Vegetable Garden sticks. Autumn began impressively with three present on Inner Farne, which stayed for two days from 20-21 August. A single bird recorded on the Brownsman Flats on 22 August, and two separate individuals recorded from Inner Farne and Brownsman on 28 August comprised the final records for the year.

Black Redstart *Phoenicurus ochruros*. A well-represented passage visitor.
Although there were no autumn records, a strong spring showing began with two males in the Inner Farne lighthouse compound from 4-5 April, two males on Brownsman on 5 April, and then a single male on the Inner Farne South Rocks on 6 April. Two males were present on 11 April, one of which, a second calendar-year bird, lingered around the Lighthouse Compound until last seen on 14 April. A male and female were on Brownsman on 11 May, and a single male was also present on 14 May. The last two spring records were of a female from 27 to 28 May around the Inner Farne tower, and a male in the Lighthouse Compound from 13-14 June.

Common Redstart © Ed Tooth.

Common Redstart *P. phoenicurus.* A common passage visitor.
A modest year for this species with the first an impressive male on Brownsman on 3 May, followed by a female in the Vegetable Garden on 5 May. Two separate females were on Brownsman and Inner Farne on 10 May, the latter lingering for seven days in the Vegetable Garden. A minimum of two females and a male were seen on Brownsman from 11-16 May, giving a peak count of four birds across the islands on 11 May. Two late spring records from the Outer Group comprised a female on Staple Island on 24 May and another from Longstone on 28 May. The first autumn record came from Inner Farne on 28 August, followed by a single bird seen on Longstone on 29 August. There were three September records, with a handsome male in the Inner Farne Vegetable Garden on 3 September, one on Brownsman on 13 September, and a female in the Lighthouse Compound on Inner Farne on 15 September. A female was present on Inner Farne from 6-9 October, followed by a male and female on 15 October. The final record was a lone female, possibly the same bird, which lingered on Inner Farne from 16-18 October.

Whinchat *Saxicola rubetra.* A common passage visitor.
Spring passage was typical, with a male present from 7-8 May in the picnic area on Inner Farne. A female on Brownsman on 8 May was the last spring record. Autumn commenced with a juvenile on Inner Farne Top Meadow on 22 July, and continued with 1-2 birds present on seven dates from 17 to 28 August on Inner Farne and Brownsman. One-2 birds were seen on an additional eight dates on Inner Farne from 5 - 17 September, whilst a single on Brownsman on 13 September was the last record for the Outer Group. The final records were singles on Inner Farne on 6 and 8 October. Maximum counts of three birds were seen on Inner Farne on 21 August and 15 September.

Siberian Stonechat *S. maurus.* An extremely rare visitor.
The islands shared in the stunning influx of Siberian vagrants that arrived in the UK during autumn with the debut arrival of this rare chat on Inner Farne. A first winter male was found on Central Meadow in late afternoon on 20 October, where it offered obliging views until it vanished just before dusk. Plumage colour suggested that the bird could be the Stejnegeri subspecies, but it did not stay long enough for the rangers to collect faecal DNA samples which might have confirmed its taxonomic status. Regardless of subspecies, this represented the first ever record for the islands and was undeniably passerine of the year.

Stonechat *S. torquatus.* An uncommon passage visitor. Bred in 1946.
It proved another elusive year for this common mainland breeder after a notable decrease in sightings since winter 2010. A female on the south end of Brownsman on 15 October was, therefore, a welcome surprise but the only record.

Northern Wheatear © Ed Tooth.

Northern Wheatear *Oenanthe oenanthe.* A common passage visitor. Bred in six years 1931-1959.
In a steady spring passage, there were records from 44 dates between 24 March and 21 June. Single males comprised many of the early sightings. Most counts stayed in single figures, but a peak of 12 birds on 1 May broke the mould, followed by modest totals of eight on 5 May and five on 4 April. The first autumn bird was a female on Inner Farne on 9 August, followed by a first-winter bird on 18 August. Birds were subsequently recorded every day from 19 August until 15 September, and logged on a further 24 dates between 17 September and 15 October. Peak passage was on 29 August, with 48 recorded across the islands, including 16 on Inner Farne, 14 on Brownsman and 18 on Longstone. All other autumn record consisted of 1-10 birds. A possible Greenland race bird was seen on Brownsman on 27 August.

Dunnock *Prunella modularis.* A common passage visitor. May have bred in the 1890s (Pybus, 1903).
Despite a generally sedentary British population, small numbers of the nominate race *P. m. modularis* trickle through the islands, passing between breeding grounds in Fennoscandia and wintering grounds in Southern Iberia. The first spring record was one seen in the Inner Farne Vegetable Garden on 27 March. There were subsequent records of singles on 12 dates between 1 April and 3 May, with birds around the Lighthouse Compound and Tower on Inner Farne. The Outer Group had three spring birds on Brownsman, with two recorded on 5 April along with a single present from 28-30 April. The autumn passage was busier with generally 1-3 present across the island on 23 dates in October. Five birds were present on Inner Farne on 18 October, while a count of six on 13 October comprised four on Brownsman and two on Inner Farne. A seasonal peak of 11 on 15 October consisted of eight on Brownsman and three on Inner Farne. A handful of singles were present throughout November and into December.

Yellow Wagtail *Motacilla flava.* An uncommon passage visitor.
It proved another lean year for this dazzling yet declining migrant, with no spring records at all. An autumn individual seen on 7 September passing west over Inner Farne was the only record of the season.

Grey Wagtail *M. cinerea.* An uncommon passage visitor. May have bred in the 1890s.
As usual, there were no spring records but Inner Farne in autumn provided five records of this partial migrant. The first was a bird passing west over the Lighthouse Compound on 23 September. Three birds were seen on three consecutive dates the following month, with a bird seen heading south over the Lighthouse on 15 October, one recorded on the South Rocks on 16 October and the final record of an individual seen on 28 October.

Pied Wagtail *M. alba yarrelli.* A well-represented summer and passage visitor and uncommon breeding species.
After the first sighting of a single bird on Inner Farne south rocks on 18 March, small numbers were seen on spring passage. Birds were fighting for territory from 21 March, with the first male heard in full song on 30 March. Nest building was observed in the Courtyard and Lighthouse Compound on 24 April. This year 6 (7) pairs nested as follows: Inner Farne 3 (3.1), West Wideopens 0 (0.4), Staple Island 1 (1), Brownsman 2 (1.8) and Longstone 0 (0.8). Fledged chicks were first seen on 4 June, and in the case of the Swallow, some pairs managed second broods after fine weather in late summer. There was a post-breeding increase during late August, with a peak count of 12 birds on 12 August. The species was noticeably scarcer in autumn, with a single seen on 14 October on Inner Farne. The final record was a late bird circling Inner Farne on 25 November.

White Wagtail *M. alba alba*
It was a good year for this continental subspecies, with singles recorded on eight spring dates. The first bird was recorded on Inner Farne Central Meadow on 27 March, with all subsequent birds also seen on Inner Farne with the exception of a single on Brownsman on 15 June. There were two autumn birds, seen on 26 August and 6 October.

Tree Pipit *Anthus trivialis*. A common passage visitor.
A quiet spring passage with only one recorded on Brownsman on 11 May. The first autumn bird was seen passing west over Inner Farne on 18 August, followed by single birds in each of the next four days. Three Tree Pipits on 25 August was the peak count for the season, and comprised two heading south over Inner Farne and a single showing well in the Vegetable Garden. Singles were also present on Inner Farne on 26 and 28 August, and one seen on Brownsman on 29 August was the last sighting for the Outer Group. Passage slowed in September, with individuals over Inner Farne on 4, 7 and 11 September, whilst two were observed passing west over the island on 9 September. On 5 October, a late individual on Inner Farne was the final record for the season.

Meadow Pipit *A. pratensis*. A common passage visitor. Bred about 1901 and in eleven years 1946-1973.
It was a quiet spring for this species with small numbers recorded; the first was discovered on the Inner Farne Dock Bank on 23 March. Subsequently, 1-7 were seen on 19 more spring dates, with all but one record from the Inner Group. There was a spring peak of 21 birds on 3 April, closely followed by 18 the following day. Nine were seen heading north on 19 April, and the last spring bird was seen on Brownsman on 28 May. The species is one of the most numerous passage migrants on the Farnes in autumn; after the first two birds present in the Inner Farne Lighthouse Compound on 23 August, Meadow Pipits were recorded on a further 51 dates until 25 October. Peak passage was in the first half of September, with a seasonal high count of 285 heading south-west over Inner Farne on 11 September, representing the fourth-highest day count for the islands. Modest counts of 66 and 33 birds were noted on 7 and 9 September, and strong easterlies on 15 October brought 67 birds across Inner Farne and Brownsman. An individual on the Inner Farne North Rocks on 12 November was the last one of the season.

Rock Pipit *A. petrosus*. A common resident well represented as a breeding species.
Birds were present and display song was observed on 12 March as males began setting up territory. A bird was seen with nest material on Inner Farne on 13 April, with the first fledged chicks trapped and ringed on 19 May. This year 21 (23.8) pairs nested, representing a recovery after a 23 year-low of 17 pairs in 2015, as follows: Inner Farne 5 (5.8), West Wideopens 1 (1.8), East Wideopens 0 (0.8), Staple Island 3 (3.6), Brownsman 7 (8), North Wamses 2 (1), South Wamses 1 (1.2), Longstone 1 (0.8) and Longstone End 1 (0.8). In late summer the resident breeding population is supplemented by migrant birds, represented by a peak count of 16 from Inner Farne on 30 August.

Brambling *Fringilla montifingilla.* A common passage visitor.
There were four spring birds on Inner Farne. A male on the North Rocks was the first seasonal sighting on 4 April; two males and a female were recorded on 14 April, with the two males still present the following day. The first autumn arrivals were groups of four and seven on Inner Farne and Brownsman, respectively, on 4 October, with birds recorded on 16 subsequent dates that month. As with many migrants that autumn, the peak passage occurred from 10-16 October, when impressive numbers were noted. The highest count was 128 on 15 October, comprising 52 on Inner Farne and 76 on Brownsman. Smaller tallies of 8-20 birds were generally recorded during this time. The last bird of the year was a female on Inner Farne on 29 October.

Chaffinch *F. coelebs.* A common passage visitor.
It was a quiet spring passage with one individual heard calling over Inner Farne on 22 March. Autumn commenced with a female present on Inner Farne from 15-17 September. Three birds were also recorded from the Outer Group from 16-18 September, which included a male on Brownsman and a female on Longstone. Passage picked up in October, with 1-5 recorded on 17 dates across both island groups. A maximum count of ten was noted on 15 October, eight on Brownsman and two on Inner Farne. A count of nine was also recorded on 13 October. The last record was a male and female from Inner Farne on 22 October.

Common Rosefinch © Ed Tooth.

Common Rosefinch *Erythrina erythrina.* An uncommon passage migrant.
At least three birds made welcome appearances on the islands in 2016. A first-summer male was discovered singing on Brownsman in the lower Vegetable Garden on 25-26 May. Possibly the same individual was found on Brownsman on 28 May. The first autumn record was a low-flying bird over Inner Farne, calling as it headed west to the mainland. The final sighting was a first-winter bird found near the Brownsman cottage on 15 October.

Greenfinch *Chloris chloris.* A well represented passage visitor.
The decline of this much-loved garden bird is reflected in the scarcity of recent records from the islands, so it was a welcome surprise as a ranger left the Lighthouse Cottage on the morning of 7 October to find a male and female perched on the Compound wall before they flew west. Two different birds were also seen heading west later the same day.

Linnet *Linaria cannabina.* A common passage and winter visitor. Bred in the 1890s.
It was a good showing this season, with the typical mix of passage and mainland birds visiting the islands. After the first sighting of six birds on 12 March, there was a daily presence of 1-9 birds in spring. All spring sightings came from Inner Farne, with birds recorded on a further 22 dates until 3 May, when two birds were seen heading west. A modest group of 28 was seen passing north via Inner Sound on 18 May, and 22 were also present on Inner Farne on 10 May. After the first autumn showing of 26 from Inner Farne on 6 October, a semi-resident flock was present throughout October and November and was seen daily, occasionally roaming to the Outer Group. A peak count of 133 on the Inner Farne Central Meadow on 25 November was a record highest day-count for Linnets on the islands.

Twite *L. flavirostris.* A well represented passage visitor.
There were four late-season records for this upland finch, which typically associates with Linnets in small numbers. The first record was one heard among a flock of 16 Linnets on the Ladies Path, Inner Farne on 20 October. Individuals were also present on Inner Farne on 25 and 18 October, whilst the final record was a single in the Lighthouse Compound on Inner Farne on 19 November.

Lesser Redpoll *Acanthis cabaret.* An uncommon passage visitor.
This species proved considerably scarcer than its continental cousin in 2016. The first sighting was of one heading west over Inner Farne on 23 September, the only sighting for that month. The maximum count was three present on 7 October from Inner Farne. Subsequently, singles were recorded on 12-15 and 17 October on Inner Farne, and two birds seen on 24 October were the final records for the year.

Common Redpoll *A. flammea.* An uncommon passage visitor.
It was an excellent year for this continental Redpoll. After the first three recorded over Inner Farne on 9 October, the species was seen on a further ten dates in autumn. Peak passage occurred on 12 October, when 18 came to roost on Inner Farne in late afternoon. This high count fell to 15 present from 13-14 October, with numbers further dropping from mid-October to early November. The final records were singles present on Longstone and Staple Island on 8 November.

Redpoll spp. *Acanthis. spp.*
Brief flyover Redpolls were recorded on four dates and could not be assigned to species. After a lone spring bird in the Inner Farne Vegetable Garden, groups of four and 13 were seen heading west on 23 September and 12 October, respectively. A single was also noted from Inner Farne on 23 October.

Goldfinch *Carduelis carduelis*. A well represented passage visitor.
It proved a typical year for this colourful seedeater, with peak passage occurring in spring. The first was one seen on the Inner Farne Central Meadow on 3 April, followed by one flying north-east past the Lighthouse Compound on 7 April. The peak count of 13 was recorded on 19 April, comprising 11 passing north through Inner Sound and one in the Inner Farne Vegetable Garden and one over Brownsman. 1-3 were recorded on three additional spring dates, followed by the final spring record of eight from Inner Farne on 29 April. The first autumn migrant was one flying west over Inner Farne on 28 September, with 1-3 seen on seven more dates between 29 September and 31 October. The exception was five juveniles and an adult on Inner Farne on 1 October.

Siskin *Spinus spinus* A common passage visitor.
It was a quiet season with passage observed on 11 dates, beginning with an irregular mid-summer arrival of a male on Brownsman on 16-17 June. Autumn was more typical, with 1-2 seen from Inner Farne on 4 dates between 16 September and 13 October. Numbers steadily grew with 11 birds recorded on Inner Farne from 14-15 October. Seven additional birds from Brownsman on 15 October contributed to a seasonal peak of 18. Numbers subsequently dropped with seven recorded on Inner Farne on 16 October, with six lingering from 17-18 October as the last seasonal records.

Snow Bunting *Plectrophenax nivalis.* A well represented passage visitor.
It was a quiet season with one spring record of a male on the Inner Farne Central Meadow on 18 March. Autumn was typically busier, with singles recorded on a further six dates. Two October records involved birds seen on Inner Farne on 20 and 28 October, while three more the next month were of birds passing over Inner Farne on 1, 16 and 26 November. The only sighting from the Outer Group was a male on South Wamses on 18 November.

Lapland Bunting *Calcarius lapponicus.* An uncommon passage visitor.
It was a better season for this scarce high-Arctic breeder, with two autumn records, both coming from Brownsman. The first was seen on 8 October, when it was flushed from the Lower Vegetable Garden before flying to the Wamses, while the second bird was seen by the south jetty on 15 October. This was a slight improvement on the past two seasons, with only one record from each year.

Yellowhammer *Emberiza citronella.* An uncommon passage visitor.
After none in 2015 there were two records of this attractive farmland bird. The first was observed on Brownsman on 15 October in the cottage sticks, while the second was recorded on Inner Farne on 16 October. It was seen circling the Lighthouse Compound before landing on the Dock Bank, where it was seen again later in the day.

Little Bunting *E. pusilla.* An uncommon passage visitor.
It was an excellent year for this small Siberian vagrant, with easterly winds bringing five individuals to three of the islands, a joint-highest seasonal count for the Farnes equalling the record set in 2000. The first bird was flushed from the Inner Farne Central Meadow on 4 October, before proving elusive and offering scant views throughout the day. A more obliging bird was discovered on Brownsman in the lower Vegetable Garden on the same day, and stayed around the North and East Rocks for five days, offering close views. On 9 October, a ranger got within three feet of one on Longstone End, whilst two more individuals were recorded from Inner Farne on 11 and 15 October.

Reed bunting *E. schoeniclus.* A well represented passage visitor.
It was a typically light passage with three birds recorded in spring, and autumn providing birds on nine dates in October. The first was a male present in the Inner Farne Vegetable Garden on 9 April, followed by two Outer Group records, a female from Brownsman on 9 May and a male on Staple Island, the last spring record, on 26 May. The first autumn birds arrived on 4 October, with two on Inner Farne and one on Brownsman, followed by 1-3 birds seen over six dates. Counts of ten and 14 birds were recorded on 13 and 15 October, respectively, across the islands, with the final sighting from Inner Farne on 16 October.

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PLANT MONITORING ON THE FARNE ISLANDS

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INTRODUCTION

The islands have seen a varied amount of effort over the years with regards to studying and monitoring plants on the islands, with detailed surveys covering the extent of the islands in some years, while in others anecdotal reports only have been recorded. To remedy this inconsistency in amount and quality of data, this year the islands have been signed up to the National Plant Monitoring Scheme (NPMS). This is a habitat-based plant monitoring scheme designed by the Botanical Society of the British Isles (BSBI), the Centre for Ecology and Hydrology (CEH), Plantlife and the Joint Nature Conservation Committee (JNCC). The aim of the Scheme is to collect data annually on changes in plant abundance and diversity throughout the UK (National Plant Monitoring Scheme 2017). There has been huge success across the UK in terms of quality data recorded with similar schemes in different taxonomic groups such as birds, bats and butterflies in the form of the Breeding Bird Survey, National Bat Monitoring Programme, and the UK Butterfly Monitoring Scheme, respectively, so it is hoped that the same level of success can be achieved with plants and provide a means to document Farne Islands' vegetation more consistently in the future.

METHODS

The NPMS has designed the survey to include 1 km square plots throughout the country. These can then be allocated to a person who, within the 1 km square, will record plants from five different survey plots. Here on the Farne Islands, a 1 km square plot was positioned to cover Brownsman and Staple Islands. From this plot, we set up, as a trial, 3 survey plots on Brownsman consisting of two 5metre x 5metre plots and one 25metre x 2metre plot (Figure 1). Plants within each plot were identified and assigned to abundance classes (Table 1).

Figure 1: The location of NPMS plots (red) on Brownsman in 2016. Satellite image from Google Earth.

RESULTS

Eleven species were recorded from the three plots (Table 2). Square plot 1, located towards the south end of Brownsman (Figure 1), had lower species diversity than the two linear plots surveyed. Yorkshire Fog *Holcus lanatus* was the dominant species with at least 70% cover (Figure 2). This grass can grow in a range of soil types and grows best in nutrient rich, wet soils. The Farne Islands offer ideal conditions for Yorkshire Fog as they have a clay subsoil with a peat top soil, the latter being rich in nutrients and both of which retain water. Once it becomes established it forms a dense sward that other plants find hard to compete with.

Linear plot 1 was located on the east side of Brownsman and had greater species richness that Square plot 1 with seven species recorded in spring (Figure 3). This reduced to six species recorded in late summer. The dominant species here was Common Saltmarsh Grass *Puccinellia maritima* (at least 50%), a common coastal plant around the UK which forms dense tufts and can become dominant in some pioneer communities, for example in lower and middle saltmarsh, and lower shore muds. Common Saltmarsh Grass grows well on clay soils with saline conditions. This area, well exposed to sea spray, will have saline soils and will be a place where Common Saltmarsh Grass, as a pioneer species, can grow without too much competition. Other salt tolerant species were also present here, including Sea Campion *Silene uniflora* (1%), Common Scurvygrass *Cochlearia officinalis* (1%), and Orache *Atriplex* (1%).

Linear Plot 2 was located around the edge of Brownsman pond (Figure 1) and had the greatest species diversity with eight species at any one time and ten in total (Figure 4). Sea Mayweed *Tripleurospermum maritimum* was the most abundant, with over 50% coverage, followed by Orache *Atriplex* with up to 33%. Sea Mayweed grows well in areas with a high nitrogen content in the soil, which can be found in abundance here on the Farne Islands due to the large amount of bird guano deposited each year. This plant species is not only salt tolerant but it also grows well on ditch banks and in damp fields; thus, the pond next to the Linear Plot 2 transect could also be providing ideal conditions for the plant.

DISCUSSION

As this is the first year that the NPMS was carried out on the Farne Islands, only limited conclusions can be derived from the data collected. However, this will change as the data accumulate if the survey is maintained in future years, allowing changes in plant abundance and distribution to be described over time. We also hope to increase to five or six plots in total next year, with the next three being set up on Staple Island. These survey plots will inform better management of the islands: some plant species can have detrimental effects on breeding seabirds, while others prevent erosion of the soil cap. Thus, the NPMS plots on the Farne Islands will not only contribute data into a national database but have the capacity to improve, using empirical evidence, the management of habitat for nesting seabirds.

Figure 2: Square plot 1 located at the south end of Brownsman. The vertical axis ranging from 1-10 represents percentage changes in abundance (Table 1).

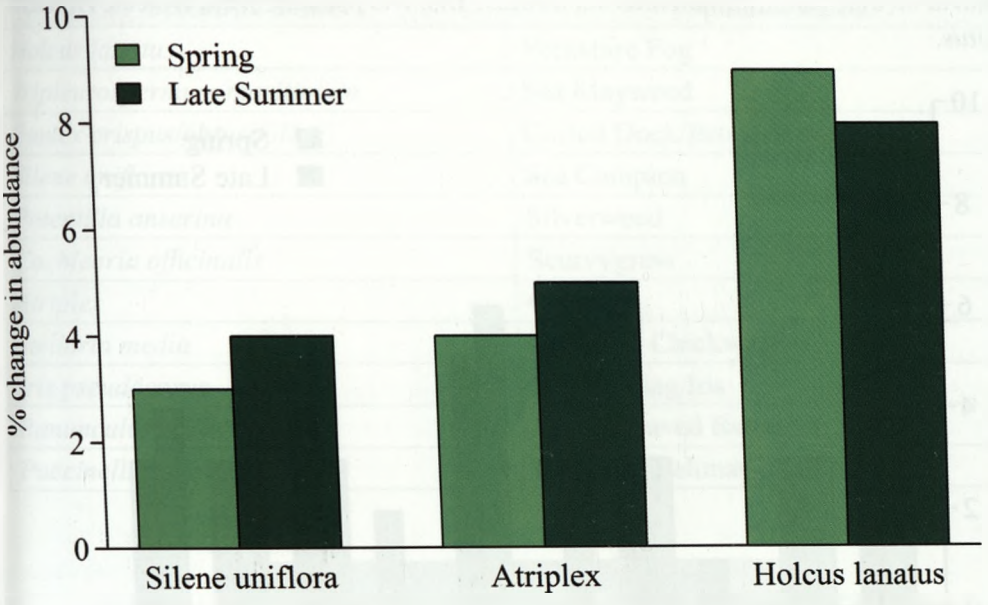

Figure 3: Linear plot 1 located on the east side of Brownsman where the rocks meet vegetation. Vertical axis as Fig. 2. Rum., *Rumex crispus/obtusifolius*; Silene, *Silene uniflora*; Pot., *Potentilla anserina*; Cochl., *Colchlearia*; Atrip., *Atriplex*; Tripl., *Tripleurospermum maritimum*; Pucc., *Puccinellia maritima*.

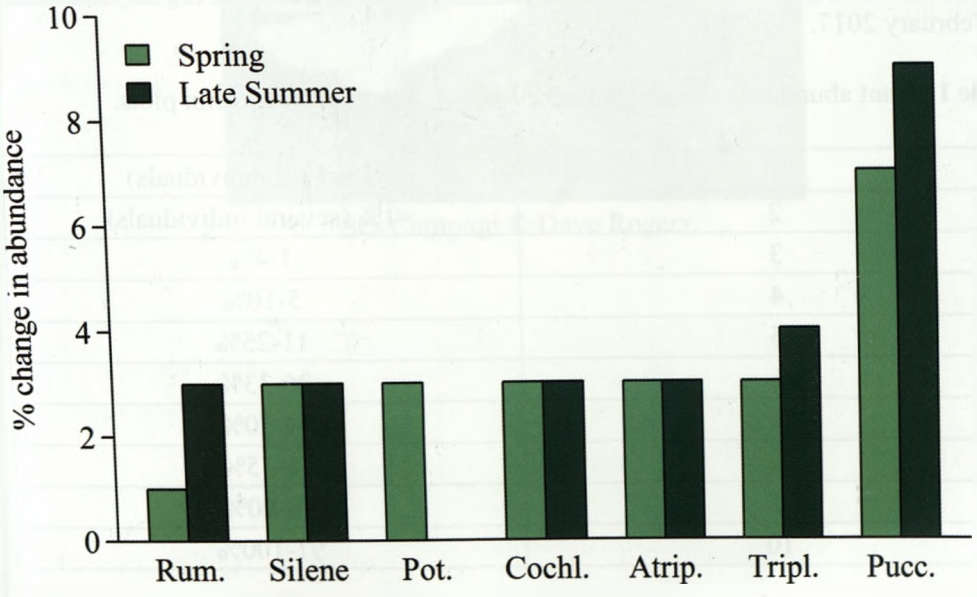

Figure 4: Linear plot 2 located around the edge of Brownsman pond. Tripl., *Tripleurospermum maritimum*; Rum., *Rumex crispus/obtusifolius*; Silene, *Silene uniflora*; Pot., *Potentilla anserina*; Cochl., *Colchlearia*; Atrip., *Atriplex*; Stell., *Stellaria media*; Ran., *Ranunculus sceleratus*; Iris, *Iris pseudacorus*; Holcus, *Holcus lanatus*.

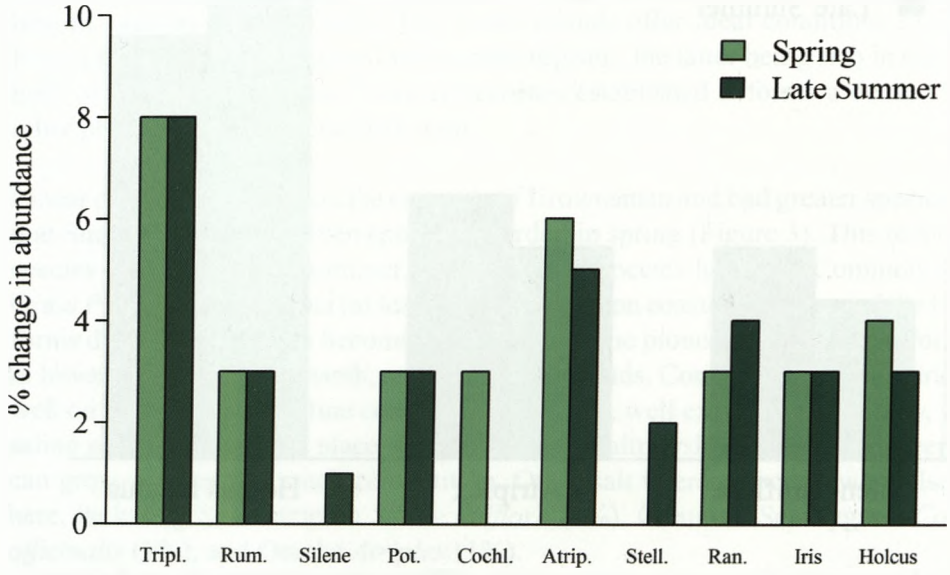

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Table 1: Plant abundance classes expressed as percentage cover within plots.

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

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

Scientific name	Common name
Holcus lanatus	Yorkshire Fog
Tripleurospermum maritimum	Sea Mayweed
Rumex crispus/obtusifolius	Curled Dock/Broad-leaved Dock
Silene uniflora	Sea Campion
Potentilla anserina	Silverweed
Cochlearia officinalis	Scurvygrass
Atriplex	Orache
Stellaria media	Common Chickweed
Iris pseudacorus	Yellow Flag Iris
Ranunculus sceleratus	Celery-leaved Buttercup
Puccinellia maritima	Common Saltmarsh Grass

Sea Campion © Dave Rogers.

THE BUTTERFLIES ON THE FARNE ISLANDS IN 2016

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INTRODUCTION

Twelve species of butterfly were recorded on the Farnes in 2016 with a total of 381 individuals, a substantial drop in abundance from last year. Dark Green Fritillary, Small Copper and Common Blue were again absent but a single record of a Ringlet was a welcome return to the islands. Butterfly populations are significantly affected by weather; for example, a mild winter preceding the wet summer of 2012 resulted in a decline in many species, whereas warmer and drier conditions in 2014 were more positive for butterfly numbers.

In 2016, however, despite relatively favourable weather conditions, many species declined across the UK (Big Butterfly Count 2016) and the same was true for the Farne Islands, although this can partly be attributed to the change in the way butterflies were monitored on the islands this year. Regular butterfly transect monitoring on the Farnes began in 2010 but has varied in intensity, and not all the islands have been surveyed each year. Originally, monitoring involved daily transects, regardless of weather, and this may have inflated the counts of individuals by multiple counts of the same individual over several days. To overcome this issue, monitoring methods used by the UK Butterfly Monitoring Scheme have been used to record the island's butterfly population by carrying out weekly transects on Inner Farne only.

Employing the 'Pollard Walk' set by the UK Butterfly Monitoring Scheme (UKBMS) (2017), a fixed-route walk was established on Inner Farne (Figure 1) designed to be walked weekly between April and September. Butterflies were recorded in a fixed width (5 metre) from the set transect line between 10:45 and 15:45, but only when weather conditions were suitable, as defined by UKBMS standardised weather conditions:

Figure 1: Butterfly transects on Inner Farne.

- Temperature 13 °C or above
- 60% sun if the temperature is between 13 °C and 17 °C for a transect to be walked
- A transect can be walked in any weather conditions, with the exception of rain, if the temperature is above 17°C
- The wind speed must not be above 5 on the Beaufort scale

Ideally, there would be 26 weekly counts annually; however poor weather conditions often reduce the number of possible counts, and this was certainly the case on the Farnes in 2016. Only seven out of the 26 weeks were surveyed (Table 1) due to either poor weather or availability of staff during the monitoring period. Butterfly abundance for 2016 will therefore be lower than in previous years as a result of the change in surveying method and application to only one island. Nevertheless, in addition to the weekly UKBMS transects, records of casual butterfly sightings between 20 March and 5 November contributed to the overall total of 380 individuals (Table 2) and provide an additional insight into annual variation in numbers. In the following systematic list, the change in monitoring method must be borne in mind, but relative changes between species, and comparisons with national survey results, help put the Farnes survey results for 2016 into context. Yearly totals of species for the last seven years are summarized in Table 3.

Table 1: UK Butterfly Monitoring Scheme transect results by date for 2016 on Inner Farne.

Survey Week	8	17	19	20	21	22	23	**Total**
Date	**20 May**	**22 July**	**6 Aug**	**12 Aug**	**20 Aug**	**27 Aug**	**2 Sept**	
Large White	0	6	3	2	0	9	6	**26**
Small White	0	0	0	1	3	0	0	**4**
Green-veined White	0	0	2	4	0	0	0	**6**
Red Admiral	0	9	12	13	1	0	1	**36**
Painted Lady	0	2	0	0	3	2	0	**7**
Small Tortoiseshell	1	0	0	2	0	2	0	**5**
Peacock	0	0	0	0	0	2	0	**2**
Comma	0	0	1	0	0	0	0	**1**
Wall Brown	0	0	0	0	0	0	2	**2**
Meadow Brown	0	0	2	0	0	0	0	**2**
Total (Summary)	**1**	**17**	**20**	**22**	**7**	**15**	**9**	**91**

Table 2: Combined butterfly sightings from UKBMS transects and casual observations on Inner Farne in 2016

Species	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Total
Large White	0	0	2	0	17	30	17	0	0	**66**
Small White	0	0	0	0	0	11	0	0	0	**11**
Green-Veined White	0	0	0	0	12	6	0	0	0	**18**
Red Admiral	0	0	5	3	57	76	13	2	1	**157**
Painted Lady	0	0	0	34	6	11	5	0	0	**56**
Small Tortoiseshell	4	4	13	1	9	17	0	0	0	**48**
Peacock	0	1	1	0	1	10	1	0	1	**15**
Comma	0	0	0	0	0	1	0	0	0	**1**
Speckled Wood	0	0	0	0	0	0	1	0	0	**1**
Wall	0	0	0	0	0	1	3	0	0	**4**
Meadow Brown	0	0	0	0	0	3	0	0	0	**3**
Ringlet	0	0	0	0	1	0	0	0	0	**1**
Total	**4**	**5**	**21**	**38**	**103**	**166**	**40**	**2**	**1**	**381**

Table 3 Yearly totals of species from 2010-2016.

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

SYSTEMATIC LIST

Pieridae

Large White *Pieris brassicae*
Recorded: 5 May – 3 September
Peak: 18 on 27 August
The Large White was the most abundant species in the UK this year according to the 2016 Big Butterfly Count. This was reflected on the Farnes with 66 individuals recorded compared to the very low count of nine last year.

Small White *Pieris rapae*
Recorded: 4 August – 27 August
Peak: 3 on 20 August
A once-abundant species on the Farnes reaching several hundred in most years, the Small White has declined steeply over the past two years on the islands. This year, the total of 11 individuals recorded were the lowest since monitoring began on the Farnes; conversely, this was the second most abundant species across the UK in 2016, with a 15% increase from last year (Big Butterfly Count 2016).

Green-veined White *Pieris napi*
Recorded: 22 July – 12 August
Peak: 6 on 30 July
A poor year on the Farnes for the Green-veined White with the second-lowest year on record at only 18 individuals compared to 29 in 2015. Last year was a bad year for this species across the UK, the Farnes included, with a 42% decline nationally and a 91% decline on the Farnes (Big Butterfly Count 2015). Across the UK in 2016, the species increased by 58% (Big Butterfly Count 2016), yet the Farnes population has shown a further 38% decline this year.

Nymphalidae

Red Admiral *Vanessa atalanta*
Recorded: 8 May – 22 October
Peak: 13 on 22 July
The Red Admiral is the most numerous butterfly species on the Farnes, which is perhaps unsurprising considering the abundance of Common Nettle *Urtica dioica*, its larval food plant, on the islands. Compared to last year, 77% fewer Red Admirals (161 individuals) were recorded on the islands for 2016. The change in surveying techniques would account for some of this decline on the Farnes, but across the UK there was a 70% increase (Big Butterfly Count 2016).

Painted Lady *Vanessa cardui*
Recorded: 4 June – 3 September
Peak: 20 on 5 June
The Painted Lady had its best year on the Farnes since 2011 with the second-highest record since regular butterfly monitoring began on the islands, with a total of 56 individuals recorded this year. Conversely, for the rest of the UK there was a decline of 23% (Big Butterfly Count 2016).

Small Tortoiseshell *Aglais urticae*
Recorded: 20 March – 29 August
Peak: 5 on 5 May
The Small Tortoiseshell has shown the biggest decline of all Farne butterfly species since regular records began in 2010. Last year saw a decline of 68% and this has been followed by a 35% decline this year. This is reflected nationally with a 47% decline across the UK (Big Butterfly Count 2016) and it is now a species of conservation concern.

Peacock *Aglais io*
Recorded: 10 April – 30 November
Peak: 5 on 29 August
There were 15 individuals recorded this year, a below-average number for the Farnes. However, despite the change in surveying techniques, this was an increase of four records compared to last year. In contrast, there was a UK-wide decline of 42% compared to 2015, and the species has declined nationally by six-fold since 2013 (Big Butterfly Count 2016).

Comma *Polygonia c-album*
Recorded: 6 August – 6 August
Peak: 1 on 6 August
An individual found resting on Sea Mayweed in Cuthbert's Cove was only the sixth record of a Comma on the Farne Islands and one of the butterfly highlights for 2016. Nationally, the Comma has declined by 46% from last year (Big Butterfly Count 2016). With an increasing northwards movement of the Comma's range and the abundance of its larval food plant, Common Nettle, this species could colonise the Farnes in future years.

Satyridae

Speckled Wood © Jim Asher.

Speckled Wood *Pararge aegeria*
Recorded: 22 September
Peak: 1 on 22 Sept
As a typical woodland species, it is unsurprising that the Speckled Wood is a rare sighting on the treeless Farne Islands, despite there being at least one record on the islands every year since 2011. This year was no different with one individual record, as in 2015.

Wall *Lasiommata megera*
Recorded: 29 August – 2 September
Peak: 2 on 2 September
This species has shown severe declines nationally, especially for inland populations and is now mostly confined to coastal areas. Four individuals were counted this year, one more than 2015.

Meadow Brown *Maniola jurtina*
Recorded: 2 August – 6 August
Peak: 2 on 6 August
The Meadow Brown is a common species nationally; however, this is not the case on the Farnes with only a few records each year. This year was no different with only three individuals seen, making this the sixth consecutive year that this Farnes rarity has been recorded on the islands.

Ringlet *Aphantopus hyperantus*
Recorded: 7 July – 7 July
Peak: 1 on 7 July
There was a single record of a Ringlet on the Farne Islands this year but having been absent last year and with records from only two previous years (13 in 2013 and 2 in 2014) it was a celebrated sighting. A good year nationally for the Ringlet with a 32% increase on last year's nationwide count.

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THE MOTHS ON THE FARNE ISLANDS 2016

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INTRODUCTION

An important element of the ecology of the Farne Island is the abundance of moths, a key food source in both their larval and adult stage to passing migrant birds and the small breeding population of passerines on the islands. Moths are also vital pollinators and provide an indication of the health of the island ecosystem. For these reasons, it is an important insect group to record and has been monitored on the Farne Islands for the past 25 years.

Moth recording on the Farnes has varied in intensity since 1991, and 2016 was generally a below average year as a result of wet and windy weather over the spring/summer period. Few nights with suitable weather conditions led to less moth trapping effort than in previous years, and this has had an inevitable impact on the numbers and variety of moths recorded. A combination of casual sightings and trapping using a Mercury Vapour Robinson light trap on Inner Farne, together with a few casual records from Brownsman, accumulated a total of 1213 individual moths of 26 species (21 macro and five micro moth species), compared to 410 individual moths of 53 species (45 macro and eight micro) in 2015 (Table 1). Trapping was conducted on nine nights between 10 June and 27 August compared to 15 nights between 23 May and 30 September in 2015. The close proximity of Inner Farne to the mainland makes it difficult to distinguish between those which are resident and those which have dispersed from the mainland to form short-term colonies on the islands.

HIGHLIGHTS

Convolvulus Hawkmoth

For the second consecutive year, a Convolvulus Hawkmoth was found on Inner Farne. Bizarrely, it was spotted underwater clinging to the jetty wall! Still alive, it was retrieved and allowed to dry out but its poor condition meant that it did not survive the ordeal. A migrant to Britain with numbers varying from year to year, it is a rarity for the Farnes and a real crowd pleaser with visitors and staff alike.

Garden Tiger Moth © Sophia Jackson.

Convolvulus Hawkmoth © Thomas Hendry.

Diamond-back Moth

This tiny moth is another migrant to Britain with only two reported on the Farnes last year and none in 2014 so it was astonishing to have a record of over a thousand Diamond-back Moths in early June this year. Being weak fliers, it was the prevailing winds in June that caused the influx of this micro moth from continental Europe, not only to the Farnes but across the UK. The last time this Diamond-back Moth was recorded in higher than normal numbers in Britain was in 1996.

Other highlights include an increase of 13% in Garden Tiger moths compared to last year, an encouraging result when the rest of the UK has noted an ongoing decline since the 1980s. The abundance of the caterpillar's food plants, Common Nettle *Urtica dioica* and Broad-leaved Dock *Rumex obtusifolius*, on the Farne Islands is most probably linked to the continuing survival of this species on the islands.
Common Footman *Eilema lurideola,* Antler Moth *Cerapteryx graminis,* Lesser Yellow Underwing *Noctua comes,* and Lesser Broad-Bordered Yellow Underwing *Noctua janthe* made a welcome return to the species list this year after their absence last year.

Table 1: Systematic List

Species	First date recorded	Last date recorded	Total no. days recorded	Individuals	*Individuals 2015*	Peak counts	UK status
MACRO							
Family: Hepialidae							
Ghost Moth *Hepialus humuli humuli*	28 June	28 June	1	2	*2*	2	Common
Common Swift *Hepialus lupulinus*	14 June	27 Aug	2	2	*4*	1	Common

Species	First date recorded	Last date recorded	Total no. days recorded	Individuals	*Individuals 2015*	Peak counts	UK status
Family: Geometridae							
Dark Spinach *Pelurga comitata*	30 July	24 Aug	3	9	*7*	5	Common
Common Marbled Carpet *Chloroclysta truncata*	8 June	8 June	1	1	*0*	1	Common
Family: Sphingidae							
Convolvulus Hawkmoth *Agrius convolvuli*	1 Oct	1 Oct	1	1	*1*	1	Immigrant
Family: Arctiidae							
Common Footman *Eilema lurideola*	30 July	30 July	1	1	*0*	1	Common
Garden Tiger *Arctia caja*	27 July	30 July	3	26	*23*	14	Common
Buff Ermine *Spilosoma luteum*	8 July	8 July	1	1	*2*	1	Common
Family: Noctuidae							
Large Yellow Underwing *Noctua pronuba*	30 July	27 Aug	4	22	*10*	8	Common
Lesser Yellow Underwing *Noctua comes*	27 Aug	27 Aug	1	2	*0*	2	Common
Lesser Broad-bordered Yellow Underwing *Noctua janthe*	10 Aug	10 Aug	1	1	*0*	1	Common
Bright-line Brown-eye *Lacanobia oleracea*	11 July	22 July	7	14	*90*	2	Common
Antler Moth *Cerapteryx graminis*	30 July	24 Aug	2	2	*0*	1	Common

Species	First date recorded	Last date recorded	Total no. days recorded	Individuals	*Individuals 2015*	Peak counts	UK status
Mouse Mouth *Amphipyra tragopoginis*	27 Aug	27 Aug	1	2	*1*	2	Common
Angle Shades *Phlogophora meticulosa*	27 Aug	30 Oct	2	5	*1*	4	Common
Dark Arches *Apamea monoglypha*	11 July	27 Aug	7	40	*46*	16	Common
Common Rustic *Mesapamea secalis*	24 Aug	27 Aug	2	28	*9*	26	Common
Rosy Rustic *Hydraecia micacea*	24 Aug	27 Aug	2	37	*30*	33	Common
Bulrush Wainscot *Nonagria typhae*	27 Aug	27 Aug	1	1	*0*	1	Common
Silver Y *Autographa gamma*	21 July	29 July	5	6	*26*	2	Immigrant
Spectacle *Abrostola tripartita*	10 June	22 July	2	2	*15*	1	Common
MICRO							
Family: Plutellidae							
Diamond-back Moth *Plutella xylostella*	4 June	4 June	1	1000+	*2*	1000+	Common
Family: Pyralidae							
Dioryctria abietella	30 July	30 July	1	1	*0*	1	Common
Family: Crambidae							
Catoptria falsella	30 July	30 July	1	1	*0*	1	Common
Small Magpie *Anania hortulata*	16 June	31 July	4	4	*23*	1	Common
Mother of Pearl *Pleauoptya ruralis*	27 Aug	27 Aug	1	2	*4*	2	Common

THE FARNE ISLANDS GREY SEAL COLONY 2016

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The trend in pup production over the past few years suggested that 2016 might be the year that Grey Seal *Halichoerus grypus* pup production on the Farnes would surpass 2000 for the first time since 1971; we were not disappointed and the previous island record of 2,041 (set in 1971) was exceeded by a considerable margin with 2295 pups (Table 1). The season started late, with the first pup seen on Longstone End on 8 October. Unfortunately, because of the exposed nature of the island, the pup did not survive long. The prolonged spell of easterly winds in early October eventually died down, and the rangers were able to make the first count on 21 October. It took a few more weeks for the rate of pup production to increase, and then over half the total seal pups were born in a 10-day period from 8 November.

Table 1: Individual Grey Seal pup counts by date and island in 2016.

	B'man	Staple	South Wames	North wamses	North Hares	Big Harcar	Longst	Longst End	Knoxes	Wide-opens	Inner Farne	
08-Oct	0	0	0	0	0	0	0	1	0	0	0	
21-Oct	3	3	10	22	2	0	0	0	0	0	0	
25-Oct	8	8	19	10	0	0	0	0	0	0	0	
29-Oct	28	42	34	18	0	0	0	0	0	0	0	
04-Nov	108	90	61	35	1	0	0	0	0	0	0	
08-Nov	131	70	0	0	5	0	0	0	0	3	0	
13-Nov	190	105	75	43	6	0	0	0	6	16	0	
18-Nov	164	85	45	12	1	2	0	0	36	34	5	
24-Nov	167	50	0	0	0	0	0	0	23	32	1	
25-Nov	0	0	45	20	3	1	0	0	0	0	0	
28-Nov	68	56	13	3	4	1	1	0	0	0	1	
29-Nov	0	0	0	0	0	0	0	0	25	29	0	
03-Dec	54	18	12	6	10	2	0	0	17	34	5	
15-Dec	13	21	0	0	0	0	0	0	5	6	12	
												Total
Total	**934**	**548**	**314**	**169**	**32**	**6**	**1**	**1**	**112**	**154**	**24**	**2295**

This year saw another huge rise in the number of seals using Brownsman as a rookery, with pup production increasing from 655 to 934. Conversely, the population remained relatively stable on Staple Island, only dropping by 18 pups, suggesting that Brownsman could be the preferred island for a prospecting cow seal. These two islands accounted for 65% of total pup production, the same proportion as last year.

There was also a big increase in the number of seals using the Inner Group of the islands, where mortality was much lower than in the Outer Group, reflecting their more sheltered position. As recently as 2012, only 44 pups were born across the inner group, representing just 2.7% of the total. This year, 290 pups were born there, representing 12.6% of the total.

Grey Seal Farne Islands © Andy Colls.

MORTALITY

Mortality (Table 2) was slightly higher than average for the previous five years, at 29% (26%). This may well be due to the large northerly storm that blew through in November which undoubtedly killed a few pups and probably accounted for the large number that went missing. As usual, mortality on the Inner Group was much lower at just 8%, compared to 32% for the outer group.

Table 2: Total pups born and mortality statistics for the last six years

	2016	2015	2014	2013	2012	2011
Total Pups Born	2,295	1,876	1,740	1,575	1,603	1,555
Surviving	1629	1,360	1.419	1,165	1,166	1,077
Unsprayed Dead	96	139	71	55	54	62
Sprayed Dead	88	79	66	78	71	61
"Missing"	482	298	184	277	312	355
Mortality	29%	27.5%	18%	26%	27.2%	30.7%

ELSEWHERE ON THE EAST COAST

The title for largest east-coast colony was a closer run thing this year than it was last. Despite the boom in pups on the Farne Islands, Blakeney Point NT in Norfolk remained the largest colony, with a total of 2,366 pups born (Norfolk Coast National Trust, 2017). In recent years, their colony has stabilised since the seals pupped there for the first time 17 years ago. Further down the Norfolk coast at Horsey, there was a new site record of 1,422 pups born (Friends of Horsey Seals 2017), and at Donna Nook 1,957 pups were born (Lincolnshire Wildlife Trust 2017), also a site record.

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THE CETACEANS AROUND THE FARNE ISLANDS 2016

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Cetaceans were sighted around the Farne Islands on 25 days during 2016; however, the diversity was low with only two species recorded: Bottlenose Dolphin and Harbour Porpoise. All were seen in Inner Sound between 23 March and 29 November.

The records comprise a combination of casual sightings and regular surveys. Regular morning surveys were carried out from March until July between the hours of 07:00 and 09:00 h from the picnic area on Inner Farne for a minimum of 30 minutes. The weather during the survey was also recorded, including visibility and the sea state (using the Beaufort Scale).

Records for last year included sightings collated from the boat operators who spend more time on the water and are more likely to encounter these species. No sightings were contributed by boat operators in 2016 and this may have contributed to the reduction in cetacean sightings around the Farne Islands in 2016.

Table 1: Number of cetaceans sighted and the peak seen at any time by month in 2016.

Species		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Total
Bottlenose Dolphin	Number of pods	4	3	5	0	1	2	0	0	3	**18**
	Greatest number of individuals in pod	10	12	25	0	12	8	0	0	80	
Harbour Porpoise	Number of pods	4	4	1	0	1	1	1	0	1	**13**
	Greatest number of individuals in pod	2	1	1	0	3	2	2	0	1	
									Total		**31**

Bottlenose Dolphin *Tursiops truncatus*

Bottlenose Dolphins were seen on 16 separate days between 25 March and 29 November. Eighteen pods in total were observed (Table 1) and the highest number of individuals sighted in a pod at one time was 80. May had the highest number of sightings with pods seen on five occasions including a pod of 25, containing mothers with calves, seen on 26 May.

The largest number of Bottlenose Dolphins sighted at once was 80 on 25 November. This included at least two calves and were moving north through Inner Sound. They were observed by the rangers at close range from the *Zodiac* and a number of them were seen breeching fully. They were first observed passing the Lighthouse Cliffs on Inner Farne, and were followed until just past Stag Rocks.

Harbour Porpoise *Phocoena phocoena*

The first sighting of Harbour Porpoise was on 23 March when two were seen moving south through Inner Sound. The last sighting was 26 November, when one was moving north through Inner Sound. 13 sightings of pods were seen on 11 separate days with the peak number of individuals in a pod being three, seen on 22 July moving north through Inner Sound. March and April had the most sightings with four in each month. This is however considerably lower than previous years, a fact which can most likely be attributed to the increase in Bottlenose Dolphin numbers and sightings in the waters around the Farnes as they are well known to attack and kill porpoises.

LINDISFARNE NATIONAL NATURE RESERVE AND ITS SHOREBIRD NESTING PROTECTION SCHEME 2016

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INTRODUCTION

The designation of the area now known as Lindisfarne National Nature Reserve (NNR) commenced in September 1964, initially to control extensive wildfowling activity. In subsequent years the remit of the Reserve extended to other areas of conservation priority including the protection of nesting shorebirds.

The Reserve extends to 3,500 hectares and forms the bulk of the larger Lindisfarne Site of Special Scientific Interest (SSSI) and is situated towards the northern end of the ecological unit known as the Northumberland Shore SSSI It is also a component of the Lindisfarne Special Protection Area (SPA), the Berwickshire and North Northumberland Coast Special Area of Conservation (SAC) and the North Northumberland Dunes SAC and has been designated a Ramsar site*.

The large shallow inlets and bays and extensive mudflats and sandflats not covered by seawater at low tide are an isolated habitat in the north of England, the nearest comparable site lying 125 kms to the south at Teesmouth. The dune system can be considered a seaward extension of the larger mainland unit but the botanically-rich dune slacks afford it a unique status in the North-East region because the nearest similar assemblages are in Cumbria and Lancashire.

The NNR is a strategically important site for migratory and wintering birds using the west European flyway. The SPA features are represented by an aggregation of 50,000 wintering waterfowl and six internationally important species of wildfowl and waders making Lindisfarne NNR the most important wetland site for birds in the north-east. It is the main wintering site for the Svalbard (Spitsbergen) population of the Light-bellied Brent goose.

All five species of tern have bred on the site including the two schedule 1species, Little and Roseate. Both Grey and Harbour seal are present and may breed annually and the dunes are botanically rich with one species of orchid and one liverwort of international significance.

*A wetland site of international importance designated under the Ramsar Convention, an intergovernmental environmental treaty signed in Ramsar, Iran, in 1971.

The NNR is managed by Natural England in consultation with local landowners and the Joint Advisory Committee.

SHOREBIRD PROTECTION

Site management and monitoring

Four formal protection areas afford protection to the Reserve's shorebirds, one in the north of the Reserve and three towards the southern boundary. These comprise boundary blue-rope exclusion zones and 1-2 tier electric fencing around the main nesting areas, and clear and numerous signs located at access points and leading up to the nesting areas (Figure 1).

Figure 1: An example of a sign used at Lindisfarne NNR to warn people of the protected status of Little Terns.

In 2015, the Reserve secured funding from the EU *Life* Little Tern project and the Heritage Lottery Fund Peregrini Lindisfarne Landscape Partnership to appoint two dedicated full time Shorebird Wardens to complement the part-time Shorebird Warden, Reserve Warden and Senior Reserve Manager. Reserve staff were supported throughout the breeding season by our dedicated volunteers. While the general purpose of the wardens was to monitor the Little Tern colonies and any other shorebirds nesting in the area, the primary role of the wardens was to minimise disturbance to the birds throughout the breeding season to maximise productivity.

Daily observations of the colonies were recorded including both environmental and behavioural aspects, for example, weather, state of the tide, number of apparently occupied nests, number of chicks present in the colony, daily high count of adult terns, and general behaviour of the Little Terns. This protocol was mirrored by the other 20 partners across England & Wales with the collation of the results due in 2018.

Once chicks had begun to hatch within the colonies, food provisioning watches were carried out. These watches consisted of hour-long observations during a quieter period of visitors to the beach, or during an overlap in wardening shifts so that one warden could engage with members of the public and one could focus on chick feeding of a single brood. During these food-provisioning watches, the observer would record frequency of feeds, length of fish provided for the chick and, if possible, the type of prey species, for example sand eel.

Disturbance and predation monitoring

The causes and severity of disturbance events to the colonies were monitored and recorded. On the Lindisfarne NNR, staff disturbance of the colonies is kept to a minimum. All aircraft fly-over activity was recorded, including any disturbance caused to the tern colonies, the registration number on the wings if readable and photographs were taken when possible. Trail cameras were used to identify egg damage early in the season (Figure 2). Concealed traps were used to remove small predators, with two field mice caught on consecutive days.

Figure 2: A trail camera image showing (within the red box) a field mouse (eye and outline of body visible); a likely culprit for egg damage seen in recent seasons.

BREEDING SUCCESS IN 2016

Little Tern

Both breeding sites at the southern end of the NNR saw high numbers of Little Tern chicks fledge. This resulted in a high total productivity (Tables 1 and 2), especially taking into account weather conditions across the season and staff intervention due to high tides. It demonstrates that the monitoring and protection regime on the site currently provides sufficient protection for the birds to nest with minimal disturbance and that the fencing infrastructure successfully keeps out land-based predators.

A total of 42 chicks successfully fledged from the two Little Tern colonies, with only one chick found dead earlier in the season. Overall, given the high productivity, the 2016 season on Lindisfarne NNR can be considered a success. Towards the end of the season, high-tide roost counts showed more adult Little Terns than the whole known population in Northumberland, the peak being a count on 23 July of 112 birds. Numbers noticeably dropped over the next few days and by the end of the monitoring period just a handful of birds were present sporadically.

Table 1: Little Tern productivity from 2000 – 2016.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pairs	7	14	8	18	32	44	55	34	1	18	6	4	14	18	35	17	37
Chicks	4	9	14	11	36	74	80	21	0		0	10	10	36	49	40	51
Fledged	0	0	8	0	25	40	17	4	0	0	0	7	6	10	43	38	42

Table 2: Summary of breeding Little Tern Numbers on Lindisfarne NNR 2016.

Numbers	Total
Peak Scrapes	37
Scrapes Lost	10
Total Scrapes	51
Total Chicks	51
Total Fledglings	42
Peak Adults	112
Productivity (Total Fledge/Peak Scrapes)	1.1

Despite initial signs of nest site prospecting, no Little Terns nested at the northern site on the NNR for the 2016 breeding season. Small numbers of Little Terns investigated the site at the beginning of May, with a high count of 15 early in the season, and a couple of pairs were seen making scrapes within the fenced-off areas. Whether the birds were put off by environmental factors such as the high spring tides or sand blow, these birds later relocated to one of the Reserve's southern sites.

At the southern site, there was only one intervention event during the 2016 season where clutches of eggs were moved approximately 4 ft up the shore to avoid an extremely high tide. While carrying out the intervention, it was noted that many of the repositioned nests only contained one or two eggs; it has therefore been assumed that birds which did not retake to their eggs simply made a new scrape and laid their final egg, after having already laid one or two eggs. This may be an explanation for the large number of single chicks in the mid-southern colony.

Other Breeding Shorebirds

Formal monitoring of the Reserve's breeding shorebirds commenced in 1971. Arctic Tern, Common Tern, Ringed Plover and Oystercatcher breed in protection areas (Table 3), taking advantage of the prime nesting habitat and protection offered from predators and human disturbance.

Common and Arctic Terns choose to nest together in a single location in the Reserve with little prospecting of other sites observed, and until recent years both Common and Arctic Terns were grouped as 'Commic' for monitoring purposes. This season, more pairs of Common and Arctic Terns nested on Lindisfarne NNR than in any previous season. In June, 136 scrapes were counted, and, allowing for minor predation, a conservative estimate would be 150-200 chicks hatched. Ratio counts between the two species were done to estimate the number of pairs of Arctic and Common Terns. Approximately 80% of the Arctic and Common Terns within the colony were Arctic Terns, and from that we estimate that the number of scrapes for each species was 120 Arctic Tern and 30 Common Tern, with an estimated 160 Arctic Tern chicks and 40 Common Tern chicks.

Six Oystercatcher nests were monitored on the southern end of the NNR, including a single nest among the main Little Tern colony. The Oystercatcher pair which nested in the middle of a Little Tern colony did not cause much disturbance to the incubating terns and proved to be a successful and aggressive guard against avian predators. Although one Oystercatcher scrape was predated at egg stage, the remaining scrapes produced at least 12 chicks.

Ringed Plover nested on both the northern and southern end of the Reserve; 14 nests were recorded over the main nesting sites but four were lost due to tide or predation. As the Ringed Plovers did not always nest near to the tern colonies (formally protected areas) and were often well camouflaged, more broods of chicks were seen than expected from the number of nests and in total 27 Ringed Plover fledglings were recorded.

Table 3: Summary of other shorebirds on Lindisfarne NNR 2016

	Total			
	Scrapes	Young	Scrapes Lost	Productivity
Ringed Plover	**14**	**27**	4	1.9
Oystercatcher	**6**	**13**	1	2.1
Arctic Tern	**120**	**160**	-	1.3
Common Tern	**30**	**40**	-	1.3

Disturbance during the season

Throughout the season, only a handful of disturbances which could be classed as having a potentially significant impact on the colony were recorded; these mainly involved members of the public accessing the beach via an alternative route with dogs off leads. Polite engagement persuaded them to walk along the edge of the colony area, resulting in no further disturbance to the colony. In general, the visitors engaged throughout the 2016 season in regards to 'dog on lead' restrictions on the site, were mostly understanding and apologetic, and put their dogs on leads for the rest of their time on the Reserve.

The southern Little Tern site on the NNR is relatively hard to access compared to other more well-known beaches along the Northumberland coast and the half hour walk from the car park to the beach entrance appears to put visitors off walking to the area where the tern colonies nest, particularly if they are a family group with younger children. It was noted by the Reserve staff and volunteers that visitor numbers to the beach were visibly lower than in recent seasons.

Throughout the breeding season there were incidents of light and 'microlight' aircraft flying over the south end of the NNR. While most aircraft flew above the required height or caused minimal disturbance to the breeding birds, there were a few occasions which caused severe stress and disturbance to the colonies. The worst incident was when an incredibly low-flying microlight flew over the beach alongside the main Little Tern colony, causing visible and prolonged disturbance. The microlight was no higher than 10 metres off the ground and looked as if it would land at any moment along almost the entire length of the beach.

No problems with land based predators were recorded during the season, despite several Fox sightings in the dunes near the colony. A Kestrel attempted to predate scrapes three times but was unsuccessful and often chased off or aerially attacked by terns or neighbouring Oystercatchers. Despite regularly flying over, no gull species attempted any predation and corvid sightings on the beach decreased as the season progressed.

There were times when the main Little Tern colony was disturbed due to volunteer or contracted shorebird wardens, but only when necessary, for example when electric fencing required fixing or the batteries were checked, when intervening to move scrapes out of the reach of high tides, and occasionally when engaging a member of the public to stop further disturbance. In total the disturbance from wardens throughout the whole season was less than four hours.

Minor disturbances which caused the birds to lift from their nests occurred throughout the season. On occasion the cause was hard to determine as the behaviour of the colony on some days appeared 'flighty', with birds often lifting for no apparent reason.

SUMMARY

Management of the Little Tern nesting areas at Lindisfarne NNR to protect them from predation and disturbance by members of the public was successful in the 2016 season, and Little Tern productivity was high, despite relatively poor weather conditions. Some intervention to move nests at a very high tide was required and may have been effective at increasing productivity. Members of the public with unrestrained dogs continue to present a problem, and although liaison with local airfields continued throughout the season greater education of local aircraft pilots and enforcement of flying regulations is needed to minimise unwarranted disturbance. Continuing effort to maintain Little Tern productivity as high as possible is essential if the decline in this species breeding in the UK is to be reversed.

RINGING FOR SEABIRD MONITORING AND CONSERVATION – ISLAND PERSPECTIVES

Chris Redfern

Natural History Society of Northumbria, Great North Museum-Hancock, Barras Bridge, Newcastle upon Tyne NE2 4PT

INTRODUCTION

Given the number of seabirds breeding in Northumberland, with around 75,000 pairs of the species listed in Table 1, seabird ringing totals for the county are modest with under 2000 (chicks and adults) ringed in 2016. Not that we should ring everything that flies, but it is important to ring adequate samples of a wide range of species to facilitate conservation. As a member of the European Union, the UK has a statutory duty to support the study of migratory birds and maintain a ringing scheme (Walker *et a.l* 2015). The 'landscape' of ringing has changed in recent years; although between 0.8 and one million birds have been ringed every year for the past 10 or more years (Walker *et al.* 2015), there is increasing emphasis on targeting projects to increase the accuracy and value of ringing for estimating survival rates, productivity and abundance. In addition to the conventional use of metal bird rings, many projects now use coded plastic rings which can be read at a distance using telescopes or digital cameras. Furthermore, the increasing miniaturisation of electronic devices that can be fitted to birds means that we can obtain high-resolution data on what birds are doing, when and where.

TERNS

EU LIFE funding supports two five-year projects, both coordinated by the RSPB, to facilitate the conservation of Little Terns *Sternula albifrons* and Roseate Terns *Sterna dougallii*, two species which nest on the Northumberland coast. Special marking or ringing techniques are components of both projects because of the recognition that being able to identify individuals in the field is important for developing conservation strategies. For Roseate Terns, the well-established use by the RSPB of metal rings with large letters and numbers is providing evidence that the Coquet Island colony may be heading towards becoming self-sustaining rather than dependent on recruitment from elsewhere. For Little Terns, the precarious nature of their breeding sites and the need for utmost care in entering colonies to ring chicks has so far limited the potential for colour-ringing breeding birds in Northumberland.

The Arctic Tern *Sterna paradisaea* is our most abundant tern species on the Northumberland coast, with over 4000 pairs in 2016; Coquet Island and the Farne islands offer security against mammalian and some mainland avian predators and are important breeding colonies. In 2015, a long-running study of breeding Arctic Terns based on the Farnes and Coquet Islands was extended with an additional project using geolocators

to obtain information of the behaviour of these birds when away from the colony. This new project, carried out in collaboration with Richard Bevan, was part funded by the BBC as part of their 'Springwatch' series and by Migrate Technology, a company that develops and markets geolocators. In spring 2016, we were anxiously waiting to see if any of the 28 birds fitted with geolocators the previous year would return to breed with the devices still intact. To our delight, some of these birds were amongst the first to return to Inner Farne in early May and we succeeded in recovering 21 geolocators during the season (Figure 1). We were also pleased to see that the devices, each mounted on a plastic colour ring, had not caused any visible damage or problems to the legs, and the breeding performance of the birds, both in 2015 and in 2016, and their return rates were similar to those of birds without geolocators. Seventeen of the devices were still working when recovered, yielding full sets of data, and the other four had data at least until early 2016 (three birds) with one device stopping just short of the 2016 breeding season. Initial analysis has shown that all birds had reached the Antarctic Circle with some birds travelling east to New Zealand. We aim to continue the project in 2017 to try to refit devices to some of the same individuals so that we can see if they are consistent in their behaviour during migration and the winter months.

Figure 1: Arctic Tern with geolocator G75 on the path outside the chapel on Inner Farne, spring 2016 (photo: David Noble-Rollin). This bird had reached 180 degrees east of the Farne Islands by 29 October 2015, which is the approximate longitude for New Zealand. The logger stopped working in February 2016, while the bird was at or below the Antarctic circle. Fortunately, it was possible to recover the stored data.

The Sandwich Tern *Sterna sandvicensis* is the next most-abundant tern species in Northumberland, with just under 2000 pairs in 2016. The colour-ringing project was continued in 2016 and 127 chicks were marked with coded colour rings on Inner Farne and Coquet Island. Since the project started in 2013, we have colour-ringed 854 chicks. Many of these have since been resighted away from Northumberland, some as far south as South Africa, and we are beginning to see many coming back to breed in Northumberland. This will give us an opportunity to measure natal dispersal (dispersal of chicks to colonies other than their natal colony) and breeding dispersal (the extent to which birds will breed in a colony one year and then move to another colony in a subsequent year). We are already beginning to appreciate how mobile these birds can

be in the breeding season, and that to answer our original questions we need to be sure that a bird seen within a colony is actually breeding (i.e. has an egg or a partner with an egg); that is not as easy as it might appear!

SHAGS

This was the last year of Liz Morgan's PhD project using GPS trackers and dive-depth monitors to study the foraging strategies of Shags *Phalacrocorax aristotelis* nesting on different islands and how this varies from year to year. Although the weather has limited her data collection to some extent this year, giving Liz perhaps the most frustrating season of her successful three-year study, overall, her data are giving important insights into the foraging strategies of individuals within the Farne Islands archipelago.

GULLS

Many of the coastal ringing projects have a conservation objective or relevance. Coquet Island is a particularly sensitive site because of the colony of Roseate Terns. Other seabirds also breed on the island, and the presence of breeding large gulls (Herring *Larus argentatus* and Lesser Black-backed *L. fuscus*) is a cause for concern as these birds can prey on other seabirds, particularly terns and Puffins *Fratercula arctica*, and may be a threat to the breeding success of Roseate Terns. To investigate the impact of large gulls, the RSPB and LIFE funding provide support for studies undertaken by PhD student Ibrahim Alfarwi. As part of the work in 2016, Ibrahim and resident Assistant Warden Wez Davies fitted GPS trackers (Figure 2) to four breeding Lesser Black-backed Gulls; three of these devices yielded data and show, perhaps surprisingly, that mainland areas, including farmland (Figure 3), are used for foraging by some of the birds. Ibrahim is hoping to obtain more of this type of data in the 2017 season.

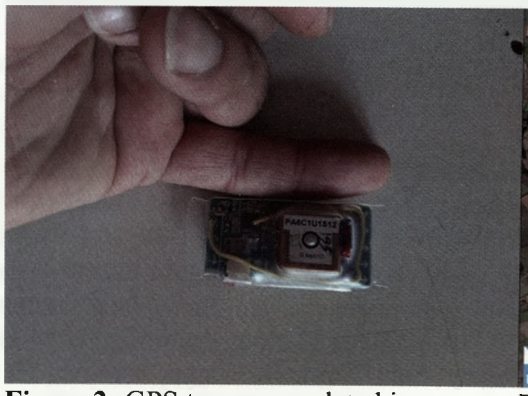

Figure 2: GPS tag encapsulated in plastic just before being attached to the back of a Lesser Black-backed Gull (Photo: Ibrahim Alfarwi)

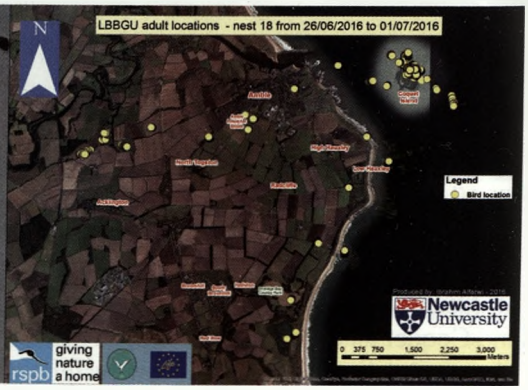

Figure 3: The GPS locations for one bird (data collection, analysis and image preparation: Ibrahim Alfarwi).

OVERVIEW

With the input of electronics to complement conventional ringing techniques, we can look forward to a greater understanding of birds as individuals. Apart from those projects involving colour rings and various electronic devices along the Northumberland coast, ringing also increases the accuracy of productivity monitoring on the Farnes and Coquet Islands, particularly with respect to terns and Black-headed Gulls. The ability to mark birds as individuals is also important for other monitoring studies in which chick growth can be compared between years to understand how different environmental factors affect productivity.

ACKNOWLEDGEMENTS

These projects would not be possible without the support of the National Trust and the RSPB who have facilitated and driven the use of ringing techniques as part of their conservation and monitoring programmes. I am grateful to the BBC for funding the Arctic Tern geolocators through their 'Springwatch' programme, and thank the National Trust Rangers on the Farne Islands for their support, time and effort in ringing seabird chicks as part of their monitoring work. I am also very grateful to Liz Morgan who has continued to drive efforts to ring and colour-ring Shags on the Farnes while carrying out her PhD studies. I thank William Shiel and his boat crews for transporting myself and equipment across to the Farnes when necessary. The Sandwich Tern study would not have been possible without the support of Paul Morrison and Wez Davies on Coquet Island and I am extremely grateful for their enthusiasm, camaraderie and willingness to get involved. Wez has made tremendous efforts to read Sandwich Tern colour rings and has identified 142 individuals on Coquet Island in 2016. My thanks also to David Noble-Rollin for the tern images and to Ibrahim Alfarwi for his work and image of gull locations.

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Table 1: Seabird ringing totals for Farnes, Coquet Island and the Long Nanny, 2015. Natural History Society of Northumbria except: [a]Mike Hodgson; [b]Tom Cadwallender (Northumbria Ringing Group). F, Farne Islands; C, Coquet Island; LN, Long Nanny

	ADULT						CHICKS			Total
	New birds			Retraps						
	F	C	LN	F	C	LN	F	C	LN[a]	
Fulmar *Fulmarus glacialis*		1						31		32
Storm Petrel *Hydrobates pelagicus*	5			1						6
Leach's Petrel *Oceanodroma leucorhoa*				1						1
Shag *Phalacrocorax aristotelis*	22			20			144			186
Puffin *Fratercula arctica*	50			2			127			179
Razorbill *Alca torda*										
Little Tern *Sterna albifrons*										
Sandwich Tern *Sterna sandvicensis*							31	96		127
Common Tern *Sterna hirundo*								10		10
Roseate Tern *Sterna dougallii*								90		90
Arctic Tern *Sterna paradisaea*	33			96			806	109	9	1053
Kittiwake *Risa tridactyla*	4						97	22		123
Black-headed Gull *Chroicocephalus ridibundus*							4	33		37
Mediterranean Gull *Ichthyaetus melanocephalus*										
Lesser Black-backed Gull *Larus fuscus*		7						3		10
Herring Gull *Larus argentatus*										
Totals	114	8		120			1209	394	9	1854

Northumbrian *Naturalist*

Northumberland Coastal Wildlife 2016

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Water Rail by Richard Potts

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CONTENTS

Natural History Society of Northumbria

FOREWORD

As a natural history society, the Natural History Society of Northumbria (NHSN) has a focus on the study of plants and animals. We also put the "history" into our natural history too, ranging from geology and palaeontology to the more-recent social history of our discipline. Recognising the contribution of past generations of natural historians to modern science and biology is an important aim of the NHSN, not just for ensuring that they get the credit they deserve, but because this enriches our own experiences of natural history and helps us to appreciate those rare observations of the natural world that are genuinely new discoveries.

The Society's *Transactions*, now published under the name *Northumbrian Naturalist*, reflect that wider view of natural history in both present and historical contexts, and is also a feature of the current issue. Two short papers, one from James Littlewood on Water Rails in Gosforth Park showing how this species is probably under recorded within its range, and one by Barry Robinson on a new species of flatworms, demonstrate the value of skilled natural historians for conservation monitoring in changing environments.

From a historical perspective, a paper by Sandy (RA) Baker and Steve Gill on amateur naturalists and entomologists active in Hartlepool, County Durham, in the last half of the nineteenth century offers a fascinating insight into how the work of dedicated amateurs has underpinned our current knowledge. Two aspects of this paper that caught my attention are relevant today: the importance of taxidermy in enthusing naturalists, past and present, and the need for us to continue their work in inspiring young naturalists who will be the conservation standard bearers for the future. Les Jessop's paper on taxidermists active in the North East in the past provides a long-overdue perspective on this important skill which has provided the foundations for our collections and displays in the Great North Museum: Hancock, and which continue to inspire new generations of naturalists. Alan Hart reminds us with his biography of Kathleen Blackburn, a distinguished botanist active in the region in the first half of the twentieth century, that the important contributions of female scientists and naturalists too often go unrecognised. Finally, Wallace Arthur gives a fascinating insight into Albany Hancock and his contribution to evolutionary biology.

Maintaining this diversity of natural history content in *Northumbrian Naturalist* is important for the Society, and we hope that members will be inspired to contribute their work on all aspects of the natural world, present and past, so that we can grow and develop this journal for the naturalists in the North East.

Chris Redfern
Editor

BREEDING SEASON WATER RAIL SURVEY AT GOSFORTH PARK NATURE RESERVE

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SUMMARY

A survey was carried out in April 2016 to establish the size of the breeding Water Rail *Rallus aquaticus* population at Gosforth Park Nature Reserve in Newcastle upon Tyne. The population proved to be significantly higher than estimated by random observation, in line with surveys elsewhere in the UK, suggesting that the population size for the region has been underestimated.

INTRODUCTION

Because of its skulking terrestrial nature and preference for thick wetland vegetation, the Water Rail is one of the UK's most difficult birds to record accurately, especially when it is not making its distinctive calls. A specific Water Rail survey is required to get a more accurate estimate of population.

To the author's knowledge there have been no formal surveys for Water Rail undertaken in the Northumberland, Newcastle and North Tyneside areas. There has been no national survey for Water Rail (Balmer *et al.* 2013). Chance patterns of detection mean that we cannot be confident about data regarding regional Water Rail distribution and population size in the past or the present.

Gosforth Park Nature Reserve is located on the northern outskirts of Newcastle upon Tyne. The reserve is 62 ha and includes approximately 10 ha of lowland wetland, which contains a mix of shallow open water, reed *Phragmites australis*, Bulrush *Typha latifolia* and low earth bunds with coppiced willow *Salix spp.* (Figure 1).

Figure 1. Part of the wetland at Gosforth Park Nature Reserve (Christopher Wren).

Significant work has taken place at Gosforth Park Nature Reserve since the 1990s in order to improve the quality of wetland habitat. Annual surveying (bird ringing) of Reed Warbler *Acrocephalus scirpaceus* takes place and the results of this have shown an increase in the population of that species. But very little is known about the Water Rail population in the reserve other than that gleaned from observation. This suggested a breeding population of 3-4 pairs in the period 2013-2015. It was considered that having a reliable baseline survey would enable the population of Water Rail to be monitored in future as the Reserve's wetland habitats continue to evolve.

METHOD

The survey method followed that described by Gilbert *et al.* (1998), using a recording of Water Rail calls to elicit a response. The method is summarised here, including any departures from Gilbert *et al.* (1998).

Dates and timing

One survey was carried out from 06:10 to 08:50 on 15 April 2016. Gilbert *et al.* (1998) recommended surveying between late March in southern England and the end of April in northern Scotland. Mid-April was considered to be appropriate for north east England. Sunrise was at 06:03, within the "early morning, after sunrise" recommended by Gilbert *et al.* (1998).

Conditions

Overcast but dry. Temperature was cool for time of year (<5°C) and had been cool and overcast/raining on preceding days. The wind was light (force 1-2) from the south-west. Gilbert *et al.* (1998) recommend surveying in winds of force 3 or less.

Water levels in the reserve can be controlled by a sluice. At the time of the survey the levels were relatively high (close to normal winter level) but there was no flooding.

Observers and recording

The survey was conducted by two observers working together (the author and Christopher Wren), as recommended by Gilbert *et al.* (1998). A clear 104 second recording of a pair of Water Rails "sharming" in Brescia, Italy was downloaded from www.xeno-canto.org (recording XC302800 by Francesco Sottile 2016) onto a tablet. The recording was then played from a portable speaker using Bluetooth. This was sufficiently loud to be heard at least 100 metres away. This system had been briefly tested at the Reserve several weeks earlier and had elicited a response from a pair of Water Rails.

The observers stopped at intervals of 50 to 100 metres on a route around the wetland to play the recording. One observer played the recording and the other stood around 20 metres away. Gilbert *et al.* (1998) recommend playing the recording for 60 seconds, followed by listening for 60 seconds. If no birds are heard then the recording is played again for 30 seconds followed by 30 seconds of listening. This was the technique initially used, but the response from Water Rails was often rapid and it was very difficult to

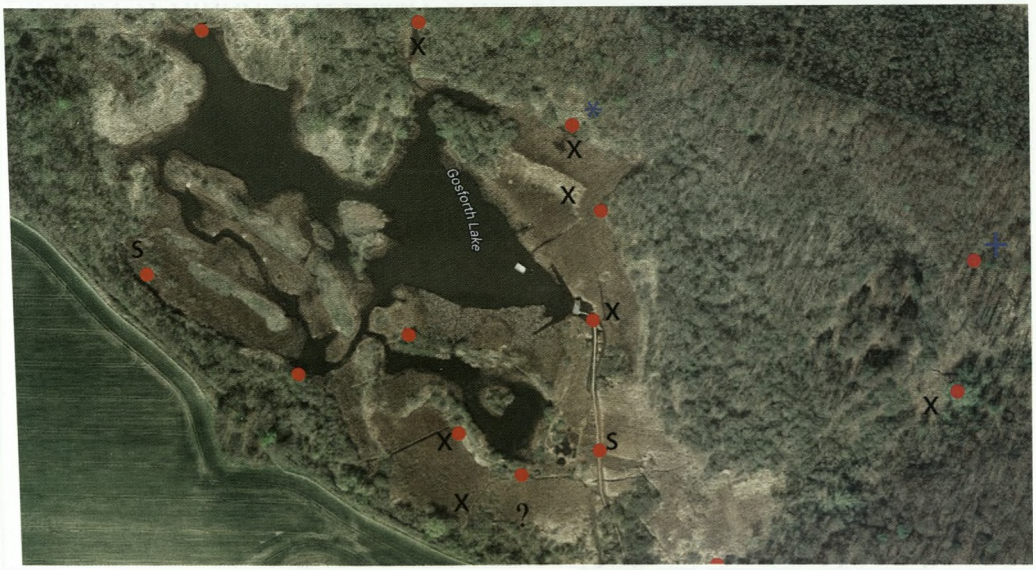
hear them above the loud recording, so instead the recording was played for around 30 seconds, followed by listening for 30 seconds. If no birds were heard then the recording was played again for 30 seconds followed by 60 seconds of listening. In cases where no birds were heard the observers repeated this last sequence but on no occasion did any birds respond to this final recording which suggests that the initial two plays were sufficient to elicit a response if birds were present.

Due to the difficulty of hearing above the recording, towards the end of the survey the speaker was placed slightly away from the observer playing it and this was considered a better method.

All calling Water Rails were plotted on a map (Figure 2) of the Reserve by both observers, who estimated where birds were calling from. Observers were conscious of having to avoid double counting and aware of the potential for Water Rails to follow the recording (Gilbert *et al.* 1998).

The observers walked in a clockwise direction around the reedbeds, selecting locations to play the recording where there was potentially suitable habitat that could be reached on foot (with wellington boots). The observers consider that the recording would have been heard (and responding birds heard) from all suitable habitat in the Reserve. Figure 2 shows the survey locations.

Figure 2. Diagram of wetland showing survey points (two observers) and locations of Water Rails. Survey locations are marked with filled red circles, proceeding in a clockwise direction from the location marked with a blue '+' (06:10 on 15 April 2016) to the final location marked with a blue '*' (08:50 on 15 April 2016). Locations of pairs are marked with black 'x', and single birds with 's'. An uncertain response is marked with '?'.



RESULTS

At least seven pairs of Water Rail were located plus a single calling male and another individual which was seen but did not call: in total 16 individuals. The area of wetland is estimated as being around 10 ha and therefore a population density of 0.7-0.9 pair/ha.

One of the observers heard what might have been an additional pair, but the location was close to where a calling pair had already been heard (and distant from the observers) so that double counting could not be ruled out.

The locations of birds recorded are shown in Figure 2. It is difficult to draw firm conclusions about distribution from this one survey but it does appear that Water Rails were absent from areas of drier reed and from areas where reed was growing in deep water, but were present at the interface of water and muddy margins. This is consistent with observations in Chown (2004).

DISCUSSION AND CONCLUSIONS

It is possible that a few wintering or passage Water Rails are in northeast England into mid-April and so this could possibly account for the individual which was seen but not heard (there is an assumption in Gilbert *et al.* (1988) that Water Rails responding as pairs are breeders rather than lingering winter or passage birds).

According to Chown (2004), in the UK, Water Rails lay their clutches from late March onwards and it is known that only one member of a breeding pair responds in at least some cases where incubation has started. A week after the survey a male Water Rail was heard singing in the early evening from the same location as an individual had been heard calling during the survey, suggesting that this was either a bird holding a territory without a female or that the female was already incubating.

The observers are confident that there were at least seven pairs of Water Rails present, but a further two pairs could not be ruled out. The breeding population is estimated at 7-9 pairs. This is double the estimate of 3-4 pairs that was based on random observation.

This is consistent with Chown (2004) who reported that Water Rail surveys at other wetlands also found significantly higher populations than had been previously estimated: Leighton Moss, Lancashire (estimated 35-50 pairs, survey found 73-104 pairs), Inner Tay Estuary (estimated five pairs, survey found 126 pairs), Stodmarsh, Kent (estimated 10 pairs, survey found 43 pairs), Dungeness, Kent (estimated 3-4 pairs, survey found 12 pairs).

Using data in the *Northumberland Bird Atlas* (Dean *et al.* 2015) an estimate of the total breeding population for Northumberland, Newcastle and North Tyneside would be around 36 pairs from 26 different sites. That 7-9 pairs have now been recorded at just one site throws this estimate into doubt.

The results of this and others' surveys suggest that Water Rail populations are significantly underestimated by random observation and that the population in the north east is likely to be much higher than previously estimated. Further surveys at other suitable sites are required to get a more accurate estimate of the regional population. Neither the survey methodology nor the number of potential sites is onerous.

Table 1. Results from Water Rail surveys at other sites using the methodology by Gilbert *et al.* (1998) (data from Chown 2004) compared with Gosforth Park Nature Reserve.

Site	Pairs	Pairs/ha
Gosforth Park Nature Reserve	7-9	0.7-0.9/ha
Inner Tay Estuary	126	0.31/ha
Leighton Moss RSPB	73-104	0.69-0.98/ha
Dungeness RSPB	12	0.52/ha
Avalon Marshes	122	0.36/ha

Table 1 suggests that the density of Water Rail at Gosforth Park Nature Reserve is at the upper end of what might be expected. Of the sites in Table 1 the most similar to Gosforth Park is Leighton Moss where the density levels are very similar. This suggests that the habitat conditions at Gosforth Park Nature Reserve are good for Water Rail.

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NEW FLATWORM SPECIES RECORDED ON TUNSTALL HILLS, SUNDERLAND

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Member of Tunstall Hills Protection Group

SUMMARY

The flora and fauna of the United Kingdom is one of the best documented in the world and it is quite unusual to find a species here which has not been recorded before. It is significant therefore to note just such a new species in northeast England. A small dark flatworm with up to 80 tiny black "eyes" has been discovered on Tunstall Hills, Sunderland (NZ392546). The 12mm-long flatworm was found, photographed and recorded by Andy Fox, a member of the Tunstall Hills Protection Group. The animal has a patchy brown external appearance with small, seemingly randomly scattered, almost iridescent, pale blueish patches. Since 2003 similar previously unrecorded small terrestrial flatworms have been reported in six localities in the United Kingdom, two in the Netherlands and one in France. The animals are specimens of a species of the genus *Marionfyfea* not previously described. In a recently published paper (Jones and Sluys 2016) the animals have been identified as a new species, *Marionfyfea adventor*. The authors acknowledge the Tunstall Hills records.

Figure 1. The newly discovered flatworm photographed with a 5p piece.
Andy Fox

REPORT

The first specimen found on Tunstall Hills was recorded on 6 March 2016 underneath limestone rock scree in a woodland area. Further specimens were recorded on 1 May 2016 (Figure 1).

Research on the internet led eventually to Hugh Jones, the world authority on land flatworms and a Scientific Associate of the Natural History Museum in London. He reported that specimens of the animal had been recorded in Buckinghamshire, Cambridgeshire and Cornwall. It was thought that the animal was a completely new and undescribed species.

Working with a colleague in the Netherlands, Hugh Jones submitted a scientific paper in June 2016 which was published in August 2016 (Jones and Sluys, 2016). In the paper the morphology and anatomy of the recorded animals was described and diagnostic similarities to the genus *Marionfyfea* noted.

The paper described the Tunstall Hills and other specimens as a new species, *Marionfyfea adventor* (sp. nov.) The only other known species of *Marionfyfea* is recorded from the Auckland Islands, New Zealand. New Zealand seems to be a centre of diversity for land flatworms and its climate is very similar to that of the UK. The flatworms may have been accidentally transported to the UK with exported plants.

TAXONOMY

Order TRICLADIDA (Lang 1884)
Suborder CONTINENTICOLA (Carranza, Littlewood, Clough, Ruiz-Trillo, Baguñà and Riutort 1998)
Family GEOPLANIDAE (Stimpson 1857)
Subfamily RHYNCHODEMINAE (Von Graff 1896)
Tribe ANZOPLANINI (Winsor 2006)
Genus *Marionfyfea* (Winsor 2011)
Marionfyfea adventor sp. nov.

ACKNOWLEDGEMENTS

With many thanks to Andy Fox for his species recording on Tunstall Hills and for access to photographs and communications.

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JOHN EMMERSON ROBSON (1833-1907) A NATURALIST FROM HARTLEPOOL - HIS MAGAZINES AND HIS FRIENDS

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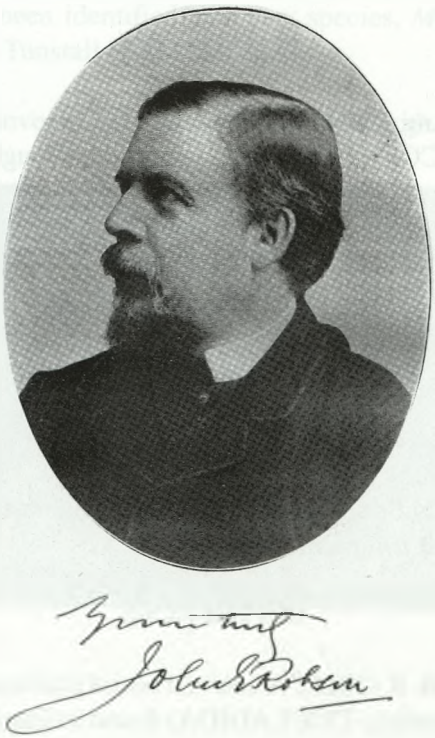
SUMMARY

In any history of natural history in northeast England, especially entomology, the names of J E Robson (1833-1907) and John Gardner (1841-1921) appear on a regular basis. Robson was best known for his "Catalogue" of Lepidoptera, which was "seen through" to completion by Gardner when Robson died. This article is about John Emmerson *(sometimes spelt "Emerson")* Robson of Hartlepool: his contribution to natural history, its literature and his associates.

A SUMMARY OF HIS EARLY LIFE, FAMILY AND CAREER



*Sadly, Sandy Baker passed away before he could see his work in print.

John Robson was born in Newcastle in 1833, and died aged 74 in Hartlepool on 28 February 1907. At his funeral, attended by the Mayor and Corporation, "the streets en route to the cemetery were lined with people assembled to show their respect" (Porritt 1907a). He lived in Hartlepool all his working life and had several occupations including working in a local bank and as a music dealer. He became a house agent and furniture dealer in partnership with Henry Adolphus Hammarbom and thereafter with William Cockburn, but after this ended in bankruptcy in 1863 he became a joiner and builder, employing nine men and eight boys (1881 census). His first wife Emma Wilson, whom he married in 1857, died in 1862 and in 1864 he married Margaret Hoggett, with whom he had seven children (four sons and three daughters). He was elected a Fellow of the Entomological Society in 1890, was a member of the Tyneside Naturalists' Field Club (1872) and became an honorary member of the Lancashire and Cheshire and The City of London Entomological Societies (Eales 2001). He was described as an "enthusiastic and genial companion" (Porritt 1907b). An artist of note, he played the piano at local social events (Newcastle Weekly Courant 3 November 1888 and 23 November 1889) and was a lifelong abstainer from alcohol, involved in the local Temperance movement associated with the Good Templars.

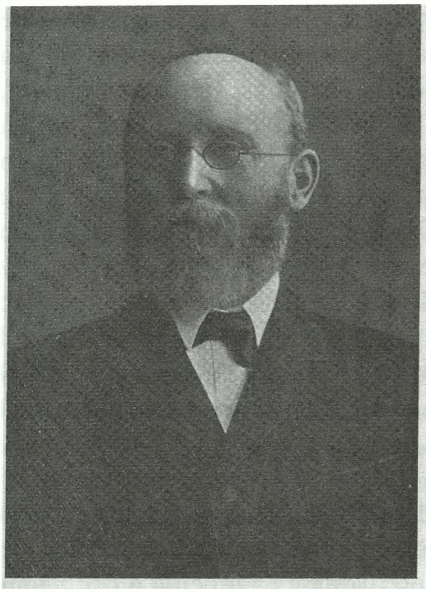
Broadly interested in entomology, not just the Lepidoptera, and always mindful of local circumstances he identified and reported the presence of a live female Colorado beetle in the hold of a "screw steamer" in West Hartlepool, warning of it being a dangerous insect which could attack local potato crops and that the authorities should be on the alert (Northern Echo (Darlington), Saturday 21 August 1886).

Apart from his entomological work, Robson took a great interest in Hartlepool, where his father had been Mayor. Especially interested in education, he was a member of the Hartlepool School Board, and served on the Borough Council. He was Conservative in politics and a Freemason.

Several notices and obituaries were published which are listed by Eales (2001)[1].

[1] *Proceedings of the Entomological. Society*. **95** 1907, *Northern Daily Mail (& Hartlepool Gazette)* 1.3.1907 and 7.3.1907, *Entomologist's Monthly Magazine* **43**: 88-89, *The Entomologist's Record* **19**: 99.

John Gardner (1841-1921)



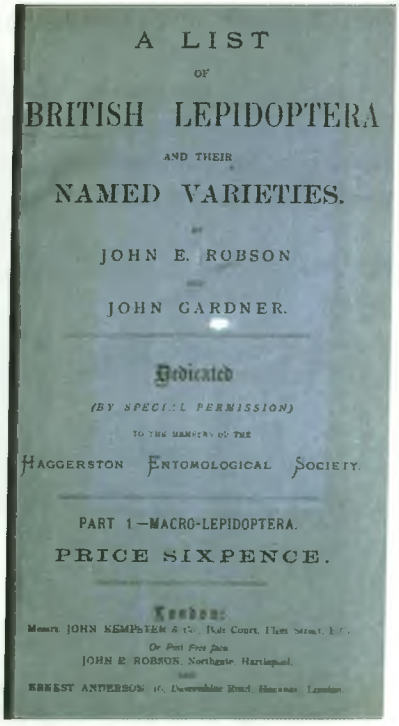
JOHN GARDNER, F.E.S.

John Gardner was born at Egglestone in Teesdale but went with his family to Hartlepool when he was aged around 15. Eventually he became a partner in a firm (trading under different names) of timber merchants and saw millers. Like Robson, he took great interest in the affairs of the town and was a councillor for a period but retired to Hart and took "a great delight in investigating the fauna of the wonderful district in which he lived" (Anon 1921). He made many "discoveries of rare or little known moths and beetles" and was regarded as the best known "local macro collector of recent years" and, next to Sang, "the best at micros also" (Anon 1921). He is remembered for his kindness, the help he gave to younger entomologists and the warm welcome to those visiting his home[2].

His collection of Coleoptera (merged with others) and his valuable collection of Lepidoptera are both held at the Great North Museum: Hancock.

Gardner was a prolific correspondent, and his letters are in the archives of The Natural History Society of Northumbria, including 34 letters from J E Robson to J Gardner dated from 16 July 1880 to 9 June 1904 and a large number of undated ones, plus a single response from Gardner to Robson dated 11 January 1901.

Reference has already been made to the part played by John Gardner in helping to complete the "Catalogue" after Robson's death. Gardner had been one of Robson's closest friends for many years and a companion on collecting trips (Eales 2001).



A LIST

OF

BRITISH LEPIDOPTERA

AND THEIR

NAMED VARIETIES.

BY

JOHN E. ROBSON

AND

JOHN GARDNER.

Dedicated

(BY SPECIAL PERMISSION)

TO THE MEMBERS OF THE

HAGGERSTON ENTOMOLOGICAL SOCIETY.

PART 1.—MACRO-LEPIDOPTERA.

PRICE SIXPENCE.

London:

Messrs. JOHN KEMPSTER & Co., Bolt Court, Fleet Street, E.C.

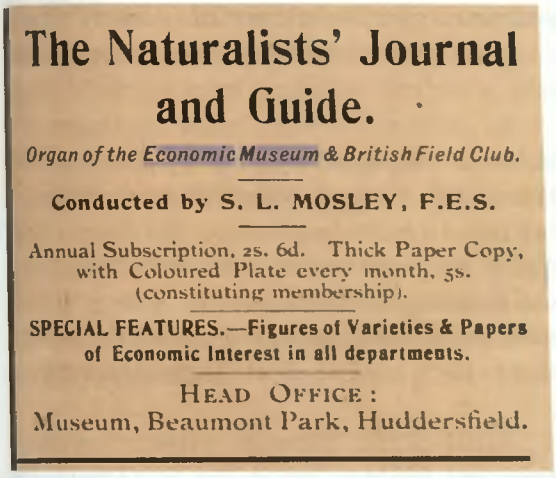
Or Post Free from

JOHN E. ROBSON, Northgate, Hartlepool.

ERNEST ANDERSON, 16, Devonshire Road, Hackney, London.

[2] Portrait – *Vasculum* **8, No.1.**

Seth Lister Mosley (1848-1929)


The Naturalists' Journal and Guide.

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Mosley was born at Lepton and died at Fartown, Huddersfield. At the age of 16 he worked for a house painter and by 21 was in the same business on his own. At this time he married Sarah Taylor and they had two sons and a daughter. Mosley inherited his interests in natural history from his father, a taxidermist (Brooke 2012) and became a keen collector, writer, artist and curator. After running his own museum from his house, he took over the establishment and running of the biology museum at Huddersfield Technical College, at the invitation of T W Woodhead, and then went as curator to Cliffe Castle in Keighley. When the Tolson Museum in Huddersfield was established he became its first curator. A workaholic and total abstainer throughout his lif, he became a local preacher after his religious conversion. He set up his own printing press, cut his own blocks, did his own printing and illustrations and published *The Naturalists' Journal and Guide* where his artistic talents and his interests in economic entomology came to the fore. His involvement in publishing with Robson began in the late 1870s when they started a penny weekly called *The Young Naturalist,* but after a few years Mosley withdrew his involvement which lasted from November 1879 (Vol. 1, No.1) until November 1884 (Vol. 5, No. 60). During their collaboration many of Robson's articles were illustrated by Mosley. Alan Brooke supplied additional information on Seth Mosley[3].

BUTTERFLIES AND MOTHS

Recognised in the north of England as "an ardent and successful Lepidopterist" (Porritt 1907b), Robson is best known for his "Catalogue of the Lepidoptera of Northumberland, Durham and Newcastle-upon-Tyne" published in four parts and two volumes in the *Transactions of the Natural History Society of Northumberland, Durham and Newcastle upon Tyne* in 1899, 1902, 1905 and 1913[4]. These dates are important partly because Robson died prior to the completion of the final volume. The death of the author while the work was incomplete created a problem but "through the good offices of Mr John Gardner, the help of Mr Eustace R Bankes, the chief British authority on the Microlepidoptera, has been secured, Mr Bankes having very kindly undertaken

[3] See also Brooke 2012.
[4] See Robson 1902, for example.

the necessary revision of the manuscript and proofs"[5]. The catalogue is still regarded as a standard work on the Lepidoptera of Northumberland and Durham and was "the definitive reference book for all local lepidopterists for the best part of a century" (Eales 2001), "although much has been added … and some of Robson's notes have been found to be faulty" (Dunn 1983).

Around 100 years after Robson published his catalogue, Dunn and Parrack (1986) published an up-to-date account of the distribution of butterflies and moths in Northumberland and Durham. The authors noted a new classification, the discovery of new species, invalid earlier records, access to the more remote areas and changes due to climatic variation as some of the main differences taking place since Robson did his earlier work. Dunn and Parrack (1986) stated that although climate change is sometimes more difficult to correlate, there does appear to be "a marked and widespread northward extension of range".

Robson also published several other books and booklets which are listed by Eales (2001), including "A list of British Lepidoptera and their named varieties" (Robson and Gardner *circa* 1886) and he was active in the Natural History Society giving lectures on "British Butterflies" (1900), The Hawk Moths" (1901) and "The appearance and disappearance of species among Lepidoptera" (1902)[6].

Tyne and Wear Archives and Museums hold no Lepidoptera collections belonging to Robson. His collections of British Lepidoptera were sold at auction in London in 1895, and others after his death in 1907, by the auctioneers J C Stevens[7]. There is further information about these collections and their sale in Eales, who states that the sales have "deprived later local entomologists of the opportunity of seeing genuine Durham specimens of, Marsh Fritillary, Scotch Argus, Small Blue, Gatekeeper and Speckled Wood butterflies and numerous moth species" (Eales 2001).

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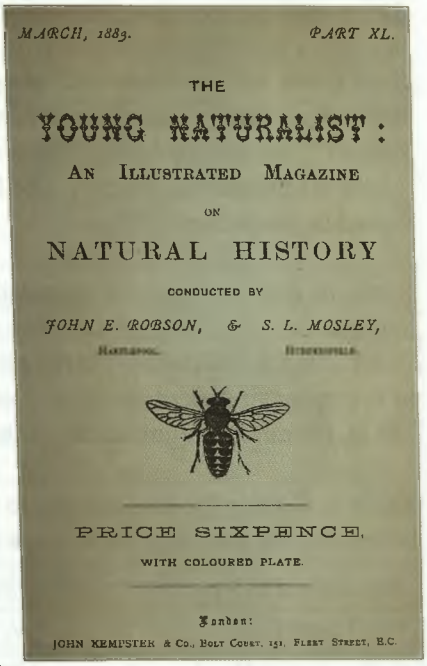
[5] *Transactions of the Natural History Society of Northumberland, Durham and Newcastle Upon Tyne*, 1908.

[6] Annual Reports in the *Transactions of the Natural History Society of Northumberland, Durham and Newcastle* and Long 1966.

[7] S Kelly, pers. comm., 2 March 2016.

Robson co-founded and, with Seth Lister Mosley, edited a magazine called The *Young Naturalist.* Seth Mosley's involvement in the early years of the magazine lasted from November 1879 until November 1884. Later Robson edited *The British Naturalist* with the help of several assistants (Table 1).


MARCH, 1889. PART XL.

THE

YOUNG NATURALIST:

AN ILLUSTRATED MAGAZINE

ON

NATURAL HISTORY

CONDUCTED BY

JOHN E. ROBSON, & S. L. MOSLEY,

PRICE SIXPENCE,

WITH COLOURED PLATE.

London:

JOHN KEMPSTER & Co., BOLT COURT, 151, FLEET STREET, E.C.

Table 1. A list of the Editorial Assistants for the *British Naturalist* at various times - Volume 1 1891-1892 and Volume 2 1893-1894.

George Carter Bignell (1826-1910) F.E.S., Plymouth based. Registrar of births and deaths.

Charles Adolphus Briggs (1849-1916) F.E.S., London and Devon, solicitor.

Samuel James Capper (*circa* 1835-1912) F.E.S., F.L.S., Liverpool and Prescott, chemist.

Theodore D Cockerell (1866-1948) probably Theodore Dru Alison Cockerell b. Norwood, London, American zoologist and academic.

Charles William Dale (1851-1906) F.E.S., Dorset.

George Elisha (*circa* 1833-1921) F.E.S., London, House Decorator.

John William Ellis (1855-1916) F.E.S., Doncaster and Liverpool, physician and surgeon

William Albert Gain (1840-1909) Devon and Tuxford, Notts., photographer.

John Gardner (1842-1921) F.E.S., Hartlepool, timber merchant. Letters at Newcastle.

Linnaeus Greening (1855-1927), Warrington, wire manufacturer.

Charles Stuart Gregson (*circa* 1817-1899) Liverpool, agent, surveyor and estate broker.

Arthur Foster Griffith (1856-1933) MA., Brighton, solicitor.

George Albert Lewcock (1841-1928), London, printer compositor.

James Petrie Soutter (1843-1895), Bishop Auckland, Bath Manager, teacher of botany.

John Read le Brockton Tomlin (1864-1954) BA, Llandaff.

William Henry Tugwell (1831-1895), London, pharmaceutical chemist.

Sydney Webb (*circa* 1837-1919), Dover.

The *Young Naturalist* started in 1879 as a penny weekly with the object of providing information for the beginner, especially the young beginner. In 1882, at the end of volume 3, the weekly issue was discontinued and with volume 4, beginning in December 1882, became a monthly magazine with (for the first time) coloured plates. Described on the front cover as "An illustrated magazine on Natural History", it was priced at sixpence. Robson wrote to Gardner in December 1885, inviting him to be one of the "Assistant Editors", the caveat being that Gardner's name would appear on the front cover but "there are no special duties"[1]. The last number of *The Young Naturalist* (Volume 11) was issued in December 1890.

Some of Robson's contributions in *The Young Naturalist* indicate his wider interests and there are articles entitled "The abundance of species in 1879", "The first daisy" and "Collecting in Hartlepool" in the early numbers. After that virtually all of his publications in this magazine were on butterflies or moths - by way of examples see Robson (1880, 1881). He made a significant number of contributions to the magazine – see Table 2.

Table 2. Robson's contributions to the first two volumes of *The Young Naturalist* Editorials and miscellaneous notes in every issue

Abundance of Species in 1879	29/11/1879 v1.5
The First Daisy	6/3/1880 v1.19
Collecting at Hartlepool	20/3/1880 v1.21; 27/3/1880 v1.22; 3/4/1880 v1.23; 10/4/1880 v1.24 17/4/1880 v1.25
British Butterflies	1/5/1880 v1.27; 8/5/1880 v1.28; 22/5/1880 v1.30; 5/6/1880 v1.32; 19/6/1880 v1.34; 26/6/1880 v1.35; 3/7/1880 v1.36; 10/7/1880 v1.37; 17/7/1880 v1.38; 24/7/1880 v1.39; 31/7/1880 v1.40; 7/8/1880 v1.41; 14/8/1880 v1.42; 21/8/1880 v1.43; 28/8/1880 v1.44; 4/9/1880 v1.45; 18/9/1880 v1.47; 16/10/1880 v1.51; 13/11/1880 v2.55; 27/11/1880 v2.57; 7(4)/12/1880 v2.58; 18/12/1880 v2.60; 25/12/1880 v2.61; 1/1/1881 v2.62; 8/1/1881 v2.63; 15/1/1881 v2.64l; 22/1/1881 v2.65; 29/1/1881 v2.66; 5/2/1881 v2.67; 12/2/1881 v2.68; 26/2/1881 v2.70; 12/3/1881 v2.72; 2/4/1881 v2.75; 9/4/1881 v2.76; 16/4/1881 v2.77l; 23/4/1881 v2.78; 7/5/1881 v2.79; 14/5/1881 v2.80; 4/6/1881 v2.82; 11/6/1881 v2.83; 18/6/1881 v2.84; 16/7/1881 v2.88; 23/7/1881 v2.89; 6/8/1881 v2.91; 13/8/1881 v2.92; 20/8/1881 v2.93; 3/9/1881 v2.95; 10/9/1881 v2.96; 1/10/1881 v2.99; 8/10/1881 v2.100; 15/10/1881 v2.101

[1] Robson to Gardner, pers. comm., 12 December 1883 (Archives of the Natural History Society of Northumbria, Great North Museum: Hancock).

Monohama sutor	4/9/1880 v1.45
Difficulties for Beginners	6/11/1880 v2.54; 29/1/1881 v2.66; 12/2/1881 v2.68; 19/3/1881 v2.73
A Swarm of Butterflies	27/11/1880 v2.57
Vanessa urticae in February	26/2/1881 v2.70
Vanessa antiopa at Seaton Snook	26/2/1881 v2.70
Vanessa c-album in Turkey	26/2/1881 v2.70
*Vanessa urtic*ae in February	12/3/1881 v2.72
A Tame Guillemot	11/6/1881 v2.83
The Mole	2/7/1881 v2.86
Notes on V c-album	23/7/1881 v2.89
Coremia munitata	6/8/1881 v2.91
The Hooded Crow at Hartlepool	13/8/1881 v2.92
Larvae of *S. ocellatus*	27/8/1881 v2.94; 3/9/1881 v2.95
Larvae on Poplar	3/9/1881 v2.95
Late Nesting	17/9/1881 v2.97
Cloantha solidaginis at Hartlepool	22/10/1881 v2.102
Lepas anatifera	22/10/1881 v2.102
P. populi in October	29/10/1881 v2.103

ROBSON ADVERTISEMENTS IN *SCIENCE GOSSIP* AND *THE YOUNG NATURALIST*

Robson obtained many of his specimens by exchange (and possibly purchase) and was always on the look-out for British Lepidoptera frequently using the pages of *Science Gossip*, the popular Victorian scientific magazine, to place his wants, offers and exchanges. He was also interested in botany as the following examples indicate: "A Herbarium of British plants numbering over 1000 specimens, and including most of the rarest species, all uniformly mounted and labelled" in return, "British or other Lepidoptera or books on natural history"[2]. In another he placed an exchange advert: "British Lepidoptera, and dried plants, to exchange for others. Many rarities"[3]. He had wide interests in natural history which included not only botany but shells, other invertebrates and horticulture.

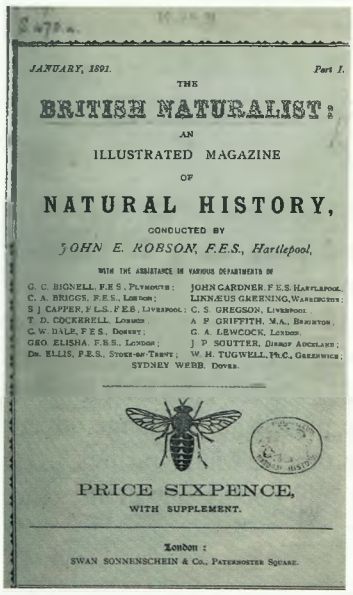
[2] *Science Gossip* **21** (1885) 245.
[3] *Science Gossip* **9** (1873) 100.

He also advertised in The *Young Naturalist* and the following are some examples of his Lepidoptera exchange entries which illustrate his main speciality. *[Authors' expansion in brackets.]*

The *Young Naturalist* (1882) - Vol. 3. No. 143.
I shall be glad to send living specimens of *Pissodes pini [=Pine weevil]* to anyone desiring them.

The *Young Naturalist* (1882) - Vol. 3. No. 152.
I will be greatly obliged to correspondents who will forward me specimens of *A[rctia]. fuliginosa [= Ruby Tiger]* from their respective districts. I wish to compare specimens from different parts of the country for an article on the species. I will make the best return in my power.

The *Young Naturalist* (1886) - Vol. 7. part 81.
Desiderata— *L[eptidia] sinapis [= Wood White], M[elitaea] athalia [= Heath Fritillary], cinxia [= Granville Fritillary], A[rgynnis]. Lathonia [= Queen of Spain Fritillary], E[rebia] cassiope [= Small Ringlet], T[hecla] rubi [= Green Hairstreak], pruni, Z[ephyrus] betulae [= Brown Hairstreak], L[ycaena]. Adonis [=Clifden Blue], argiolus [= Holly Blue], avion [=Large Blue], N[emeobius] lucina [= Duke of Burgundy Fritillary], S[teropes] paniscus [= Chequered Skipper], H[esperia] comma [= Pearl Skipper],* and females only of *A[nthocharis] cardamines [=Orange-tip], A[rgynnis] aglaia [= Dark Green Fritillary], S[atyrus] megaera [= Wall Brown], H[ipparchia] semele [= Grayling], E[pinephele] tithonus [=Large Heath], L[ycaena] aegon [= Silver-studded Blue].* I will make a good return.


JANUARY, 1891. Part I.

THE

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AN

ILLUSTRATED MAGAZINE

OF

NATURAL HISTORY,

CONDUCTED BY

JOHN E. ROBSON, F.E.S., Hartlepool,

WITH THE ASSISTANCE OF VARIOUS DEPARTMENTS OF

G. C. BIGNELL, F.E.S., Plymouth; JOHN GARDNER, F.E.S. Hartlepool.
C. A. BRIGGS, F.E.S., London; LIKNÆUS GREENING, Warrington;
S. J. CAPPER, F.L.S., F.E.S., Liverpool; C. S. GREGSON, Liverpool.
T. D. COCKERELL, Lyndon; A. P. GRIFFITH, M.A., Brighton.
C. W. DALE, F.E.S., Dorset; G. A. LEWCOCK, London.
GEO. ELISHA, F.E.S., London; J. P. SOUTTER, Bishop Auckland;
Dr. ELLIS, F.E.S., Stoke-on-Trent; W. H. TUGWELL, Ph.C., Greenwich;
SYDNEY WEBB, Dover.

PRICE SIXPENCE,
WITH SUPPLEMENT.

London:
SWAN SONNENSCHEIN & Co., Paternoster Square.

The *Young Naturalist* **10** (1889): part 110.
Wanted to borrow, to illustrate an article, extreme forms of *Melanippe fluctuata [=Garden Carpet]*. The greatest possible care shall be taken of any entrusted to me, and they shall be returned as soon as done with. I would also make a good return for typical specimens from any locality.

CHANGE OF TITLE TO *THE BRITISH NATURALIST* AND PERSONNEL INVOLVED

Following the last number of *The Young Naturalist* in January 1891, a new magazine was launched to replace it, called *The British Naturalist*. An editorial note in the last edition of the former magazine[4] explains the change, "For the last eleven years it has been my pleasure to

[4] *The Young Naturalist*, December, 1890.

conduct the 'Young Naturalist'... whilst I have made many friends, I have not lost one, and by the able assistance of my correspondents and co-adjudicators, the magazine has year by year to improve, and to receive a larger share of support. But a mistaken opinion as to its scope has been assumed from its title. It has, therefore, been deemed prudent to make the slight alteration needed to remove that impediment to its success, and in future it will be known as the *British Naturalist*". Robson wrote to Gardner for help: "I intend to introduce a new feature into the magazine...I want a column or so headed Notes on Larvae ...I shall have to ask my friends for contributions to it. Will you write one, two or three? Short notes better than long ones"[5]. Three volumes were completed under Robson's editorship (to the end of 1893) and then in January 1894 he handed it over to Joseph Smith and Linnaeus Greening, both hailing from Warrington. Until this time, John Robson had been the sole editor of *The British Naturalist* but he was assisted by a number of other naturalists/entomologists (Table 1).

In all Robson edited the two magazines for 14 years, from 1879 to 1893.

CONCLUSION

John Robson had many friends and associates in natural history and without them he could not have written his "Catalogue" or edited his magazines. Two in particular stand out, John Gardner and Seth Mosley, and they illustrate the web of connections in natural history in the north of England at this time. The magazines, which in general were proliferating in science at this time, helped to link these naturalists and strengthen their connections.

ACKNOWLEDGEMENTS

We would like to thank the following people for their help: Alan Brooke who is working on a volume on the life and work of Seth Lister Mosley, June Holmes, Archivist of the Natural History Society of Northumbria, and Stephen Kelly of Tyne and Wear Museums for their invaluable work on our behalf.

Since the submission of this article the primary author - Sandy (Richard Alan) Baker - has passed away and any communication pertaining to the article should be directed to the secondary author.

[5] Robson to Gardner, pers. comm., 12 December 1890 (Archives of the Natural History Society of Northumbria, Great North Museum: Hancock).

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ROBSON, J E (1880). British Butterflies: 19 *Young Naturalist* **2**: 36-38. [used for a description of *Euphydryas aurinia*].

ROBSON, J E (1881). British Butterflies: 27 *Young Naturalist* **2**: 108-110. [used for a description of *Polygonia c-album*].

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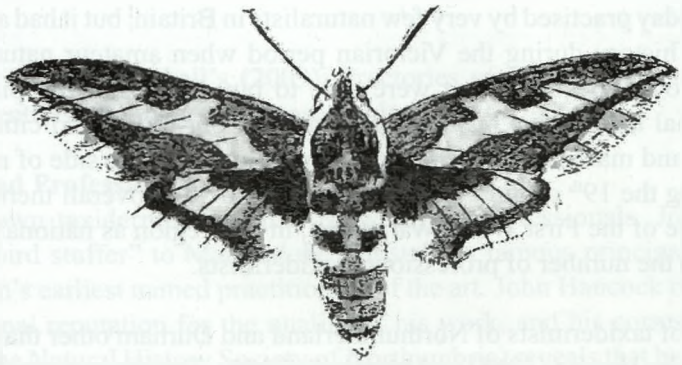
D. Euphorbiæ.



D. Galii.

Illustration: The Young Naturalist Vol.III pl.12. (by S L Mosley) to accompany Robson's British Moths genus Deilephila pp.309-311.

AN HISTORICAL LIST OF TAXIDERMISTS OF BERWICKSHIRE, DURHAM AND NORTHUMBERLAND

Leslie Jessop

c/o Natural History Society of Northumbria, Barras Bridge, Newcastle upon Tyne NE2 4PT

SUMMARY

Several discrete sources have been used to compile a list of the taxidermists who were active in north east England and in Berwickshire from the 18th century to the middle of the 20th. The list, which is surprisingly large will, it is hoped, serve to underline the importance of the craft in the practise of natural history in Britain during that period.

INTRODUCTION

Taxidermy is today practised by very few naturalists in Britain, but it had a very important role in natural history during the Victorian period when amateur naturalists not only prepared their own specimens but were able to buy professionally prepared mounts from commercial taxidermist businesses in most of our towns and cities. Displays of mounted birds and mammals played a central part in the public side of most provincial museums during the 19th century and well into the 20th, but overall there was a change at about the time of the First World War, when, in this region as nationally, there was a steep decline in the number of professional taxidermists.

There is no list of taxidermists of Northumberland and Durham other than as part of the nationwide lists by Herriot (1968) and Marshall (2009). This paper started with a simple enquiry as to exactly how many known taxidermists could be located in our region and the list grew surprisingly large. Information has been brought together from various sources to assemble the first historical directory of taxidermists in north east England, beginning with the earliest known practitioner (John Goundry in the late 18th century) and extending up to the period of the Second World War.

One source of information is museum collections. There are thousands of items of taxidermy in the collections of the historic museums of north east England, especially in Newcastle, Sunderland, South Shields, Gateshead and Middlesbrough but there is often very little associated information about the taxidermists who prepared the specimens. A few cases of birds are signed, or have labels with the name of the company who supplied the work; most of the examples I have seen are from the historic collections of Sunderland Museum and Saltwell Towers (Gateshead). Newcastle is special, since we know that the taxidermist John Hancock donated his own collection to form the core of the British Birds display when the museum was redeveloped in the 1880s, and hundreds of his specimens still survive. Although not individually labelled, there is

often enough documentation to recognise pieces of his work. Indeed, John Hancock is such an important figure in this regard that a mere listing in this directory cannot properly do him justice.

Trade directories have been very useful sources of information (a list of the trade directories that have been seen follows the list of References). These directories listed people by their address and also by trade: for taxidermists the trade was usually given as "Animal Preserver", or "Bird and Animal Preserver" but occasionally taxidermists can be found among "Miscellaneous Trades and Professions". From 1909 the name was replaced by "Taxidermist" in Ward's Directory; some editions of Kelly's directory list both "Taxidermists" and "Bird and Animal Preservers". No taxidermists were listed in Ward's Directories after 1916, but Kelly's continued to list them until 1934. Only once, in the *Directory of northern towns* (1886), is the term "bird stuffer" used, and this was for J Chambers of 93 High Wilson Street, Middlesbrough.

Some information has been drawn from newspapers. This has been facilitated in recent years by searchable online databases of British newspapers (the *Gale Newsvault* has been used).

Herriot's (1968) and Marshall's (2009) directories of British taxidermists have been searched for entries relating to northeast England.

Amateurs and Professionals

The best known taxidermists in this list were not professionals. John Goundry, the "joiner and bird stuffer" to Marmaduke Tunstall, is famous principally because he is one of Britain's earliest named practitioners of the art. John Hancock of Newcastle built an international reputation for the quality of his work, and his correspondence (in the archives of the Natural History Society of Northumbria) reveals that he did sell his work, but the rarity with which he advertised in trade directories as a bird preserver shows that he regarded himself principally as an amateur. There were probably many naturalists with an interest in birds who were able to prepare a study skin or a simple mount, and whose names – with a few exceptions – will not be found in the written record.

For several decades the leading professional taxidermists of the region were Robert Duncan and family of Newcastle, whose firm advertised in trade directories between 1847 and 1913. In the latter half of the 19th century they were rivalled by John Jackson (active 1888-1906).

During the 19th century, the period of the greatest growth of their collections of birds and mammals, only one museum in the region (Durham University Museum) employed a taxidermist. Other museums relied on the support of amateur taxidermists (such as John Hancock in Newcastle and William Yellowly in South Shields), occasionally contracting professional work (Bates in Newcastle) or on donations of material that had already been prepared. The Earl of Ravensworth, whose collection went to Saltwell Towers, had

specimens prepared by Duncan; the origins of specimens in the collection of Edward Backhouse (who gave his collection to Sunderland Museum) are mostly unknown; Abel Chapman's Big Game heads were mainly prepared by Rowland Ward of London.

Arrangement of the list

The following list is arranged first by county (Berwickshire then Northumberland then Durham, with the "Town and County" of Newcastle treated as part of Northumberland), secondly by place (arranged alphabetically), and if there is more than one known taxidermist in a place then they are sorted alphabetically by name.

An index, listing taxidermists by name and also by place, is given at the end of the paper.

BERWICKSHIRE

Berwick

Andrew Brotherston

Andrew Brotherston "of Berwick-on-Tweed" was listed by Marshall (2009) because of a passage in a paper by George Bolam (1896). When discussing the Ruff, Bolam said "I have at various times seen birds in the late Mr Brotherston's shop, but never an adult in winter dress, and I know that he used to regard the immature plumage as that of the adult in winter".

However, it is clear from several mentions of Brotherston in *The Birds of Berwickshire* by G Muirhead that Andrew Brotherston was based in Kelso, not Berwick. Unless Berwick connections can be found he might not qualify for this list.

John Brown

Was listed in *Kelly's Directory* as a taxidermist at 51 West Street (1902).

John Hogarth

Was listed in *Kelly's Directory* for 1894 at 20 Hide Hill.

NORTHUMBERLAND

Alnwick

Thomas Newton

An article by Sidney Gibson (1869) in *The Gentleman's Magazine* included information from Algernon, Duke of Northumberland (1792-1865), who told him he remembered a Wild Cat killed in Hulne Park *circa* 1810 and stuffed by Thomas Newton, the keeper of Brizlee Tower. It had a short thick tail and measured six feet long.

Cullercoats

J Taylor
J Taylor is mentioned in a paper by Charlton (1911): on page 131 he thanked "Mr J Taylor, formerly taxidermist, Cullercoats, for notes concerning the Bittern, &".

Dudley

James Foote
Was listed in *Kelly's Directory* (1921-1929).

Haltwhistle

Robert Liddell
Was listed in *Kelly's Directory* (1921-1934) at Main Street, Corrowdale, Haltwhistle.

D Byers
Was listed by Herriott (1968) as working in Haltwhistle in the 1930s. Examples of his work are in Carlisle Museum.

Hexham

William Swinburne
According to Marshall (2009), William Swinburne of Back Street, Hexham, was listed in Slater's *Royal National Commercial Directory of the Northern Counties* for 1854-1855.

Morpeth

J and George Anderson
Were listed in *Kelly's Directory*, for 1890 at Dragon Yard.

John Batey
The *Newcastle Courant* reported on 5 October 1849 that a Grey Phalarope had been shot on Morpeth High Common and was in the hands of John Batey "the eminent animal preserver" of Morpeth.

Francis and Louisa Wood
Francis Wood (of King Street, Morpeth) was listed in *Kelly's Directory* for Northumberland in 1902. In 1921 Mrs Louisa Wood was listed, at 98 Newgate Street.

Newcastle

T H Archer
A short note by T H Archer of Newcastle upon (1893) includes the passage "The specimen I recorded in the March 'Naturalist', and which I dissected and stuffed, had been feeding on small shrimps …"

A Baldwin
Was listed in several trade directories, 1892-1899, at 42 Side.

T Bates
Thomas Bates had several addresses, mainly in Bailiffgate, a street redeveloped in the late 19th century and now equating to the first 100 metres of the eastern end of Westgate Road (near the junction with Nicholas Street). This address was very handy for the Newcastle Museum, prior to its move to Barras Bridge.

In *Kelly's Directory* for 1894 T Bates and Son was at Darn Crook, and Thomas Bates at Barrow's Court (Newgate Street) – were these two separate premises for one business?

Information from descendants (*via* Michael Turner, *pers. comm.* 2015) suggests links to Thomas Newman Bates (1830s-1890s) and his son George Newman Bates (1855 – *circa* 1912). On the latter's marriage certificate, his father gave his occupation as taxidermist (although when G N Bates was born (1855) his father was described as a Master Hatter with his address at the Black Gate, Castle Garth). A family tradition is that some of G N Bates's work was in the Hancock Museum.
Addresses:

Variously as 4, 5 and 7 Bailiffgate	*circa* 1859-1888
Recorded once at 21 Westgate Street	1863
Later seems to have removed to Barrows Court (now covered by part of the Eldon Square shopping centre)	1891-1894
Traded as T Bates and Son at Darn Crook	1890-1896
8 Low Friar Street	1902

A letter in the archives of the Natural History Society of Northumbria, from John Hancock to the Dowager Marchioness of Normanby in 1879 mentions giving birds to Mr Bates "the person who stuffs the specimens for the Newcastle Museum". Another letter, from John Hancock to Richard Howse in 1880, discusses getting "a young Razorbill in the nest plumage & Bates now has it to stuff for the museum".

William Tuke wrote to John Hancock in 1881 and alluded to correspondence with Bates, who had stated that he had worked for the Newcastle Museum under Hancock's direction for some years. In reply, Hancock said "I have known Bates (whom you enquire about) for many years. The Birds he has done for our museum pretty well but I generally touch them up a little before they are cased. I can say this however, his specimens are much

superior to what are generally seen in public museums and I think he could do very well to put your collection in order. He has been at work upon something of the same kind for the Sunderland Museum and I believe he has given satisfaction". There is no signed example of his work in the collections of Tyne and Wear Museums.

John Bigger
In an article on Natural History in the *Newcastle Weekly Chronicle* (29 March 1919), Charles Wain said "I met a reader in the Hancock Museum the other day ... Mr John Bigger of 51 Coward St is a specialist in the art of taxidermy".

Thomas M Charlton
Is known from trade directories *circa* 1887–1890, at 22 Howard Street.

W Charlton (1823-1900)
Is known from trade directories. Also, the *Newcastle Weekly Courant* recorded his death, age 77, at the residence of his son-in-law William R. Moran (172 Hotspur Street, Heaton) on 28 September 1900.

Address:
Traded at three addresses on Newgate Street, 1877-1899. Not listed in directories after 1899.

97 Newgate Street	1873
118 Newgate Street	1877
113 Newgate Street	1880-1899

T Craster
Was listed in *Ward's Trade Directory* in 1851 at Saville Row.

George Cummings
Was listed in *Kelly's Directory* (1890-1894) at 37 High Friar Street.

Robert Duncan and family
The longest-serving firm of professional Bird and Animal Preservers in Newcastle was Robert Duncan and family, who were listed in Trade Directories between 1844 and 1913. It is likely that a lot of birds in Lord Ravensworth's collection were mounted by Duncan, but only 17 birds in Tyne and Wear Museum's collection are housed in cases signed by him. These include some of the larger display cases, for instance TWCMS: H15821 (A White-tailed Eagle, dated 1877) and TWCMS: H14957 (a Gyrfalcon, dated 1856).

Newcastle Courant 13 July 1855 reported that a mature female Pectoral Sandpiper in Summer plumage had been shot on 27 June on Whitley Sands by Robert Duncan Jr, animal preserver, Newcastle upon Tyne.

Addresses:
Saint Andrew's Court, where Duncan traded, ran back from the east side of Pilgrim Street, opposite Hood Street. Not listed in directories after 1913.

6 St Andrew's Court	1844-1855
25 Pilgrim Street	1855
11 St Andrew's Court	1857-1888 and 1894
	(possibly, the same building had two street addresses)
43 Pilgrim Street	1889-1895
45 Pilgrim Street	1895-1913

Thomas Ellison
Was recorded in trade directories between 1827 and 1855, but his movements cannot be known precisely because the directories cover only a few isolated years over that period. Angas Court (also known as *Angus* Court) was demolished for the extension of Grainger Street between the Bigg Market and Westgate Road. His last address, Shakespeare Street, runs along the side of the Theatre Royal and was definitely an up-market move.

Ellison was listed as a Bird Preserver (rather than Animal Preserver) in *Parson's Directory* for 1834. On 4 October 1834 the *Newcastle Courant* reported that a White-tailed Eagle had been shot near Shields and was in the possession of Mr Ellison. In 1841 he prepared a Goshawk shot in Northumberland, subject of a note by T J Bold in *The Zoologist* in 1845 (**3:** 823).

Newcastle Courant 29 May 1830. "On Tuesday last, a fine specimen of the Golden Thrush, or the Golden Oriole, was shot on the estate of Cuthbert Ellison Esq. M.P., of Hebburn, near Newcastle, and is now deposited in the hands of Tho. Ellison, animal preserver, No. 3 Angas's Court, Newcastle, for Preserving". This bird was later in the possession of John Hancock and came to the Hancock Museum – it was listed by Howse (1899) in his list of birds in the Hancock collection.

Addresses:
(not recorded in the 1824 directory)

Court 24 Bigg Market	1827
3 Angas Court	1833-1839
7 Shakespeare Street	1844, 1855

G A Emory
Was listed in trade directories 1914-1916, at 43 Corporation Street.

T C Forster
Was listed in trade directories. He seems to have shared a premises (and a business?) with T.B. White at 15 Clayton Street (1913-1916); possibly successors to J. Harris, 1906-1910 at the same address.

T H Gibb
Was listed in trade directories in 1857 at 93 Clayton Street.

J Gibson
Was listed in trade directories in 1853 at Hanover Terrace.

Mrs H M Grant
Was listed in trade directories. Apparently a short-lived business, only recorded at 4 Blenheim Street in 1877, it seems to have taken over from W Hepple (who was recorded at the same address in 1875).

John Hancock
The best-known Newcastle taxidermist, he only rarely advertised as such in the directories. He is recorded as such at his home address of 4 St Mary's Terrace in 1855 and 1860.

The Hancock Museum has hundreds of examples of John Hancock's work. His collection was the basis of the Bird Gallery until the 1970s and then was used for the synoptic series of British birds around the balcony. Almost all of the specimens are now in storage.

There is one example of signed work by John Hancock in Tyne and Wear Museums collections: a Gyrfalcon (TWCMS : B3037) on a plaster base that is signed "J. Hancock 1857". However, a pair of Snowy Owls (TWCMS : H15820) may be further examples of Hancock's work: a letter (in Sunderland Museum curatorial files) from Hancock to Lord Ravensworth discusses two Snowy Owls mounted and placed on plaster rocks at a cost of six guineas.

J Harris
Was listed in trade directories 1906-1910, at 15 Clayton Street.

John Henderson
An item from the reports of the Police Courts in the *Newcastle Courant* for 6 June 1876 concerned a woman lodging with John Henderson, a bird preserver "residing at 75 Blenheim Street". This implies that Henderson lived at the address rather than carried out a business there: was he an employee of one of the taxidermy firms such as Duncan?

W Hepple
Is known from trade directories to have been active at four addresses in the Westgate Road area between 1866 and 1875.

Addresses:

29 Wellington Terrace	1866-1867
3 Westgate Hill	1869-1872
165 Westgate Road	1873
4 Blenheim Street	1875

W Hodge

Was listed in Trade Directories in 1873, at 15 Brunswick Place. The street where he traded is off the west side of Northumberland Street, the home of the Brunswick Chapel and (now) one side of Fenwick's department store. Another taxidermist, James R Ryott, had a business at 2 Brunswick Place in 1847.

John Jackson

John Jackson had probably the most prestigious address (on Grey Street) of any of Newcastle's professional Bird and Animal Preservers. He was trading at 26 High Bridge between 1888 and 1897 and later at Reid's Chambers, 53 Grey Street 1898-1906. The two addresses may have been the same building, and several businesses operated from the address. The building still stands, on the corner of High Bridge and Grey Street (south side of High Bridge, west side of Grey Street).

Of the 12 taxidermy practitioners listed in *Kelly's Directory* in 1894, only Jackson was listed as "Taxidermist" – the other 11 as "Bird and Animal Preservers".

Two birds (a Glaucous Gull, TWCMS: H15816 and a Woodcock, TWCMS: H15806) in Tyne and Wear Museums collections, formerly at Saltwell Towers, are labelled as being the work of John Jackson, his name being written in pencil on the inner face of the left side of the case.

George Midgeley

Was listed in *Kelly's Directory* for 1890, at 86 Darn Crook – yet another taxidermist in Darn Crook, alongside T Bates and Aaron Vineberg.

Alex Paul

Alex Paul was listed as a bird preserver – rather than an animal preserver – in Parson and White's directory for 1827 at Court 4, Newgate Street.

R Purdy

Was listed in trade directories in 1877 at 11 William Street.

Joseph Thomas Richards

Was listed once in *Kelly's Directory*, for 1894, at 139 Market (possibly one of the stalls in the Grainger Market?)

Joseph Robson
Was listed in *Kelly's Directories* (1890-1894) at 67 High Friar Street.

James R Ryott
James Russell Ryott is known as an artist (see entry in Marshall Hall's *The Artists of Northumbria*). Active as an artist from the 1820s onwards, he did animal, sporting, landscape and portrait paintings in oil and watercolour. He was the father of the artist William Ryott (1817-1883). He advertised only once as a taxidermist, in the trade directories 1847 at 2 Brunswick Place.

D Smith
Was listed in trade directories 1857-1869 at 10 Westgate Street.

R S Tuart
Was listed in trade directories in 1851 at Pandon Bank.

Joe Turner
Was listed in trade directories in 1902 at 11 Fuller Road.

Aaron Vineberg
Was listed in *Kelly's Directory* for 1894 at Darn Crook. This short street also housed Thomas Bates and Son's business, suggesting there might have been some link.

John Wardle
A fairly early taxidermist and one of the few with an "up-market" address: Brandling Place is in Brandling Village, Gosforth. I have seen no examples of his work.

Addresses:

Ravensworth Place	1833
Brandling Place	1837-1839

Edward Watson
Was listed in trade directories in 1847 at Friar's Green.

T B White
Was listed in trade directories in 1913 at 15 Clayton Street, so he might have been in a short-term partnership with TC Forster.

Peter Wilson
Was only listed once, in *Kelly's Directory* for 1894 at 50 Market (possibly one of the stalls in the Grainger Market?).

Richard R Wingate
Richard Wingate was often recorded in trade directories as a brush maker rather than a taxidermist. One directory has him as an Animal – rather than Bird – Preserver. His role in the early history of the Newcastle Museum and as an influence on the young John Hancock and Joshua Alder is well known. He did a lot of repair work on specimens in the Allan Museum, and re-mounted the famous Wombat before it was illustrated by Robert Bewick.

Addresses:

Westgate	1824-1834
2 Strawberry Place	1837-1839
9 Spring Gardens Terrace	1844-1855

North Shields

John Hogarth
Was listed in *Kelly's Directories* (1890-1894) at 194 Stephenson Street.

Nunwick

An entry in Marshall (2009) for "R T Thompson" of Nunwick is misleading. Richard Heywood Thompson (1850-1935) owned Nunwick Hall, which is in Great Salkeld, (Cumbria), and not in the village of Nunwick (Northumberland).

Rothbury

Thompson
Thompson of Rothbury is mentioned in a paper by F B Whitlock (1892) about interbreeding of Merlin and Kestrel. The alleged interbreeding was written up in manuscript by Mr Thompson of Rothbury, who must have died between writing a report in 1887 and Whitlock's visit in May 1892 when he was "the late" Mr Thompson. (Please note that Thompson of Rothbury is not to be confused with Thompson the innkeeper of Harbottle, whom Whitlock met in May 1892).

"I have since learnt that the two birds were given to an innkeeper at Alwinton, who in turn passed them on to Mr Thompson, who did a little bird-stuffing in his leisure time".

Seaton Deleval

William Richardson

William Richardson is mentioned in a paper by J M Charlton (1911). On page 131 he thanked "William Richardson (taxidermist), Seaton Deleval [sic], for much information regarding occurrences at Holywell and Deleval".

Whittingham

A. Hepburn

A chapter on PRACTICAL TAXIDERMY (pages 757–769) in S. Maunder, 1848, *The Treasury of Natural History*, was "kindly furnished by Mr. A. Hepburn of Whittingham, an enthusiast in the pursuit of Natural History". The chapter describes the preparation of a range of animals.

Whitley Bay

G Wright

G Wright is mentioned in a paper by JM Charlton (1911). On page 131 he thanked "Mr G Wright (taxidermist), Whitley Bay, for supplying me with information regarding several rare specimens which have passed through his hands".

Wooler

William Hall

The *Newcastle Weekly Courant* for 1 December 1888 reported that a Great Grey Shrike had been caught on 26 November in the garden of William Hall, "bird preserver at Wooler".

William Hall was listed in *Kelly's Directories* 1921-1929 at Ramsey's Lane, and in 1934 at Cheviot Street, but given the gap in years this could be two different people.

Barnard Castle

Robert Carter
Was listed in *Kelly's Directories* (1890-1902), at 40 Bank.

Bishop Auckland

John Gornall
Was listed in *Kelly's Directory* for 1890 at 36 Surtees Street.

Mr Smith
The *Northern Echo* for 10 June 1882 reported that "a fine specimen of the Sweet Martin Cat ... has been trapped at Hoppyland Park, the residence of Mr Blenkinsop, J.P., and is now in the possession of Mr Smith, bird preserver, Bishop Auckland. It is now about forty years since an animal of this kind was captured in this district". The note is interesting as a rare record of Pine Marten as much as for the record of this taxidermist. Hoppyland Hall is near Hamsterley.

Crook

W Rawe
In October 1927 Mrs Rawe gave Sunderland Museum a collection of mammals and birds set up by "the late William Rawe of Farrer's Arms, Bankfoot, Crook". Most of the specimens were sent to Ashburne House in 1927 and their fate from then is not known. However there are 74 birds still in the museum and catalogued as being prepared by William Rawe: all are exotic species, and were possibly deceased caged birds.

Darlington

J W Geldard
Was listed in *Kelly's Directories* (1902-1914), at 21 Archer Street. His Christian names were Jarvis Watson (Marshall 2009 where his surname is given as Gelard, after Merchant 2005).

George Noble
According to Marshall (2009), he was listed in Pigot and Co. *National Commercial Directory of Durham, Northumberland and Yorkshire* for 1834 at Skinnergate.

Robert Noble
Was listed in *Kelly's Directories* 1890-1902 at 33 Skinnergate.

East Blackdene

Thomas Coulthard
East Blackdene, a hamlet in upper Weardale, is an unlikely place to find a taxidermist. The *Northern Echo* for 5 November 1897 reported that a Barnacle Goose had been shot in Middlehope and was in the hands of "Mr Thomas Coulthard, animal and bird preserver, of East Black Dean".

Durham

Cullingford family
A pair of Great Bustards in Sunderland Museum (TWCMS : B1154 and B1155) are labelled as having been prepared by Cullingford of Durham. Since the birds date from 1893, they are probably the work of John Cullingford, preserver of birds and mammals at Durham University Museum.

A case containing three Snow Buntings also in Sunderland Museum has a suggestion written on the base that they may have been stuffed by "Cunningford" of Durham. The simple layout of birds in the case is typical of Cullingford's style.

Joseph Cullingford was listed in *Kelly's Directory* for 1902 at Palace Green (1890-1902).
Mrs Elizabeth Anne Cullingford was listed in *Kelly's Directories* at Palace Green, 1914-1921.

Charles Hy Palmer
Was listed in *Kelly's Directory* for 1890 at 75 Hallgarth Street.

William Proctor
Taxidermist to Durham University Museum

William Proctor was the only person in the north east to give his profession as Bird and Animal Preserver in the 1851 census. The address at that time was "Museum, 19 South Bailey".

Durham University's Museum was founded in 1833, the year after the founding of the University, and it was only the second university museum in England to be opened to the public. The first keeper, William Proctor, was appointed "to the charge of the Birds in the Museum" in 1834 at a stipend of £25. Proctor (1798-1877) was a carpenter's

apprentice who turned to natural history and specialised in taxidermy. His best-known exploit was a collecting trip to Iceland.

The Museum was first housed in the Fulling Mill, and then moved to South Bailey and later to Bishop Cosin's Almshouses on Palace Green under the guardianship of Proctor's successor, Joseph Cullingford.

A visitor in 1892 (Schonix, 1892) had "no hesitation in saying that their museum reflects no credit on the University of Durham" but also noted that there was a good collection of British birds that was nearly complete and included a number of rarities. However a chest on the floor of the museum contained dusty and unmounted birds.

By 1917 the University had decided to disperse much of the natural history collection to the departments.

Ferryhill

William Coates
Was listed in *Kelly's Directory* for 1902 at East End, Sedgefield, Ferryhill.

Hartlepool

Mr Mann
Mr Mann of Hartlepool who "flourished late 19th century" was listed by Marshall (2009), the listing being based on information in *The Enchanted Aviary List.*

Joseph Clementson and Son
Was listed in *Kelly's Directory* for 1902 at 50 Whitby Street and 10 Market Hall, West Hartlepool.

Jarrow

William Blaycock
William Blaycock of 25 Bladen Street was listed in *Kelly's Directories* 1914-1929.
He was also recorded as a taxidermist in Marshall (2009), based on information in Merchant (2005).

Thomas Malone
Was listed in *Kelly's Directory* 1921 at 53 Grange Road.

Ludworth

Bob Lofthouse
Bob Lofthouse was a miner and an amateur naturalist of Ludworth, a mining village near Durham City. He was active in the early-mid 20th century and was still remembered locally in the first decade of the 21st century. His collection of mounted birds and mammals passed to Durham County Council, then onwards to their School Loans department and was finally donated to Tyne and Wear Museums. Many of the specimens are of small, local species (including a lot of Passerines and a few birds of prey). They are almost all housed in boxes made for the School Loans department, but a small number of what may have been Lofthouse's original boxes remain.

Middleton-in-Teesdale

Nicholas Wearmouth
Nicholas Wearmouth (1826-1891) of Newbiggin (a small village two miles west of Middleton-in-Teesdale) was a village grocer and provision dealer and amateur naturalist, particularly active on the Yorkshire side of the Tees. In an obituary notice in *The Naturalist* in 1891, J Backhouse wrote: "For years, with untiring energy, Mr. Wearmouth (a self-taught taxidermist) collected and stuffed a vast number of birds, both British and Foreign, but chiefly the former, amongst which were many rare specimens from his beloved valley".

Ryton

Edward Heppel
Was listed in *Kelly's Directory* 1914 at 9 Thorpe Avenue.

South Shields

Robert Clark
A teal in a glass-fronted wooden case (TWCMS:E2869) South Shields Museum's collection has a label pasted inside stating "Preserved by Robert Clark South Shields 1842".

Wards Directory for South Shields for the period include two Robert Clarks: 1) A shipowner and proprietor of the Cumberland Arms Inn, living at 45 East Holborn (1847 and 1850 directories), and 2) A brazier (1850 directory). It is quite possible that neither of these two was the taxidermist.

George Green

"Wandering Willie" was a dog (a Border Collie) that famously lived on the ferry between North and South Shields for several years and whose preserved body is in the Turk's Head public house in Tynemouth.

A newspaper cutting about "Wandering Willie" (in South Shields Library) shortly after the dog's death in 1880 stated that the taxidermy "has been entrusted to Mr G. Green, of Morton Street, South Shields, a taxidermist of considerable ability".

No taxidermists called Green are known from local directories, and the 1880 directory for South Shields did not list a Mr Green in Morton Street. The 1881 census for South Shields listed Mr George Green (age 29), his wife Sarah (age 30) and four children, living at 12 Morton Street. George Green was born in Monmouth and Sarah in Hexham but the children were born in South Shields, indicating that they had lived in the town at least 4-5 years. George Green's occupation was given as House Joiner.

William Marshall

Was listed in *Kelly's Directory* for 1902 at 27 Long Row.

William Yellowly (1823-1893)

William Yellowly – sometimes written as Yellowley – of 5 East Catherine Street, South Shields was by profession a pharmacist, although he also advertised in Directories as an "animal and bird preserver". He obtained specimens, *among others* from Wombwell's, Mander's, Edmonds's and Bostock's travelling menageries. He seems to have retired young, since an obituary (at age 70) stated that he retired into private life "many years ago". He was Honorary Curator at the South Shields Museum, serving on the Museum's committee for 19 years and lending them his extensive collection of birds and mammals in addition to whatever unrecorded donations he made.

Yellowly's collection was bought by the shipping magnate Sir Walter Runciman, who presented it to South Shields Museum in 1921. The collections are now in the care of Tyne and Wear Museums.

Printed advertisements for his taxidermy work singled out notable specimens. A "splendid stuffed cape lioness ... in a recumbent position", dating from 1864, is probably TWCMS : A152 (which is currently on loan to the GNM: Hancock). Three other of his lions, of which he seems to have been particularly proud, survive: 1) "Wallace", who is one of the key historic exhibits of Sunderland Museum (TWCMS:H14703); 2) a male, in the style of Wallace (formerly of South Shields Museum), and 3) a prowling

female (TWCMS:H14702, formerly of Sunderland Museum). However another of his masterpieces, a Boa Constrictor in the act of destroying its prey, has not survived and there are no known photographs of it. His one surviving "masterpiece" example of bird taxidermy is a White-tailed Eagle with the wings outstretched.

Yellowly's standard pose for larger Carnivora was to mount them as if walking, with the head turned to one side. His work with Primates was more imaginative, using a variety of sitting and walking poses, with the limbs variously arranged. His largest mammal mount, a Tora Hartebeest (TWCMS: A149), was mounted in a seated position with the legs bent under the body. Yellowly also prepared a wide range of smaller mammals, and it may be worth noting that the mammal display at South Shields was at one time considerably more extensive than the one at the Hancock Museum.

It appears that William Yellowly's sons, William and Alexander, were also taxidermists. Alexander R Yellowley of 38 Vespasian Avenue was listed in *Kelly's Directory* (1921).

Spennymoor

T Alderton
Was listed in *Kelly's Directory* for 1890 at 14 Duncombe Street. According to Marshall (2009) he was listed by Merchant (2005).

T B Dunn
T B Dunn of Spennymoor was listed by Herriot (1968); a racing pigeon "Prince of Rome" by him is in Derby Museum.

Mrs Jane Hann
Was listed in *Kelly's Directory* for 1890 at Byer's Green, Spennymoor. She was possibly related to the Thomas Hann of Byer's Green listed by Marshall (2009).

Staindrop

George Harrison
A pair of Redpoll in Tyne and Wear Museums collection (TWCMS: B1186) is in a case with a trade label for George Harrison, Bird and Animal Preserver, Staindrop. According to Marshall (2009), he was listed in Slater's *Royal National Commercial Directory of the Northern Counties* for 1854-1855.

Stanhope

William Clark
According to Marshall (2009), William Clark of Stanhope was listed in Slater's *Royal National Commercial Directory of the Northern Counties* for 1854-1855.

Charles F Tinkler and his brother
Charles F Tinkler, of Front Street, Stanhope, was listed in *Kelly's Directories* 1890-1921.

J W Fawcett (1901) said that when dozens of Waxwings were shot in 1870 "the Tinkler brothers, the local taxidermists, preserved over 60 specimens for various persons".

Stockton

Thomas Green
According to Marshall (2009), Thomas Green of Huswife's Lane Stockton was listed in Slater's *Royal National Commercial Directory of the Northern Counties* for 1854-1855.

Thomas Campion Lambert
Was listed in *Kelly's Directory* for 1890 at 81 Queen Street East, South Stockton.

Robinson Walker
Robinson Walker of Stockton on Tees (of unknown dates) was listed by Marshall (2009), based on information provided by CJ Devlin.

Sunderland

In addition to those mentioned below, the 1883 directory lists six Bird Dealers, none of whom were bird/animal preservers: presumably they ran pet shops.

G Barnes
Is known from trade directories only.

Addresses:

51 Sans Street	1877
Borough Road	1880

John Egglestone
John Egglestone never seems to have advertised in the directories. However in 1910 he gave the profession "naturalist" against his name in the Names section, although he was not listed in the Trades and Professions section. In 1889 his address was 10 Salem Hill.

John Egglestone, who was employed as an attendant at Sunderland Museum, fell in the River Wear and his body was found on 31 December 1909 (see reports in the *Daily Echo* in the cuttings book in Sunderland City Library). In addition to his job in the Museum, he was a dealer in Natural History specimens. Although there is little known about his business he is known to have sold some mounted birds and mammals to Sunderland Museum: for instance, the Museum bought a juvenile Polar Bear (TWCMS: 2001.501) from Egglestone in February 1888 for £12. We do not know whether Egglestone did the taxidermy or if he was only acting as a dealer.

T Proud
Was listed in trade directories (1859) at 11 Broad Street, Monkwearmouth.

Mrs Ann Simpson
Some work is needed to clarify the relationships of the Simpsons who were recorded as Animal and Bird preservers: it cannot just be coincidence that Mrs Ann Simpson operated in 1880-1887 from the same address (28 Church Street) where Thomas Simpson operated in 1859. In 1890 her address was given as Burdon Lane.

In 1873 Mrs Simpson was not listed in the Trades section of the directory, but in the Names section her profession was given as Naturalist. In 1877 her profession was given as Bird Stuffer.

Thomas Simpson
(See Mrs Simpson, above). In 1869 Thomas Simpson was not listed among the Trades section of the directory, but in the Name section his profession was given as Animal Preserver. According to Marshall (2009), he was listed in Slater's *Royal National Commercial Directory of the Northern Counties* for 1854-1855 as living in Church Street.

Addresses:

Church Street	1854-1859 (number 28 Church Street, in 1859)
7 Hendon Road	1880-1883
5 Hendon Road	1887-1890

J Thomas
Was listed in trade directories (1880-1887) at 77 Trimdon Street.

Swalwell

Thomas Robson
(See Turner 2013).
This Thomas Robson (#1) is not to be confused with a second ornithologist of the same name (#2), author of *Birds of the Derwent Valley* (1896). A footnote in that book says that Thomas Robson #1 had a "self-made" collection of stuffed birds.

Thomas Robson #1 was born at Ryton on 22 March 1812. He was employed as a young clerk by Crowley, Millington and Co. of Swalwell. In 1862 he emigrated to Turkey but before doing so sold his collection. The larger birds were bought by Col. J A Cowen; others, including a Great Reed Warbler (a first British record), were bought by Mr Thomas Thompson and bequeathed to the Hancock Museum in 1904. Robson continued to collect specimens in Turkey until his return to England in December 1883. He died on 5 January 1884.

YORKSHIRE

Wycliffe

(Included here because of the historically important link between Marmaduke Tunstall and John Goundry)

John Goundry

We know of John Goundry through George Townshend Fox's *Synopsis of the Newcastle Museum* (1827) and Thomas Bewick's autobiographical *Memoir* (1862). John Goundry of Wycliffe did taxidermy work for Marmaduke Tunstall (1743-1790). Fox referred once, on page 244, to Old John Goundry, Mr Tunstall's "joiner and bird-stuffer", who was still living at Wycliffe in 1827. Goundry was a tenant on the Wycliffe estate, his house being shown on a plan of 1789 by John Bailey (in the Burton Constable archive) as being beside the church and river, with a garden of 20 perches.

John Goundry was certainly preparing specimens in 1790, when he stuffed a Stoat for William Salvin (letter from Tunstall to William Salvin, 24 May 1790). Goundry probably also prepared a male and female Scaup in December 1788, the first specimens of that species Marmaduke Tunstall had seen. The pair of Scaup survived in the museum at least until 1827 but was discarded before 1884. It is not possible to say with certainty that any of the mounts that do still survive are John Goundry's handiwork: Tunstall's museum was probably largely assembled prior to 1776 and lay in London until 1783, and it is unlikely that specimens would be sent from London to Wycliffe for stuffing.

ACKNOWLEDGEMENTS

I would like to thank Eric Morton and June Holmes, and the librarians of the City Libraries of Newcastle and Sunderland and of the Newcastle Literary and Philosophical Society, for the help they have given during the long preparation of this list.

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DIRECTORIES SEEN

In this list, titles are indicated by abbreviation and year: *A General Directory* is indicated by GD; *Parson and White's* by PW; *Kelly's* by K *Richardson's* by R; *Ward's* by W; *Whelan* by Wh; *Williams* by Wi; Directory *of the Towns of Newcastle and Gateshead* by DT.

Newcastle	GD1824, PW1827, DT1833, P1834, DT1837, R1838, R1839, Wi1844, GD1847, W1847, W1850, W1851, W1853, Wh1855, W1855, W1857, W1859, W1860, W1863, W1866, W1867, W1869, W1872, W1873, W1875, W1877, W1880, W1883, W1887, W1893, W1897, W1903, W1904, W1906, W1908, W1910, W1913, W1914, W1916
Sunderland	DT1833, P1834, DT1837, GD1847, W1847, W1850, W1853, W1857, W1859, W1869, W1873, W1877, W1880, W1887, W1889, W1893, W1897, W1903, W1910, W1913, W1916
South Shields	PW1827, P1834, GD1847, W1847, W1850, W1859, W1867, W1880, W1883, W1887, W1893, W1897, W1903, W1910, W1913, W1916
Durham City	PW1827, DT1833, P1834, DT1837, W1847, W1853
County Durham	K1890, K1894, K1902, K1914, K1921, K1929, K1934
Northumberland	K1890, K1894, K1902, K1921, K1929, K1934

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Name	***see under*** **town**
Tuart, RS	Newcastle
Turner, Joe	Newcastle
Vineberg, Aaron	Newcastle
Walker, Robinson	Stockton
Wardle, John	Newcastle
Watson, Edward	Newcastle
Wearmouth, Nicholas	Middleton-in-Teesdale
White, TB	Newcastle
Wilson, Peter	Newcastle
Wingate, Richard R	Newcastle
Wood, Francis & Louisa	Morpeth
Wright, G	Whitley Bay
Yellowly, William	South Shields

KATHLEEN BEVER BLACKBURN: A DISTINGUISHED BRITISH BOTANIST

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SUMMARY

Kathleen Blackburn was an academic botanist in Newcastle upon Tyne for nearly 40 years, being appointed as a lecturer in 1918. As well as her teaching, she made significant contributions to plant genetics and cytology and to pollen analysis. This article on her life and work is based principally on archival material held in the library of the Natural History Society of Northumbria.

INTRODUCTION

Kathleen Bever Blackburn (Figure 1) was a botanist on the academic staff of Durham University at Newcastle upon Tyne for nearly 40 years. In 1918 she was appointed to lecture in botany at Armstrong College, Durham University at Newcastle upon Tyne. She was made Reader in Cytology, King's College[1], Durham University at Newcastle upon Tyne in 1947, retiring in 1957. She was an important figure in botanical research in the United Kingdom, and internationally in the 20th century. Her principal contributions were in plant cytology and genetics, and pollen analysis.

Blackburn died in 1968, not all that long ago in archival terms but long enough for memories of her to fade significantly. Documents belonging to her and other material about her are held in the archives of the Natural History Society of Northumbria, of which she was a member. The intention of this article is to provide a review of her archive in order to bring her and her contributions back into view again.

METHODS

There are some two dozen file boxes of material about her in the archives of the Natural History Society of Northumbria housed in the Great North Museum: Hancock Library, Newcastle upon Tyne. This material and some from other sources were examined to build up a picture of her and her career. Her archive includes her published papers, but as is noted later, much of the other material is fragmentary, making it difficult to comment on factors which underlay her scientific contributions although the broad outlines of her career are usually visible. Some of the material, such as newspaper cuttings, is unattributed. University calendars, theses possibly written by her students and other references to or by her in the literature, were examined in order to augment material in the archives.

[1] King's College became University of Newcastle upon Tyne in 1963.

Figure 1. Kathleen Blackburn. This photograph was probably taken in 1926, when she was attending the International Botanical Congress at Ithaca, New York.

DISCUSSION

Kathleen Blackburn was born in 1892. She attended Bedford College, University of London, gaining a B.Sc. (1912) and M.Sc. (1914). She was a lecturer in botany at the Southlands Training College, Battersea, London from 1914-1916, and appointed lecturer in botany at Armstrong College, Newcastle upon Tyne in 1918. (Her own notes, written a few years before her death, say 1916; other sources say 1918.) A D.Sc. was awarded from the University of London in 1924. She was a Fellow of the Linnean Society by 1927. She was made Reader in Cytology, Kings College, Durham University at Newcastle upon Tyne, in 1947. A letter to her indicates that she was "Supervisor of Research" in the Department of Botany, Kings College in 1949[2]. She retired in 1957.

[2] Letter of 31 August 1949 from the Director, McCaulay Institute of Soil Research, addressing

Her first published work was an anatomical study of vascular tissue in seedlings, principally from the *Ranunculaceae* (Blackburn 1917). Then her cytological skills formed the basis of a study of chromosome complements of British roses (Blackburn and Heslop-Harrison 1921). The basic chromosome number (x) in *Rosa spp.* was determined to be seven. Different forms of roses were in fact polyploids arising by hybridisation. Examination of the chromosomes was a means of clarifying taxonomic relationships (Blackburn, 1925; Blackburn and Heslop-Harrison 1924). (When out collecting plants near Morpeth, Northumberland, she discovered a new species of rose, *R. berniciensis* (*Daily Express* 1929).)

Her work on roses made her reputation, both at home and abroad. Her attendance at the British Association meeting in Toronto in 1924 was noted in newspapers, for example *The Times* (1924): "... Blackburn ... adduced the genus Rosa ... [and] pointed out that the basal number of chromosomes in the nucleus of the cells of roses is seven ... there are other types with different combinations of the number seven ... hybridity was the cause of many of these forms ... investigation of the chromosomes might throw a new light on the relationships of the plants." A suffragette magazine, *The Women's Leader* (1924) said: "Botanical research is another field in which women will be represented ... Sir Frederick Keeble[3] paid a glowing tribute ... [Blackburn] had solved the well nigh insoluble riddle of cross-fertilization of the rose".

She had hopes of finding sex chromosomes (X and Y chromosomes) in *Salix* and *Populus*, and she did find possible male chromosomes in *Populus tremula* (Blackburn and Heslop-Harrison 1924). She then made a study of plants in the genus *Silene* (campions) and further enhanced her reputation when she established that female and male flowers of *Silene spp.* had X and Y sex chromosomes (Blackburn 1923, 1924). These differ in size and shape, and she was the first correctly to identify the Y chromosome as the larger of the two (in *Silene latifolia*). Prior to these discoveries by her and others it was not realised that any plants had sex chromosomes in the way that mammalian species do. Her papers on sex chromosomes in plants are still cited by current researchers (for example Kejnovsky and Vyskot 2010). In fact, X and Y sex chromosomes are quite rare in plants, occurring only in a minority of dioecious species (in which the male and female flowers are borne on separate individuals,) a point appreciated by her (Blackburn 1929a). (The genera *Salix, Populus, Silene* all include dioecious species.)

In later papers (Blackburn 1927a, 1927b, 1933), she commented on the utility of chromosome numbers in understanding relationships among species in *Silene* and related genera. The basic chromosome number in *Silene* is 12. Polyploidy occurs only in two species: in one of these, *Silene ciliata*, a race has a haploid count of 96, is 16-ploid, yet this is not reflected in morphological differences between this race and those with smaller numbers of chromosomes. Without the study of chromosome complements, the existence of a genetically different race would not have been realised.

[3] Sherardian Professor Botany, University of Oxford.

For this and other work, Blackburn was awarded the fifth Trail Award by The Linnean Society of London (1930). The Trail Award was established "to encourage study that throws light on the substance known as Protoplasm for the physical basis of life". The citation includes "you may justly claim to have given the first definite proof of the existence of sex chromosomes in flowering plants, when in *Lychnis alba* (*S. latifolia*) you showed an XY pair of chromosomes in the male and a corresponding XX pair in the female" and "More recently you have investigated chromosome numbers in *Silene* and neighbouring genera. In this laborious work more than eighty species were studied".

In 1934, some of her work caught the eye of the *Eastern Daily Express*, *Glasgow Herald*, *The Times*, *The Daily Telegraph* and the *North Mail and Newcastle Daily Chronicle*, perhaps because it entailed cricket. Growers of cricket bat willows had suffered substantial financial loss as half the trees resulting from setts planted 10-15 years earlier proved useless for making bats. The newspapers appear to have picked up a hope expressed in the *10th Annual Report of the Imperial Forestry Institute* that a study of chromosome number and morphology in willow trees would form the basis of a test able to select for setts giving usable wood on maturity. Blackburn was named as Queen Willow (*North Mail and Newcastle Daily Chronicle* 1934). The work was done in collaboration with a PhD student (Wilkinson 1934). Unfortunately, further work showed that in *Salix alba var caerulea*, the cricket bat willow, chromosome number and morphology were too complex and too difficult to observe to form the basis of a practical test (Wilkinson 1939).

In 1942 she was one of the co-authors with Heslop-Harrison of a paper (Heslop-Harrison *et al.* 1942) concerning whether or not the chromosome number of *Rosa spp* could be correlated with the vitamin content, presumably of the hips. (Alternative sources of vitamin C were of interest during the war.)

These various discoveries were made through her skills as a cytologist (an expert in the structure and function of plant and animal cells). Her principal tools would have been the microscope, the microtome and an array of procedures to prepare specimens for staining and sectioning prior to placing them on microscope slides. At the time, images of chromosomes were seen and reported as not much more than dark blobs; it is a testament to her skills as a microscopist that she, and others, managed to infer any conclusions about chromosome structure and behaviour at all.

For chromosomal examination, Blackburn and her students appear to have generally used traditional stains such as haemotoxylin and Gentian Violet followed by embedding the specimens in wax prior to sectioning for study under the microscope. With regard to the use of chromosome number and morphology to elucidate taxonomic relationships, doubts about the ultimate usefulness of this approach had been expressed at least as early as 1930 (Leadbetter 2004) although Blackburn and her students continued to use it into the 1950s.

An advance in techniques for examining chromosomes that she and her students adopted, at least by 1939 (Wilkinson 1939), was the use of aceto-carmine to stain chromosomes in squashes of plant tissue. Aceto-carmine as a chromosomal stain was originally used by the American botanist (and Nobel prize-winner) Barbara McClintock. The technique was introduced to Britain in 1935 by another cytologist, Irene Manton (Leadbetter 2004). Manton was a graduate of the University of Cambridge, who was advised by Blackburn to spend some time as a postgraduate student in Stockholm. Manton later became head of the Botany Department at Leeds University and had a stellar career as a botanist and electron microscopist. The two remained in contact professionally, and were also personal friends.

The continued use of classical cytological techniques is a reflection of the fact that the cytochemical and biochemical techniques of molecular biology, which give very detailed insights into the structure and function of chromosomes, only became generally available after Blackburn retired. She was undoubtedly aware of electron microscopy, and appears to have had access to it, but did not turn to it in the way that Manton did at Leeds; none of her publications entail electron microscopy.

Blackburn's cytological skills, apart from matters to do with chromosomes, were used in an investigation of the alga *Botrycoccus braunii* (Blackburn 1935-1936). This green alga is single celled but also colony forming; cells reside in cup-shaped spaces in a common matrix, and contain oil droplets. Fossilised remains of these colonies have been found in peats originating from the infilling of ponds (see for example Raistrick and Blackburn 1932a) and in "bog-head" coals formed from lake bottom sediments - boghead coals are a type of oil-shale coal and thus of considerable economic significance. (The occurrence of *B. braunii* in "bogheads" is further discussed in Temperley 1935-1936.) Blackburn's archive contains two letters suggesting she was consulted by oil geologists with regard to botanical aspects of oil prospecting; one, dated 1938, from the Anglo-Iranian Oil Company (a precursor of BP) indicates that she received a sample of "proto-boghead" from Meninge, South Australia, and another dated 1939 from the Geological Survey Office refers to her "botanical evidence" that had been used in interpreting samples from boreholes for oil at Formby, southwest Lancashire. (*B. braunii* and other algae were not thought to be a major source of oil at Formby (Cope and Blackburn 1939).)

By the 1930s Blackburn had become adept at pollen analysis, especially of grains found in peat. The ability to identify pollen grains by light microscopy as belonging to a particular plant species, genus, or family enables conclusions to be drawn, for example about the distribution of plant in previous ages, climatic changes, the origin of soils, the age of fossils and human artefacts. The technique was developed in Scandinavia and began to be publicised outside Scandinavia in the 1920s (Erdtmann 1921). Blackburn learnt how to analyse pollen from a pioneer in Sweden, Lennart von Post (Lunn 1983), and was, perhaps, encouraged to take up the technique by her head of department, J W Heslop-Harrison (Lunn 2004b). She has been credited with introducing pollen analysis

to Britain (Lunn 2004a), although Swedish and British scientists used pollen analysis to study vegetational history in Britain well before she published papers entailing pollen analysis (Marshall 2005; West 2014a).

In 1929, a geologist who became a leading palynologist, Arthur Raistrick, was appointed to the Geology Department at Armstrong College (Marshall 2005). Blackburn collaborated with Raistrick on a study of glaciation and vegetation history in the North Pennines, looking for evidence to support the nunatak theory[4]. Pollen in peat was extracted via a peat corer, cores being taken at sites ranging from shorelines to hill top. The results of the study were published in a series of papers (Blackburn 1931a; Raistrick 1931; Raistrick and Blackburn 1932a); although nunataks with vegetation on them undoubtedly existed during the ice ages, the pollen analyses (and other considerations of plant distribution) suggested it was not necessary to postulate nunataks as the sole determinants of the present flora. Other work on vegetation history in Northumberland derived by pollen analysis is discussed in Raistrick and Blackburn (1931a) and Blackburn (1953).

Her facility with pollen analysis meant that from the 1930s she became as well known for this work as for her skills as a plant cytologist. The technique was also avidly taken up by others in Britain (see for example, Godwin 1934a, 1934b; Raistrick 1932; West, 2014a, 2014b). Somewhat surprisingly, of the theses held in the Newcastle University library possibly written by students under her guidance, only one (Pearson 1954) entails analysis of pollen (from peat).

Other examples of her work using pollen analysis include:

- An analysis of two Lake District peats (Raistrick and Blackburn 1932b). They hoped that analysis of these samples would stimulate a wider study of Lake District peats, which in turn would augment a wider concurrent study of the peats of northern England.

- An account of the history of vegetation of the Linton Mires (originally a lake trapped by glacial moraines), Wharfedale, Yorkshire, to support a geological history of the area (Blackburn 1938-1950).

- Pollen extracted from peat collected on the island of Barra during the Hebridean expeditions was used to build up a picture of post-glacial vegetation (Blackburn 1946).

- The species giving rise to 140 tree pollen grains from a minute sample of peat on a nut of *Trapa natans* (water chestnut) washed up on the south-east shore of South Uist were identified (Heslop-Harrison, J W and Blackburn 1946). This

[4] The nunatak theory entails the escape of some species from the last ice age through growing in ice-free areas, thus affecting plant distribution once the ice sheets disappeared. Heslop-Harrison was a noted proponent of this theory, for example Pearman *et al.* 2008.

information was used to support the nunatak theory. The apparent occurrence of *Trapa natans* in such a northerly location has become one of the questions surrounding some of the work of J W Heslop-Harrison (Sabbagh 1999, 2016).

- In 1944 she was a member of the North Tyne Regional Survey Committee, apparently set up within King's College in the Department of Agriculture under the auspices of the Forestry Commission, to study geology, biology and land use in view of the rapid afforestation being carried out by the Forestry Commission north of the Tyne. What is now Kielder Forest was of particular interest. Her contribution was to comment on soils and peat bogs, pollen analysis forming a major basis for this. Kielder was a remote location in those days; members of the committee faced transport difficulties getting to and moving in the area. A letter from the Forestry Commission informed her that when she made a visit to the area (in 1944) there was every possibility that she would have access to a bicycle. Petrol was still an issue for committee members in 1948 (petrol rationing did not end until May 1950).

She also appears to have been a member of the "Newcastle Party" which in turn was part of "University Forestry Research" which looked at soils and plant cover over Northumberland as a whole - again she carried out pollen analysis in peat bogs.

She is noted (Clark 1983) as contributing to the recognition of Sites of Special Scientific Interest (SSSI), although her archive doesn't contain any material specifically labelled as relating to SSSI's.

In 1954 the Botanical Society of the British Isles set up the Distribution Maps Scheme to record the distribution of vascular plants in the British Isles. Blackburn's involvement with this scheme continued after her retirement, although possibly only briefly as there is no material on the scheme in her archive dated later than 1960.

Blackburn's skills at reconstructing past vegetation using both pollen analysis and examination of larger fragments of plants were valued by archaeologists, particularly those working along Hadrian's Wall and elsewhere in the north east. Apart from work on an elk skeleton at Neasham (below), her archive contains just two other references to archaeology. One is correspondence with the leader of a dig (Aileen Fox in 1951/1952) at Kestor Rock, Dartmoor, about pollen analyses of peat taken from early Iron Age huts. Her contribution is noted in Fox (1954). The other is notes and drafts of an apparently unpublished article on snails and diatoms found in a deposit (exposed in 1955) from the Roman baths at Bath. In contrast, the archaeological literature contains many more references to assistance she gave in interpreting archaeological specimens:

- In 1939 an elk skeleton was found at Neasham near Darlington in a brick pit belonging to the Neasham Brick and Tile Co., County Durham. Examination of the pollen grains in the clay and peat surrounding the bones suggested, in

conjunction with other evidence, an age of some 10,000 to 12,000 years (late Glacial to early post-Glacial) for the skeleton (Blackburn 1952).

- She identified the source of charcoal (hazel) found with pine cones (*Pinus pinea*) at the temple of Mithras at Carrawburgh (Blackburn 1951) and in a supposed cremation pit at a site near Penrith (Bersu 1940).

- Pollen from positions in long and round cairns at Bellshield Law, Redesdale was analysed, although the results showing pollen typical of the area threw no great light on the function of the cairns (Newbigin 1936).

- Archaeologists came to a better understanding of structure and function at forts along Hadrian's Wall through:

    1. her identification of wood in a well at Vindolanda (Blackburn 1933). Along with the oak, ash, birch, alder, sycamore, hazel, alder, cherry, willow, ivy, yew and pine was the root and base of a stalk of cabbage which she considered bore a resemblance to modern cabbages. This last has intrigued modern archaeologists (Hall and Huntley 2007).

    2. analysis of pollen from a vallum ditch at Benwell, Newcastle upon Tyne (Blackburn 1941).

    3. identification of weed seeds (Blackburn 1929b) and recognition that blocks of peat in the vallum ditch (which appears to have been filled in soon after it was made) at Birdoswald had not formed in situ (Richmond 1931).

    4. comments on the origin (pond bottom) of a slime sample from a turret wall (Garthshide Turret) (Simpson *et al.* 1934).

    5. her identification of snails from the rampart of a native settlement of the Roman period on the Whin Sill near Barrasford, Northumberland (Blackburn 1942).

Blackburn was clearly an active, independent woman committed to her profession. She rode a motorcycle in the early days of motoring (Clark 1983) and later drove her own car - these activities apparently being sufficiently unusual to be remarked upon by the press at the time (*Yorkshire Post* 1932). She went on botanical expeditions to isolated islands in the Hebrides - again, noted in the press (*The Daily Mail* 1937). She appears to have never married. She seems to have lived in the family home in Jesmond, Newcastle upon Tyne, at least in later years, with her sister, Dorothy Blackburn. Her father (E P Blackburn) was a prominent minister in the Methodist Church, ending his career at Jesmond after a number of ministries round the country. His daughters were active members of the congregation. (E P Blackburn was also a noted naturalist and amateur conchologist (Dunn 1983).

Apart from her published work (a list of her papers is given in the appendix below) her archive is fragmentary in regard to her professional life. Material is present from all stages of her career, but what is perhaps surprising is the almost complete absence of lecture and class notes despite the fact that she lectured for nearly 40 years and had a reputation as a conscientious teacher (Valentine 1970).

She had a number of graduate students throughout her career (Valentine 1970). A search of the Newcastle University library catalogue for Masters' and PhD theses revealed 21 that could have been written by her students (see appendix). Two proved to be missing but of the 19 theses examined in only two was there direct acknowledgement of her as supervisor, although her help was acknowledged in others. Fifteen theses, dating from 1928 to 1958, were on attempts to use chromosome number and morphology to elucidate taxonomic relationships.

In general, there is little material relating to these theses in her archive. An exception to this is a substantial correspondence involving one of her PhD students, F Hussein, and other botanists around the country about *Cardamine pratensis*, the Cuckoo Flower. *C. pratensis*, a native of Britain, favours wet places and poses taxonomic difficulties being extremely variable in leaf shape. It was of interest to cytologists, no doubt because a study of its chromosomes held out the possibility of resolving its taxonomy. Its chromosome number had been studied by botanists (including Irene Manton) prior to Hussein, who went on to establish that there are two chromosome races with 2n=30 and 56. Plants with the lower number tend to be confined to the south of England (Howard 1951; Hussein 1948, 1955).

Along with the paucity of teaching material is the absence of any sort of coherent, organised set of laboratory notebooks, records of data and the like (although we need to bear in mind that for both laboratory notebooks and lecture notes "absence of evidence may not be evidence of absence"). There are some notebooks with field data but these are of variable sizes and often not fully used nor part of any obvious sequence. Laboratory data, for example pollen counts and plant lists (from field trips with, for example, the Wallis Club), are often recorded on scraps of paper which were originally used for something else: old examination scripts, used envelopes, religious timetables, laundry dockets. Perhaps she was very frugal by nature or frugality had been forced upon her by war and economic depression. Perhaps she carried her research work in her head and the scraps of paper were only intended to be *aides memoire* rather than systematic, permanent records available for others to peruse.

The lack of a well organised, annotated system of records may not have been uncommon among academics of the period. They were after all very autonomous compared with researchers in a modern academic environment (even if collaborating with others or contributing to committees) and had no automatic expectation that their records might be questioned by others or be required to support research assessment exercises, impact ratings, patent applications *etc*. Data were collected to answer scientific questions and

then usually presented after analysis in academic publications, committee reports and the like. These were what appeared in public and helped determine the authors' reputations.

Some of Blackburn's own lecture notes from 1910, taken when she was a student at Bedford College, University of London, are in her archive. In contrast to the fragments of her professional notes, these are neat and ordered in bound notebooks. Some practical botany notebooks contain very good drawings of plants, their quality suggesting that some unsigned water colours of flowers in her archive are also her work.

She supported the activity of naturalists outside the University through her memberships of organisations such as the Northern Naturalists' Union, The University of Durham Philosophical Society, the Natural History Society of Northumberland, Durham and Newcastle upon Tyne and the Wallis Club (a field club for naturalists). She was secretary of the Northern Naturalists' Union in the 1940s and 1950s, and its vice-president in 1936. She was president of the Biological and Geological Section of the University of Durham Philosophical Society in 1927. The Wallis Club (1922-1939) had a series of annual dinners, and her archives contain menus of this event from 1927, 1930, 1935 and 1936 and are an insight into what was presumably considered fine dining at the time, for example Tournedos of beef (1927), Halibut au Gratin (1930), Varie Potage de Fausse Tortue (1935), and more prosaically, Roast Chicken (1936). There is an invitation to attend a Social Evening on 17 October 1929 to mark the centenary of the Natural History Society of Northumberland, Durham and Newcastle upon Tyne; the entry ticket has not been detached from the invitation so appears to be unused. She was a member of the Armstrong College Staff Dramatic Society and played (date not given) Lady Bountiful in Farquhar's *The Beaux' Stratagem* and one of "Two Elderly Women" in *King Lear's Wife* by Gordon Bottomley in November 1931 (the other play on the programme was *The Frogs* by Aristophanes). She gave talks outside the university, for example at Sunderland and Hexham (Blackburn 1926; 1931b) and wrote popular articles on botanical topics (see for example Blackburn 1927c, 1932, 1940).

As noted in newspapers of the day, she took part in expeditions to study the flora of islands in the Inner and Outer Hebrides (1934-1938). These were led by her head of department, J W Heslop-Harrison (Heslop-Harrison 1938). On the surveys on the island of Rhum, Blackburn was responsible for collections of the *Violaceae* and she published records of bryophytes collected from the Isles Parish of Invernesshire and the island of Soay (Blackburn and Lobley 1939). Her archive contains pollen counts (frequency of observations of pollen from various species found in peat cores) collected from Rhum in 1938. The counts are recorded on unbound pieces of paper recycled from various sources (including church timetables dated 1929); some formal pollen diagrams (illustrating quantitatively the occurrence of pollen from various species and plant families at various depths of the soil cores) are among the initial pollen counts. She does not appear to have published the results of these analyses except in the case of Barra, where profiles were published as representative of those in the Outer Hebrides (Blackburn 1946).

It is worth bearing in mind that facilities on the islands were basic or non-existent. "Leisure" and "outdoor" clothing as we know them today were not available - photographs indicate that expedition members wore their usual everyday clothing - nor was camping equipment as sophisticated and light as it is today. An unattributed newspaper cutting points out that on the expedition to Rhum and other islands of the Hebrides members of the expedition would endure all manner of hardships including staying in deserted huts, camping under canvas and washing their own dishes. (On Rhum at least, the leader of the expedition stayed in the comfort of Kinloch Castle.) In an issue of *The Daily Mail* (1937) noting that five women were included in an expedition to Soay Island, Blackburn is quoted as saying that "We are certainly prepared to rough it. We shall carry all our provisions and equipment with us, and do our own cooking, but I hope we shall have a roof over our heads at night". It would be intriguing to know what the professional and personal relationships among members of the expeditions were and to what extent it was taken for granted that the women took on logistical as well as botanical roles.

She took part in academic conferences of course, including some held overseas. The archive contains material relating to the British Association meeting in Toronto in 1924 (as noted above) and other Association meetings within the United Kingdom. She attended the Fourth International Botanical Congress, Ithaca, New York in 1926 (Figure 2), and meetings of the International Congress of Plant Sciences in the USA and the International Genetics Congress in Berlin (other details of these meetings are not recorded). She is included in a list of participants in the commemoration of the 70th birthday of Professor Kenjiro Fujii (there is a signed photograph of the professor), a Japanese cytologist, in 1937-38, although it is not clear whether she travelled to Japan for this event.

Figure 2. Attendees at the Fourth International Botanical Congress, Ithaca, New York, 1926. Blackburn is second from left, in the front row.

An interesting insight into her character - perhaps a reflection of both religious and scientific ideals - is given by the assistance she gave to at least two, possibly three, German prisoners of war to carry out pollen analyses while they were incarcerated in the north of England at Featherstone Castle, near Haltwistle (Lunn 1983). At least one of these went on to publish his work on blanket peat in the north Pennines (Precht 1953). The opportunity to do the work was arranged through the YMCA. The camp at Featherstone Castle was graded "white", the prisoners living under a relatively liberal regime.

Her last academic publication appears to have been in 1957 (Blackburn and Morton 1957) and she retired in the same year (Valentine 1970). Her retirement was marked by an attractive bound testimonial illustrated with botanical drawings, especially of chromosomes, and containing signatures of colleagues and students. She was also presented with a card containing the signatures of 50 current and former female colleagues.

In her later life she suffered significant ill health (Valentine 1970). This affected her professionally before retirement (Thomas 1968). She was admitted to Preston Hospital (now demolished), Tynemouth, in 1961, seemingly remaining there until her death in August, 1968 (Thomas 1968).

CONCLUSION

There is a poignancy about Blackburn's archive. One tends to think of archives as concerning people from the distant past, but she is a person now just out of reach, and who had a career under circumstances markedly different from those that someone with her abilities could expect today. A young academic today with a reputation similar to hers in the 1920s, and even more so after her work with pollen analysis and with ample evidence of her impact outside the university, might have her own research group, be successful at raising research funds and have a high rating in research assessment exercises. She might also have job offers from other universities wanting to improve their research quality ratings, and be not far from a professorship.

The Botany Department at Newcastle was a small one. In 1920 there were three academic staff including Blackburn. When J W Heslop-Harrison was appointed as head of department in 1927 there appear to have been seven academic staff. (There were fewer in the interwar years.) There were nine by her retirement in 1957. In 1947, one year after Heslop-Harrison's retirement, 29 years after her appointment to the academic staff, and more than 20 years after the discoveries for which she first became internationally known, Blackburn was made a Reader, the most senior rank below Professor - in her day, a department would usually have only one "professor", the head of department.. It is difficult not to wonder about power structures in the department (as well as on the expeditions to the Hebrides)[5].

There is no verified photograph of her in her archive. There is a photograph of her as a young woman in Lunn (1983b), later ones in the Smithonsian Institution Archives, Washington, DC, and in the Hunt Institute for Botanical Documentation, Carnegie Mellon University Pittsburgh. Photographs in her archive and in the literature (for example, reports on the Hebridean expeditions) show a bespectacled but unidentified woman who is probably her. Her photograph in the Smithsonian Institute has the caption "Blackburn was a distinguished British botanist who discovered that 'plants as well as animals have in their cells bits of living matter known as the sex chromosomes' ". We can add her contributions to palynology and archaeology.

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[5] Blackburn was a contemporary of J W Heslop-Harrison throughout his career and indeed was the next most senior member of the Botany Department after his appointment as Head in 1927. What she thought or knew of his behaviour during the period of the allegations described in Sabbagh (1999, 2016) we may never know.

University of Aberdeen); and Keith Elliot for drawing my attention to work Blackburn had done on archaeological finds. If it were not for Mr. Elliot's prodigious knowledge of references to her archaeological work I would not have realised its extent. I would also like to thank the staff in the Stores and Special Collection Room of the Robinson Library, Newcastle University, for their help with University calendars and theses. Permission was obtained from The Linnean Society of London to quote from the text of the Trail Award in 1930, and from the Hunt Institute for Botanical Documentation, Carnegie Mellon University, Pittsburgh, to reproduce the photographs of Blackburn.

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A list of published works by Kathleen Blackburn and student theses on her work is available on the Natural History Society of Northumbria website www.nhsn.ncl.uk

MOLLUSCS, MEDALS, AND MONSTERS: LETTERS BETWEEN ALBANY HANCOCK AND THOMAS HENRY HUXLEY

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SUMMARY

Albany Hancock first wrote to Thomas Henry Huxley ("Darwin's bulldog") in April 1852, asking for information from a paper published by a Swiss biologist, Albert von Kölliker, in German – a language that Huxley could read but Hancock could not. This letter started a correspondence that lasted for more than 20 years; the final letter was from Huxley to Hancock in July 1873, just three months before Hancock died. The main subjects of their correspondence were: the comparative anatomy of molluscs and other invertebrates; the Royal Medal, awarded to Hancock for his anatomical studies; and fossil vertebrates, including extinct crocodile-like reptiles ("monsters"). The two men only met once, when Huxley came to Newcastle in 1865 to see vertebrate fossils that Hancock and his friend Richard Howse had in their possession. Curiously, although the Hancock-Huxley correspondence straddled the launching of Darwin's evolutionary theory in *The Origin of Species*, published in 1859, neither Hancock nor Huxley mentioned Darwin, evolution, or natural selection in any of their letters to each other.

INTRODUCTION

The extensive correspondence between Albany Hancock and Thomas Henry Huxley included discussion of three main issues. The first, starting in 1852, was their differing interpretations of various aspects of molluscan anatomy. The second, starting in 1854, involved the structure of brachiopods (lamp-shells), Hancock's major paper on these animals, which Huxley helped him to publish in the *Philosophical Transactions of the Royal Society*, and the Royal Medal of that society, which Hancock was awarded in 1858. The third, starting in 1865, involved fossil vertebrates. In this paper, I deal separately with these three issues. However, before we look at the issues and the relevant letters, we should examine some brief background information on their authors.

Albany Hancock (1806 to 1873; Figure 1) trained as a solicitor but the law did not suit him, and very quickly after qualifying he gravitated to a focus on his main passion – natural history, and zoology in particular (Embleton 1877). Although self-taught in this area, he became one of the leading figures in Britain, and indeed the world, in the area of comparative invertebrate anatomy. While he is usually described as a specialist in molluscs, the animals that were in his day thought to be molluscs belonged to at least three different animal phyla – the Brachiopoda (lamp-shells) and Chordata (subphylum Tunicata) as well as the Mollusca of today. His expertise with these animals came through detailed dissections of many specimens spread through several taxa. All this work was carried out personally, rather than via a research group, as is the norm in biology today. He was also a skilled artist, and illustrated many of his articles copiously.

Figure 1. A photographic portrait of Albany Hancock c.1860 by Robert Benson Bowman. The original is in the collection of the Natural History Society of Northumbria, ref.NEWHM:1996.H54

Figure 2. A *carte de visite* of Thomas Henry Huxley, c.1860. The original is in the Brady photographic collection, Newcastle City Library. Reproduced with the permission of Newcastle upon Tyne City Libraries and Information Service.

Thomas Henry Huxley (1825 to 1895; Figure 2) is best known for his role as Darwin's bulldog – the man who championed Darwin's theory in the public domain, a domain which Darwin's health and disposition did not permit him to enter personally (Desmond 1997). Most famously, Huxley did battle with Bishop 'Soapy Sam' Wilberforce in the 1860 Oxford evolution debate. But in addition Huxley was a skilled biologist – and comparative anatomist in particular – in his own right. Like Hancock, he personally performed many dissections of molluscs and other animals. His early work on jellyfish, conducted while on a voyage of discovery on *HMS Rattlesnake*, was rewarded with his receipt of the Royal Medal from the Royal Society in 1852 – the same medal that he helped Hancock to get in 1858 (see above).

When the correspondence between Hancock and Huxley began, Hancock was 45 years old and Huxley 26. Yet it is clear from the nature of Hancock's initial approach to Huxley that he was consulting an equal or senior in scientific terms, not a junior. Huxley was already well known at that stage, Hancock much less so. Hancock's opening letter (15 April 1852) begins thus: "I take the liberty of writing to you prompted by the suggestion of Mr Woodward from whom I learn that you have kindly expressed your willingness to assist me to some information extracted from Kölliker's paper on the development of Sepia." In relation to this particular request, Huxley had read Kölliker's paper in its original German, and had prepared a translation of it, which he shared with Hancock.

Huxley's reply was equally courteous; and the correspondence continued in the same vein right through its 21 years, even when the two men disagreed strongly about some point of anatomical interpretation, which they often did. Here is Huxley (in his letter of 7 July 1852) comparing his exchange with Hancock to his exchange with another (un-

named) correspondent: "I have just been getting such a blowing up from a man to whom I was obliged to suggest certain differences of opinion that I am quite refreshed by looking over the tone of your letters – I trust our correspondence may not end with our small controversy." And indeed it did not end with this controversy – on interpretations of molluscan anatomy – but continued through other controversies (and agreements) for many years.

SOURCES

For readers who would like to consult the full correspondence, this is now available in transcribed form on the archives section of the website of the Natural History Society of Northumbria, http://www.nhsn.ncl.ac.uk/resources/archive/ The locations of the original letters are as specified below.

Letters from Hancock to Huxley are in the Archive of Imperial College London. All letters in this collection are coded in the following form: HP 17.000 AIC, where: HP stands for Huxley Papers; 17 refers to volume (all letters from Hancock are in volume 17); 000 refers to the sheet number on which the letter starts (these range from 250 to 330); and AIC stands for Archives of Imperial College

Letters from Huxley to Hancock are in the Archive of the Natural History Society of Northumbria, in the Hancock Museum, Newcastle upon Tyne. All letters in this collection are coded in the following form: NEWHM: 2017.H64.00, where: NEWHM stands for Newcastle Hancock Museum; 2017 is the year of transcription; H64 is an identifier for the letters from Huxley to Hancock within transcription year 2017; and 00 refers to letter number (these range from 1 to 40).

It is clear that some letters are missing, but these probably constitute only a small fraction of the total correspondence. Almost all the letters that survive are complete. However, there are a few exceptions. These are noted in the transcriptions of the letters concerned. A few letters contain diagrams; one of these is shown here as an example (Figure 3).

COMPARATIVE INVERTEBRATE ANATOMY

The Mollusca is the second-largest phylum in the animal kingdom, with about 100,000 extant species being recognized today, making it twice as large as our own phylum, the Chordata (Brusca and Brusca 2003). Although it is now clear to biologists which animals belong in the phylum Mollusca and which do not, the situation was much more fluid in the 19th century. Large groups of molluscan and quasi-molluscan species were recognized then, for example: Gastropoda (snails and slugs), Bivalvia (clams, cockles, mussels and their kin), Cephalopoda (nautilus, cuttlefish, squid and octopus), Brachiopoda (lamp shells) and Tunicata (sea squirts). But how these were related in the form of an evolutionary tree was uncertain. Indeed, even *whether* they were related was uncertain until the advent and acceptance of Darwinism. Today we recognize the first three of the above five groups as molluscs. We regard the brachiopods as being

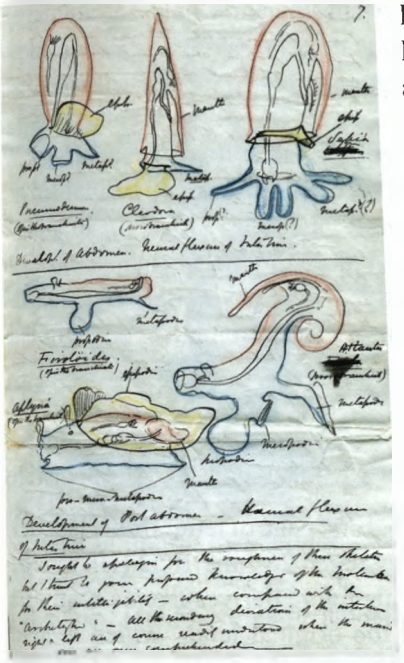

Figure 3. Drawings of various molluscan forms by Huxley in the document that he sent to Hancock along with his letter of 4 May 1852 (NEWHM: 2017.H64.2). The animals shown at top left and top centre are gastropods; top right is a cuttlefish (cephalopod); the animals at the bottom are various types of gastropods. The purpose of these drawings is to contrast two different types of flexure of the intestine in the 'cephalous molluscs' (i.e. Gastropoda + Cephalopoda).

a separate phylum outside the Mollusca; and the tunicates we recognize as being very far outside – indeed much more closely related to the vertebrates than to the molluscs.

In order to understand the issues that Hancock and Huxley were discussing in their correspondence, we have to appreciate that it started seven years before Darwin's (1859) publication of *The Origin of Species*. The early correspondence was thus pre-natural selection and also pre-widespread belief in evolution. And yet the main issue was the *relationship* among the animals concerned. This was at the time thought of as 'the pattern of natural classification' (*sensu* Panchen 1992); and work done in this area took the form of establishing which structures in one animal corresponded with (were 'homologous to') which structures in another. The term *homology* derives from Richard Owen's book *Lectures on Invertebrate Anatomy* (Owen 1843; see also Owen 1848).

Today, the most-used example of homology of structures is that between the bones of the human arm (humerus, radius, ulna) and their counterparts in other mammals, such as mice, bats or tigers. But Hancock and Huxley were working on molluscs, not mammals. And they were primarily focused on which structures in cephalopods are homologous to which structures in gastropods. They initially took very different views on this issue, in both cases based on their own personal dissections of specimens. However, their views began to converge in June 1852. On the 7th of that month Huxley opened a long letter as follows (Figure 4): "I trust that your eyes will be in good condition when you receive this for I feel moved to write you a screed of no ordinary dimensions, and I know by experience what it is to have to read any amount of my calligraphy". Huxley then launches into very detailed information on nerve ganglia in both groups, and, importantly, criticizes Richard Owen's work on this subject: "The same buccal ganglia are as you justly observe always below the oesophagus – at the re-entering angle between the oesophagus & the buccal mass, where the latter is well developed; - and such is their place in Argonauta – Octopus & Sepia. Prof Owen has I believe simply missed them in Nautilus".

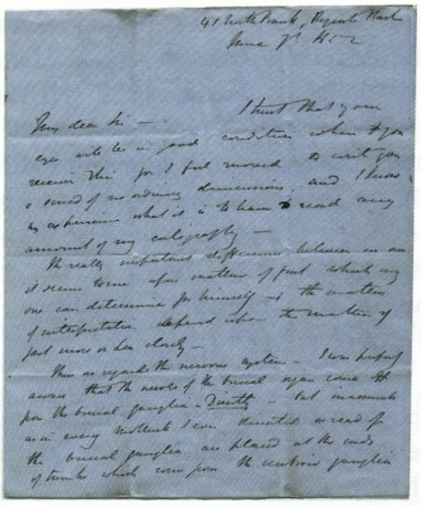

Figure 4. First page of letter from Huxley to Hancock dated 7 June 1852 (NEWHM.2017.H64.4). This figure derives from a scan of the original letter, which is held in loose-leaf form in the Archives of the Natural History Society of Northumbria.

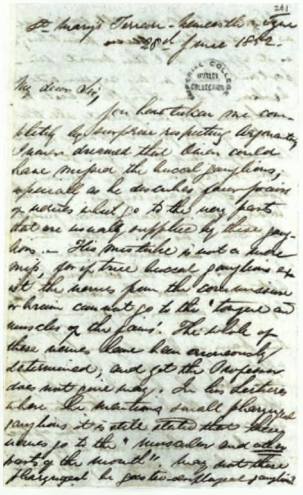

Figure 5. First page of letter from Hancock to Huxley dated 28 June 1852 (HP 17.261 AIC). This figure derives from a scan of a copy of the original letter, which is held in bound form in the Archives of Imperial College London – hence the missing left-hand edge, though none of the words are rendered illegible by this binding effect.

At this time – in 1852 – Owen held an unassailable position in British comparative anatomy, and most biologists simply deferred to his expertise (Cadbury 2001). But Huxley did not. And his pointing out of Owen's fallibility to Hancock had a big effect. Hancock had clearly been putting much trust in Owen's work, and had been basing his interpretation of his own dissections on Owen's description of the cephalopod nervous system. Hancock's amazement at Huxley's revelation about Owen is apparent in his reply to Huxley (28 June 1852; Figure 5):

"You have taken me completely by surprise respecting Nautilus (Argonauta); I never dreamed that Owen could have missed the buccal ganglions especially as he describes four pairs of nerves that go to the very parts that are usually supplied by these ganglions. His mistake is not a mere slip, for if true buccal ganglions exist the nerves from the commissure or brain cannot go to 'the tongue and muscles of the jaws'. The whole of these nerves have been erroneously determined. And yet the Professor does not give way. In his lectures where he mentions small pharyngeal ganglions it is still stated that these nerves go to the "muscular and other parts of the mouth". May not these pharyngeal be gastric-oesophageal ganglions? I have lost however all confidence in this dissection of Nautilus; and as it appears that this most important link in my argument is broken I have thought it best to withdraw, for the present, all that portion of my paper relating to the homologies and to confine it to a mere description of the nervous system of Ommastrephes."

Regarding the taxa under discussion, both *Nautilus* and the squid *Ommastrephes* are cephalopods, so the expectation is that the broad structure of the nervous system, and in particular the system of nerve ganglia, should be the same.

When Hancock finally sent a copy of his paper on *Ommastrephes* to Huxley, he said (in his letter of 15 August 1852): "I have much pleasure in sending for your acceptance a copy of my paper on the nervous system of Ommastrephes; and am glad to find that it meets with your approbation. Should it assist in determining the homologies of the Mollusca, and in any way prove the accuracy of your views on the subject I shall feel that my labour has not been in vain."

Although Hancock changed his view on exactly which nerve ganglia in cephalopods are homologous to which ones in gastropods, this can be regarded as a shift in the particulars of his view rather than a more general shift. Right at the start of his correspondence with Huxley (15 April 1852), he had already "arrived at the conclusion that the Cephalopoda are true Mollusks formed more immediately on the gasteropodous type".

Likewise, Huxley already held this view in 1852, and had done since several years earlier. In the document accompanying his letter to Hancock dated 4 May 1852, he states: "I have endeavoured to show that all Cephalous Mollusks from the Cephalopod to the nudibranch – are organized upon one typical form and arise in consequence of modifications of that form according to definite laws." This view is then stated in his paper 'On the morphology of the cephalous Mollusca' (Huxley 1853). (Note that this term refers to the Cephalopoda *and* the Gastropoda; it is to be contrasted with the term Acephala (headless) which was in the 19th century used to refer to the Bivalvia.)

So, at the outset, Hancock and Huxley were agreed that it was possible to find specific structures in cephalopods that were homologous to specific structures in gastropods; it was 'only' the details of that specificity that they initially disagreed on. However, if the details were at issue then the whole business of homologizing was risky, so in fact the details were crucial.

We turn now to the broader issue of whether brachiopods, tunicates (ascidians), and even bryozoans (moss animals) should be considered to be molluscs. Hancock concluded a detailed comparative anatomical study with the following remark (14 September 1856): "Thus it would seem that the spaces between the walls of the viscera and the sheath can exactly distinguish the Brachiopoda as well as the Ascidia and Bryozoa from other molluscs by the respiratory organ being in connection with the alimentary system; and when we look at the whole anatomy of these animals it would seem desirable to place them in a group apart from the rest of the Mollusca." This is now routinely done; though we also put brachiopods, tunicates and bryozoans in different phyla *from each other*.

Huxley, in his letter of 18 May 1857, makes specific reference to the difference between the bivalve molluscs (also called Lamellibranchia) and the brachiopods (lamp shells),

the latter also having a two-valved structure: "I have been in the habit of pointing out the difference between the Lamellib & Brachiopod shell – though both are bivalves – based on the especial direction of the hinge with relation to the axes of the body in both". Our current understanding that these two groups belong in separate phyla is partly based upon this observation. Any modern text on the invertebrates, such as that by Brusca and Brusca (2003), informs its readers that the two valves of a bivalve mollusc are left and right, whereas the two valves of a brachiopod are dorsal and ventral.

In conclusion, both Hancock and Huxley took the views that: (1) cephalopods are true molluscs; but (2) brachiopods (and tunicates and bryozoans) are not. At the time, these views were contested; now they are both known to be correct. The certainty that now prevails about these issues is, of course, based partly on molecular phylogeny, an approach that did not become available until the late 20th century.

AWARD OF THE ROYAL MEDAL TO ALBANY HANCOCK

The Royal Society, founded in 1660, awards several different medals. Of these, the Royal Medal has been awarded annually (up to three medals per year) since 1826. It is awarded for "the most important contributions to the advancement of natural knowledge". Recipients in the 19th century included (in chronological order), Charles Lyell, Michael Faraday, Richard Owen, Thomas Henry Huxley, Charles Darwin, Joseph Dalton Hooker, Albany Hancock, Alfred Russel Wallace, and Ray Lankester. More recent recipients include, Francis Crick (the structure of DNA), John Gurdon (the first cloned animal), Tim Berners-Lee (the World Wide Web), and Alec Jefferies (the technique of DNA fingerprinting). For the full list of recipients, see https://en.wikipedia.org/wiki/Royal_Medal

The first hint at a possible Royal Medal award for Hancock in the Hancock-Huxley correspondence comes in a letter from Huxley written on 14 July 1856: "Is the Brachiopoda paper for the Royal? Let me beg that it may be – I have more reasons than one for making the sequel". The word 'sequel' is used because Hancock had already published his major paper on the sea-slug *Doris* (co-authored with Dennis Embleton; Hancock & Embleton 1852) in the *Philosophical Transactions of the Royal Society* a few years earlier. Whether Hancock understood what Huxley was hinting at here is unclear – his later expression of surprise (see below) suggests not.

Hancock's reply to Huxley's suggestion is, as might be expected, positive. He writes (in a letter of 19 July 1856): "I should have much pleasure in sending my paper to the Royal Society; but I had not thought of doing so, as you informed me some time ago, that communications of a more general character were looked upon with greater approbation. I could have no objection, however, if you think a memoir on the anatomy of the Brachiopods would be acceptable."

In his reply (a letter of which the first page is lost but was probably written between 16 and 20 July 1856), Huxley makes a suggestion as to how to title a paper so as to draw

attention to its general importance: "Will you permit me to make a suggestion about papers for the Transactions? It is this – that it is very advisable to have their scope as *general* as possible. Papers on special points – e.g. the anatomical details of a single genus or single family are not well looked upon unless their anatomy be considered in a general point of view – and it is always advisable to let the titles of the papers express their generality of treatment – Thus if I were going to send a paper about the points we have been discussing I would not call it 'On the anatomy of Rhynchonella psittacea' but on 'The general structure of the Brachiopoda as illustrated by...' or something of that kind – and I would make the contents answer to the title". Hancock took this advice; when the paper came out (Hancock 1858) it was entitled "On the organization of the Brachiopoda".

Hancock submitted his manuscript to Huxley on 18 April 1857. In his letter of that date he says: "I forward to your address by this day's post my much delayed paper on the Brachiopods. It is a long story, and I am afraid will weary the members of the Royal Society, who may be so unfortunate as to be present at the meeting. It is full of details; but I hope only such as are necessary to the elucidation of the subject; and I think that you will find it satisfactory." On 8 May, Huxley writes to Hancock, saying: "I am more & more pleased with your memoir & I find only 3 points on which I should have a criticism or two to offer". He tells Hancock that he will read the paper to the Royal Society the following Thursday (14 May 1857).

On 18 May 1857, Huxley informs Hancock: "The abstract of your memoir was read on Thursday evening. Owen was present but he had not the generosity or good feeling to make a single remark either in acknowledgement of his own mistakes – or of the high value of your researches – But I expected nothing else from him".

Hancock did not send the final version of the full manuscript to Huxley until May 1858. Huxley thanked him for it as soon as he received it (17 May 1858). Then, later that year (5 November 1858), Huxley wrote to Hancock again; here is the main text of the letter: "I believe I am committing a very irregular act as no one has any business to know what takes place at the Council Meetings of the Royal Society except the members of the Council but as I *do* know – I really cannot refrain from offering you my very hearty congratulations on the award of the Royal Medal – an honour you have so well earned – I may explain now the reason why I urged you so strongly to complete your memoir last year was because the point was then under discussion – but it was thought better to wait until your beautiful memoir on the Brachiopoda was before the Society. I trust we shall at any rate meet this year".

Hancock replies on 7 November 1858 in a characteristically modest way: "Accept my best thanks for your kind letter and congratulations, which have however not a little alarmed me. – I in no way calculated on such an honor as you announce; and indeed do not feel conscious of meriting it. It is nevertheless very gratifying to learn that the little I have done in the furtherance of knowledge has been deemed worthy of so high a mark of approbation."

There follows a series of letters about the desirability of Hancock coming to London to receive the medal in person, as is the normal procedure. However, Hancock keeps expressing reluctance, and gives his final word on the subject in a letter of 18 November 1858: "I am greatly obliged to you for your letter of the 10th Inst: and however glad I should have been to follow your advice I find that my coming to London at this moment is quite impracticable. I must therefore give up all notion of personally receiving the medal, and can only hope that my absence will not be attributed to any want of respect to the Royal Society nor to indifference to the high honor done me by that distinguished body. And now may I ask of you a favour to add to the many I have already experienced at your hands. Will you be so kind as to receive the medal for me?"

Huxley does as Hancock asks; he collects the medals on his behalf. Then he posts them to Hancock. But before he does so he writes (15 December 1858): "I have but just this to say that I packed up your medals yesterday as lightly & safely as possible intending to send them by post – But as I find they weigh lb 1 & ¾ and will consequently cost you between five & six shillings in postage registration I thought I had better inform you of this fact before sending them". There are no more (surviving) letters in either direction until 1860, by which time the subject of the Royal Medal is in the past and the correspondence begins to move in other directions, one of which, eventually (in 1865) is fossil vertebrates.

FOSSIL FISH AND REPTILES

Huxley writes to Hancock (an undated letter of either November or early December 1865) that he has heard of Richard Howse's fossil discoveries from the Permian geological period, and indicates that he would like to personally inspect the fossils concerned. He makes a request of Hancock as follows: "I am alarmed at the thought of making any proposition to Mr Howse himself – lest he regard it as an insidious attempt at a scientific raid – So I appeal to you to be intercessor & bail, for me with Mr Howse – I am coming to Bradford to give a lecture in Christmas week – and I am greatly inclined to extend my travel to Newcastle – if Mr Howse will let me look at his specimen – But I do not want to make the request, if he is not as well assured as you would be under like circumstances, that I by no means want to meddle with the work which he is so excellently competent to do". Hancock's reply comes on 15 December: "Your letter came to hand just as I was finishing a drawing of the new Permian Reptile, to illustrate a paper which Mr Howse and I are preparing, and which we had determined to send to you for advice, and to be laid before the Geological Society if you thought proper, and this notwithstanding the disjunction of the "North and South". – It was therefore with much pleasure that I learn that there is a prospect of your visiting Newcastle during Christmas week. – And I can assure you that both Mr Howse and myself will have the greatest pleasure in laying whatever we have before you, whether Reptilian or Piscine or of what nature soever the things may be that interest you."

On 20 December 1865, Hancock writes again firming up the details of Huxley's visit: "I am very much pleased to learn that you have determined to visit Newcastle on the 30th Inst. – We shall be ready to receive you at 10 a.m. or as soon after as convenient. – In the meantime we are availing ourselves of the skilful manipulation of our friend Mr Atthey to have the specimens fully displayed before you arrive." Huxley's visit to Newcastle in December 1865 appears to be the only time that Hancock and Huxley met.

After their meeting, Hancock and Huxley continued their discussion of fossil vertebrates – both fish and reptiles – by letter. As with their earlier correspondence on molluscs, the focus of attention was the detailed anatomy of the animals concerned, and its interpretation. The last (surviving) letter on the subject is from Hancock to Huxley on 24 June 1870. In it, he thanks Huxley for helping with a paper by Hancock and Howse on the fossil fish *Dorypterus*. The final letter of the correspondence is more about illness than fossils. Huxley writes on 2 July 1873 (probably in reply to a letter from Hancock that has been lost): "I am grieved to hear that you are such a sufferer from dyspepsia. It is another point of sympathy between us as it knocked me up at the beginning of last year & makes my life a burden to me at times – the only comfort is that it does not kill – This is the fourth or fifth bad attack I have had since I was a boy & after a term of greater or less suffering I always come out on the other side & get hale & hearty again – The only thing is that the process of "coming out" is slower at 47 than at 17 – Pray remember me very kindly to your brother". Albany Hancock died on 24 October 1873, three months after he received this letter.

DISCUSSION

Here, I focus on the comparative invertebrate anatomy theme which, as the relative lengths of the foregoing three sections indicate, was the lion's share of the correspondence between Hancock and Huxley, in terms of both 'scientific meat' and number of handwritten pages. So, we need to consider further the important issue of 'the pattern of natural classification'.

A long time before Darwin, those who studied the animal and plant kingdoms thought of the structure of these kingdoms as being hierarchical, and consisting of 'groups within groups'. This idea can be traced back to ancient Greece, with Aristotle devising such a scheme for animals. In the 18th century, the Swede Carl Linnaeus (1707-1778) gave us the basis for our modern classification of both animals and plants, with his binomial system of genus-species, such as our own familiar descriptor *Homo sapiens*. Species are nested within genera, genera within families, and so on all the way up to the major groups called phyla (such as Mollusca and Brachiopoda) being nested within a kingdom (Animalia).

Something that goes along with a pattern of groups-within-groups (or nested groups, which is another term for the same thing), is a pattern of nested homologies. For

example, humans share homologous mammary glands with their fellow mammals – this feature is one of the defining characteristics of the class Mammalia, which includes over 5000 species. But the homology of limb bones noted earlier (humerus, radius, ulna) characterizes not *just* the mammals but a wider group – the tetrapods or land vertebrates – that also includes amphibians, reptiles and birds (more than 20,000 species overall). The spinal column is an even broader homology, characterizing the sub-phylum Vertebrata (over 50,000 species). And the less-known notochord, which is only an embryonic structure in mammals, is a homology characterizing the whole of our phylum Chordata, including sea-squirts (which have a larval notochord) and lancelets (which have an adult one) as well as vertebrates.

The pattern of nested homologies in the Mollusca is less easy to identify than its vertebrate counterpart, which is why much of molluscan phylogeny is still contested today – especially in terms of the pattern of groups within groups within the largest molluscan class, the gastropods (snails and slugs; about 80,000 species of them). But even in the 19th century, the main subgroups of molluscs were recognizable in terms of the homologies that were present within them but not between them. For example, the cephalopods all have multiple tentacles, whereas other groups of molluscs do not. And within the cephalopods, there is a smaller nested group, the octopods, where the norm is eight tentacles rather than ten (squid and cuttlefish) or more (nautiloids and the extinct ammonites). So, Hancock and Huxley had no problem recognizing these groups. Rather, the problem was how to interpret any one such group – such as cephalopods – in terms of its relations with others – such as gastropods.

We should now transcend such details and ask the big question: what does (and did) a pattern of natural classification mean? Today it is readily interpreted in terms of a pattern produced by evolution, or "descent with modification" as Darwin called it; and more specifically in terms of an evolutionary process driven by natural selection. But how was natural classification interpreted before 1859? For a detailed discussion of this issue, see Panchen (1992); but here is a brief summary.

There are at least two answers to the question. The first, applicable to a creationist world-view, was 'a pattern in the mind of God'. The second, applicable to those biologists who believed in evolution before Darwin provided us with a mechanism for it, was essentially the same as our interpretation today, but minus the 'natural selection'. Which camp Hancock and Huxley belonged to is a matter of debate. Probably, both believed in evolution when their correspondence started in 1852, despite being initially ignorant of its driving force. Whether or not this is true, the fact that neither Hancock nor Huxley once referred to Charles Darwin, to descent with modification, or to natural selection, given that their correspondence continued for fourteen years after publication of *The Origin*, is rather strange. This is perhaps a topic for historians of science to get to grips with in the future.

ACKNOWLEDGEMENTS

I would like to express my thanks to Ian Bower, June Holmes and Leslie Jessop for their help in accessing materials in the Archives and Library of the Natural History Society of Northumbria. I have imposed on their time rather often over the two and a half years that deciphering this correspondence has taken, and they have always dealt with my queries courteously, promptly and effectively; I could not have undertaken this project without them. I also owe them and Chris Redfern thanks for their helpful comments on the manuscript. As a member of the Natural History Society of Northumbria, I would like to express my gratitude to the Heritage Lottery Fund for their support of work on the Society's archives. Finally, I would like to thank Anne Barrett, archivist at Imperial College London, for access to the letters from Hancock to Huxley, which are in the AIC collection.

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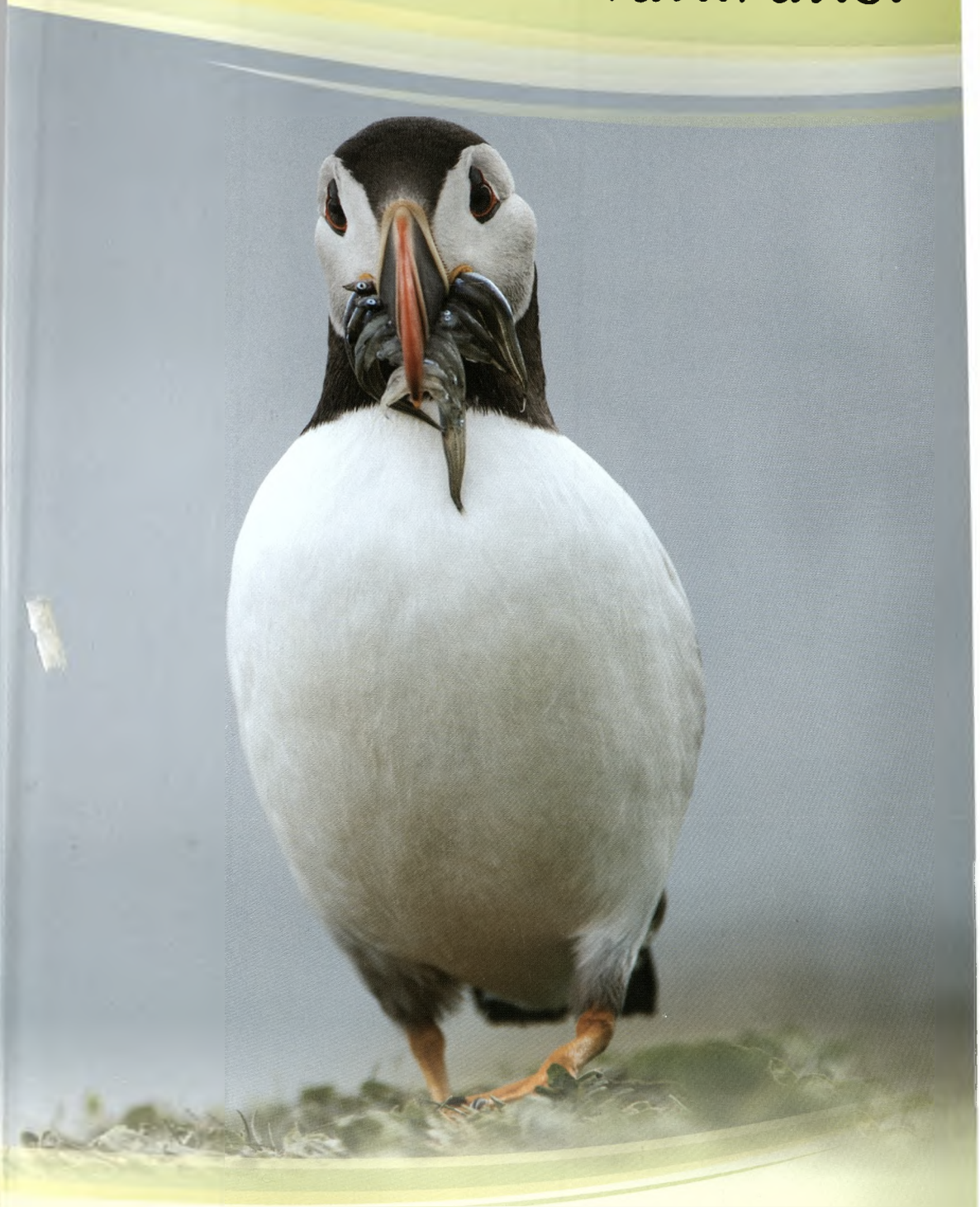

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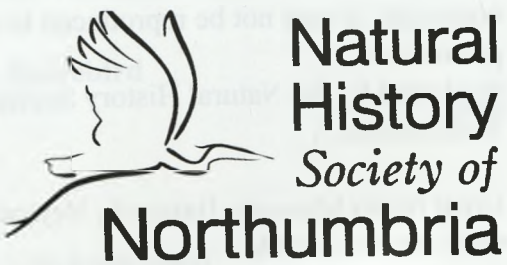

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Natural History Society of Northumbria

EDITORIAL

Arctic Tern by Tom Hendry

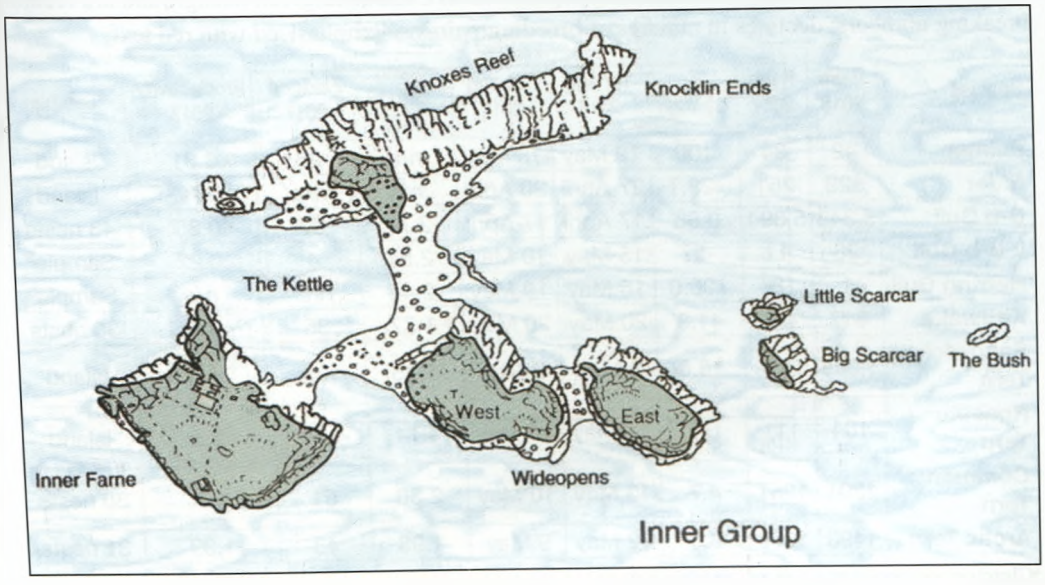
We chose sandeels for our cover image this year, and Puffin was a natural choice as a wrapper. These small fish are vital for the seabird colonies on which Northumberland Coastal Wildlife 2017 is focused. Northumberland sandeels, a major component of the diet of many seabird species in the region, may be a discrete population dependent on spawning and dispersal from offshore waters. Dispersal of sandeel larvae is likely to vary with seasonal patterns of North Sea water circulation affected by wind direction and other climatic factors. Such broad statements are underpinned by very little hard evidence, however, and given the importance of our seabird colonies, studies to understand what determines sandeel abundance in this region of the North Sea are well overdue. Seabirds themselves may be good tools for monitoring sandeel abundance and observations of diet composition and the frequency of sandeel delivery to seabird chicks may help to explain annual variations in seabird breeding success.

Monitoring the numbers and breeding success of seabirds, an important part of conservation, and protecting them against human disturbance, excessive predation and tidal inundation, requires major inputs of time and resource. At our mainland seabird colonies, there is a constant pressure from recreational use of the coastal habitats during the breeding season. Diverting visitors away from sensitive areas is a top priority, but also gives opportunities for conversations about conservation. With visitors numbering around 50,000 each year, the Farne Islands offer unique opportunities for public engagement and education and this is an important part of the National Trust's work. The Farne Islands are indeed a unique and special place, and there can be few, if any, other places in the world where it is possible to experience a range of seabird species breeding a few feet away.

Our region has a rich resource of wildlife under the expert care of a wide range of organisations. This edition of Northumberland Coastal Wildlife 2017 brings together the work of staff and volunteers from RSPB, National Trust and Natural England. We hope that the sharing of knowledge in this way will inspire the protection of biological diversity for future generations.

Chris Redfern

Maps of the Farne Islands



COQUET ISLAND: BIRDS AND MANAGEMENT FOR WILDLIFE

Wesley Davies[1], Paul Morrison[1] and Chris Redfern[2]

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INTRODUCTION

Coquet Island is a Special Protection Area (SPA) and is now encompassed by the larger Northumberland Marine SPA. Consultation on this designation concluded on 21 April 2017 and offers protection for the foraging grounds of the reserve's seabird assemblage. The site remains a Site of Special Scientific Interest (SSSI) designated for its internationally important populations of breeding seabirds. The reserve is managed by the RSPB to benefit four tern species, Puffins *Fratercula arctica*, Eiders *Somateria mollissima*, Kittiwakes *Rissa tridactyla*, Fulmars *Fulmarus glacialis* and recently a few pairs of Mediterranean Gulls *Ichthyaetus melanocephalus*. The island is home to the sole breeding colony of Roseate Tern *Sterna dougalli* in the UK. Roseate Tern is listed on Annex I of the Birds Directive and Schedule 1 of the Wildlife and Countryside Act 1981. Appropriate management of Coquet is therefore critical to conservation of this species in the UK. Although there is no public access onto the island, boat trips run from Amble by a local boat company allow all species to be seen and enjoyed from a safe distance offshore. Close, live views of the Roseate Terns can be viewed in the breeding season remotely on the internet (www.rspb.org.uk/coquetlive).

Table 1: Seabird breeding statistics for Coquet Island. Cells with green background are record-breaking numbers; declines in number of breeding pairs are emphasised with red text.

Species	Pairs 2016	Pairs 2017	% Change	1st egg 2016	1st egg 2017	Mean clutch 2017	Fledged 2017	Productivity 2017	Sample
Fulmar	42	84	100	19 May	18 May	n/a	26	0.31	Island
Eider	329	251	-23.7	27 April	20 April	n/a	n/a	n/a	Island
B-h Gull	5,348	5,394	0.86	17 April	17 April	2.77	37	0.86	43 nests
L B-b Gull	26	11	-57	15 May	10 May	2.57	4	0.22	Sample[a]
Herring Gull	1	8	700.0	15 May	10 May	2.45	n/a	n/a	Sample[b]
Kittiwake	317	448	41.3	20 May	20 May	1.77	36	1.2	30 nests
Sandwich Tern	1,349	1573	16.6	8 May	2 May	1.35	n/a	n/a	Island
Roseate Tern	104	111	6.7	17 May	16 May	1.71	166	1.5	Island
Common Tern	1201	1257	4.7	13 May	10 May	2.30	51	1.7	30 nests
Arctic Tern	1490	1579	6.0	12 May	9 May	1.98	43	1.39	31 nests

[a]Clutch size from island census, productivity from 18 study nests.
[b]Clutch size from island census, only one study nest monitored for productivity and this was unsuccessful.

2017 BREEDING SEASON SUMMARY

The season started with a rodent incursion: a single male Brown Rat *Rattus norvegicus* was discovered in early January. Several removal techniques were implemented before the rat was finally dispatched prior to the return of Puffins at the start of the breeding season.

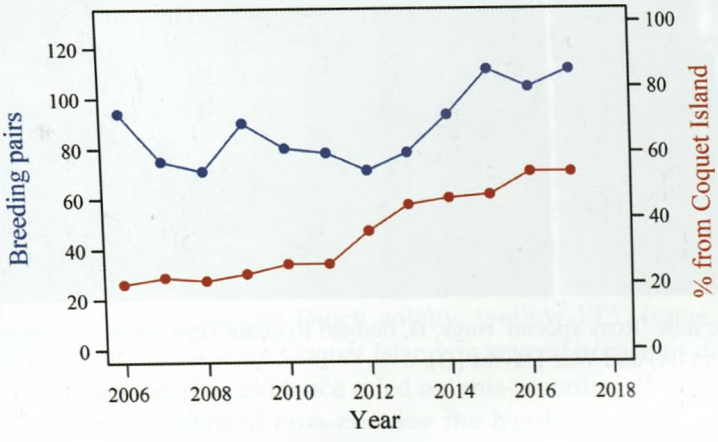
The breeding season on the island this year went well for almost all species. A dry spring and early summer and good food supply led to two productivity records being broken as well as several population records. However the Eider population fell dramatically, falling below the SSSI threshold. The Lesser Black-backed Gulls *Larus fuscus* also struggled, increasing slightly in population but fledging few chicks (Table 1).

Roseate Tern *Sterna dougalli*

At the start of the season the terraces were resurfaced with fresh shingle collected from the island foreshore to restrict parasite life cycles and reduce vegetation growth. The nest boxes were reinstated in their allocated locations and new boxes added to provide additional nesting spaces.

The Roseate Tern population increased by 6.7% from 2016 and equalled the peak population (2015) of 111 pairs (Figure 1). Dry weather and plentiful fish led to low chick mortality and the colony achieved the highest productivity on record at 1.5 chicks fledged per pair. A record-breaking 166 Roseate Tern chicks fledged from the island in 2017. Ten pairs nested outside boxes, in crevasses and between boxes; this number is double the average and may have been a result of the warm weather conditions this year.

Roseate Terns on Coquet Island:
breeding pairs and origins



However, 2017 was not a problem-free year for Roseate Terns, as five adults were discovered dead on the terrace or in boxes. One individual discovered in a box with an egg may have been involved in a territorial dispute, as a pair using the box continued to fledge a chick successfully. Post-mortem examinations proved negative for common infectious disease, and the root cause of the deaths was inconclusive.

A new type of Roseate Tern special ring was introduced this year. These new rings have an alphabetic character code: two letters above two letters. Because the new rings also have the BTO web address included, one new 'Rosy special' ring now does the job of the two rings (BTO and old 'Rosy special') that previously had to be fitted to each bird. This effectively halves the disturbance time spent in the colony. Coquet Island birds are being ringed on the left leg (Figure 2) while birds on the large Rockabill colony in the Irish Sea are being ringed on the right leg, making initial colony distinction easy. All chicks were ringed on Coquet Island this year. Over 220 adult rings were read in the field, and of these the proportion that were fledged from Coquet Island remained unchanged from 2016, with slightly more adults hailing from Coquet Island (54% to 46%).

Figure 1. The number of Roseate Tern pairs breeding on Coquet Island from 2006 to 2017 (blue line and symbols) and the percentage of those of known origin, determined from the 'Rosy special' ring numbers read through a telescope, that had fledged from Coquet Island in previous years (red lines and symbols).

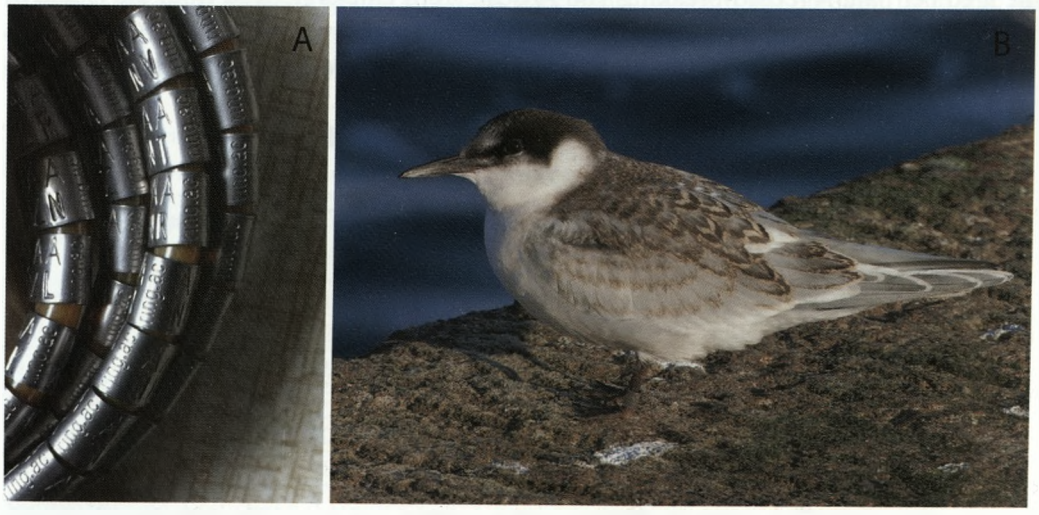


Figure 2. A, the new 'Rosy special' rings; B, fledged Roseate Tern chick with ring. Photographs by Paul Morrison (A) and Wez Davies (B).

Although the proportion appears to be changing towards a Coquet-raised majority (Figure 1), a detailed analysis (in press) shows that the island is a 'sink' for Roseate Terns from Rockabill. This indicates that the Coquet colony is not sustainable without immigration of new breeding birds from elsewhere. However, the underlying trend of an increasing proportion of Coquet-raised breeding birds may be the start of a move towards sustainability, and is supported by observations that the productivity on Coquet Island is now greater than that on Rockabill.

Throughout the season, 24-hour surveillance over the colony was maintained, including continuous CCTV coverage. There were many 'low level' daytime incidents involving recreational canoeists which were dealt with amicably, causing minimal disturbance to nesting seabirds.

Arctic Terns *Sterna paradisaea* and Common Terns *Sterna hirundo*

The Common Tern population increased from 1,201 in 2016 by 4.7% to 1,257 pairs. The Arctic Tern population increased to its highest ever level at 1,579. Both species had average clutch sizes. Common Terns had a high productivity at 1.7 chicks fledged per pair while Arctic Terns fledged more chicks per pair than ever before at 1.39.

Sandwich Tern *Thalasseus sandvicensis*

The Sandwich Tern population increased from 1,349 in 2016 by 16.6% to 1,573 pairs. Increases in the Sandwich Tern population are always welcome, but this species does fluctuate widely.

There were two colonies, the first numbering more than 1,200 pairs. It was not possible to monitor productivity this year, but indications were good with large flocks of fledged chicks and few carcasses in the colonies.

Darvic rings were not used this year, but a sample of over 100 chicks was ringed with BTO rings. Ring reading was successful, with many schemes being recorded from the UK and Europe. One bird in particular 'yellow-T51' showed an exchange with Holland within a week. This bird was ringed as a chick at a colony in Texel, Netherlands (Coordinates: 53.124096, 4.895332) on 27 June 2015, and apparently spent the 2016 summer in the Gulf of Cadiz, Spain. In 2017 it was recorded in the Netherlands on 5 August, approximately 30 km south of its original ringing location, then on Coquet Island on 13 August and back in the Netherlands again on 16 August. Our Dutch colleagues initially were reluctant to believe the sighting given the rapidity of the movement and because another bird from the Dutch colony, 'yellow-1T5' (same alphanumeric characters, different order), was on Coquet Island on several occasions during the 2017 season. However, photographic evidence ruled out mis-recording (Figure 3). Just when we thought this bird had stopped criss-crossing the North Sea, yellow-T51 was seen in Scarborough in early September. Evidence for regular exchange of Sandwich Terns over the North Sea is growing, but such frequency is unprecedented.

Figure 3. The evidence: T51 on Coquet Island, 13 August 2017. Photograph by Wez Davies.

Samples of guano were collected for a second year and sent to the Research Institute for Nature in Brussels, for analysis alongside samples from around Europe. Early indications received show a shift towards a more clupeid-based diet in 2017, and the final results are expected by the end of the year.

Puffin

This was not a census year but Puffins returned to the island in good numbers. Good food supply and fair weather must have led to good productivity. Browsing by Canada Goose *Branta canadensis* on the island helped clear vegetation around many burrows, making it easier for Puffins to get to their burrows.

Eider

Eiders struggled in 2017, with the population decreasing by 23.7% to 251 nesting females. This figure is below the SSSI threshold of 311 (5-year mean). The first two ducklings were recorded in Amble harbour on 16 May. A peak count of 81 was recorded on 5 June. The duckling counts steadily decreased thereafter, and for the period 24 June to 31 July fewer than 10 were recorded daily. At the end of the survey, only six ducklings were regularly seen, suggesting a very low proportion made it to adulthood. There was an increase in the number of Great Black-backed Gulls *Larus marinus* within the harbour, and reports of them targeting the ducklings suggest that this may have had an effect.

Black-headed Gull *Chroicocephalus ridibundus* The Black-headed Gull population increased from 5,348 in 2016 by 0.86% to 5,394 pairs. This count is within the margin of error for this census, and surpasses the record set in 1987. Productivity for this species remained relatively low at 0.86.

Mediterranean Gull
One pair of Mediterranean Gulls bred on Coquet Island this year. Two other individuals showed interest including a colour-ringed individual (Yellow 2X4H) that had been ringed as a chick on Coquet Island in June 2015. The un-ringed individual was present for three weeks before moving on, while the ringed bird was present throughout the season. The breeding pair was successful, raising three chicks to fledging, and all were colour-ringed before leaving the island. All fledged chicks have now been reported away from the island, so have fledged successfully: one was seen locally at St Mary's Island, one in Dumfries and Galloway in September 2017 and the third fledged chick in Cheshire in October 2017. Another (2X1H) of the Mediterranean Gulls ringed on Coquet Island in 2015 was also seen in Northumberland this year, on the Farne Islands on 19-21 May.

Fulmar *Fulmarus glacialis*
The Fulmar population on the island bounced back after several years of decline and surpassed all previous records. Twice as many (84) apparently-occupied sites were recorded than in 2016. The increased population was not matched by strong productivity however, and 0.31 chicks fledged per site. All except the chicks nearest the Roseate Tern terraces were ringed, and any regurgitates inspected: one chick expelled a quantity of polystyrene balls. There was also a length of plastic tape in one of the nest sites but it could not be confirmed whether it was windblown or brought in as food.

Kittiwake The Kittiwake population continued to grow, breaking all records with a total of 448 nests. New nests were concentrated on the cliff behind the south beach and in the main colony to the east. Two new areas were occupied by Kittiwakes at the end of the season on the far northeast, but no nests resulted. The productivity was average at 1.2 chicks per pair.

Large gulls
A research project was initiated in 2012 to study the impact on breeding terns by the Lesser Black-backed and Herring Gulls *Larus argentatus* that also nest on the island. This project continued as part of a PhD supported by Newcastle University. There was a fall in the Lesser Black-backed Gull population which declined by 57.6% to 11 pairs while Herring Gulls increased by 700% to eight pairs. A sample of adults and chicks were ringed with green darvic rings. New GPS units powered by integrated solar panels were used to help understand movements; these new units were attached to two birds with weak-link harnesses and are designed to last up to four years, reporting locations automatically via the mobile phone network. Preliminary analysis showed movements between the mainland, Coquet Island and the Farne Islands, as well as initial winter movements.

Other species
A local Peregrine *Falco peregrinus* continued to take a random selection of species (predominantly pigeons) during the season, visiting on average once every two days,

but caused little sustained disturbance to the colony overall. Two Carrion Crows *Corvus corone* were present throughout most of the season, predominantly on the northeast of the island.

The winter Twite *Linaria flavirostris* population varied widely with only six present in winter 2016 but 52 returning in October 2017. The Grey Seal *Halichoerus grypus* loafing population remained stable, peaking at 523. Two pups were seen in late October but both died. Turnstone *Arenaria interpres* were present, including various individuals from a colour-ringing scheme on the mainland. The wintering Purple Sandpiper *Calidris maritima* population exceeded 145. A pair of Blackbirds *Turdus merula* nested on the island for the first time on record, and although incubated eggs did not manage to rear any chicks.

OVERVIEW

The removal of the Brown Rat *Rattus norvegicus* early on led the way to a successful year for most species. The Roseate Tern productivity was particularly good news and will hopefully edge the colony towards sustainability. All tern species did well, with no foul weather events at key stages and good food supplies. The decline in Eider population is the latest in dips below the SSSI threshold, and the reserve is listed as 'failing/recovering' for this reason. The decline is due to external factors such as river water quality, food availability or a consequence of being at the southern breeding range on the east coast for this species. Trials of chick shelter 'rafts' with vegetation-suppressing bases were successful in attracting Common Terns towards the Roseate Tern colony, particularly late in the season.

WINTER WORKS

Improvements were made to the accommodation on the island over the winter, including a new kitchen and solar system, as well as the planned installation of a desalination unit. Nesting habitat for Roseate Terns was increased with a new tier to the northern terrace constructed from interlocking plastic paving and extra boxes ordered.

ACKNOWLEDGEMENTS

Many people contribute to the management of Coquet Island, both directly through volunteer activities and indirectly through the support, goodwill and encouragement of the local community. Hilary Brooker-Cary provides unstinting support to all aspects of Coquet Conservation, Stephen Lunn's innovative engineering skills keep the island functioning despite the harsh marine environment, and Tom Cadwallender provides his expertise for ringing the Roseate Tern chicks. We thank Filip Wieckowski for his efforts on the night watches as a Species Protection Assistant. RSPB residential volunteers provided much-needed hard labour for vegetation management. We also thank Ibrahim Alfarwi for his work with large gulls. The conservation of Roseate Terns on Coquet Island is supported with a contribution by the LIFE programme of the European Union.

LONG NANNY TERN COLONY

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INTRODUCTION

The 7.5 ha Long Nanny Tern site lies within the Northumberland Newton Links SSSI and comprises sandy beach, saltmarsh and dune habitats bordered by the Long Nanny Burn to the north. The reserve is an important breeding site for Little Tern *Sternula albifrons*, Arctic Tern *Sterna paradisaea* and Ringed Plover *Charadrius hiaticula*. Little Terns are the second rarest breeding seabird in Britain with an estimated 1900 pairs (Cabot and Nisbet 2013). The species has amber conservation status in the list of Birds of Conservation Concern (Eaton *et al.* 2015) and is protected under Schedule 1 of the UK Wildlife and Countryside Act 1981. The Long Nanny site holds up to 2% of the national population of Little Terns. Protection at the Long Nanny Tern Site may have led to the establishment of the Arctic Tern colony at the site, first recorded breeding there in 1980 and reaching a peak of over 2,000 pairs in 2014 (Dorman *et al.* 2017), making it the largest mainland colony in the UK. The site also supports a regionally-important population of Ringed Plovers, with an estimated 10 to 15 breeding pairs. The British population of Ringed Plovers has reduced by 37% between 1984 and 2007 (Robinson *et al.* 2015) and has been moved from amber to red status in the most recent list of Birds of Conservation Concern (Eaton *et al.* 2015).

This stretch of the Northumberland coast is popular with holidaymakers, dog walkers and other leisure users, and the Long Nanny tern colony is situated on a large beach popular with both locals and tourists. As in many coastal areas (Cabot and Nisbet 2013), beach use by members of the public directly reduces the availability of nesting habitat for Little Terns and other species. In addition, indirect disturbance from human activities such as water sports, running and dog walking can also have detrimental impacts on nesting birds. Potential impacts are complex and difficult to quantify in the field, but are likely to include increased energy expenditure, higher levels of stress on the adult birds, and an increase in time that eggs and chicks are left unattended and vulnerable to the effects of bad weather and opportunistic predators. Apart from human disturbance, the Little Terns are also vulnerable to predation by a wide range of terrestrial and marine species including Stoats *Mustela erminea*, Foxes *Vulpes vulpes*, gulls and birds of prey.

The primary nesting area for both tern species is a low-lying sand spit at the northeastern end of the site. In recent years the spit has eroded and is regularly inundated by spring tides. Without intervention this would result in the majority of Little Tern nests being washed away and deserted. The site is also extremely dynamic and subject to frequent topographical changes which offer opportunities to encourage birds to nest in areas more protected from tidal inundation. Thus, the rangers employed by the National Trust

during the breeding season have a nationally significant role in protecting the Little Tern colony and associated species from human disturbance, predation and the effects of tidal inundation. Recording the work that is undertaken, and the outcomes in terms of breeding success, levels of disturbance and positive engagement with local people and tourists, is essential to support and evolve the management of the site as a wildlife resource of national and local significance.

CONSERVATION AND MONITORING METHODS

Work began at the site on 3 May; rangers were resident from 5 May until 28 July, and daylight work was supplemented by a night shift from 13 May, ensuring 24 hour coverage for the rest of the season. In addition to monitoring breeding activity, colony disturbance and attempting to deter predators, the rangers, assisted by volunteers, provided information to visitors and encouraged beach users to avoid the site.

Site and habitat management

At the start of the season, the colony site was cordoned off using a rope-and-post fence, extending 30 metres down the beach to discourage people from passing along it at high tide. Signposts to warn people about nesting shorebirds and the requirement for all dogs to be on a lead were placed 10-20 metres outside the ropes at regular intervals. The gate to the south of the bridge was tied shut to prevent access to the saltmarsh and diversion signs were placed on the gate and adjacent fence. Wooden posts marking the route to the tern site and the diversion across the dunes to Beadnell were placed at the south end of the site. Signposts were placed on the northern side of the burn to prevent people approaching the colony from the north. Vegetation on the paths and camping area was strimmed and blue polypropylene rope used to mark out a public path from the site entrance in the south to the hut. The toilet huts, tents, and remote hide were erected and the site made ready for habitation by 5 May. Vegetation in the tern garden, an area on the seaward side of the hut (Figure 1), was cut back by strimming before the breeding season to provide a nesting area for Arctic Terns. Two elevated vegetated areas, dominated by Marram Grass *Ammophila arenaria*, adjacent to the saltmarsh and opposite the burn were also strimmed to increase breeding space for Little Terns above the high tide line.

Breeding bird monitoring

A hide in the dunes overlooking the sand spit and northern salt marsh of the site was used for most of the monitoring observations of Little Terns. Daily counts of adult Little Terns were carried out through the season, and chicks and fledglings were counted as often as possible. When weather allowed, rangers entered the colony daily to locate and check the status of Little Tern nests. Arctic Tern breeding success was monitored daily in fixed quadrats of 4 x 4 metres. For the colony as a whole, the number of 'Apparently Occupied Nests' (AON) was estimated on 9 June by seven observers in a line, each walking a transect through the colony and recording each nest scrape and the contents. To prevent double counting, a red kidney bean was placed in each counted nest. Arctic

Tern fledglings were counted daily from several points in the colony and productivity was calculated as the maximum number of fledglings divided by the AON. Ringed Plover nests, found by watching birds back to their nests, were checked whenever possible.

Protection of breeding birds

Decoys and sound lures were used in an attempt to encourage Little Terns to nest within the raised, strimmed areas along the northern shore where they would be more protected from spring high tides. An electric fence around the Arctic Tern colony encompassed both the dune colony and spit colony Little Tern scrapes; the shingle colony nests and a few of the spit colony Little Tern nests were originally laid outside the fence but were moved within as protection from nocturnal predators. A temporary chicken-wire fence was erected along the southern edge of the dune colony to act as a barrier against predation by larger mustelids, although ineffective against Weasels *Mustela nivalis*. Ringed Plover nests were protected, when possible, with wire mesh cages to exclude predators from the nest while allowing plovers to walk through holes in the mesh.

Spring high tides were one of the main threats to Little Terns. The majority of Little Tern nests were raised on to sand-filled plastic fish boxes to reduce the risk of being washed away during spring tides. Nests were left as long as possible before they were raised to reduce the likelihood of desertion. Many boxes were later raised on to a wooden pallet to increase the height of the scrape even further. In addition to raising nest heights, 34 boxes were moved up the beach a few metres each day, some as far as 18 metres. Despite being raised and moved, many nests were still at risk from being flooded by the highest tides. When necessary, eggs and chicks at risk were transferred into labelled egg boxes and kept in the hut until the tide had receded to a safe level. Similar methods were used in attempts to protect three Ringed Plover nests that were at risk from high tides.

Weather recording

Temperature was recorded daily at the Long Nanny site using a digital maximum/ minimum thermometer located on the ground and protected from direct sunlight. Three temperature readings were taken each day at 09:00: actual temperature and maximum and minimum temperatures over the previous 24 hours. Cloud cover was estimated each day at 06:00 using Oktas. Rainfall was recorded daily in mm at Newton Point (1.5 miles south) using a copper rain gauge. Wind strength was estimated each day at 06:00 using the Beaufort wind scale; wind direction was estimated in relation to the coastline which runs approximately north-south.

Disturbance recording

Disturbance incidents were categorised as minor, moderate or major in severity when < 20%, 20-80% or > 80 % of the entire colony was disturbed, respectively. Activities or factors leading to disturbance were categorised as defined by the EU LIFE+ Little Tern recovery project and included: human, joggers, vehicles, loose dogs, dog walkers, kites flown by beach users and 'unknown'. Disturbance caused by wildlife was recorded by species name. Approximate start times and duration of disturbance episodes were recorded, and the tern species affected. In previous seasons, disturbance recorded as 'unknown' was included under the human disturbance category. This season greater efforts to rule out predators and other wildlife were made to increase the accuracy of estimating disturbance by human activities. It is important to note that the estimation of disturbance severity is subjective, and becomes more accurate as ranger experience increases during the season. In addition, some disturbance is due to ranger interventions (in response to disturbance) and monitoring activities.

Feeding surveys

To monitor Little Tern chick feeding, the frequency, type of fish and size relative to adult beak length, observed using a telescope, were recorded during surveys carried out by the rangers between 14 June and 19 July, each survey lasting a minimum of one hour. Eight of the 57 surveys by rangers could not be identified to a particular brood due to chick location and mobility. The data reported included > four hours of observation data from Nick Brodin, a Masters student working at the site. Formal feeding surveys were not carried out on Arctic Terns, but casual observations using similar methods were recorded.

RESULTS

Little Tern

Little Terns arrived on 3 May and were monitored until 28 July; the maximum number seen on site was 89 on 26 July. The minimum number of breeding pairs was 38, comprising 35 pairs incubating eggs on 22 June and three pairs found with chicks three days before. The nests were in three distinct sub-colonies: 1) the spit colony on the northern end of the sand spit, where Little Terns have nested in previous years; 2) the dune colony on the beach between the sand spit and the saltmarsh, similar to an area used last year but closer to the saltmarsh; 3) the shingle colony on the western shore of the spit (Figure 1). Although no Little Terns nested in the raised strimmed areas, the dune colony was along the northern shore of the eastern strimmed area and these birds could have been influenced to nest there by the tape lure and decoys nearby.

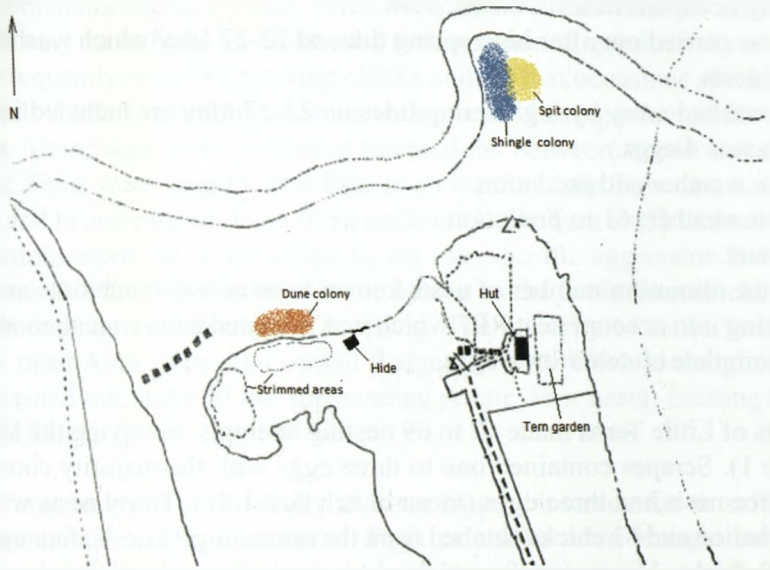

Figure 1. Sketch map of Little Tern nesting areas at the Long Nanny in 2017.

Birds nested in three waves over the season. The first nest and egg were found on 18 May and over the next week a stint of laying was recorded. Many of these nests were washed out during high spring tides at the end of May. A second wave of nesting occurred from 30 May and many of these were likely to have been birds relaying after loss of their nests. At the Lindisfarne Little Tern colony approximately 16 km to the northwest, many Little Terns abandoned their nests as a result of strong winds on the night of 7 June, and six days later a third wave of at least 30 additional Little Tern pairs began to nest at Long Nanny; some of these may have been from Lindisfarne.

Table 1. Breeding statistics for Little Tern, Arctic Tern and Ringed Plover at the Long Nanny.

	Little Tern	Arctic Tern	Ringed Plover
Minimum number of pairs/AON[a]	38	1865[b]	9
Number of scrapes	67-69		16
Number of eggs	125	3262[c]	54
Mean clutch size	1.81	1.92[d]	3.25
Number of hatchlings	63		28
Known egg losses	58	307[e]	
Chicks lost	59	412[f]	25
Adults lost	0	6	0
Number of fledglings	4	479[g]	3
Productivity	0.11	0.26	0.33[g]

[a] Apparently occupied nests of Arctic Tern.
[b] Census was carried out after high spring tides of 22-27 May which washed out a large number of nests.
[c] 207 eggs washed away by high spring tides on 22-27 May are included in this total
[d] maximum was 4 eggs.
[e] High tides, weather and predation.
[f] 351 to poor weather; 61 to predation.
[g] highest count.
[h] based on the minimum number of nests known to be active at one time and calculated without taking into account nest RP7 which was predated before incubation had started with an incomplete clutch of two eggs.

The 38 pairs of Little Terns made 67 to 69 nesting attempts, involving the laying of 125 eggs (Table 1). Scrapes contained one to three eggs with the majority containing two, and only three nests had three eggs (mean clutch size 1.81). Thirty nests were deserted during incubation and 63 chicks hatched from the remaining 33 nests; four eggs failed to hatch. Of 63 chicks, 11 were confirmed dead or seen to be predated, two were presumed dead, four were known to fledge and the fates of the remaining 48 are unknown. Over two evenings, 11 Little Terns were ringed with BTO rings and one was large enough for an additional coded yellow colour ring to be fitted. The low overall productivity of 0.11 fledged young per pair (Figure 2) was the result of several factors. High tides contributed to the loss of 14-16 nests, despite the mitigation measures described below. However, the predation of chicks, mainly by Black-headed Gulls *Chroicocephalus ridibundus*, was the main factor in low productivity. Black-headed Gulls were seen entering the colony up to 10 times in one hour and three Little Tern chicks were definitely taken by these gulls. Lesser Black-backed Gulls *Larus fuscus* were seen to take two chicks and a Kestrel *Falco tinnunculus* also took at least one chick from the dune colony.

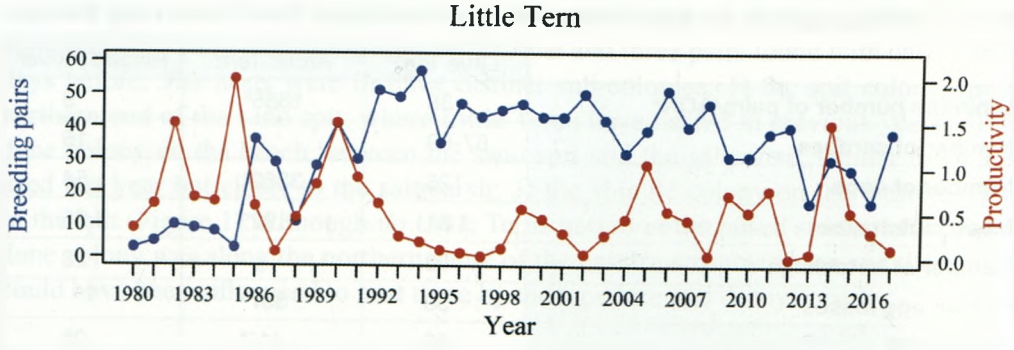

Figure 2. The minimum number of Little Tern pairs and productivity at Long Nanny from 1980 to 2017.

Negative interactions between Little Terns were apparent as soon as most eggs had hatched, and may have been an additional factor reducing productivity. Adult Little Terns were frequently observed pecking chicks and on two occasions chicks may have died as a result. Little Tern adults were also often seen chasing other adults around and stealing fish. There were fewer negative interactions between Arctic Terns and Little Terns. Arctic Terns were seen to steal fish, to sit on the Little Tern nest boxes, to mob Little Terns and in one case an Arctic Tern pecked a Little Tern chick to death. However, such interactions were not as prevalent as the intraspecific aggression between Little Terns, and was also less obvious later in the season as the Little Tern chicks developed. This may be related to the timings of hatching. The majority of Little Terns started to hatch when most Arctic Tern chicks had fledged or were close to fledgling, and high tides had washed out many of the surrounding Arctic Tern nests, creating more space for the Little Terns.

For Little Terns to breed successfully at Long Nanny, intervention to safeguard nests from environmental effects is essential. Eggs or chicks were brought into the hut to prevent them being inundated by high tides on nine occasions for a maximum duration of one hour and 22 minutes for one high tide, and a total duration of seven hours across all occasions. During the first spring high tides of the season, at the end of May, eggs had to be taken in to be incubated three times. A high tide on the afternoon of 27 May caused the entire spit and dune colony to flood, submerging all nests and washing away boxes and pallets (Figure 3). All eggs were collected in time and incubated inside for one hour and 15 minutes. Afterwards the boxes and pallets were retrieved, reconstructed a few metres higher up the beach, and the eggs placed back into scrapes made on the boxes. Only three pairs returned to incubate their eggs; the other 12-14 pairs deserted. The spring high tides of June were less destructive, although eggs and chicks were taken in five times over five days. A very rough sea on the morning of 29 June generated an unexpected flood over the spit half an hour after high tide and washed out two nests; these were the only pairs which abandoned their nests during June spring tides.

Overall, 59 Little Tern nests were subject to ranger intervention, and 17% of these were abandoned after intervention. Tolerance to intervention varied throughout the season: 50% of birds that laid eggs during the second wave of nesting abandoned after their scrapes were raised on to a box. In contrast, no birds that laid eggs during the third wave of nesting abandoned their scrapes when rangers raised them, despite three times the number of nests being raised in this way. Similarly, only one (3%) pair abandoned during the move of 34 boxes inland, even though they were moved as far as 18 metres. Thus, moving boxes inland during the high tides at the end of June had a very positive outcome, whereas nests on boxes that were left *in situ* at the end of May were subsequently washed out.

Figure 3. Tidal inundation of the Long Nanny spit and nesting boxes.

Part way through the season, the level of sand went down in many of the fish boxes as a result of the dry weather and leakage of sand from the holes in the bottom and sides. Blocking the holes with Marram Grass proved effective in stopping sand leakage, while allowing water to drain when necessary. In future it may be worthwhile to line the bottom of boxes with terra-mat before filling it with sand, as a measure to prevent the problem of sand leakage. Otherwise, raising nests into boxes was a successful way to increase the height of nest scrapes as protection against tidal inundation.

Over 61 hours of surveys, the majority of fish seen fed to chicks (mean 2.18 feeds/hour) were sandeels *Ammodytes* species (79.7%; mean size 1.21 times adult beak length). Clupeids (*Clupeidae*) made up the second most frequent fish (13.3%; mean 1.03 beak length) within the chicks' diets this year, with one clupeid being identified as a Sprat *Sprattus sprattus*. One fish recorded during surveys was a goby species (*Gobiidae*) and nine fish fed to chicks were not identified, therefore recorded as unknown. Incidental observations include flatfish being brought in by adult Little Terns. Little Terns were seen feeding in Embleton Bay, Football Hole, Beadnell Bay and the Long Nanny Burn and these areas may be key feeding resources for the survival of the Long Nanny colony.

Arctic Tern

This species was monitored though a count of 'Apparently Occupied Nests' (AON), daily counts of fledglings and more intensive monitoring of groups of nests within survey quadrats established in different parts of the colony (Figure 4). These quadrat samples represented different vegetation cover: 1) a sandy area with little vegetation cover at the south end of the site; 2) the tern garden, where the ground is densely covered by grass, and 3) the inner side of the sand spit, which is sparsely covered with Marram Grass. Data for nest density in 2017 are consistent with descriptive information from the previous year (Dorman *et al.* 2015) where the highest density was in the centre of the spit and lower densities on the beach and dunes. The colony is protected by the electric fence and the presence of the rangers, but nests were not raised during high tides.

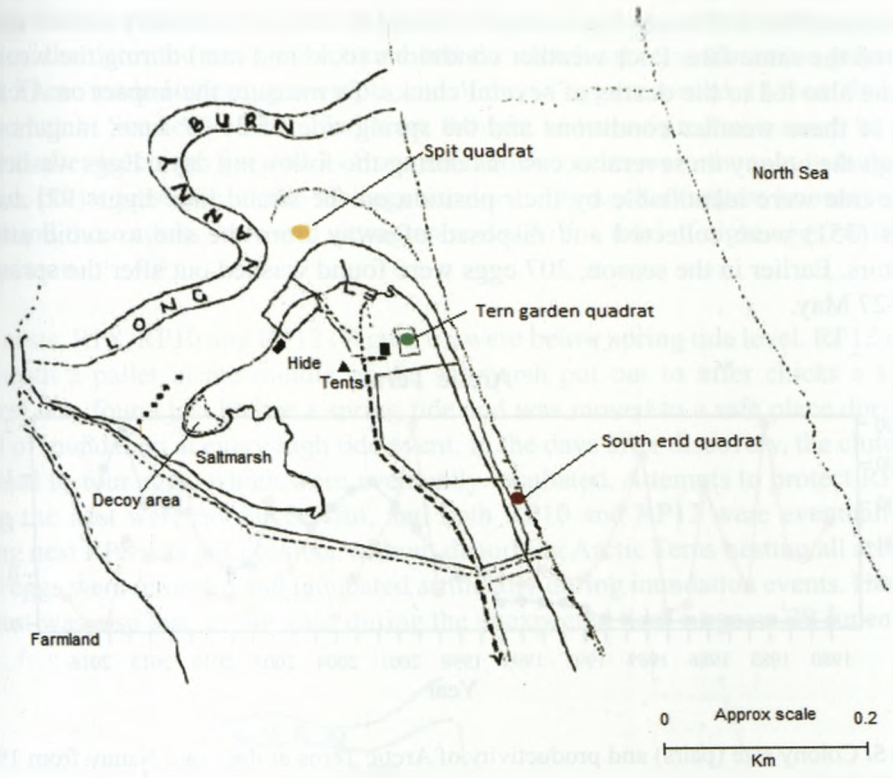

Figure 4. Sketch map of the location of Arctic Tern monitoring quadrats at the Long Nanny site.

In total, 1,865 AON, the third highest count at the site (Figure 5), were counted on 9 June: 1,730 scrapes with eggs and 135 scrapes apparently active but without eggs. Fifteen scrapes had only chicks and 32 scrapes had chicks and eggs, with a total of 67 chicks. Breeding statistics are summarised in Table 1. Although the highest fledgling count was 479, the number fledged could have been significantly higher, perhaps 600-1000 (Kevin Redgrave, pers. obs.). Therefore the calculated productivity of 0.26 (Table 1) may be an underestimate, but was still an improvement on the previous two years (Figure 5).

The first egg was laid on 13 May. The Arctic Terns left their nests unattended for a period of four hours between 23:00 and 03:00 up to 28 May for birds nesting on the spit, or 1–4 June for birds nesting in the tern garden and the front beach. The reason for this behaviour is unknown and the absence of incubating birds during these periods may have caused regular chilling, which may have extended the incubation period. The period between the first egg date and the first chick hatching date (8 June) was 26 days, five days longer than the 21-day average incubation period for Arctic Terns. Unlike last year, the adult terns remained with their chicks overnight, and this may have been a consequence of the absence of Stoats on the site this season.

High winds at the Long Nanny site on 11-12 June destroyed seven of the 13 nests in the spit quadrat, and a significant proportion of the nests in the colony overall may have suffered the same fate. Poor weather conditions (cold and rain) during the weekend of 29 June also led to the deaths of several chicks. To measure the impact on Arctic Tern nests of these weather conditions and the spring tide of 24-27 June, rangers walked through the colony on several occasions during the following days. Eggs washed away by the tide were identifiable by their position on the strand line. Eggs (97) and dead chicks (351) were collected and disposed of away from the site to avoid attracting predators. Earlier in the season, 207 eggs were found washed out after the spring tides of 22-27 May.

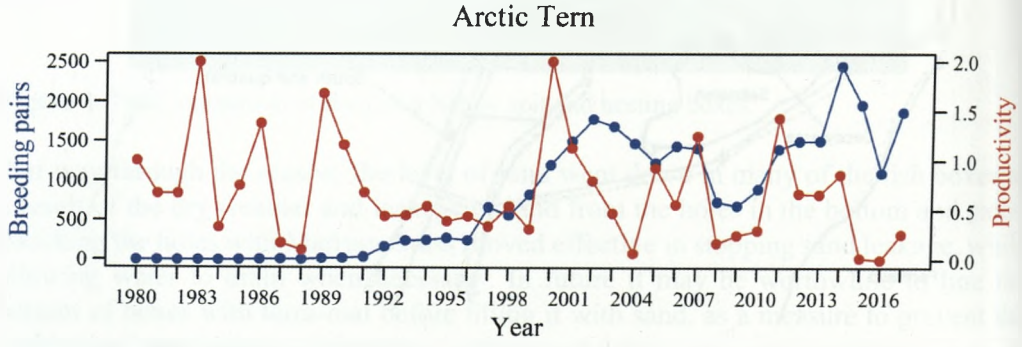

Figure 5. Colony size (pairs) and productivity of Arctic Terns at the Long Nanny from 1980 to 2017.

In total, 62 chicks and three eggs were known to have been predated. The main predator species was Kestrel, seen taking 52 chicks. Black-headed Gulls were also seen taking chicks and eggs and were recorded taking up to four eggs in an hour, so may have taken hundreds of eggs and chicks throughout the season. Although Weasels were present throughout the whole breeding season, none was seen taking chicks or eggs and the impact of predation on the Arctic Terns is unknown.

From casual observations, the main fish brought to Arctic Tern chicks were sandeels, with an average size of 1-1.5 adult bill lengths. Sprats (average two bill lengths) were frequently recorded in July, and gadoid juveniles (average one and a half bill lengths) were also recorded.

One hundred and twenty-nine Arctic Tern chicks were ringed during four sessions in the colony. On 1 June the BTO ring number of a perched Arctic Tern was recorded; this had been ringed as a chick in the Long Nanny colony on 3 July 2001.

Ringed Plover

Breeding statistics are summarised in Table 1. Taking into account the distribution of territories, the dates the nests were found and the clutch sizes, at least nine pairs were present. These made 16 nesting attempts, and of the 54 eggs recorded, 14 from five nests failed to hatch. Six nests (20 chicks) were thought to have failed as a result of avian predation after hatching; five chicks from another two nests were thought to have been predated, but at least one of the siblings survived. Three chicks were known to have fledged and three adults were still sitting on nests (with a total of eight eggs) at the end of the season.

Three nests, RP8, RP10 and RP12 (Figure 6), were below spring tide level. RP12 nested underneath a pallet in the middle of the saltmarsh put out to offer chicks a shelter. The nest was found just before a spring tide and was moved to a safe place during the period of inundation at every high tide event. In the days after discovery, the clutch size increased to four eggs, which were eventually incubated. Attempts to protect RP10 by raising the nest were not successful, and both RP10 and RP12 were eventually lost. Raising nest RP8 was not possible without disturbing Arctic Terns nesting all around it, so the eggs were removed and incubated artificially during inundation events. However, this nest was also lost, in this case during the unexpected tidal surge on 29 June.

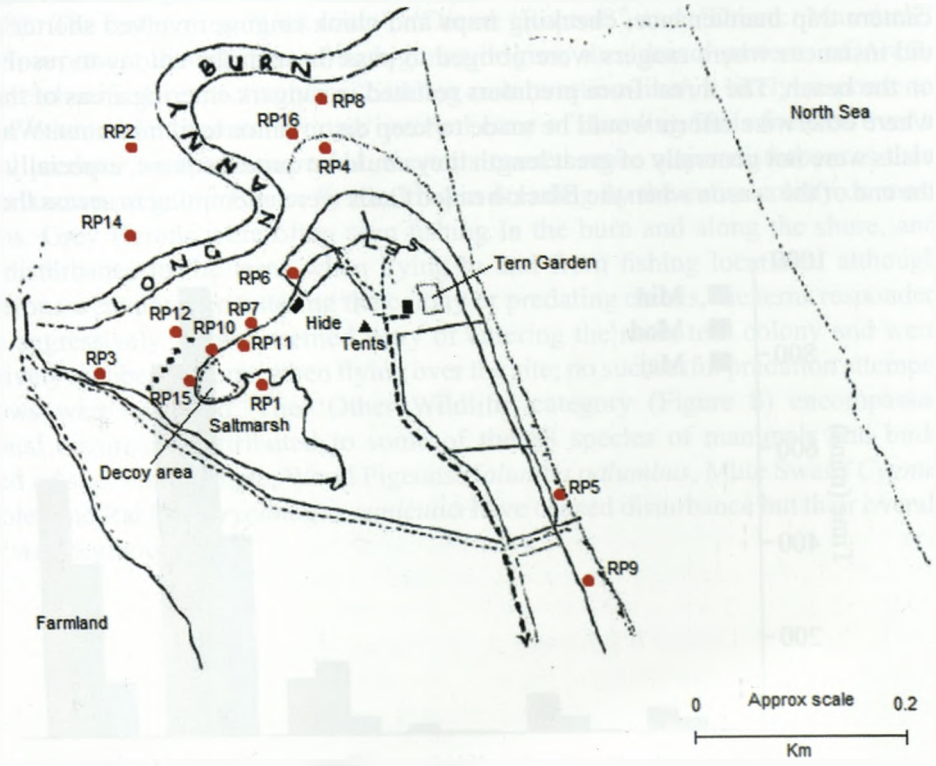

Figure 6. The location of Ringed Plover nests at the Long Nanny in 2017.

One nest, RP7, was confirmed predated when known to have two eggs and before it was caged for protection. Predation, possibly by a mustelid, was also confirmed when a Ringed Plover chick was found dead on the saltmarsh with its head missing. A Kestrel was seen hunting over the saltmarsh and spit on a few occasions before Arctic Tern chicks hatched and it is likely that it took Ringed Plover chicks. Some of the chicks may also have been predated by gulls, and towards the end of the season Black-headed Gulls became a major threat. They were seen on several occasions flying low over the saltmarsh, where chicks from nests RP13 and RP11 were feeding. Although Ringed Plover adults often chased gulls away, none of the chicks in this area reached a good size or fledged, and efforts to offer additional protection with wooden pallets for shelter and a makeshift scarecrow were unsuccessful.

Disturbance by humans

Ranger disturbance, which accounts for a greater proportion of disturbance than any other category (Figure 7), results from the essential and sometimes protracted visits into the colony to protect eggs and chicks during high spring tide events, reconstructing entire sub-colonies after inundation, and carrying out the initial raising of nests. Reinstating the rope boundary fence after high tides, set-up and maintenance of the electric fence and the installation of chicken-wire barrier fences also accounted for several hours of disturbance over the course of the season. Routine monitoring such as nest checks, camera trap maintenance, checking traps and chick ringing involved shorter visits, as did instances where rangers were obliged to pass through the colony to resolve issues on the beach. The threat from predators resulted in rangers entering areas of the colony where otherwise efforts would be made to keep disturbance to a minimum. While these visits were not generally of great length they could be quite frequent, especially towards the end of the season when the Black-headed Gulls were attempting to access the colony.

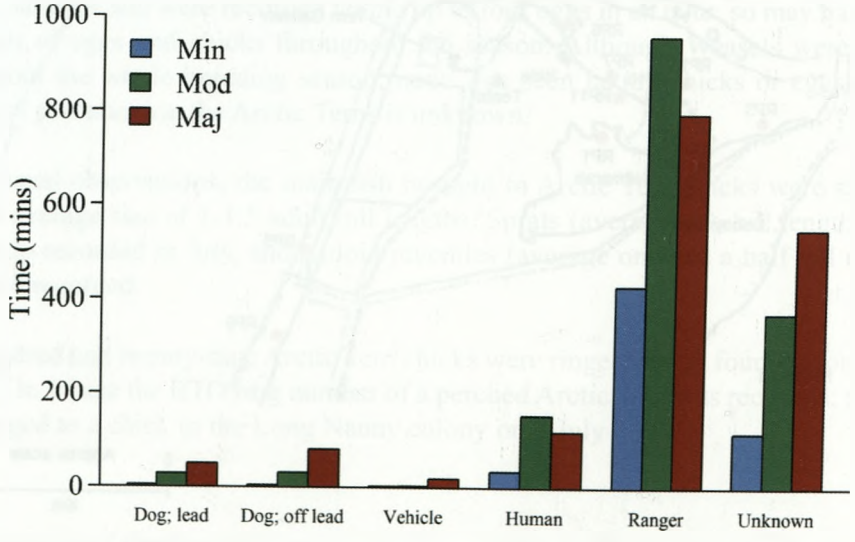

Figure 7. Levels of disturbance (Min: minor; Mod: moderate; Maj: major) created by different human activities at the Long Nanny in 2017.

The 'unknown' category (Figure 7) was the second largest cause of disturbance, thought to relate to unidentified human activities. The 'human' category comprises disturbance resulting from kite surfers, jet skiers, horse riders, walkers and joggers; most of these events were of minor or moderate severity.

The 'vehicle' category encompasses any type of vehicle, but the only disturbances in this category were from aircraft, which caused the highest proportion of major disturbances when they flew below the voluntary 1,500 feet no-fly zone in place over the site. Thus, while the total disturbance generated by vehicles was small (Figure 7), it had a relatively high impact.

Loose dogs are also a relatively high impact disturbance, resulting from dog walkers crossing the burn from the north, or walking along the north side of the burn and allowing their dogs to cross freely into the colony. Although these events only affected the low tide roost, on a few occasions loose dogs crossed into the colony, fortunately with no adverse consequences.

Disturbance by predators

The main known predator disturbances were from Kestrels, large gulls and Weasels, with Grey Herons *Ardea cinerea* and Crows also creating a considerable contribution (Figure 8). The categories 'Unknown', 'Dread: Raptor?' and 'Dread: Mammal?' (Figure 8) represent disturbance of ambiguous origins; the 'dread' patterns of Arctic Terns were classified, respectively, as 'Starling murmuration-like', a likely response to raptors or other aerial predators, or an inverted cone of dreading birds focused over a terrestrial predator such as a mammal. Kestrels caused more major disturbances than any other known predator (Figure 8) resulting in dreading by the entire colony on most occasions. Grey Herons were often seen fishing in the burn and along the shore, and caused disturbance to the terns when flying to and from fishing locations; although Grey Herons were not seen entering the colony or predating chicks, the terns responded to them aggressively. Crows seemed wary of entering the main tern colony and were aggressively mobbed by terns when flying over the site; no successful predation attempts by Crows were recorded. The 'Other Wildlife' category (Figure 8) encompasses occasional disturbance attributed to some of the 88 species of mammals and birds recorded on site. For example, Wood Pigeons *Columba palumbus*, Mute Swans *Cygnus olor*, voles and Rabbits *Oryctolagus cuniculus* have caused disturbance but their overall impact was negligible.

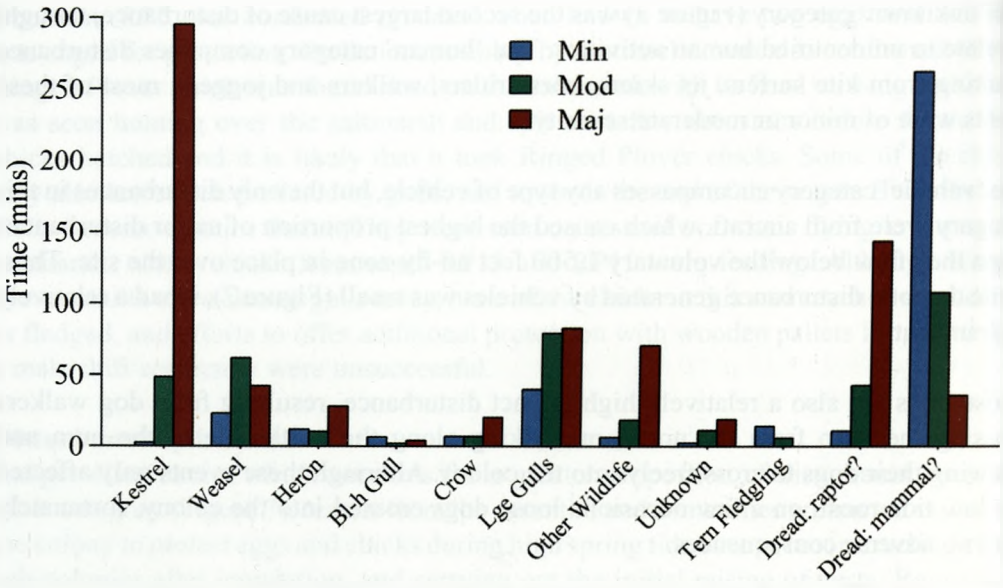

Figure 8. Disturbance by severity category (as in Figure 7) created by predator activity at the Long Nanny in 2017.

There is a significant gull roost at the mouth of the burn with up to 300 Lesser Black-backed, Great Black-backed *Larus marinus* and Herring Gulls *Larus argentatus*. As a result of the proximity to the colony, most disturbance attributed to large gulls was caused by roosting birds flying together up or down the shore with the encroaching or receding tide. There was otherwise surprisingly little interaction between the roost and the colony. Towards the end of the season, Lesser Black-backed Gulls were seen flying through the colony attempting to predate; these could be birds that had moved to the site from the Farne Islands after breeding. Although Black-headed Gulls had a significant impact on Little Tern productivity, terns do not seem to recognise them as a threat and these small gulls caused little overall disturbance.

Weasels were present on the site from the beginning of the season with at least four individuals seen together. After the first month of the season, the intensity of Weasel-attributed disturbance decreased dramatically, even though individuals were still seen moving around the site. Although they were seen on site during the day and at night, no evidence of predation on tern eggs or chicks was found. The relatively good Arctic Tern productivity this year suggests that Weasels had a much smaller impact than the Stoats present in previous years.

Predation

The main confirmed predators this year were Kestrels and gulls. There was an isolated kill of an adult Arctic Tern by a Peregrine *Falco peregrinus* on 2 June and predation of an Arctic Tern egg by a Hedgehog *Erinaceus europaeus*.

A Kestrel first entered the colony on 11 May this season and predation of tern chicks was first seen on 6 June. Male and female Kestrels were seen in the colony, and may have been a breeding pair feeding nestlings in woodland to the west of the Long Nanny site. The intensity of Kestrel predation dropped off dramatically in the last month of the season, and this may have resulted from fledging of the Kestrel chicks. Voles seemed to have been abundant this year and may have attracted the Kestrels away from tern chicks as a food source.

Predation by Black-headed Gulls had a significant impact on tern productivity and these gulls were also assumed to be responsible for the loss of most of the Ringed Plover chicks, as adult Ringed Plovers were often seen chasing Black Headed Gulls from the saltmarsh. As this species does not seem to be considered a threat by terns, how predation by small gulls can be reduced by the rangers without causing considerable disturbance to the colony is a significant problem. Towards the end of the season Lesser Black-backed Gulls were also seen taking Little Tern chicks from the saltmarsh.

A Weasel was first observed on site on 24 May and was frequently seen for the remainder of the season. No predated eggs or chicks showing evidence that indicated Weasel predation were found. Weasels have been seen actively hunting voles, and the apparent abundance of voles this year may explain the lack of predation pressure on terns. A Ringed Plover chick was found dead on the saltmarsh missing a portion of its head, considered to be a classic indicator of Weasel predation. A gamekeeper installed traps across the site in areas considered hot spots for Weasel activity and two Weasels were caught during the season.

Two Hedgehogs were seen, the first just outside the southern boundary of the site, while the second accessed the tern garden on 1 June. Hedgehogs are opportunistic predators of ground-nesting birds and took an Arctic Tern egg from a nest in the tern garden quadrat. The Hedgehogs were caught and relocated to a suitable location away from the site.

A Fox was seen feeding on the washed-up carcass of a sheep on the north side of the burn on 21 June. A Fox entered the colony on 4 July but was outside the electric fence and not close enough to predate Little Tern chicks before being scared off by the rangers. An Otter *Lutra lutra* was seen on 21 July running between the Little Tern boxes but was scared off by the ranger and all Little Tern chicks were accounted for the next day.

Volunteers and visitors

The site benefited from ten regular volunteers providing a total of 649 hours of contribution to the site. During the season there were 3,010 visitors to the site, 80 of whom were children. The main challenge in engaging visitors was that the location of the viewing platform was not ideal, and this may need to be more mobile in future years to reflect the change in location of nesting birds.

SUMMARY

The Long Nanny is a wildlife resource of national and local significance and the National Trust rangers have a nationally-significant role in protecting the Little Tern colony and associated species from human disturbance, predation and tidal inundation, and in recording the outcomes of conservation work at the site. The rangers, assisted by volunteers, provided 24 hour coverage of the site for the majority of the season. Thirty-eight pairs of Little Terns made up to 69 nesting attempts, most of which required ranger intervention to provide protection against tidal inundation. Nest scrapes were raised on to sand-filled fish boxes, and moving boxes inland during the high tides at the end of June had a positive outcome. The low overall productivity of Little Terns resulted from loss of nests to tidal inundation and the predation of chicks, mainly by Black-headed Gulls. The number of Arctic Terns nesting was the third highest count at the site. Productivity of Arctic Terns was affected by weather and predation, and the difficulty of obtaining accurate counts of the number of fledged birds. Nevertheless productivity was a substantial improvement on the previous year. Ringed Plover productivity was also low as a result of predation and high tides. The causes and patterns of disturbance of the tern colonies were similar to previous years. Ten regular volunteers contributed 649 hours of their time and made important contributions to achieving the National Trust's conservation objectives for the site.

ACKNOWLEDGEMENTS

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FARNE ISLANDS WEATHER

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It was a warm and dry start to the 2017 season, with very low rainfall and calm conditions in April making a promising start to the nesting season. April was dominated by a light northerly and westerly breeze, and ended with a force 8 northwesterly gale on 24-25 April which delayed the Brownsman team's move to the Outer Group by several days.

May remained very dry, and passed without any severe weather beyond force 5 winds and northerlies from 5-7 May. Easterly winds early in the month resulted in some of the year's best birding days, in terms of species diversity: on 1-2 May, sightings included Mandarin *Aix galericulata*, Garganey *Anas querquedula*, Black-tailed Godwit *Limosa limosa*, Short-eared Owl *Asio flammeus*, Sand Martin *Riparia riparia*, Wood Warbler *Phylloscopus sibilatrix*, Sedge Warbler *Acrocephalus schoenobaenus*, Reed Warbler *Acrocephalus scirpaceus*, Lesser Whitethroat *Sylvia curruca*, Ring Ouzel *Turdus torquatus*, Pied Flycatcher *Ficedula hypoleuca*, Black Redstart *Phoenicurus ochruros*, Tree Pipit *Anthus trivialis*, and – most unseasonably – Pallas's Warbler *Phylloscopus proregulus*! The latter part of May remained calm, with temperatures reaching 18.2°C on 25 May, allowing a fine start for many of the first chicks hatching on the cliffs, as well as a great experience for visitors during the May half-term school holiday.

The beginning of June took a turn for the worse as the rain descended, with 41.8 mm recorded in a 48-hour period on 6-7 June. This had a heavy impact on several species: many Shag *Phalacrocorax aristotelis* chicks which were too large to be brooded were found dead, and Puffin *Fratercula arctica* burrows were severely flooded – particularly on Brownsman where the seal colony has caused soil compaction. The rain coincided with strong northwesterly winds (force 7 on 7 June), which limited the number of possible cliff counts to the minimum of five this year. Further westerly gales persisted until the end of the month, with another 30 mm rainfall in the period 20-21 June. These conditions were poor for seabirds and visitors alike, with many waterlogged Eider *Somateria mollissima* nests, while Staple Island remained closed to visitors for 56% of June, due either to rain or unfavourable landing conditions on the West Face jetty.

Conditions improved in July, with predominantly calm westerlies and intermittent rain throughout the month. The exception came on 19-20 July when 40 mm of rain were recorded, preceding three days of fresh northerly gales, with force 8 recorded on 23-24 July.

August and September followed without any notable periods of poor weather, and remained slightly drier and warmer than the Seahouses average. A moderate force 7 westerly gale on 2-3 October produced a record day-count for Pink-footed Goose *Anser*

brachyrhynchus as coastal birds were seen passing through Inner Sound. Rangers were granted some brief respite from the westerlies on 19 October, when heavy rain combined with southeasterlies to produce a spectacular fall of Blackbird *Turdus merula*, Redwing *Turdus iliacus* and Song Thrush *Turdus philomelos*.

November began dry but breezy, and produced heavy seas and difficult conditions for seal monitoring work, which was persistently hampered by strong winds and difficult landing conditions until a brief period of calm from the 14-16 November. Rain and force 9 northerly gales descended in the final week of the month and temperatures plummeted, with hail and sleet recorded on 28 November. Many seal pups were lost before the storm relented, and many remained uncounted due to the difficulties presented by the weather. December began with a northerly breeze that fortunately calmed in time for a final partial count of seal pups prior to rangers departing the islands on 5 December.

In summary, 2017 was the year of the westerly wind! It was reasonably wet (Table 1), though rainfall tended to arrive in torrential showers rather than prolonged periods of light rain as occurred in 2016. This was particularly unfortunate for the Pufflings, which had just started to hatch when the first wave of heavy rain occurred. The highest daily rainfall in May was just 5 mm, then 26.6 mm in June and 40 mm in July, illustrating the favourably dry start to the nesting season, while average temperatures in both May and June were warmer than 2016 (Table 2), the highest temperature of the season being 24.1°C on 18 June.

Table 1. Total rainfall (mm) for Inner Farne by month in 2014, 2015, 2016, 2017 and the Seahouses average.

	May	June	July	Aug	Sept	Oct	Nov	Total
Inner Farne 2017	16.9	98.2	90.6	27.6	39.3	46.9	65.5	385
Inner Farne 2016	23	49.2	39.5	29.7	28.4	36.4	57.6	263.9
Inner Farne 2015	68	33.9	67.9	64.9	35.4	74.9	96.3	441.3
Inner Farne 2014	46.5	42.4	53.1	94.2	10.3	40.9	69.5	356.9
Seahouses average	52	48	55	72	61	59	71	418

Table 2. Average temperatures (°C) for Inner Farne by month in 2015, 2016, 2017 and the Seahouses average.

	May	June	July	Aug	Sept	Oct	Nov
Inner Farne 2017	11.4	14.3	14.5	15.1	12.7	11.7	4.7
Inner Farne 2016	10.1	12.1	15.0	15.5	15.0	12.8	5.6
Inner Farne 2015	10.1	13.4	14.5	14.7	13.3	10.7	7.9
Seahouses average	10.1	12.8	14.3	14.4	12.2	9.8	6.3

BIRDS OF THE FARNE ISLANDS

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National Trust, Farne Islands, Seahouses, Northumberland NE68 7SR

BREEDING OVERVIEW

As is often the case, temperamental island weather had a significant role in the breeding success of seabirds on the Farne Islands. Below-average rainfall and warmer weather at the beginning of the season allowed Arctic Tern chicks a strong start in life with good overall productivity (Table 1). Arctic Tern numbers were also up by 25%, in contrast to Common Tern and Sandwich Tern which were down by 14% and 12% respectively. Kittiwakes, heavily affected by strong winds in 2016, had a much-improved year with numbers and productivity higher than in 2016 (Table 1). There was no obvious shortage of sandeels *Ammodytidae* which will have contributed to the successful year for Arctic Terns and Kittiwakes. In contrast to 2016, heavy rainfall in June flooded many Puffin burrows on Brownsman leading to a drop of overall productivity (Table 1). After the next Puffin census, due in the 2018 season, we will be in a better position to assess how the population has fared since the last census in 2013. Eiders suffered the biggest decline of all the breeding species (Table 1) with breeding numbers at their lowest since the late 1940s and productivity the lowest since 2012. Razorbill and Cormorant numbers were lower than in 2016. The Black-headed Gull population decreased by 4% but both Lesser Black-backed and Herring Gulls increased by 4% and 28% respectively. There was no breeding attempt from Shelduck on Brownsman this year which brought the total number of breeding species for 2017 down from 24 to 23. Roseate Terns were present around the islands but continued to remain absent as a Farne Island breeding species.

The sea state only allowed five cliff counts for each island group, carried out within the periods 1-19 June for the Inner Group and 10-18 June for the Outer Group. Nest counts were carried out on the Inner Group over 9-10 June and the Outer Group over 12-13 June. Mechanical problems with the boat engine for the Outer Group prevented the counting of some species on some of the islands: Eider and Fulmar were not counted on South Wamses, North Wamses, Big Harcar, Northern Hares or Longstone; Shag and Oystercatcher were not counted on Big Harcar, Northern Hares or Longstone; Oystercatcher were not counted on North Wamses; Kittiwake, Guillemot and Razorbill were not counted on Big Harcar. The totals for these species should therefore be taken as a minimum for the islands this year.

Table 1. Breeding pairs and productivity for key seabird species on the Farne Islands in 2017. For comparison with 2017 figures, the data used for 2016 are the totals only for islands that were counted in both years. N/A = not applicable.

	Pairs 2017	Pairs 2016	% change	Productivity Inner Group	Productivity Outer Group	Productivity all islands 2016	Productivity all islands 2017	5-yr mean
Arctic Tern	1883	1508	25	0.75	0.27	0.23	0.53	0.48
Eider	337	573*	-41	2.44	2.05	2.67	2.22	2.32
Shag	710	648*	10	1.24	1.27	1.19	1.26	1.31
Kittiwake	4753	3494*	36	0.61	0.77	0.58	0.69	0.73
Fulmar	180	168*	7	N/A	0.46	0.56	N/A	0.49
Razorbill	459	479*	-4	0.5	N/A	0.45	N/A	0.59
Puffin	N/A	N/A	N/A	0.6	0.43	0.7	0.52	0.77

*The number of pairs in 2016 excludes the counts for those Outer Group islands which were not counted for this species in 2017.

Table 2. Total counts for breeding birds (pairs, except Guillemot which are given as individuals) in 2017. The percentage change from 2016 has been omitted for species which were not counted on some of the islands (see text), but for Eider, Fulmar, Shag, Kittiwake and Razorbill, percentage change using only data for islands that were counted in both years is shown in Table 1.

Species	2017	2016	% change
Shelduck	0	1	-100
Mallard	17	20	
Eider	337	593	
Red Breasted Merganser	1	1	0
Fulmar	180	244	
Cormorant	92	96	-4
Shag	710	688	
Oystercatcher	13	27	
Ringed Plover	4	4	0
B-h Gull	487	506	-4
L Bl-b Gull	593	572	4
Herring Gull	847	660	28
G Bl-b Gull	15	22	-32
Kittiwake	4753	3527	
Sandwich Tern	556	629	-12
Common Tern	75	87	-14
Arctic Tern	1883	1508	25
Guillemot	48234*	49037*	
Razorbill	459	491	
Swallow	5	6	-17
Rock Pipit	11	21	-48
Pied Wagtail	4	6	-33

* individuals

BIRD MIGRATION OVERVIEW

With 167 species seen across the islands, the overall tally was depleted compared to previous years by the lack of easterlies in spring and autumn, which resulted in an absence of typically reliable drift-migrants such as Bluethroat and Red-backed Shrike. Storm and Leach's Petrels were also not seen or attracted to the sound lures used in night-time mist-netting sessions for these species. Nevertheless, it was a year of surprises: the islands' first ever Black-browed Albatross was undoubtedly 'bird of the year'; the season also boasted the first White-tailed Eagle, the second Serin, White-billed Diver and Great White Egret, and the first spring record for Pallas's Warbler. The year also marked the return of such scarce passage migrants as Garganey and Spotted Redshank. Additional compensations were House Sparrow and Stonechat, probably encouraged by westerly winds, and two Little Buntings. The islands also benefitted from the Hawfinch invasion across the UK, and the first multiple record of this species for the Farnes closed the season in style.

In order of rarity status, the highlights of this season were Black-browed Albatross (first), White-tailed Eagle (first wild individual), two White-billed Divers (second and third), Serin (second), Great White Egret (second), two Mandarin (fifth and sixth), Hawfinch (seventh, eighth and ninth), Dusky Warbler (ninth), Little Egret (ninth), Great Shearwater (fifteenth record, seventeenth individual) and Pallas's Warbler (first spring record and twenty-first in total). With the exception of Black-browed Albatross and Great White Egret which are awaiting a decision, records of species in the above list which require independent evaluation have all been accepted by the Northumberland County Records Committee.

Some notable falls and good visible migration resulted in some impressive day counts. May brought the second highest day counts for Lesser Whitethroat and Little Tern, while the third highest count for Black-tailed Godwit was logged in September. October provided the record count for Pink-footed Goose and the joint highest for Water Rail, with the third highest count for Brambling occurring in the same month. Autumn ended on a high note with the record day count for Goldfinch in November.

Other highlights included (number of individuals in brackets): Garganey (2), Slavonian Grebe (2), Red-necked Grebe, Balearic Shearwater, Spoonbill (2), Little Stint, Spotted Redshank, Wood Sandpiper (2), Long-tailed Skua, Glaucous Gull (4), Iceland Gull , Black Tern, Great-spotted Woodpecker, Yellow-browed Warbler (8), Barred Warbler (2), Wood Warbler (3), Ring Ouzel (3), Mistle Thrush (2), Black Redstart (5), Stonechat (3), Yellow Wagtail (2), Grey Wagtail (4), Tree Sparrow, House Sparrow, Lapland Bunting (3), Yellowhammer and Little Bunting (2). Records of Balearic Shearwater and Little Bunting have been accepted by the Northumberland County Records Committee.

Bridled Guillemot by Alan Hewitt

SYSTEMATIC LIST

Species are listed in the order used in the ninth edition of the British List (British Ornithologists' Union [BOU], 2018). The status of each species is classified using the categories listed below according to Edition 8.1 of the IOC World Bird List. For breeding species on the Farnes, an occurrence is counted as a single nesting pair, and a five-year mean of pairs 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, but 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

With respect to numbers of breeding pairs or breeding productivity, numbers in parentheses after the 2017 data are means for the previous five years.

Brent Goose *Branta bernicla.* A well represented passage and winter visitor.
Once again, the majority of records concern 'pale-bellied' birds (*B. bernicla hrota*) that overwinter at nearby Lindisfarne. Autumn passage commenced on 30 August with two individuals passing northeast through Staple Sound. Small numbers of 1-7 were logged on 2-4 and 15 September, with a seasonal peak of 20 passing north on 18 September. October provided a handful of singles, with a bird present on the Inner Farne South Rocks on 30-31 October. Three birds of the locally scarcer 'dark-bellied' race (*B. bernicla bernicla*) were seen this season, with two passing north through Staple Sound on 9 October. The third bird was discovered rafting on the Kettle on 14 October and lingered on Knoxes Reef where it was seen on four more dates until 27 October. Sightings that could not be assigned a race include an individual on Knoxes Reef on 3 November, and flocks of seven and four passing north through Inner Sound on 29 November.

Brent Goose by Tom Hendry

Greater Canada Goose *B. canadensis.* An uncommon passage visitor.
A remarkable season brought a pair of resident Canada Geese to the islands. First recorded on Inner Farne on 21 April, they were seen almost daily throughout spring until 9 June on both Inner and Outer Groups. Regular sightings on the Brownsman and Inner Farne meadows raised speculation that the birds may breed, but despite extensive searches, no evidence of a nesting attempt was found. The pair was joined by a third individual from 25-29 April and 1-3 May, and by a fourth and fifth bird on 29 April and 2 May, respectively. These newcomers did not linger however. Typical spring passage gave a seasonal high count of 65 heading north over Knoxes Reef on 9 May. A skein of 23 which passed north off Brownsman was noted on 1 June, while flocks of 15 and 60 through Inner Sound on 4 June marked the close of the moult migration. It is likely that the residing pair departed the islands with such a moulting flock. A group of six passing south through Inner Sound on 23 September was the first autumn record since 2014, while the final record was of a group of four passing north through Inner Sound on 26 September.

Barnacle Goose *B. leucopsis.* A well represented passage and winter visitor.
It was a quiet year for this small arctic grazer, with skeins and individuals recorded on six dates. The first sighting was an individual on the East Wideopen rocks on 7 April, followed by 17 roosting on West Wideopen on 22 April. Ten passing north over Knoxes Reef were the last of the spring passage on 24 April, while a single bird on Knoxes Reef on 2 June marked a midsummer anomaly. After breeding in Svalbard, autumn passage commenced with 13 skeins totalling 418 birds passing through Inner Sound on 8 October. Intriguingly, this was the highest day count since 2011, when the record count of 1,802 was set on the exact same date. A skein of 77 passing north through Inner Sound on 8 October was the final record for the year.

Greylag Goose *Anser anser.* An uncommon passage and winter visitor.
Greylag movements typically involve feral and wild birds around the Farnes, yet such origins can be tricky to determine. The sole spring record concerned an individual flushed from the Inner Farne Central Meadow on 5 April. Autumn records were skeins of seven and six passing north and west respectively over Staple Sound on 18 October, and a single individual passing west on 30 October.

Pink-footed Goose *A. brachynchus.* A well represented passage and winter visitor.
It was a record-breaking year for this small grey goose. Spring passage was light, with two skeins recorded on 1 April totalling 106 birds. Autumn migration began in mid-September, with the first two skeins on 15 and 19 September. Both contained 18 birds and passed through Inner Sound. Peak passage occurred in early October, with the onset of strong westerlies that pushed coastal birds out into Inner Sound; this began on 2 October, when 360 birds were seen in the evening, and culminated in 83 skeins passing through Inner and Staple Sounds on the following day when a staggering 4,443 geese were recorded, more than doubling the previous record day count of 2,061 from last season. A flock of 265 on 4 October, which included a group of 25 rafting on Brownsman Flats, was followed by 107 passing north through Inner Sound on 5 October. Thereafter, numbers declined with 1-62 geese recorded on eight subsequent dates from 6-27 October.

Mute Swan *Cygnus olor.* An uncommon visitor.
The records for Britain's heaviest bird typically reflect local movements, and this season provided sightings on two dates. At sunrise on 16 October the rangers were treated to the impressive spectacle of a juvenile landing on the Kettle. It lingered for an hour before taking off and heading west to the mainland. The second and more typical record involved two adults flying north through Inner Sound on 29 October.

Whooper Swan *C. cygnus.* An uncommon passage and winter visitor.
For the first year since 2008 there were no spring records of this elegant Arctic visitor. Small numbers were noted from late October as birds moved south along the east coast to British wintering grounds. Six were recorded flying south over the Kettle on 26 October, followed by a herd of 11 which passed north through Staple Sound on 31 October. They proceeded to raft on the sea behind North Wamses. The last sighting was on 1 November and involved a group of five adults and a juvenile passing north over Inner Sound.

Shelduck *Tadorna tadorna.* A well represented visitor and occasional breeder.
Though regularly seen throughout spring and summer, there was no evidence of a nesting attempt by this secretive breeder. On the Inner Group, a pair was initially present on the Inner Farne Central Meadow on 5 April, and subsequently recorded on St Cuthbert's Cove, Knoxes Reef and East and West Wideopen until 18 June. It was a quieter season for the Outer Group, with a male on Brownsman pond on 3 and 13 May, and the East Meadow on 4 and 5 June. This individual potentially joined the Inner Group pair on four dates across May and June, as a maximum of four birds was logged on 31 May and 13 June. Passage was meagre with 2-3 birds recorded on seven dates starting on 26 May. The final record was of two heading north through Inner Sound on 27 August.

Mandarin *Aix galericulata.* An extremely rare visitor.
This tree-nesting perching duck made a striking reappearance on Inner Farne, with two drakes present on the North Rocks on 2 May. Remarkably, this sighting was 12 years to the day since the previous Farnes record in 2005, which also consisted of two drakes. This fascinating occurrence represents the fifth and sixth individuals for the islands and the fourth record.

Garganey *Spatula querquedula.* An uncommon passage visitor.
On the misty dawn of 2 May, a drake on Brownsman pond marked the first sighting since 2014 and the third earliest spring record for the Farnes. Impressively, a second drake arrived at the Inner Group on 5 June, found rafting on the Kettle. These sightings marked the twenty-second and twenty-third records for the Farnes, after the first record on 21 May 1979.

Shoveler *S. clypeata* A well represented passage and winter visitor and extremely rare breeder.
After the only successful breeding attempt in 2014, there was no evidence of nesting this year. The single spring record consisted of two drakes and a female on Inner Farne on 22 March. They were flushed from the Central Meadow pond and flew east. The only autumn records involved 33 birds over three days in late September. Fifteen landed on Knoxes Reef on 28 September, followed by five the following the day. Thirteen were subsequently seen heading east over Inner Sound on 30 September.

Gadwall *Mareca strepera* An uncommon visitor.
It was an excellent year for this scarce dabbler. A male and a female were initially seen on the Central Meadow pond, Inner Farne on 19 April. They were subsequently seen on the mornings of 22, 26-27 and 29 April, and raised speculation that a breeding attempt might be made. Alas, the lack of sightings after that of a single female on 5 June put such hopes to rest. As nesting has occurred on nearby Coquet Island, future colonisation could be possible on the Farne Islands. Autumn passage commenced on 22 August, when a flock of five headed west over Inner Farne. A single was also present on Knoxes Reef on the same date.

Wigeon *M. penelope* A common passage and winter visitor.
A male and a female heading north through Inner Sound on 25 April marked the first seasonal record, followed by a male present on Ladies' Path, Inner Farne on 30 April. An unusually late spring record concerned a female on West Wideopen on 3 June. Numbers substantially increased in autumn, with groups of 1-78 recorded across 28 dates from 3 September to 1 November. Larger day counts involved 10 flocks totalling 133 birds flying north through Inner Sound on 8 October, and 120 moving north on 16 October. Peak passage occurred on 9 October, with 378 passing through both Inner and Staple Sounds. Passage and wintering birds are a common presence throughout November, particularly at regular roosting sites including Knoxes Reef and Brownsman. A notably large gathering on 16 November involved a flock of over 200 around the North Wamses.

Mallard *Anas platyrhynchos.* A common passage and winter visitor and well represented breeder.
A satisfactory year for the Mallard with 17 nesting pairs found, including one daring duck that bravely nested tucked in between two gas bottles and produced 11 ducklings. The first nest was found in the Inner Farne Vegetable Garden on 30 March with 11 eggs and the first ducklings of the season appeared on 21 April. Several more broods were seen throughout the season, including a late one of nine young which were rescued from the St Cuthbert's Gut by rangers on 6 September. The 17 females nested as follows: Inner Farne 8 (6.6), West Wideopen 3 (3.2), East Wideopen 0 (1.2), Knoxes Reef 0 (0.2), Staple Island 1 (2) and Brownsman 5 (3). Note that some of the Outer Group islands were not counted. After the breeding season, this species winters in moderate numbers, particularly around Knoxes Reef and the Wideopens. Small numbers were also observed on passage from late autumn onwards.

Mallard by Jennifer Clarke

Pintail *A. acuta.* An uncommon passage and winter visitor.
It was another modest season for this distinctively slender duck, with five autumn records. The first record was a sizeable flock of eight seen flying north through Inner Sound on 10 September. October provided the bulk of sightings, all of birds passing north through Inner Sound. These included four females on 3 October and groups of two and seven recorded on 5 and 7 October respectively. The last record was of a drake and female passing north through Inner Sound on 11 November.

Teal *A. crecca.* A common passage and winter visitor.
Spring passage was typically light for this pint-size duck, with 1-3 birds recorded across nine dates between 17 April and 19 May. Sightings generally involved pairs and singles flushed from the Brownsman and Inner Farne Central Meadow ponds. Midsummer records included a male and female rafting off Brownsman North Rocks on 17 June, followed on 3 July by a male flushed from the Brownsman pond. Autumn was typically more productive, with 1-40 birds observed on passage over 30 dates from 13 August to 19 October. Thereafter, groups of 1-50 were present during November and December at roosts around North Wamses, Staple Island and Knoxes Reef.

Tufted Duck *Aythya fuligula.* A well represented visitor.
After a productive year in 2016, this season proved typically quiet for this crested *Aythya*. With a lack of spring birds, the first sightings came in midsummer. A drake flushed from Brownsman pond on 1 June was followed two days later by a second on Inner Farne, found on the Central Meadow pond on 3 June. A group of three ducks and a drake passing north through Inner Sound on 8 October was the sole autumn record.

Scaup *A. marila.* An uncommon passage and winter visitor.
This handsome diving duck is uncommon on the islands and 2017 proved no exception. The only record was of a drake flying north through Inner Sound on 10 July, among a flock of 150+ Common Scoter.

Eider *Somateria mollissima.* A common breeding resident.

Prior to breeding, a roosting flock of 138 birds was present on the Inner Group on 19 March. It was an extremely poor breeding season for what is undoubtedly one of the iconic birds of the Farnes, declining by 41% from 2016. It appeared a promising start with the first nest on Inner Farne on 30 March, 11 days earlier than 2016 and the earliest nest on record for the Farne Islands. (Counts of nesting Eider were not made on South Wamses, North Wamses, Big Harcar, Northern Hares or Longstone.) Only 337 breeding pairs were counted, the lowest total since the late 1940s, at a time when Eiders were recovering from the practice of minesweepers using the islands for target practice at the end of World War II. Productivity was also relatively low at 2.22 (2.32) with 536 chicks fledging from 241 monitored nests. The first ducklings were observed on 9 May. The 337 females nested as follows: Inner Farne 197 (332.6), West Wideopen 4 (17.6), East Wideopen 3 (4.4), Knoxes Reef 0 (2.6), Staple Island 22 (34.2) and Brownsman 111 (146.6). After a count of 46 birds on 13 August, post-breeding numbers typically increased throughout the autumn.

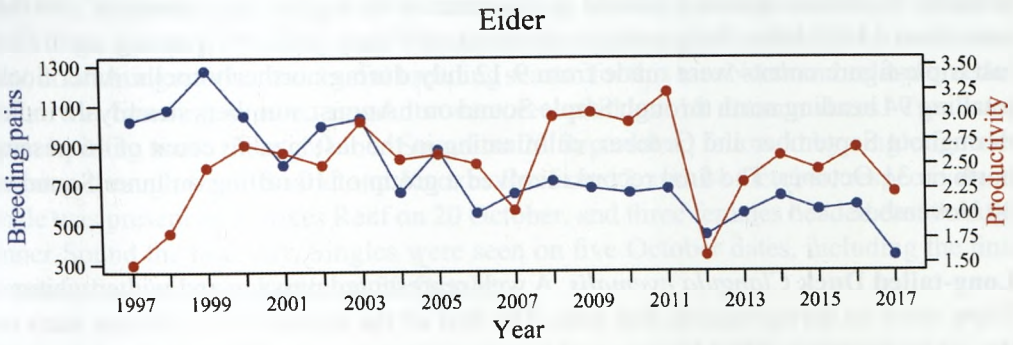

Figure 1. Eider population and productivity from 1997; although some Outer Group islands were not counted in 2017, these would probably only have contributed *circa* 20 to the overall total on the basis of counts for 2016.

Mallard by Jennifer Clarke

Velvet Scoter *Melanitta fusca.* A well represented passage and winter visitor.
Although a quiet season for this rather smart sea duck, it was a marked improvement on last year. The first sighting was a bird among 10 Common Scoters heading south through Staple Sound on 23 July. Seven other individuals were seen during autumn, a period when birds typically move north to moulting grounds off the Aberdeenshire coast. On 9 August, a lone drake passed north off Inner Farne, followed by a pair north through Staple Sound on 23 August. September provided the remaining sightings, with two heading north through Inner Sound and singles in Staple Sound on 10 and 18 September, respectively. The final record on 19 September was of a drake among nine Wigeon flying north through Inner Sound.

Common Scoter *M. nigra.* A common passage and winter visitor.
This season provided records on 55 dates. Though seen on fewer days than in previous years, a total of 2,912 birds were logged around the islands from 27 March to 30 November. Apart from pairs and singles, flocks typically numbered from 3-40 birds. Notable migration occurred around midsummer with higher day counts of 139-341 seen from 14-20 June. Peak passage occurred on 7 July with 357 passing north. The last triple-figure counts were made from 9-12 July during northerly spells. After flocks totalling 94 heading north through Staple Sound on 1 August, numbers steadily dwindled throughout September and October, culminating in the last sizable count of 46 passing north on 31 October. The final record involved a group of 10 rafting on Inner Sound on 30 November.

Long-tailed Duck *Clangula hyemalis.* A well represented passage and winter visitor.
There were no spring records this year. The first of the autumn was a female seen on the sea to the north of Big Harcar on 3 October; there were no further records until 29 October, when a flock of 12 passed north through Staple Sound, followed by five males flying north via Staple Sound on 30 October. Two heading north through Inner Sound on 14 November were followed by the final record of three males passing north through Staple Sound on 2 December. Though wintering ducks are typically a reliable presence around the islands, none were seen this season.

Goldeneye *Bucephala clangula.* A common passage and winter visitor.
It was a quiet year for Goldeneye, with no evidence of a wintering flock around the islands. All sightings occurred in autumn, with an individual flying north through Inner Sound on 9 August providing an unusually early record. Aside from a bird present on Knoxes Reef on 29 September, all other records came from November. One-eight were noted over four dates from 5-14 November, with most records involving singles and pairs heading north through Inner Sound. Notable exceptions involved four flying north through Staple Sound on 12 November, followed by a group of three females and a drake passing west via Inner Farne Lighthouse Cliffs on 13 November.

Goosander *Mergus merganser.* An uncommon passage visitor.
Typically a species of inland waterways, it was a sparse season for this bulky sawbill. There were no spring records for the first time since 2013, and it was not until 29 September that the first bird, a female, was seen on Knoxes Reef. Four males passing north through Inner Sound on 3 October provided the only record for that month, while the last sighting for the year was a male passing north through Inner Sound on 29 November.

Red-breasted Merganser *M. serrator.* A well represented passage and winter visitor and rare breeder.
A pair bred on Inner Farne for the thirteenth consecutive year with the first sighting of a male and a female on the Inner Farne beach on 16 April. A female was flushed from a nest on 9 June during the annual nest count of the islands. This was not in the traditional nesting location, and although a second nest was not found at its usual site, the regular presence of two males and two females on Inner Farne from 24 April onwards suggests that two separate pairs may now be attempting to breed on the islands. A brood of ducklings was seen on 4 July near the site at which a female was flushed on nest-count day, confirming another successful breeding season for this rare Northumberland breeder. After the breeding season, migrants were recorded on 10 autumn dates. Two were seen heading south through Inner Sound on 23 September, followed by single females passing through Inner Sound and Knoxes Reef on 13 and 14 October, respectively. A male was present on Knoxes Reef on 20 October, and three females headed east through Inner Sound the next day. Singles were seen on five October dates, including the final record of a bird in the Kettle on 30 October.

Red-throated Diver *Gavia stellata* . A common passage and winter visitor.
Spring passage was light with 1-2 birds seen on eleven dates between 17 March and 14 June. After the first autumn record of two singles flying south on 10 September, sightings predictably increased with 1-3 birds seen over 13 additional dates until 31 October. Numbers peaked the following month, with high counts of five seen on 3 and 14 November, all heading north through Inner Sound. In addition to four individuals passing through Staple Sound on 4 November, 1-3 were recorded on seven subsequent dates until the rangers departed from the islands in early December.

Black-throated Diver *G. arctica.* An uncommon passage and winter visitor.
Remarkably, of the four wintering and breeding diver species that regularly occur in the Western Palearctic, this species proved just as elusive as the rare White-billed Diver in terms of 2017 occurrences. The first record was a moulting bird passing south through Inner Sound on 30 September. On 9 October, a second bird flying south through Inner Sound marked the final sighting.

Great Northern Diver *G. immer.* A well represented passage and winter visitor.
The only spring record for this powerful diver was on 20 May, when a smart individual in full breeding plumage was watched swimming north across Staple Sound. Autumn

passage commenced on 7 September, and singles were seen on five additional dates until 30 October, when two flew west over Staple Sound. Although numbers never reached the record highs of last November, sightings increased during the month with two passing north on 12 November. Four were present the following day, including a confiding individual on the sea off Inner Farne Lighthouse Cliffs. Singles were present on 3, 15 and 26 November, before three were seen heading north on 29 November. The final records of the season were the following day, with an individual passing north through Staple Sound and a second on the sea in Inner Sound.

White-billed Diver *G. admasii.* An extremely rare visitor.
Among the biggest surprises in a year of remarkable sightings was the appearance of this hefty diver. On 29 October a tense and twitchy seawatch ensued after reports of a moulting adult flying north past Whitburn at 10:33. As the bird was tracked up the Northumberland coast, to the excitement of observers on the mainland, it was discovered that it was followed by a second winter-plumaged individual. At 12:30 the first was picked up by the rangers as it powered north through Inner Sound. The second one was seen at 13:35 as it travelled through Staple Sound, closely following a Great Northern Diver that had passed by moments earlier. These marked the second and third records for the islands, after the first occurrence 17 years ago on 17 September 2001.

Black-browed Albatross *Thalassarche melanophris.* An extremely rare visitor.
On 29 June 2017 a dream came true when a Black-browed Albatross visited the Farne Islands. Arguably the most coveted individual seabird in Europe, this South Atlantic vagrant was first spotted in Sylt, Germany on 21 April. The bird was a true wanderer and visited numerous sites in the North Sea across Norway, Denmark, Netherlands and France. 'Albert', as he soon became known to British birders, made a brief fly-by past Bempton Cliffs on 13 May, where he was photographed by a young birder, who shortly afterwards visited Staple Island and proudly showed his pictures to envious rangers. On 28 June the bird made a spectacular return to Bempton where it was photographed on the cliffs, dwarfing the nesting Gannets. The following day the Albatross was seen heading north past Whitburn at 05:45. The Farnes rangers embarked on a tense morning of seawatching through the open window of Brownsman Cottage, the one place that offered shelter from strong northerly gusts. Spirits were low as the hours dragged on with no further reports. At 11:50 the rangers picked up the unmistakable silhouette of the albatross heading north, approximately 800 metres away in Staple Sound. The winds were near gale force, but the bird navigated the massive storm swell with minimal effort. After 15 seconds it disappeared from view, but later that day it was picked up at Eyemouth, St Abbs and Dunbar. Despite the brief viewing time, it will be a long while before the stunned rangers forget the sight of a Black-browed Albatross against the distant backdrop of Bamburgh Castle. This wonderful sighting is the first record for the Farne Islands.

Fulmar *Fulmarus glacialis.* A common breeder, abundant on passage.
Birds were attending nest sites by the time the rangers returned to the islands on 16 March. The first egg was found on 24 May and 180 pairs (excluding North and South Wamses, Big Harcar or Longstone End which were not counted in 2017) were distributed as follows: Inner Farne 33 (23.6), West Wideopen 16 (12.4), East Wideopen 20 (19.2), Knoxes Reef 15 (16.6), Staple Island 42 (46.6) and Brownsman 54 (61.2). For these islands the total of breeding Fulmars increased by 7% (Table 1). Productivity, monitored on the Outer Group only, was 0.46 (0.49*) with 24 chicks fledged from 52 nests monitored. After the breeding season birds returned to the islands on 14 November and large numbers were present on the cliffs by the end of the month.

*This is a four-year mean as productivity was not monitored in 2015.

Fulmar by Tom Hendry

Sooty Shearwater *Ardenna grisea.* A well represented to common passage visitor.
It was a quiet season for this oceanic wanderer, with 50 birds recorded in Staple Sound across six dates. Singles passing north on 23 July and south on 9 August were the only records in their respective months, with the bulk of passage occurring over four days in September. Two birds heading north on 15 September were followed by 10 the next day, while 17 September provided the peak day count of 34 passing north. Three northerly flyers on 18 September was the final record of the season.

Great Shearwater *A. gravis.* A scarce visitor.
This South Atlantic shearwater was hosted briefly by the Farnes for the fourth consecutive year: a bird which was tracked north from Craster on 16 September was seen by a ranger at 08:15. It drifted slowly from behind the Scarcar Rocks and lingered behind Knoxes Reef, where it settled among feeding gulls for a few seconds before taking flight and continuing north. This obliging individual marked the seventeenth record for the islands.

Manx Shearwater *Puffinus puffinus.* A common passage visitor.
A lack of northerlies resulted in another quiet season for this pelagic favourite; even so it was an improvement on last year in terms of records. After the first sighting of three heading northeast on 18 May, relatively low numbers of between 1-13 were observed on a further 36 days until 27 September. Peak passage occurred during a northerly spell in June, with the season's maximum count of 43 on 26 June. As usual, Staple Sound was the preferred route for passage, with only 12 of 202 logged individuals opting for Inner Sound. Once again, there were no loafing flocks around the islands.

Balearic Shearwater *P. mauretanicus.* An uncommon passage visitor.
The Farnes have been a reliable site for this critically endangered shearwater, with records in 22 of the past 24 years. The trend continued this season, when a bird tracked from Beadnell was seen passing north through Staple Sound on 18 September.

Red-necked Grebe *Podiceps grisegena.* A well represented winter and passage visitor.
The national decline of this wintering grebe is reflected in local records, where it continues to be scarce around the islands. Nevertheless, a winter-plumage bird was photographed on the water off North Wamses on 23 October by Andrew Douglas. This much welcomed observation marked the first record for two years, after a blank season in 2016.

Slavonian Grebe *P. auritus.* An uncommon winter and passage visitor.
Despite a localised wintering population off Stag Rocks (Bamburgh) and Lindisfarne NNR, this slender grebe rarely strays into the Farnes recording area. However, a single was observed battling strong northerly winds as it passed north through Inner Sound on 11 November and a second bird was seen flying north through Inner Sound on 29 November, in the company of a Guillemot.

Spoonbill *Platalea leucorodia.* A rare visitor.
After a four-year absence, the season provided two records of this charismatic heron. On 9 April, a very public adult was observed by rangers and visitors amongst the Inner Group islands. Initially seen over West Wideopen, it flew across the Kettle and over Inner Farne Top Meadow before heading south to the mainland via the Lighthouse Cliffs. The second record concerned an adult in the Outer Group on 21 May. It was observed by one of the rangers as it passed the Staple Island jetty and flew north over the Brownsman Cottage. After the first record in 1988, all subsequent sightings are from 2002 onwards and 2017 marks the eighth year since then in which Spoonbill has been recorded on the Farnes.

Grey Heron *Ardea cinera.* A well represented visitor, bred in 1894.
This island favourite is a scarce visitor during spring yet becomes a regular presence in autumn as singles typically reside around Knoxes Reef and Longstone. This season however provided the best spring for Grey Heron in over eight years, with 1-2 birds recorded on 17 dates between 27 March and 26 June. From 3 July, 1-2 were seen on most days throughout autumn and into November. Peak counts of four were observed

passing east over Staple Sound on 17 September, and also roosting on Knoxes Reef on 24 September. Counts of three were also noted on 3 July, 14 July and 2 September.

Great White Egret *A. alba.* An extremely rare visitor
In the late afternoon of 11 October, as the rangers used a sunny spell during an otherwise rainy day to look for birds on Inner Farne, they encountered a Great White Egret on North Rocks. The startled bird flew off across Inner Sound towards Bamburgh. This was the second record for the islands, after the first on Longstone End in 1998. With increasing sightings of this species in the UK, and individuals lingering on the Northumberland coast, this graceful giant may become a more regular visitor to the Farnes in future years.

Little Egret *Egretta garzetta.* A scarce visitor.
Though increasingly common on the Northumberland coast, these snowy-white herons remain a scarce yet increasing visitor to the Farnes, and one that never fails to stir excitement among the rangers who find them. On 30 March a bird was discovered by the Churn pool, and then took flight along the Quarry cliffs. It was watched by three rangers as it flew west across Inner Sound towards the mainland. This was the ninth individual recorded on the islands and the first since 2014.

Gannet *Morus bassanus.* An abundant passage and summer visitor.
Europe's largest seabird was a daily presence around the Farne Islands, with birds making foraging trips from breeding grounds in Lothian and East Yorkshire. Large numbers were recorded throughout the season, with a peak count of over 1,000 birds logged on 29 June. On 24 May, an adult was observed on the sea in Brownsman Gut before moving on to the Flats. Remarkably, the clearly exhausted bird was later rediscovered sleeping outside the Brownsman tower. It was gone by the following morning.

Shag by Tom Hendry

Shag *Phalacrocorax aristotelis*. A common breeding resident.

Present all year round the Farnes, with a significant post-breeding population maintained during winter. Usually the first of the island's seabirds to start breeding, Shags were fully established at nesting sites when rangers returned to Inner Farne in March. The first egg was recorded on Mother's Day, 26 March, at Lighthouse Cliffs on Inner Farne. Shags nesting on Big Harcar, Megstone and Longstone End were not counted this year and the total of 710 for the rest of the Farnes archipelago were distributed as follows: Inner Farne 307 (245.6), West Wideopen 93 (73.8), East Wideopen 60 (63.6), Skeney Scar 14 (44.4), Staple Island 118 (115), Brownsman 82 (79.2), North Wamses 14 (29.6), South Wamses 15 (26.2) and Roddam and Green 7 (6.8). The first chick was observed on 4 May, and 510 chicks fledged from 406 monitored nests, giving a productivity of 1.26 (1.31), an increase on the 1.19 for last year. Fledglings were seen from mid-late June.

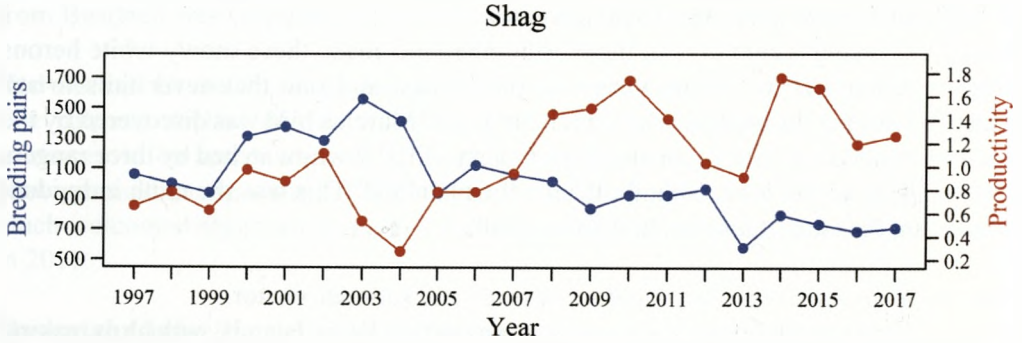

Figure 2. Shag population and productivity from 1997; although some Outer Group islands were not counted in 2017, these would probably only have contributed circa 50 pairs to the overall total on the basis of counts for 2016, suggesting that the population is at least stable compared to 2016 and is likely to have increased slightly, as suggested in Table 1.

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

This species is present throughout the year, although only small numbers are observed in winter. After a steady decline over the last three decades, Cormorant breeding numbers have been relatively stable in the past five years, although decreased compared to last year by 4%. Birds were on nests by April but no attempt to record the first egg date was made to keep disturbance to a minimum. A total of 92 (98.4) pairs nested as follows: East Wideopen 37 (49.6), North Wamses 0 (16.2) and Big Harcar 55 (32.6). The gradual shift of breeding from North Wamses to Big Harcar ended with none nesting on North Wamses for the first time since 1937. This shift started in 2008 and is a consequence of stopping open access to Big Harcar in 2007, leaving it free of regular human disturbance.

Sparrowhawk *Accipiter nisus*. An uncommon visitor.

There were three records of this woodland hunter, all from the Inner Group, with European migrants typically making up the majority of birds. The first record on 28 June was of a female roosting on Prior Castell's Tower, sheltering from northerly gales. A large female, most likely of Fennoscandia race, was present on Inner Farne on 16 October. It was found perched on a Central Meadow post before relocating to the Dock Bank sticks. The third bird recorded on 6 November was also present on the Dock Bank.

White-tailed Eagle *Haliaeetus albicilla.* An extremely rare visitor.
On 2 April, rangers were alerted to a commotion out at sea between Inner Farne and Megstone. Approximately 200 gulls were mobbing an enormous bird of prey: an articulated barn door with deep and powerful wingbeats. The ecstatic rangers alerted colleagues and visitors to the presence of an immature White-tailed Eagle. It did not linger however, and shortly after 13:40 the mighty bird headed northwest towards the mainland in the direction of Ross Sands. This brief but unforgettable encounter marked the first true record for the Farne Islands. In 2010 a tagged bird arrived on Staple Island and was present from 28 August to 14 September; released 10 days earlier as part of a translocation program in Fife, the bird was certified as Category E and therefore could not be classed as a wild record. Fast forward to 2017, and the first wild Sea Eagle to grace the Farnes, a thrill to witness, is likely to have hatched from an east coast nest.

Water Rail *Rallus aquaticus.* An uncommon passage visitor.
It was an excellent year for this skulking migrant, with Inner Farne providing five individuals recorded over three dates in autumn. As in most years the Dock Bank was a reliable site for this species, with birds flushed on 9 August and 25 September. A night of heavy southeasterly downpours drove three to seek shelter in the ranger buildings, and were discovered on the thick, foggy dawn of 20 October. A somewhat surprised ranger found the first lurking in the men's toilets, and two were found in the Pump House shed. All left of their own accord and did not need assistance to escape. This remarkable record marked the joint highest day count for Water Rail, with the only other record of three birds dating back to 30 October 1883.

Water Rail by Tom Hendry

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

This striking wader is common throughout the year, with numbers peaking in the autumn after the breeding season. No nest count was conducted on North and South Wamses, Big Harcar, Northern Hares and Longstone this year. The first nest with three eggs was discovered on 20 May on Inner Farne Dock Bank. Across the rest of the islands, 13 pairs nested as follows: Inner Farne 5 (6.2), West Wideopen 1 (2.8), East Wideopen 0 (1), Knoxes Reef 2 (2.4), Staple Island 2 (5.6) and Brownsman 3 (9.2). Oystercatcher nests on the Farnes are particularly vulnerable to gull predation, but although some were lost this way a number successfully produced fledglings. Chicks were observed on Brownsman on 5 June and also on Staple Island. The first fledglings were seen on 24 June near Ladies' Path on Inner Farne. A peak count of 142 was recorded from Inner Farne on 22 November.

Lapwing *Vanellus vanellus.* A well represented passage visitor; sporadic breeder in the past, last attempt in 1962.

It was a subdued season for this declining farmland species with records on five dates. On 17 June, a single bird flying north over the Brownsman southeast cliffs was the first record in late spring this year. A second bird was then flushed from Staple Island Meadow on 3 July, while a single heading west over Inner Farne North Rocks on 24 September was the only sighting for that month. On 19 October another single was seen from a visitor boat, flying low over South Wamses. A modest flock of five was seen over Inner Farne on the same day and was the only multiple sighting for the season. The final record was of an individual flying west over the Inner Farne Lighthouse Compound on 20 October.

Golden Plover *Pluvialis apricaria.* A common passage visitor.

Most records for this upland breeder typically involve birds in post-breeding flocks that gather on the Outer Group. This season was no exception, with 17 of the 29 records relating to such roosts. With no spring sightings, the roost on Longstone provided the first record of 50 birds on 3 July. The roost subsequently fluctuated over the autumn with over 200 present across 10 dates from 3 August to 8 September. Peak counts of 500 were on 4 and 8 August. Passage was also noted from the Inner Group in small numbers. After a single on Ladies' Path on 12 September, 1-40 birds were seen from Inner Farne on seven dates until 5 October. A single flying west over the Inner Farne Lighthouse Compound on 14 October was the last of the season.

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

The islands host a small breeding population of this petite charismatic wader with the first bird seen on St Cuthbert's Cove on 21 March. The first egg was discovered in a nest in a hollow on the rocks beside the path leading to the Inner Farne jetty on 7 May and contained four eggs by 13 May. A Little Tern ringing session on Inner Farne beach on 16 May resulted in one of the nesting plovers being caught in a mist net and ringed.

As in 2016, 4 (5.2) pairs nested across the islands as follows: Inner Farne 2 (1.6), Staple Island 0 (0.4), Brownsman 2 (2.8) and Longstone 0 (0.4). Unfortunately, they were not to be as successful as last year, despite their persistent efforts to overcome disturbance, predation and bad weather. A protective chicken wire cage was placed over the Inner Farne nest in a bid to prevent predation of the eggs, but the close proximity of the nest to the path left it vulnerable to visitor disturbance, and despite the ranger's best efforts to keep visitors away and the perseverance of the incubating female, the nest was eventually predated on 25 May. The pair re-laid on the beach, dangerously close to the tide line. Rangers raised the nest by relocating it on to a raised platform of a fish crate filled with sand. The adaptable pair soon learned to hop on to the raised platform and continued to incubate safely out of reach of the tide. Sadly, a particularly bad storm from the north during spring tides decimated the Inner Farne beach overnight, destroying all the scrapes and nests, including that of the Ringed Plover. A juvenile Ringed Plover was recorded on Inner Farne Ladies' Path on 24 July, possibly from the Inner Group's second nesting pair. The two breeding pairs on Brownsman failed to produce any young. It was an unusually scarce year for post-breeding and passage birds, with only a small gathering of two adults and a juvenile present on St Cuthbert's Cove, Inner Farne during August. The last bird was seen on 22 August.

Whimbrel *Numenius phaeopus.* A well represented passage visitor.
Despite an absence of sizeable flocks this season, it was a decent year for Whimbrel with records on 52 dates, the highest since 2012. Spring passage involved singles present from 19-24 April and 26-29 April on Inner Farne, followed by an individual seen on Brownsman from 30 April-1 May. Individuals were subsequently seen on Inner Farne North Rocks across three dates in early May, followed by a bird on Knoxes Reef on 31 May. June commenced with two spotted in the Inner Group on 13 June, followed by a single present on Staple Island from 15-16 June, and Inner Farne North Rocks on 21 June. Migration was more visible from July onwards, with 1-3 recorded from both Inner and Outer Groups across 33 dates, including the final sighting of two on Longstone on 10 October. The only larger counts involved four passing north over Ladies' Path, Inner Farne on 26 August, and four on Knoxes Reef on 27 September.
Curlew *N. arquata.* A common passage and winter visitor.

Curlews are present throughout the year on the Farne Islands, with large post-breeding roosts typically assembling on Knoxes Reef and West Wideopen. The peak count this year was 100 birds on 23 August. (Table 3).

Table 3. Peak counts of Curlew abundance, Farne Islands 2017.

	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Individuals	35	16	12	5	52	100	50	40	78	98

Bar-tailed Godwit *Limosa lapponica.* A well represented passage visitor.
In contrast to its Black-tailed namesake, it was a disappointing year with only five

records. The first sighting was a female present on St Cuthbert's Cove, Inner Farne, on 30 April, which lingered through to the following day. Meanwhile, in the Outer Group a single north over Brownsman alongside a Black-tailed Godwit on 1 May was the final spring record. Autumn passage began with one passing west over Inner Farne on 10 September, and the final record was one on Knoxes Reef on 18 September.

Black-tailed Godwit *L. limosa.* An uncommon passage visitor.
It was a great year for this species with impressive numbers recorded across nine dates in 2017. The first record was a single which flew north, in the company of a Bar-tailed Godwit, over Brownsman pond on 1 May. A second individual found on Knoxes Reef on 13 June was followed by a flock of five passing west over Inner Sound a week later on 20 June. Flocks of six birds north over Inner Farne and five on Knoxes Reef were seen on 5 and 9 July respectively, and a single was logged from West Wideopen on 13 August. A count of 30 on Knoxes Reef on 20 August was surpassed by a flock of 41 passing through Staple Sound on 17 September. This is the third highest day count for Black-tailed Godwit on the Farnes, following 42 seen on 7 July 2006 and 88 on 10 July 2010. Two on the Inner Farne North Rocks on 3 November was the latest record since 2012.

Turnstone *Arenaria interpres.* A common passage and winter visitor.
Turnstones are present all year round on the Farne Islands, with large roosts on Knoxes Reef and Longstone. Peak passage occurred in autumn, with 221 recorded across the islands on 13 August. (Table 4).

Table 4. Peak counts of Turnstone, Farne Islands 2017.

	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Individuals	14	9	20	11	142	221	17	200	53	120

Knot *Calidris canutus.* A well represented passage visitor.
This stocky shorebird is a regular fixture of the Farne Islands summer, with large flocks gathering from May onwards on Knoxes Reef and Longstone. The first record was a single on Inner Farne on 2 April, followed by a group of four heading east over Staple Island on 17 May. Numbers increased from 2 June with counts of 1-59 birds on a further 38 dates, reaching a peak of 121 birds in the Knoxes Reef roost on 13 June. Seventy on Longstone on 10 August was the maximum on the Outer Group. The final records were of four individuals on Ladies' Path, Inner Farne, on 19 August and a single there on 29 August.

Ruff *C. pugnax.* A well represented passage visitor.
It was a typical year with 19 birds recorded across five autumn dates. A single on Ladies' Path, Inner Farne, on 18 August was the first sighting, followed by three heading west over Inner Farne on 25 August. A month later five were seen on Knoxes Reef, before a flock of three passed through Inner Sound on 30 September. The final record of seven Ruff flying north over Inner Farne on 20 October was the latest since 2010.

Sanderling *C. alba.* An uncommon passage visitor.
Though regular on the mainland, this energetic surf-runner is scarce on the Farnes and this season proved no exception. There were three records, all hailing from Inner Farne. An adult summer-plumage bird was present in St Cuthbert's Cove on 23 July, followed by a second on 7 August. The last record was of a group of five adults which flew from South Rocks to Ladies' Path on 8 September, all in close proximity to rangers on the jetty.

Dunlin *C. alpina.* A common passage and winter visitor.
Light spring passage provided 1-2 birds on nine dates from 9 April to 23 June on Inner Farne, Knoxes Reef and Brownsman. Thereafter, 1-4 birds were present on Brownsman for five consecutive days from 26-30 June, with three again seen on 2 July. Numbers increased throughout summer and autumn, with 1-10 birds recorded on 31 dates from 4 July to 31 August. Higher counts during this period involved 22 on 16 July, and the peak count of 40 on 17 July, which included 18 on Brownsman, 4 on Knoxes Reef and 18 on West Wideopen. Passage slowed considerably as autumn progressed, with singles logged on 25 and 30 September on Inner Farne. A count of 22 on Knoxes Reef on 5 October was the third highest for the season. The final record was a single on Inner Farne South Rocks on 20 November.

Purple Sandpiper by Tom Hendry

Purple Sandpiper *C. maritima.* A common passage and winter.
The Farnes host nationally important numbers of this obliging wader, and support approximately 1% of the wintering population in the UK. It was a quiet year by most standards, with a meagre peak of 43 recorded on 27 July across Longstone and Staple Island (Table 5). June is typically a blank month for Purple Sandpiper on the islands, but on 9 June a count of six on Knoxes Reef was the first record for that month since 2012.

Table 5. Peak counts of Purple Sandpiper abundance, Farne Islands 2017.

	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Individuals	20	14	2	6	43	6	18	2	31	18

Little Stint *C. minuta.* An uncommon passage visitor.
There was one record for this inconspicuous *calidrid*, typically a bird of autumn passage but which put in an early appearance on Inner Farne this season. A single observed in St Cuthbert's Cove on 29 May was only the second spring record since 1999; the last spring occurrence was on Longstone on 30 May 2012.

Woodcock *Scolopax rusticola.* A well represented passage visitor.
It was a quieter than average season, with just one spring record of a fly-by past Inner Farne on 28 March. Autumn passage started slowly with one flushed from the Inner Farne Cemetery on 19 October. This was followed by singles on Inner Farne South Rocks on 23 October and on Brownsman on 24 October. Movement became more visible from 1 November, with 1-2 birds sighted on eight further dates until 25 November, when an individual flushed from the Inner Farne Top Meadow was the final record. Peak passage occurred on 3-4 November, with four seen on both days passing west across Staple and Inner Sounds, and also on Longstone, North Wamses and Staple Island.

Jack Snipe *Lymnocryptes minimus.* A well represented passage visitor.
It was an unusually quiet year for this small snipe, with a total of only three seen on Inner Farne over two autumn dates. The first was present on the dried-up pond on Central Meadow on 13 October, while on 19 October the second and third birds were found on the North Rocks and Central Meadow.

Snipe *Gallinago gallinago.* A well represented passage visitor.
It proved a somewhat dismal year for Snipe with only 22 records. For the first time since 1983 there were no spring sightings, with the first record being one flying west over Inner Farne on 25 August. Passage became more frequent from 3 September with a single passing west through Inner Sound, closely followed by the seasonal peak of four heading west over Inner Farne on 10 September. Singles were logged on a further 17 dates until the final record of one flying north through Inner Sound on 30 November. Pairs were also logged on 25-26 September and 5 October during this period, all from Inner Farne. The only record from the Outer Group was an individual on the Brownsman Flats on 14 November.

Common Sandpiper *Actitis hypoleucos.* A well represented passage visitor.
A quiet spring for this species, with a single record from Brownsman North Rocks on 30 May. After the first autumn bird was flushed from Brownsman pond on 3 July, sightings became more frequent with individuals seen on a further 19 dates until the last sighting on 10 September. Additionally, pairs were also seen on 21 July, and 2, 22 and 27 August, whilst peak counts of three were seen on 9 and 18 August on the Inner Farne South

Rocks. The majority of records came from Inner Farne, with 22 of 27 sightings made from the North Rocks, South Rocks or Ladies' Path.

Green Sandpiper *Tringa ochropus.* An uncommon passage visitor.
After a quiet year in 2016, the season saw a marked improvement with a minimum of five Green Sandpipers recorded over six dates. The first was found skulking by the Brownsman pond on 24 July, where it lingered through to the following day. As the rangers viewed this bird on 25 July they were pleased to see a second fly in to join it. One seen on 27 July was presumably from this pair. The Inner Group provided two records, with singles flushed from the Inner Farne Top Meadow and pond on 7 and 22 August respectively. An individual on the Brownsman Flats on 5 September was the final record.

Redshank *T. tetanus.* A common passage and winter visitor; bred in nine years 1901-1943.
This noisy wader is typically present throughout the year and was recorded on every month that the rangers inhabited the Farne Islands. As in most years, numbers increased from July onwards once breeding on the mainland had finished. The peak count of 78 (Table 6) was recorded on 9 July and was the highest day count for Redshank since 2013. Large counts of 57 and 66 were also logged on 14 and 17 July respectively.

Table 6. Peak counts of Redshank abundance, Farne Islands 2017.

	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Individuals	2	25	3	10	78	29	24	8	8	2

Wood Sandpiper *T. glareola.* An uncommon passage migrant.
An obliging adult, the first of this species since 2014, was discovered on the Brownsman pond on 30 June and was also seen the following day, offering close views as it roosted by the Flats. A second individual was roosting on Knoxes Reef on the morning of 4 July.

Spotted Redshank *T. erythropus.* A scarce passage visitor.
After a three-year absence of this species, an immature Spotted Redshank made a welcome appearance on the Farnes, seen at dusk on 27 August by the Churn pool on Inner Farne. It took flight towards Ladies' Path, but despite an extensive search could not be located. This was the first sighting since 2014, when an immature bird was seen on Brownsman on 2 September.

Greenshank *T. nebularia.* A well represented passage visitor.
Another poor season for Greenshank with just four records, all from the Inner Group. The first flew south, calling, over Inner Farne on 18 August; a single was present on the North Rocks on 26 August. An individual on Ladies' Path on 10 September was the only record for that month, and the final record was of one heading south over the Kettle on 23 October, the latest Greenshank record in over ten years.

Kittiwake and chick by Tom Hendry

Kittiwake *Rissa tridactyla.* An abundant breeder and passage visitor, well represented in spring.

A much-improved year for this species, with a 35% increase in breeding pairs despite the lack of counts for Big Harcar. There was also a welcome increase in productivity from 0.58 to 0.69 (0.73) with 467 chicks fledged from 674 monitored nests. The first egg was spotted on 14 May at Inner Farne Lighthouse Cliffs. The 4,753 breeding pairs counted were distributed as follows: Inner Farne 1,665 (1,249.4), West Wideopen 234 (192.6), East Wideopen 273 (222), Skeney Scar 179 (131), Staple Island 1,210 (970), Brownsman 1,156 (1,024.6), North Wamses 32 (23.6) and Roddam and Green 4 (8.8). The first chicks to hatch were on Brownsman on 3 June and at Inner Farne Lighthouse Cliffs on 7 June. After breeding, small numbers of this dainty gull were observed throughout September, October and into November.

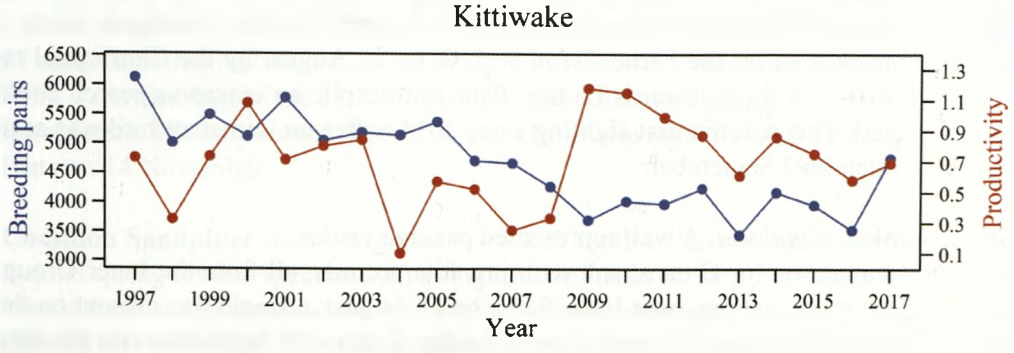

Figure 3. Kittiwake population and productivity from 1997; although some Outer Group islands were not counted in 2017, on the basis of counts for 2016 these would probably only have contributed circa 30 pairs to the overall total.

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

The spring roosts for this species were considerably smaller than in previous seasons, with a peak of 240 across the Inner Group on 19 March. Black-headed Gulls began to settle on Inner Farne Central Meadow in early April and the first egg was found on 25 April. Two pairs returned to Brownsman for another breeding attempt, but as happened last year the nest was predated. In total 487 (523.4) pairs nested as follows: Inner Farne 485 (522.8), Brownsman 2 (0.6), representing a decrease of 4% from 2016. The first chicks were seen on 15 May. Interestingly, a chick which had fallen from a nest on the Vegetable Garden wall wandered into an Arctic Tern nest on the adjacent boardwalk and was brooded by the adult tern; however, the Black-headed Gull chick was not fed by the adult tern and eventually died. As was the case last year, there were no large wintering flocks in November, although a high count of 292 was logged across Knoxes Reef and the Wideopens.

Little Gull *Hydrocoloeus minutus.* A well represented passage and winter visitor.

It was a good year for this small gull with at least four individuals seen over 12 spring dates. The first record was of a first-summer bird present in the evening gull roost at St Cuthbert's Cove, Inner Farne on 16 April. Two weeks later a second first-summer individual was spotted on the Inner Farne Top Meadow on 1 May. It was presumably this same individual that was seen on seven further dates, typically around Inner Farne Meadows, until 24 May, when it was recorded for the last time on South Rocks. It had also flown to Brownsman Flats, where it was seen from 18-19 May. A separate adult was present on Ladies' Path on 2 May. The final sighting concerned another first-summer bird, which travelled from Knoxes Reef to Brownsman on 28 June, where it was again seen two days later.

Mediterranean Gull *Ichthyaetus melanocephalus.* An uncommon passage and winter visitor.

It was an unusual season on the Farnes for this continental colonist. On 2 April a handsome black-hooded individual was spotted by one of the rangers on Inner Farne Central Meadow within the Black-headed Gull colony. Remarkably, this second-summer bird was not only observed calling and displaying to its neighbouring Black-headed Gulls, but also took up residence in the colony. It was seen on a further 29 dates throughout April and May, though there was no evidence of a nesting attempt. It transpired on 19 May that the resident Mediterranean Gull had been replaced by a ringed bird, but there was no evidence that the two separate individuals had been present on the island at the same time. The new individual, which had been ringed as a chick on Coquet Island, Northumberland (30 km south of the Farne Islands), in June 2015, was seen on consecutive days until 25 May, the last date that either bird had been seen in the colony. These events encourage speculation that the small colony of Mediterranean Gulls on Coquet Island may establish the species as the next breeding bird for the Farne Islands.

Common Gull *Larus canus.* A common visitor; bred in four years 1910-1914 and possibly in 1916 with attempted breeding in 1974.
Low numbers of Common Gulls were recorded in spring and autumn. The first record was a single on Knoxes Reef on 2 April, followed by flocks of six and four on 21 April, before a modest peak count of 24 on Knoxes Reef on 24 April. Autumn birds were mostly seen in single figures during October.

Great Black-backed Gull *L. marinus.* A well represented breeder, common passage and winter visitor.
This year bucked the recent upward trend of this apex predator and saw a 32% decrease in breeding numbers compared to last year with 15 (17.6) pairs which nested as follows: West Wideopen 1 (1.6), East Wideopen 3 (4.2), Knoxes Reef 0 (0.6), Staple Island 5 (1.4), Brownsman 2 (1.6), North Wamses 2 (3.6), South Wamses 2 (2.4) and Big Harcar 0 (2). After the breeding season the resident population was supplemented by wintering birds which numbered into the dozens across the Inner and Outer Groups.

Glaucous Gull *L. hyperboreus.* An uncommon passage and winter visitor.
It was a good year for this heavy-set northern gull with a minimum of four recorded over five months. On 18 March one of the rangers stepped outside the Lighthouse Cottage dormitory on Inner Farne to find a confiding second-winter bird perched on the rocks. It lingered all day and was joined by another second-winter individual in the West Wideopen roost. Thereafter one of them was seen on a further 34 dates across Inner Farne, West Wideopen, Brownsman and Staple Island until 28 May. There were other second-winter birds seen in autumn, the first being an individual on East Wideopen on 18 September. The last one of the season was observed on 22 November relaxing in the Kettle before relocating to the South Rocks.

Glaucous Gull by Tom Hendry

Iceland Gull *L. glaucoides*. An uncommon passage and winter visitor.
For the first time since 2012 there was only one record of this white-winged gull. A second-winter bird flew close past the Lighthouse Cliffs on the morning of 28 November, presumably having left the gull roost at Knoxes Reef and the Wideopens. It subsequently flew west towards the mainland.

Herring Gull *L. argentatus*. A common breeding species, abundant passage and winter visitor.
A resident of the Farnes, pre-breeding roosts peaked at 291 across the Inner Group on 21 March. The number of breeding pairs of this red-listed species increased by 28%, with the 847 (757.2) pairs distributed as follows: Inner Farne 33 (19.8), West Wideopen 114 (110.8), East Wideopen 242 (148.4), Knoxes Reef 87 (75.8), Skeney Scar 24(29.6), Staple Island 39 (40), Brownsman 12 (7.6), North Wamses 88 (146.2), South Wamses 67 (41.8), Roddam and Green 32 (18.6) and Big Harcar 109 (84). After breeding, large numbers wintered around the islands, particularly on Knoxes Reef and the Wideopens.

Lesser Black-backed Gull *L. fuscus*. A common breeding summer and passage visitor.
Prior to breeding, the evening roosts of this migratory gull peaked at 110 birds on 19 March. Although a below-average breeding year for this large gull, the population increased by 4%. The 593 (672.2) pairs nested as follows: Inner Farne 35 (27.6), West Wideopen 92 (179.2), East Wideopen 58 (103.2), Knoxes Reef 29 (28.8), Skeney Scar 1(10.4), Staple Island 133 (41.4), Brownsman 14 (13.4), North Wamses 45 (73.4), South Wamses 117 (116.2), Roddam and Green 2 (2.4) and Big Harcar 67 (67.2). Despite growing numbers of this species wintering on the mainland, the island population typically departs for the Iberian Peninsula and further south in late September.

Sandwich Tern *Thalasseus sandvicensis*. A common breeding summer and passage visitor.
The first birds of the year were seen on 30 March when five flew south over West Wideopen and eight were in the Ladies' Path roost that night; the peak count in the roost was 600 on 7 May. This season saw a continuation of the decline since 1982 with a 12% decrease in breeding pairs compared to last year. From the 4,086 pairs in 1982 there has been an overall decline of 86% to the present day. All 556 (825.6) nesting pairs were on Inner Farne, and there was no repeat of the breeding attempt on Brownsman (five-year mean 4.8) last year, despite the regular presence of a pair throughout May and June. The first egg was discovered on the Central Meadow on 14 May. The first chick was seen on 3 June and fledglings were within the colony from 24 June. After the breeding season small numbers were recorded on eight dates between 21 August and 19 September, with a maximum of 40 on 19 September.

Little Tern *Sternula albifrons.* A well represented passage visitor.
The first record this season was of 42 in the traditional St Cuthbert's Cove roost on 30 April. Numbers quickly rose to a peak of 124 on 8 May (Table 7), the second highest count for the islands, and included a colour-ringed individual from a colony near Hartlepool. Numbers then decreased until the last four were seen on 12 June. Five were caught for colour-ringing on 16 May, and of these one was originally ringed as a chick in a now-defunct colony in Montrose Bay, Scotland. Away from the roost, the only other record was of two on Brownsman Flats on 29 May.

Table 7. St Cuthbert's Cove roost counts of Little Terns for May 2017.

Date	1	2	3	4	5	6	7	8	9
Number	33	65	69	73	83	83	107	124	107

10	11	12	14	15	19	20	23	27	28
10	11	12	14	15	19	20	23	27	28

Roseate Tern *Sterna dougallii.* A well represented summer and passage visitor. Uncommon breeder.
The first birds of the year were recorded on 17 May; subsequently 1–2 were seen around the islands on 12 dates until 6 July. The first juvenile was seen with its parent on Inner Farne on 16 July, and the two were identified from the ring numbers, read through a telescope, as originating from Coquet Island. Two adults and two juveniles were noted on 30 July, and numbers increased to seven adults and two juveniles on 1 August, reaching a peak on 7 August with three juveniles and eight adults. Small numbers were logged around Longstone between 26 August and 13 September, with a maximum of about 30 on 2 September.

Common Tern *S. hirundo.* A common breeding summer and passage visitor.
The first sighting of the year was an individual on Knoxes Reef on 26 April and numbers increased to 13 in the Ladies' Path roost on 29 April. By 2 May pairs had started to settle at their usual nesting location by Central Meadow pond. The downward trend continued this season and the lowest numbers since 1975 were recorded with only 75 (91) pairs nesting on Inner Farne only. Fledglings were noted by the Central Meadow pond in early to mid-July. There were no autumn records this season.

Juvenile Arctic Tern by Tom Hendry

Arctic Tern *S. paradisaea.* An abundant breeding summer and passage visitor. The first two of the season flew over on 6 April but there were no further records until 21 April. By 24 April, the roost had increased to 12. As usual, numbers increased rapidly and 3,000 were counted on 15 May. The first eggs were discovered on 15 and 16 May on Inner Farne and Brownsman, respectively. The 2017 season was an excellent one for this species, with a 25% increase in breeding pairs and the highest overall productivity since 2014. The 1,883 (1,839) pairs nested as follows: Inner Farne 1,328 (1,247), Staple Island 2 (9) and Brownsman 553 (583). Despite the increase in numbers of large gulls, the main island predator for the Arctic Tern, overall productivity was good at 0.53 (0.48) with 911 chicks fledging from 1,705 nests monitored: a welcome improvement from the 0.23 last year (Figure 4). It is noteworthy that the productivity on Brownsman, an island with no visitor access, was only 0.27 compared to 0.75 for Inner Farne; the higher productivity on Inner Farne may be due to the protection from predators afforded by regular human activity. The first chick hatched on 6 June on Inner Farne and fledglings were present from early July. After the breeding season, there were some large movements with more than 500 logged passing the islands on 12 September and 200 the following day. The final record was of 18 birds in Staple Sound on 20 September.

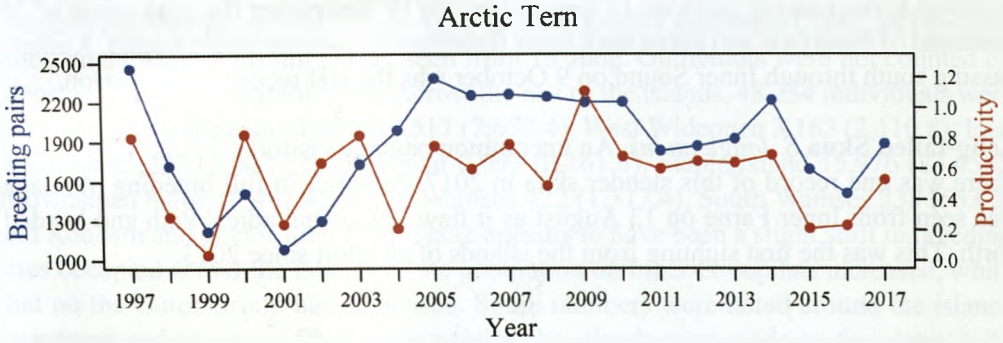

Figure 4. Arctic Tern population and productivity from 1997.

Black Tern *Chlidonias niger.* An uncommon passage visitor
It was a very quiet season for this elegant marsh tern, with just a single present on Longstone on 29 September.

Great Skua *Stercorarius skua.* A common passage visitor.
The only spring record occurred on 11 May, when an adult passing east flew low over Brownsman. This was followed in midsummer by two singles north through Staple Sound on 30 June. After the first autumn record of one flying north through Inner Sound on 11 July, 1-3 were seen on a further 15 dates until 26 September. Peak passage occurred on 17 September with seven passing north through Staple Sound, followed by six the next day. The only other high day count involved four on 3 September comprising three passing north and one south through Staple Sound. A single flying north through Inner Sound on 13 October was the last record of the season. Of the 47 individuals seen throughout the year, 28 were recorded during September.

Pomarine Skua *S. pomarinus.* A well represented passage visitor, common in some years.
Despite an absence of high day counts it was a decent year with records on five autumn dates. The first was a dark-phase bird passing south through Inner Sound on 22 August, the only record for the month. The only multiple sighting was of two, a juvenile and a dark individual flying south on 5 September, followed by another dark-morph individual heading south on 11 September. Dark juveniles were also seen heading north through Staple Sound on 16 and 18 September. Unlike last year, there were no November records. There were also no records for full 'spoon-tailed' adults this season.

Arctic Skua *S. parasiticus.* A common passage visitor.
A total of 88 birds was recorded over 34 dates this season, commencing with the only spring record, a dark-morph adult mobbing a gull through Staple Sound on 1 June. The first autumn bird flew north past Longstone on 3 July and was followed by 1-6 on a further six July dates until 4 August, when a single and a pair passed through Inner and Staple Sound, respectively. Passage became more visible from 5 August onwards, with 1-6 seen on a further 21 dates until 30 September, when an individual passed south over Knoxes Reef. There were only two higher day counts this season, the first of which involved seven passing north on 14 September. On 17 September the peak count of 10 consisted of three pale and seven dark birds flying north through Staple Sound. A single passing south through Inner Sound on 9 October was the last record of the season.

Long-tailed Skua *S. longicaudus*. An uncommon passage visitor.
There was one record of this slender skua in 2017. An adult in full breeding plumage was seen from Inner Farne on 13 August as it flew low over Ladies' Path and headed north. This was the first sighting from the islands of an adult since 2013.

Little Auk *Alle alle.* A well represented passage and winter visitor.
Despite some favourable conditions, it was a quiet season for this tiny arctic Auk and only small numbers were recorded on a handful of dates. The first record came on 5 November when two birds flew south through Inner Sound, followed a week later by five flying north through Staple Sound. There were no further records until a single individual was seen on the sea off Inner Farne North Rocks on 26 November. The final sightings were on 29 and 30 November, when eight and two respectively were seen flying north.

Guillemot and chicks by Sarah Lawrence

Guillemot *Uria aalge.* An abundant breeding resident and passage visitor.
The first egg was discovered on 16 April at Inner Farne Lighthouse Cliffs, and the first chick on 21 May. Jumplings were seen from 13 June. Guillemots were not counted on Megstone or Big Harcar this year. Across the rest of the islands, 48,234 individuals were counted as follows: Inner Farne 12,517 (7,672.4), West Wideopen 3,163 (2,110.8), East Wideopen 5,237 (3,002), Skeney Scar 2,093 (2,161.6), Staple Island 15,976 (23,458), Brownsman 8,468 (9,481.4), North Wamses 422 (1,317.4), South Wamses 238 (553.2) and Roddam and Green 120 (141). There appears to have been a slight shift in breeding sites occupied across the islands as the population on Inner Group has increased, while that on the Outer Group has decreased. Small numbers were noted around the islands in autumn and counts of 50 or more passing the islands were made on five dates, with more than 80 noted on 29 October.

Razorbill *Alca torda.* A common breeding resident and passage visitor.
Birds were already present on the islands when rangers returned in mid-March and by 26 April the first Razorbill egg was found at Inner Farne Lighthouse Cliffs. The first chick was observed on 3 June. Productivity, monitored only on Inner Farne, was 0.50 with 19 chicks fledged from 38 nests (Figure 5). Big Harcar was not surveyed during cliff counts, and the 459 pairs across the rest of the islands were distributed as follows: Inner Farne 223 (220.6), West Wideopen 64 (81.4), East Wideopen 31 (29.6), Skeney Scar 8 (18.2), Staple Island 87 (66.4), Brownsman 12 (19.8), North Wamses 12 (8.8), South Wamses 20 (16) and Roddam and Green 2 (0.4). After the breeding season, birds were recorded on five dates between 10 October and 30 November. The only notable movement was on 29 October when 11 flew north.

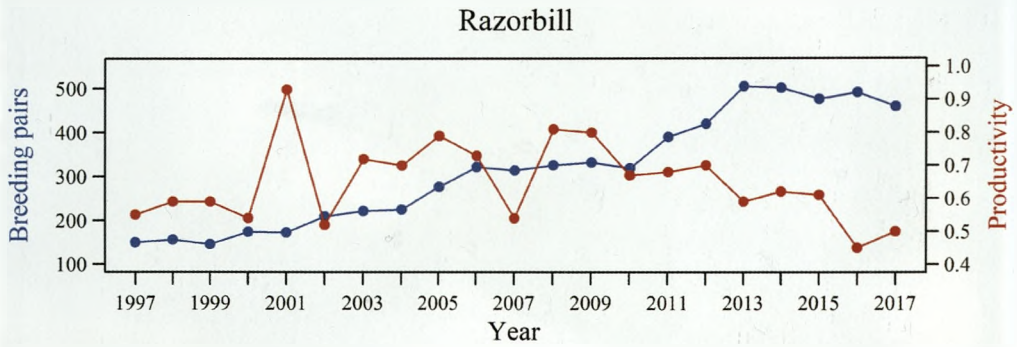

Figure 5. Razorbill population and productivity from 1997; although Big Harcar was not counted in 2017, this island would probably only have contributed circa 12 pairs to the overall total on the basis of counts for 2016.

Black Guillemot *Cepphus grylle.* A well represented winter and passage visitor. Bred in seventeenth and possibly eighteenth centuries.
A quiet season for this striking auk with only two records. The first was on the rocks below the Inner Farne Lighthouse on 24 October, and the second on 15 November when one was seen on the water off North Wamses as the rangers were returning from marking seals.

Puffin *Fratercula arctica.* An abundant breeding summer and passage visitor.
Puffins were present on Inner Farne on 20 March, and by 28 March were observed back at their burrows. They were seen with fish at burrow entrances on 23 May, indicating that chicks had hatched. The first fledglings were noted by 1 July. The next Puffin census is due in 2018 and no population counts were undertaken this year. Heavy rain affected productivity giving a low value of 0.52 (0.77) compared to 0.70 last year. There was a stark difference in productivity between Inner Farne at 0.60 and Brownsman at 0.43, with Rangers finding many of the Puffin burrows on Brownsman badly flooded because of the wet weather. The difference in productivity between these two islands may be due to the high density of Grey Seals *Halichoerus grypus* which pup on Brownsman and in the last few years have spread on to the soil cap, compacting and collapsing many of the

burrows. Small numbers were recorded fairly regularly through September. The final record was of a first-winter bird on 24 November.

Puffin by Tom Hendry

Feral pigeon *Columbia livia.* A common breeding resident.
Present throughout the year. As usual, numbers increased to several hundred birds in autumn providing a ready food supply for Peregrines.

Woodpigeon *C. palumbus.* An uncommon passage visitor.
It was a quieter season for Woodpigeon with only six records, mostly from the Inner Group islands, although the first two records came from the Outer Group, with one flying over the west face of Staple Island on 22 May, and the second south over Brownsman Cottage on 14 June. These were the only records for the Outer Group. Thereafter, singles were present on Inner Farne on 26 June, 26 August and 13 October. The final record was one flying west over the Inner Farne Courtyard on 19 October.

Collared Dove *Streptopelia decaocto.* An uncommon passage visitor.
This common mainland species is scarce on the islands and remained so this year. A single individual found in the Brownsman Vegetable Garden on 19 May was the only record.

Short-eared Owl *Asio flammeus*. An uncommon passage visitor.
After two bumper seasons, 2017 was a lean year for this striking day-flying owl, with only three records. The first bird was chased south by two gulls over Brownsman Flats on 1 May. This was followed on 14 May by one flying east over Inner Farne Central Meadow. The final record was an individual on 30 October, which circled West Wideopen before flying to Inner Farne Top Meadow and perching near the boardwalk.

Short-eared Owl by Tom Hendry

Swift *Apus apus*. A well represented summer and passage visitor.
After four were noted on 20 May, birds were logged on a further 15 dates, mostly in July. Most records were of 1–3, with five north on 5 July being the season's peak count. The final record was of two over the Inner Farne Lighthouse Compound on 11 September.

Kestrel *Falco tinnunculus*. A well represented passage visitor; may have bred in 1916.
Spring sightings were typically few in number, a female on Staple Island and Brownsman on 1–2 May and a male on Inner Farne on 8 May being the only ones. After 25 August, when a female was on Inner Farne, birds were seen on a further 10 dates until 6 November. Apart from a male and female on 18 October, all records were of individuals, mostly females.

Merlin *F. columbarius*. A well represented passage and winter visitor.
Females were on Inner Farne on three dates from 23 March to 22 April, and a female was on Inner Farne on 7 August. From 8 September there were regular sightings until the rangers departed in December.

Peregrine *F. peregrinus*. A well represented passage and winter visitor; may have bred around 1925.
There were records on seven spring dates from 17 March to 4 April, but no further sightings until 14 August, when a female was seen on Brownsman. Sightings became more regular from September, with at least one female becoming resident around the islands.

Jackdaw *Coloeus monedula.* A well represented visitor. Former breeder, last in 1966.
There were just two records of this intelligent corvid, one during spring and another during autumn. An individual was on Prior Castell's Tower, Inner Farne, on 18 April, with two also there on 20 September.

Rook *Corvus frugilegus.* A well represented visitor.
This was a comparatively quiet season with only four records, two in spring and two in autumn, all from Inner Farne. An individual flew south over Prior Castell's Tower on 8 April; another was recorded there on 23 April. In autumn, one was seen flying west on 8 September and the final record was of an individual on Central Meadow on 18 September.

Carrion Crow *C. corone.* A well represented visitor and rare breeding species.
Birds were seen throughout the year, but as usual peak counts occurred in spring with 14 on 1 May, 20 on 9 May and 13 on 16 May. Although they were present during the seabird breeding season, there was no evidence of any nesting attempt, despite a seemingly resident pair on Brownsman. Throughout autumn, 1–5 were recorded with a peak of 14 on 10 September.

Skylark *Alauda arvensis.* A common passage visitor.
The only spring sighting this season was of an individual on Inner Farne on 28 and 29 March. There were no further records until 20 September, when three were on Inner Farne. Small numbers were logged on a further 17 dates with a peak of seven flying west on 19 October. The last record was of an individual on the Inner Farne Dock Bank on 13 November.

Sand Martin *Riparia riparia.* A well represented summer and passage visitor.
There were only two spring records this year: the first was of an individual flying east across Staple Sound on 1 May, followed by one south over St Cuthbert's Cove, Inner Farne, on 13 May. During autumn, birds were recorded on three dates. Two were flying around Inner Farne on 27 September, one of which stayed until the following day; the final one, the latest ever record for the islands, was of an individual which flew over Inner Farne Lighthouse Compound on 17 October.

Barn Swallow *Hirundo rustica.* A common summer and passage visitor.
The first of the season was seen on 5 April. Except for 25 flying north on 16 May, most subsequent spring passage records were of 1–5 birds. It was a good breeding season for the Swallow with many pairs producing second broods; the pair in the Inner Farne Information Centre produced a particularly late second brood, fledging on 6 September. Many of the buildings on the islands had nests, especially in St Cuthbert's Chapel, the Information Centre, and the Acetylene Store on Inner Farne, as well as Brownsman Tower and Longstone Lighthouse. In total, 5 (6.2) pairs nested as follows: Inner Farne 3 (2.4), Staple Island 0 (0.2), Brownsman 1 (1.2) and Longstone 1 (2.4). The first

fledglings were observed on 18 June, with the first brood from the Information Centre nest fledging on 18 July. After the breeding season, mainly small numbers were logged on autumn passage, but there was a notable movement on 6 August with more than 50 noted flying south. The final record was on 4 October.

House Martin *Delichon urbicum.* A well represented summer and passage visitor. Six pairs attempted to breed in 1950.
The first record of the spring was an individual flying around the Inner Farne Lighthouse on 1 May. Passage birds were noted on a further five dates in May. Autumn produced five records between 22 August and 2 October, all of single birds except for 20 hawking for insects around Prior Castell's Tower, Inner Farne, on 20 September.

Willow Warbler *Phylloscopus trochilus.* A common passage visitor.
The first sighting was on Inner Farne on 15 April. Birds were then recorded on a further 16 dates, almost daily from 29 April until 14 May. Numbers peaked on 1 and 2 May when 15 were seen across the islands. July brought single birds to Inner Farne on four days. There was an almost daily presence from 1 August until 10 September with peaks of five on 1, 5 and 7 August, and subsequently on a further eight dates until the last two individuals on Inner Farne Dock Bank on 4 October.

Chiffchaff *P. collybita.* A common passage visitor.
There were records for this species for every month the rangers were in residence except for December. The first was on Inner Farne on 23 March (the second earliest after 21 March 2005) and small numbers were noted throughout April. Numbers swelled on 1 May with 18 present across the islands followed by 23 the next day. Thereafter, birds were recorded almost daily until 2 June, with a further peak of 13 on 12 May. A single bird was on Brownsman on 4 July. Individuals were logged on Inner Farne on four days in the first half of August before small numbers became a constant presence on the island from 20 August until 5 October. Passage was then noted on a further eight October dates, with a peak of seven on 20 October before the last sighting on 6 November.

Wood Warbler *P. sibilatrix.* An uncommon passage visitor.
This season saw three records of this lemon-breasted leaf warbler. Spring passage brought singles to Inner Farne and Brownsman on 1 May and 19 May, the first spring records since 2013. An individual was then found on Inner Farne on 5 August, making this the best year for this species since 2010.

Dusky Warbler *P. fuscatus.* A rare visitor.
During a brief spell of southeasterly winds, a typically skulking individual of this eastern species was found on 16 October. First heard calling near Inner Farne Vegetable Garden, the bird gave brief views before disappearing into the vegetation. This is the ninth record for the Farnes.

Pallas's Warbler *P. proregulus*. A scarce visitor.
It came as a surprise when this striking Siberian sprite, more typically associated with autumn, was found around the Brownsman Cottage on 2 May. Staying until the following day, it was extremely confiding and offered point-blank views, occasionally landing within a foot of the rangers. This is the twenty-first record for the islands and the first in spring.

Pallas's Warbler by Tom Hendry

Yellow-browed Warbler *P. inornatus*. An uncommon passage visitor.
Despite the meagre easterlies this autumn, it was a fairly good showing for this increasingly common Siberian leaf warbler, with records from 12 dates of a minimum of eight individuals. Late September produced the first records and at least two individuals were on Inner Farne from 24 to 29 September. The year's maximum of six was recorded on 28 September with four on Inner Farne and two on West Wideopen. Two were then recorded on 17 October with one remaining until 22 October.

Sedge Warbler *Acrocephalus schoenobaenus*. A well represented passage visitor.
Although marginally better than 2016, it was another lean year for this species with just six records. The first of the year was in Brownsman Vegetable Garden on 1 and 2 May, followed by another there on 11 and 12 May. An individual was present on Inner Farne from 11 to 14 May, followed by the final bird of spring on 21 May. Apart from an early migrant found skulking by the Brownsman jetty on 25 July, the only other autumn record was of an individual on Inner Farne on 30 September.

Reed Warbler *A. scirpaceus.* A well represented passage visitor.
It was a very quiet year for this unstreaked *Acrocephalus*, the only record being an individual on Brownsman on 1 and 2 May. For the first time since 1985 there were no autumn records.

Grasshopper Warbler *Locustella naevia.* A well represented passage visitor.
This streaky warbler has been fairly elusive recently with only four seen in the last three years. This season was no different, and the only record was of one in the Inner Farne Vegetable Garden on 2 and 3 May.

Blackcap *Sylvia atricapilla.* A common passage visitor.
A quiet year for this distinctive warbler. One to four were recorded across the islands on 14 days between 15 April and 14 May with peaks of 11 on 1 May and eight on 2 May. Autumn was quieter still and birds were only logged on eight dates between 26 September and 22 October, and apart from four on 20 October all records were of one or two.

Garden Warbler *S. borin.* A common passage visitor.
A quiet spring produced records of an individual on 12 and 13 May. Single birds were then recorded on eight dates between 4 August and 21 September, with two present on 19 September. All sightings were from Inner Farne.

Barred Warbler *S. nisoria.* An uncommon passage visitor.
After a blank year in 2016, normal service resumed for this classic drift migrant with two records. The first was flushed from vegetation around the Brownsman pond on 5 September, and another was around the Inner Farne Lighthouse Compound on 25 September.

Lesser Whitethroat *S. curruca.* A common passage visitor.
The first spring bird was on Brownsman on 30 April. The following day an influx began and 15 were logged across the islands with 12 on Brownsman, and three on Inner Farne. Fourteen were noted on 2 May: seven on Brownsman, six on Inner Farne, and one on Staple Island. The next day the second highest day count for the islands was set with 18 individuals recorded across the islands, 12 on Brownsman and six on Inner Farne. Numbers decreased on 4 May with only four present, two on each of Brownsman and Inner Farne. Thereafter, birds were noted on a further seven dates in May, with the last one on 13 May. There were only two autumn records, a single on 16 and 17 September and another from 28 September to 1 October, both on Inner Farne.

Whitethroat *S. communis.* A common passage visitor.
The first seasonal record was from Brownsman on 1 May where three were present. The following day seven were counted across the islands, five on Brownsman and two on Inner Farne. There were sightings on another five spring dates until 25 May when

a single was on Inner Farne. Autumn passage produced four records, all from Inner Farne. The first was a bird present from 5 to 8 August and the last was one seen on 17 September.

Goldcrest *Regulus regulus.* A common passage visitor.
After the outstanding showing last year, this season was an altogether more sedate affair for this charming kinglet. Birds were seen on nine spring dates between 22 March and 3 April; most records were of 1–6 birds, with a peak of 10 on 23 March. Autumn passage started on 27 August and 1–3 were seen on eight further dates until 28 September. Numbers increased in October with 1–8 noted on 13 dates, and a maximum of 10 on 2 October. The last record was of five on 21 October. All were on Inner Farne.

Goldcrest by Tom Hendry

Wren *Troglodytes troglodytes.* A common visitor; a rare breeder.
Two were on Inner Farne on 17 March and numbers increased until at least eight were seen on 29 March. Small numbers were then noted on 11 dates between 10 April and 14 May. The first of the autumn was on Inner Farne on 18 September after which there was a constant presence until the rangers departed. Most records were of 1–6 birds but 20 were logged on 9–10 October and 10–30 between 16 and 23 October.

Starling *Sturnus vulgaris.* A common visitor; extremely rare breeder.
Spring produced 1–2 on five dates before Starlings became a regular presence from late May onwards. Throughout June and July, a flock of up to 19 was around the Outer Group. Numbers on Inner Farne built up during June and 42 were noted on 26 June. Their presence was more noticeable during July and August, with a maximum of 70 on 19 July, and 60 on 24 August. Numbers decreased from September but around 20 were seen regularly until the rangers departed.

Ring Ouzel *Turdus torquatus.* An uncommon passage visitor.
It was another quiet year for this montane species with just three individuals seen. The only spring bird flew west over Inner Farne on 1 May. During heavy thrush passage on 19 October a female stopped briefly near the pond on Inner Farne. Another female was on Inner Farne from 21 to 23 October.

Blackbird *T. merula.* An abundant passage visitor. Rare historic breeder.
A quiet spring for Blackbirds with 1–3 on Inner Farne from 20 March to 3 April and individuals recorded on three days in May. The first record of autumn was on 25 September and 1–6 were then recorded until 19 October when more than 1,000 were counted heading west over the islands. The following day at least 100 were logged and small numbers were then seen until the end of the season with peaks of 23 on 23 October, 20 on 21 October, and 16 on 20 November.

Fieldfare *T. pilaris.* A common passage visitor.
Spring records comprised 1–2 on eight dates between 28 March and 5 May. The first sighting of autumn was on Inner Farne on 17 October and small numbers were recorded on a further 12 dates until 20 November. Peak counts of 17 on 3 November, 16 on 23 October, and 13 on 24 October were all of birds heading west over the islands.

Redwing *T. iliacus.* An abundant passage visitor.
Singles were on Inner Farne on six days between 20 March and 9 April. The first autumn records were from late September on Inner Farne. From 10 October small numbers were on Inner Farne until 19 October when more than 7,000, the sixth highest day count, flew west over the islands. At least 300 were logged the next day and 22–60 on 21–23 October. Thereafter small numbers were seen until the rangers left.

Song Thrush *T. philomelos.* A common passage visitor.
Spring produced few records with individuals recorded on only five days between 28 March and 7 May. After singles on Inner Farne on 22 July, 26 August and 24 September, on most days small numbers were seen, with peaks of 16 on 28 September and 22 on 29 September, until 19 October when more than 4,000, the second highest day count, flew west over the islands. At least 250 headed west the following day and 16–35 were on Inner Farne on 21–23 October. Thereafter, small numbers were noted until the end of the season.

Mistle Thrush *T. viscivorus.* An uncommon passage visitor.
As befits its status on the islands, there were only two records of this hefty thrush this season. One was on Inner Farne Dock Bank on 29 September and the other flew west over Inner Farne North Rocks on 20 October.

Spotted Flycatcher *Musicapa striata.* A well represented passage visitor.
A meagre year for this species with just three records. The only spring bird was in the Brownsman Vegetable Garden on 13 May. Singles were then in the Inner Farne Vegetable Garden on 20 August and 28 September.

Robin *Erithacus rubecula.* A common passage visitor. Bred in 1951.
During spring 1–3 were seen across the islands on 26 dates between 19 March and 21 May. After a single on 20–21 August there was a constant presence from 1 September onwards. Numbers fluctuated and peaks included 10 on 8–10 October and 10–31 on 18–23 October.

Pied Flycatcher *Ficedula hypoleuca.* An uncommon passage visitor.
This year produced a small handful of sightings of this attractive flycatcher. A single female was on Brownsman from 1 to 3 May. Another was on Inner Farne from 2 to 4 May, with a second one also noted on 3 May. For the first time there were no autumn records.

Black Redstart *Phoenicurus ochruros.* A well represented passage visitor.
Spring records comprised four individuals: a showy male on Brownsman, a male and female on Staple Island on 2 May, and a female in Inner Farne Lighthouse Compound that remained until 4 May. A slightly unseasonal male was seen on Inner Farne on 29 July. The only other autumn record was of a male present around the Inner Farne Lighthouse Compound and Picnic Area from 20 October to 26 October.

Redstart *P. phoenicurus.* A common passage visitor.
Spring produced only a handful of birds, all male. The first was on Brownsman on 1 and 2 May, with another present on 13 May. One was on Inner Farne for six days from 4 May, and the final spring record was an individual around Staple Tower on 19 May. An unseasonal female was in Inner Farne Courtyard on 27 July and there were further records during the autumn of 1–2 on Inner Farne between 24 September and 2 October with the last bird of the year, a female, present on Inner Farne on 19 October.

Whinchat *Saxicola rubetra.* A common passage visitor.
Spring was typical with two records, the first an individual on 7 May in the Inner Farne Lighthouse Compound and the second another on Brownsman the next day. Autumn passage was equally sparse, starting with an individual in the Brownsman Vegetable Garden on 30 August; 1-2 were then recorded on Inner Farne each day from 26 September to 2 October.

Stonechat *S. rubicola.* An uncommon passage visitor. Bred in 1946.
Since 2010 this common mainland breeder has been elusive on the islands with single records from only three years. This year was unusual with two males on 2 October and another on 17 October, all on Inner Farne.

Wheatear *Oenanthe oenanthe.* A common passage visitor.
Spring passage was logged on 24 dates between 28 March and 31 May. Although most records were of 1–3 birds, five were on Inner Farne on 9 April and numbers peaked on 30 April with 10 individuals, eight on Inner Farne and two on Brownsman. Autumn

started early with a single in Brownsman Gut on 9 July, then an individual around the Inner Farne Picnic Area on 11 August. Subsequently 1–4 were recorded on 42 dates until 31 October, with peaks of five on 1 September and eight on 27 August.

Stonechat on adjacent mainland by Chris Redfern

House Sparrow *Passer domesticus.* An uncommon visitor.
This abundant but declining mainland resident is comparatively rare on the islands. A female which perched briefly by the Inner Farne Vegetable Garden on 26 October was therefore a welcome sight. This is the twenty-fifth record for the islands and the first in over a decade, the last being in 2006.

Tree Sparrow *P. montanus.* An uncommon visitor.
Although more common on the islands than House Sparrow, Tree Sparrows are still relatively scarce and have only been recorded in six years since 2000. The single bird this year was in the Inner Farne Vegetable Garden on 17 April and was the first since 2014. This is also the first year since 1999 that both British sparrow species have been present on the Farne Islands, and only the tenth such year since the 1880s.

Dunnock *Prunella modularis.* A common passage visitor.
Spring produced only one record, an individual on Inner Farne on 17 March. The first autumn sighting was on Inner Farne on 9 October; four were present the following day, reducing to three on 11 October. From 15 October 1–2 were noted each day until the rangers departed.

Yellow Wagtail *Motacilla flava flavissima.* An uncommon passage visitor.
For the third year in a row there were no spring records of this declining migrant. A juvenile on Inner Farne North Rocks and an adult flushed from Inner Farne Dock Bank, both on 11 August, were the only records.

Grey Wagtail *M. cinerea.* An uncommon passage visitor.
Once again there were no spring records of this smart wagtail and it was not until 9 October that two flew from Ladies' Path on Inner Farne to Knoxes Reef. There were two further records: an individual flew south over Inner Farne Lighthouse Compound on 19 October and one was present on Inner Farne the next day.

Pied Wagtail *M. alba yarrellii.* A well represented summer and passage visitor and uncommon breeder.
Birds carrying nesting material were seen in late April and the first nest in the Brownsman Vegetable Patch was discovered on 13 May, shortly followed by a second one with six eggs on 21 May. It was a below average year for this species with only 4 (7.2) pairs nesting as follows: Inner Farne 2 (3.4), West Wideopen 0 (0.4), Staple Island 0 (1) and Brownsman 2 (1.8). After the breeding season numbers swelled and counts of 10 or more were regular in August.

White Wagtail *M. alba alba*
This nominate subspecies was noted around the islands on nine dates between 18 April and 2 June; apart from three on 1 May, records were of individuals, mainly on Inner Farne.

Meadow Pipit *Anthus pratensis.* A common passage visitor.
Spring passage was light with records on Inner Farne on eight days between 23 March and 16 April, and a peak count of five on 30 March. One was on Brownsman on 5 June, followed by another on 25 July, and five on 27 July. Autumn passage was better and small numbers were logged, again on Inner Farne, on 37 dates from 17 August to 22 November. Peak counts were 12 on 3 October and 15 on 5 October.

Tree Pipit *A. trivialis.* A common passage visitor.
The first three days of May produced the only spring records with three on 1 May, six on 2 May and one on 3 May, all on Inner Farne. Single autumn birds were noted on 10 dates between 22 August and 11 October on Inner Farne.

Rock Pipit *A. petrosus.* A common resident and well represented breeder.
Breeding pairs were already establishing territories on Inner Farne when rangers returned to the islands in mid-March, and the first egg was discovered there on 17 April. The Outer Group's first nest by Brownsman Cottage was found on 5 May. North and South Wamses and Longstone were not counted, but for the rest of the islands 11 pairs nested as follows: Inner Farne 4 (5.8), West Wideopen 1 (1.6), East Wideopen 0 (0.6),

Staple Island 2 (3.6), Brownsman 4 (7.6). Fledglings were observed on 28 May on Inner Farne and on 15 June on Brownsman. There were no noticeable influxes during autumn this season.

Chaffinch *Fringilla coelebs.* A common passage visitor.
As in the last two years there was only one spring record, a female in the Inner Farne Vegetable Garden on 19 March. Autumn passage began on 24 September with one feeding on Inner Farne South Rocks. One or two were then logged until 29 September when four were present in the Inner Farne Vegetable Garden. October produced the remaining records with birds present on Inner Farne from 16 to 21 October; numbers peaked on 19 October with 12 counted across the island.

Brambling *F. montifringilla.* A common passage visitor.
For the first time since 2007, spring failed to produce any records of this attractive northern finch. As with Chaffinch, autumn passage started on 24 September with one in the Inner Farne Vegetable Garden. One–five were then recorded on a further five dates until 18 October. On 19 October, during a period of heavy thrush passage, 500 were recorded passing west over the islands, the second highest day count (jointly with 500+ on 14 October 2001). Fifty were then counted on 21 October, reducing to 25 the next day. Seven on 7 October were the last of the year.

Hawfinch *Coccothraustes coccothraustes.* An extremely rare visitor.
During a record invasion year nationwide, three of these bulky finches were seen flying west beyond Inner Farne North Rocks on 31 October. These are the seventh, eighth and ninth individuals to be recorded on the islands, and the first occurrence of multiple birds.

Twite *Linaria flavirostris.* A well represented passage visitor.
Three flying over Inner Farne were the only records of this moorland breeder. One flew north on 18 October, and then two south on 23 October. Finally, an individual was recorded flying west past the Lighthouse Cliffs on 13 November.

Linnet *L. cannabina.* A common passage and winter visitor.
A reasonable year with a constant presence in both spring and autumn. During spring one-five were recorded on 22 dates from 17 March to 22 April with a maximum of seven on 28 March. Autumn began with a single on Inner Farne South Rocks on 8 September. Thereafter Linnets were present from 19 September until the end of the season. Throughout this time numbers fluctuated but 10 dates provided counts of 20 or more with a peak count of 45 on 3 November. Apart from 12 on Brownsman on 14 November, all were on Inner Farne.

Common Redpoll *Acanthis flammea.* An uncommon passage visitor.
A good year for this continental redpoll produced records on six dates. Two frequented Inner Farne Dock Bank and Vegetable Garden between 16 and 19 October. On 20 October numbers swelled and four were present. The final record was of two around Inner Farne Central Meadow on 23 October.

Lesser Redpoll *A. cabaret.* An uncommon passage visitor.
It was a reasonable season with records on eight dates, all from Inner Farne. A single lingered from 29 September to 2 October with another on 5 October. Three were present on 8 October in the Vegetable Garden, then two on 16 October; the final record was of one on 10 November.

Redpoll spp. *Acanthis spp.*
This year produced two records of redpolls that could not be assigned to a particular species. One flew over Inner Farne on 10 October, and another on 15 October.

Goldfinch *Carduelis carduelis.* A well represented passage visitor.
A quiet spring for this colourful finch with only two records, one on Inner Farne on 30 April and another on Brownsman on 5 May. Autumn was very different with birds seen on Inner Farne throughout October and November. Numbers built up from a single present on 4 October and most days from 8 October provided counts of around eight. Fourteen dates provided counts of 10 or more and 16 were present on 21 October, 3 November and 22 November. On 14 November, 30 were recorded flying around Brownsman Cottage, taking the total for that day to 38, a record count for the islands.

Serin *Serinus serinus.* An extremely rare visitor.
On the foggy afternoon of 12 May a female was found feeding around Inner Farne Lighthouse and Picnic Area where it remained until the following morning. This is only the second record for the Farnes after the first in 1969.

Siskin *Spinus spinus.* A common passage visitor.
It was an extraordinarily quiet year for this diminutive finch with only one record: an individual flying west over Inner Farne on 21 March. This is the worst showing for Siskin since the 1970s.

Yellowhammer *Emberiza citrinella.* An uncommon passage visitor.
With only 17 records of this familiar farmland bunting in the last 10 years (including three blank years), it is no surprise that an individual around the Inner Farne Picnic Area and Lighthouse Compound on 19–20 October was the only record.

Little Bunting *E. pusilla.* An uncommon passage visitor.
On 15 October one was found on Inner Farne Dock Bank where it gave close views before flying to Central Meadow, where a second individual was also seen.

Reed Bunting *E. schoeniclus.* A well represented passage visitor.
Spring passage was light with only two individuals seen: one on 29 March in Inner Farne Vegetable Garden and another around Brownsman pond on 11 May. All autumn records were from the Inner Group, with birds logged on 14 dates between 16 August and 23 October, and a peak of seven on 28 September.

Lapland Bunting *Calcarius lapponicus.* An uncommon passage visitor.
As was the case last year, there were two records of this arctic species. Two flew east, calling, over Inner Farne on 27 September. The other record, on 20 October, was of an individual feeding on Inner Farne Central Meadow.

Snow Bunting *Plectrophinax nivalis.* A well represented passage visitor.
It was a fairly quiet year for this alpine breeder with records on four autumn dates, all on Inner Farne. On 7 October two females and a male were in St Cuthbert's Cove. These records were followed by a male on 12 November and a male and a female the following day. The final record was of a female on Brownsman on 2 December.

Snow Bunting by Tom Hendry

ACKNOWLEDGEMENTS

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ADDENDUM TO 2016 REPORT

Tundra Bean Goose *Anser serrirostris.*
On 19 December 2016 a Tundra Bean Goose was seen and photographed on the shoreline of Brownsman. This would be the second ever Bean Goose record for the Farne Islands, and as two Bean Goose races - Tundra Bean and Taiga Bean Goose *A. fabalis* - have now been elevated to species status (BOU 2018), then if accepted by the Northumberland County Records Committee this may be the first record of Tundra Bean Goose for the islands.

Tundra Bean Goose by David Steel

BUTTERFLIES ON THE FARNE ISLANDS

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INTRODUCTION

There were 597 individual butterfly sightings of 10 species recorded on the Farne Islands in 2017 (Table 1). Abundance increased by 57%, but species numbers decreased from the 12 recorded in 2016; missing species included Ringlet, Meadow Brown and Comma (Table 2). Conversely, across the rest of the UK, Comma had a bumper year, exhibiting a 90% increase on 2016. The Small Copper made a welcome return to the species list after being absent since 2014.

For the second year, regular UK Butterfly Monitoring Scheme (UKBMS) transects were conducted and favourable weather conditions allowed for 13 of the 26 survey weeks to be completed. Casual observations also contributed to the total numbers of butterfly sightings for 2017.

As always, weather played a significant part in the Farnes' butterfly populations. Warm weather at the start of the season accelerated the development and emergence of some butterfly species, whereas above-average rainfall for July and August may have contributed to the absence of others. However, despite the above-average rainfall for August, it was this month which brought the highest number of butterfly sightings for the islands (Table 3).

Table 1. UKBMS-transect and casual-sighting totals of butterflies for 2017.

Species	UKBMS	Casual	Total
Large White	22	14	36
Small White	36	50	86
Green-Veined White	13	25	38
Small Copper	1	2	3
Red Admiral	149	168	317
Painted Lady	1	24	25
Small Tortoiseshell	2	46	48
Peacock	8	22	30
Speckled Wood	0	6	6
Wall	1	7	8
Total	**233**	**364**	**597**

Table 2. Yearly totals of species from 2010-2017.

Species	2010	2011	2012	2013	2014	2015	2016	2017
Large White	185	15	78	408	208	9	66	36
Small White	669	173	276	702	537	35	11	86
Green-Veined White	73	17	23	151	331	29	18	38
Small Copper	40	0	0	2	4	0	0	3
Common Blue	0	0	0	1	0	0	0	0
Red Admiral	323	1051	513	110	2039	676	157	317
Painted Lady	20	136	8	24	39	26	56	25
Small Tortoiseshell	312	138	391	355	229	74	48	48
Peacock	45	30	102	62	47	11	15	30
Comma	2	1	1	0	0	1	1	0
Dark Green Fritillary	1	1	0	0	0	0	0	0
Speckled Wood	0	3	2	1	10	1	1	6
Wall	17	6	0	37	7	3	4	8
Meadow Brown	0	30	4	4	1	4	3	0
Ringlet	1	0	0	13	2	0	1	0
White spp				904				
Total	**1688**	**1601**	**1398**	**2774**	**3454**	**869**	**380**	**597**

Table 3. Combined butterfly sightings from UKBMS transects and casual observations on Inner Farne in 2017 by month.

Species	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct
Large White	0	0	4	0	3	25	4	0
Small White	0	0	0	4	16	58	8	0
Green-Veined White	0	2	22	1	10	3	0	0
Small Copper	0	0	0	0	0	2	1	0
Red Admiral	1	2	50	57	39	123	40	5
Painted Lady	0	0	5	8	3	5	4	0
Small Tortoiseshell	1	14	16	6	5	4	2	0
Peacock	0	0	2	0	0	21	7	0
Speckled Wood	0	0	0	0	0	0	3	3
Wall	0	0	0	0	0	6	2	0
Total	**2**	**18**	**99**	**76**	**76**	**247**	**71**	**8**

Pieridae

Large White *Pieris brassicae*

Recorded: 14 May–28 September

Peak: 11 on 17 August

The Large White decreased by 45% on the Farne Islands in 2017, a decline that was reflected nationally by a 40% decline in this species across England (Big Butterfly Count 2017). This year the peak count of 11 was also lower than the 2016 peak count of 18.

Small White *Pieris rapae*

Recorded: 3 June– 9 September

Peak: 12 on 8 August

An increase of 682% made 2017 a healthier year for the island's Small White population, a species which had previously been steadily declining on the islands since the record count of 702 in 2013. There were 86 individuals recorded this year compared to 11 in 2016. This increase is in stark contrast to the 39% drop exhibited throughout England in 2017 (Big Butterfly Count 2017).

Green-veined White *Pieris napi*

Recorded: 23 April–21 August

Peak: 9 on 17 July

This was a much-improved year on the Farnes for the Green-veined White after it suffered the second-lowest year on record in 2016. There were 38 individuals compared to 18 in 2016, resulting in a 111% increase, a very positive result when compared to the national decline of 39% (Big Butterfly Count 2017).

Lycaenidae

Small Copper *Lycaena phlaeas*

Recorded: 13 August – 28 September

Peak: One on 13 August and 28 September

This small but unmistakable butterfly made a welcome return to the islands after a three-year absence. Three individuals were recorded between 13 August and 28 September. The Small Copper had an improved year nationally with a UK increase of 62% which could account for the reappearance of this species on the Farne Islands.

Nymphalidae

Red Admiral *Vanessa atalanta*

Recorded: 23 March – 18 October

Peak: 32 on 3 June

The Red Admiral made a good recovery this year after a 77% drop from 2015 to 2016. There were 317 individuals recorded in total, an increase of 102% on 2016. Red Admiral numbers were also up nationally with an increase of 75% on 2016 and the Big Butterfly Count reporting the highest numbers on record (Big Butterfly Count 2017). Once again, the Red Admiral was the most abundant butterfly species recorded on the islands. This healthy population has always been attributed to the abundance of the Red Admiral's larval food plant, Common Nettle *Urtica dioica*; however, the peak count of 32 this year came from a large number of Red Admiral butterflies feeding on the flowering Charlock *Sinapis arvensis* by St. Cuthbert's Cove.

Painted Lady *Vanessa cardui*
Recorded: 29 May–24 September
Peak: 23 on 30 May
After the bumper total on the Farne Islands in 2016, the Painted Lady declined by 55% this year. Conversely, the species increased by 31% in the UK overall (Big Butterfly Count 2017). However, the Farnes peak count of 23 was slightly higher than the peak count of 20 in 2016 which may have reflected the warmer, drier weather in spring this season.

Small Tortoiseshell *Aglais urticae*
Recorded: 26 March–19 September
Peak: 4 on 13 May
This early butterfly has displayed a steady decline since regular recording began on the islands in 2010. This year, Small Tortoiseshell numbers remained the same as last year with 48 individuals recorded in both 2016 and 2017.) Nevertheless, this is still low for this species when compared to the high numbers recorded from 2010–2014 (Table 2).

Peacock *Aglais io*
Recorded: 16 May–28 September
Peak: Three on 30 August
The Peacock fared better this year after a below-average year in 2016. Thirty individuals were recorded, an increase of 100% since 2016 compared with a 1% increase nationally (Big Butterfly Count 2017).

Satyridae
Speckled Wood *Pararge aegeria*
Recorded: 20 September–9 October
Peak: Two on 9 October
An unlikely species for an unforested island location, the Speckled Wood is becoming a reliable annual record for the Farnes. Six records made 2017 the second-highest year on record for the species. This rise in numbers was reflected across the UK with an increase of 15% since 2016.

Wall *Lasiommata megera*
Recorded: 17 August–2 September
Peak: One
A good year on the islands for the Wall with eight individuals recorded compared to four in 2016. This species has declined nationally and is mostly confined to coastal areas. Yorkshire Fog *Holcus lanatus*, the larval food plant of the Wall, is abundant on the Farne Islands.

REFERENCE

BIG BUTTERFLY COUNT (2017) http://www.bigbutterflycount.org/2017mainresults

MOTHS ON THE FARNE ISLANDS

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INTRODUCTION

Moths represent a significant part of our biodiversity; although elusive and often overlooked, they are essential to an island's ecology. Much of the floral diversity on the Farnes may be attributed to moths: larvae eat vegetation and adult moths are important pollinators of many flowering plants on the islands. The seeds produced by these plants, as well as the adult and larval moths themselves, are substantial sources of food for the migratory birds and bats that pass through these islands. Moths are highly sensitive to environmental change, making them ideal indicator species, and they warrant detailed and extensive study to understand potential ecosystem changes on the islands, and indeed throughout the UK.

The recording of moths during the 2017 season was hampered by poor weather, and the trap was not used in the Vegetable Garden during the breeding season due to the light-level disturbance caused to nesting seabirds. Trapping was restricted to Inner Farne where a 125 W Robinson Mercury Vapour Trap was run on seven nights between 28 July and 2 September. The majority of sightings were opportunistic casual observations. Of the 302 individuals recorded this season there were 32 different species of moth, 28 'macro' and four 'micro'.

SEASON HIGHLIGHTS

Hummingbird Hawk-moth *Macroglossum stellatarum*
In Farnes terms, 2017 was an exceptional year for Hummingbird Hawk-moth with six individuals seen across the islands. Inner Farne hosted the bulk of these sightings, and one caused havoc in the Information Centre on 26 May while many visitors sheltered there from the rain.

Dark Sword-grass *Agrotis ipsilon*
A slightly worn individual was found in Prior Castell's Tower basement on Inner Farne during a clean-out. Despite being rather common on the mainland, this moth remains a scarcity on the Farnes and was a welcome addition to the species list.

Silver Y *Autographa gamma*
Inner Farne experienced a sizeable influx of Silver Y during a period of strong southeasterly winds in late September. Throughout this period the species could be seen readily in broad daylight and was often flushed from vegetation as rangers crossed the islands looking for migrant birds.

Copper Underwing *Amphipyra pyramidea*

A dead Copper Underwing was discovered lying on the table in the Inner Farne Information Centre. The identity of the specimen was confirmed by a local expert. This represents only the second record for this species within the VC68 recording area.

SYSTEMATIC LIST

Species	First date recorded	Last date recorded	Total no. days recorded	Individuals	Individuals 2016	Peak counts	UK status
MACROLEPIDOPTERA							
Family: Hepialidae							
Ghost Moth *Hepialus humuli humuli*	18 Jun	18 Jun	1	1	2	1	Common
Common Swift *Hepialus lupulinus*	29 May	19 Jun	3	3	2	1	Common
Family: Lasiocampidae							
Fox Moth *Macrothylacia rubi*	27 May	28 May	2	2	0	1	Common
Family: Geometridae							
Magpie *Abraxas grossulariata*	9 Jul	9 Jul	1	1	0	1	Common
Silver Ground Carpet *Xanthorhoe montanata*	30 May	25 Sep	3	3	0	1	Common
Dark Spinach *Pelurga comitata*	4 Aug	4 Aug	1	4	9	4	Common
Common Marbled Carpet *Chloroclysta truncata*	30 Aug	30 Aug	1	1	1	1	Common
Family: Sphingidae							
Hummingbird Hawk-moth *Macroglossum stellatarum*	26 May	12 Jul	5	6	0	2	Immigrant
Family: Arctiidae							
Garden Tiger *Arctia caja*	7 Jul	13 Aug	9	20	26	10	Common
Family: Noctuidae							
Garden Dart *Euxoa nigricans*	1 Aug	1 Aug	1	2	0	2	Common
Dark Sword-grass *Agrotis ipsilon*	29 Jul	29 Jul	1	1	0	1	Immigrant
Large Yellow Underwing *Noctua pronuba*	18 Jul	2 Sep	6	6	22	1	Common
Lesser Yellow Underwing *Noctua comes*	24 Jul	7-Aug	3	4	2	2	Common
Cabbage Moth *Mamestra brassicae*	28 Jul	29 Jul	2	3	0	2	Common
Bright-line Brown-eye *Lacanobia oleracea*	29 May	4 Jun	2	3	14	2	Common

Species	First date recorded	Last date recorded	Total no. days recorded	Individuals	Individuals 2016	Peak counts	UK status
Antler Moth *Cerapteryx graminis*	7 Aug	7 Aug	1	1	2	1	Common
Smoky Wainscot *Mythimna impura*	1 Aug	7 Aug	3	7	0	3	Common
Grey Chi *Antitype chi*	21 Aug	21 Aug	1	1	0	1	Common
Copper Underwing *Amphipyra pyramidea*	16 Aug	16 Aug	1	1	0	1	Common
Mouse Moth *Amphipyra tragopoginis*	28 Aug	28 Aug	1	1	2	1	Common
Angle Shades *Phlogophora meticulosa*	16 May	8 Oct	9	9	5	1	Common
Dark Arches *Apamea monoglypha*	10 Jun	4 Sep	11	58	40	30	Common
Common Rustic *Mesapamea secalis*	5 Jun	7 Aug	4	18	28	15	Common
Rosy Rustic *Hydraecia micacea*	28 Jun	22 Sep	5	33	37	24	Common
Frosted Orange *Gortyna flavago*	2 Sep	2 Sep	1	2	0	2	Common
Burnished Brass *Diachrysia chrysitis*	29 Jul	1 Aug	2	1	0	1	Common
Silver Y *Autographa gamma*	3 May	29 Sep	7	72	6	50	Immigrant
The Spectacle *Abrostola tripartita*	5 Jun	1 Aug	2	2	2	1	Common
MICROLEPIDOPTERA							
Family: Oecophoridae							
Brown House-moth *Hofmannophila pseudospretella*	14 Jun	14 Jun	1	4	0	4	Common
Family: Elachistidae							
Agonopterix alstromeriana	15 Sep	17 Oct	22	36	0	11	Common
Family: Choreutidae							
Nettle-tap *Anthophila fabriciana*	9 Oct	15 Oct	2	2	0	1	
Family: Tortricidae							
Aethes rubigana	1 Aug	1 Aug	1	1	0	1	Common
Family: Crambidae							
Small Magpie *Anania hortulata*	28 May	11 Jul	6	8	4	2	Common

Garden Tiger Moth by James Crymble

Dark Sword-grass by James Crymble

Silver Y moth feeding from Sea Campion flower by James Crymble

GREY SEALS ON THE FARNE ISLANDS

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INTRODUCTION

There has been a rapid increase in Grey Seal *Halichoerus grypus* pup production on the Farne Islands in the past 10 years, with 2016 producing the highest pup numbers in recorded history, and this trend seemed set to continue in 2017. The 2017 season began reasonably early, with the first seal pup found on Longstone Island on 20 September. The first round of monitoring followed three weeks later on 10 October, while peak counts were recorded during the second full week of November (week commencing 13/11/2017), when 40% (853) of the season's pups were counted.

Counting efforts were stalled by challenging weather throughout November, and it was feared that a final period of strong northerly wind and heavy rain from 25 November - 2 December would cut the monitoring season short. Fortunately, sea conditions eased in early December, allowing a final count of Brownsman and the Inner Group before rangers departed for the year. The final counts brought the total number of pups born in 2017 to 2,131 (Table 1), the second highest ever recorded on the Farne Islands.

Difficult landing conditions meant that some islands, particularly Brownsman, were visited less frequently than anticipated this year. Therefore, it is possible that the slight decline in pup numbers on Brownsman (from 934 in 2016 to 909 in 2017) does not reflect the actual numbers born, so this figure should be treated with caution as the seal colony remained dense and gave the impression of increased numbers compared to last year.

The number of seals pupping on the Inner Group continued to rise in 2017, with a total of 374 pups born, 17.5% of the overall total for the Farnes. This increase was particularly noticeable on Inner Farne, where a small colony of 21 pups was established by 24 November, over a fortnight earlier than in 2016 when only six pups were recorded by the same date. The final count of 37 is the highest number of pups on Inner Farne since records began in 1956.

Challenging landing conditions prevented a final count on Staple Island and a mid-December recount of all islands. Had the weather allowed these counts to be completed, it is likely that the total number of seal pups in 2017 would be a record for the Farnes, so the final figure of 2,131 should be treated as a bare minimum count.

Grey Seal pup on the Farne Islands by Duncan Halpin.

Table 1. Grey Seal pup counts by island in 2017.

	B'man	Staple	South Wamses	North Wamses	North Hares	Longstone Main	Roddam and Green	Knoxes Reef	Wide-opens	Inner Farne	
20 Sept						2					
10 Oct			2	2							
24, 25, 26 Oct	17	38	36								
3, 4 Nov	87	40		102							
8 Nov		121	102	30			2				
14, 15, 16 Nov	474	158	75	40	10		1	31	63	1	
24 Nov		86						33	90	20	
29 Nov											
2, 3, 4 Dec	331					1		28	92	16	
											Total
Total	**909**	**443**	**215**	**174**	**10**	**3**	**3**	**92**	**245**	**37**	**2,131**

MORTALITY

The mortality recorded in 2017 was extremely high, at 62% (Table 2). However, this percentage is misleading because the final recounts were not possible and as a consequence the number of pups recorded 'missing' is artificially high. Using data from the penultimate counts (excluding all new pups that were not recounted), mortality was estimated to be 45.4% (Table 2), which is the highest since 2010 (48.2%). A turbulent November ended with a week of strong northerly winds coinciding with the onset of spring tides, and it is therefore unsurprising that many pups were lost to the storms.

Table 2. Mortality statistics and total number of pups recorded within the past seven years.

	2017 (penultimate count)	2017 (overall)	2016	2015	2014	2013	2012	2011
Total pups born	1468	2131	2295	1876	1740	1575	1603	1555
Surviving	801	801	1629	1360	1419	1165	1166	1077
Unsprayed dead	88	146	96	139	71	55	54	62
Sprayed dead	55	55	88	79	66	78	71	61
"missing"	524	1,129	482	298	184	277	312	355
mortality	45.4%	62.4%	29%	27.5%	18%	26%	27.2%	30.7%

NOTABLE PUP SIGHTINGS

On 24 November, a young seal pup from the Farne Islands was discovered on St Mary's Island, some 40 miles south of the Farnes (Figure 1). Having been washed from the island where it was born, identification was possible thanks to the pink dye marking the pup's lanugo[1] which revealed that it had been counted by rangers eight days earlier on 16 November. A pup with similar markings was found washed onto Ladies' Path, Inner Farne, two days previously, before going missing, so it is possible that the pup originated from the ill-sheltered Knoxes Reef. The healthy 31 kg pup was rescued from St Mary's Island by the British Divers Marine Life Rescue (BDMLR) and taken to the Marine Rescue Centre at Blue Reef, Tynemouth, for care prior to its successful release on 13 December at Whitley Bay. A second pink-dyed pup was rescued 80 miles south of the Farnes at Runswick Bay on 4 December, and a third at nearby Whitby Beach on 16 December.

[1] Lanugo is the soft white coat which the pup develops in utero and with which it is born.

These individuals are not the first Farnes pups recorded as having survived being washed from the islands while still reliant on their mothers; three pups were discovered 350 miles away in Texel, Netherlands in 2010, and a further pup was found in the same location in 2012.

Figure 1. Farne Islands Grey Seal pup found on St Mary's Island by Mark Sand, Blue Reef Aquarium.

ENGLISH EAST COAST COLONIES

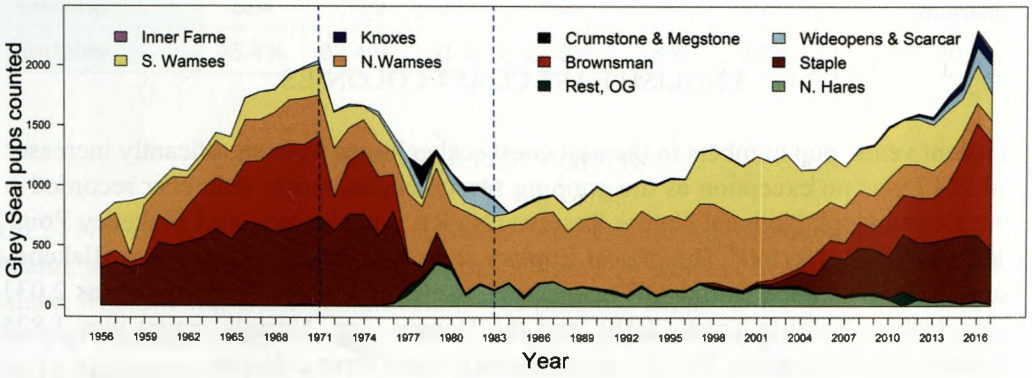
In recent years, pup numbers in the east coast seal colonies have significantly increased and 2017 was no exception as the pupping season began earlier than ever recorded at both Donna Nook National Nature Reserve (NNR), Lincolnshire, and Blakeney Point, Blakeney NNR, Norfolk. The largest English coast seal colony in 2017 was Blakeney Point with 2,700 pups (National Trust, 2018), while the Donna Nook count was 2,033 (Lincolnshire Wildlife Trust, 2018), and the Horsey Gap, Norfolk, count was 1,825 (Friends of Horsey Seals, 2018) – record counts for all three colonies.

SEAL PUP NUMBERS 1956 to 2017

The past two years have seen the highest Grey Seal pup production ever recorded on the Farne Islands. From 1983, pup production made a gradual recovery to pre-cull levels, until numbers rose rapidly in the late 2000s (Figure 2). The increase in pup numbers has been accompanied by a shift in distribution between the islands. After the last cull, seals did not pup on the previously favoured Staple or Brownsman islands in any great numbers for some 20 years until recolonisation of Brownsman began with 27 pups in 1998. In the intervening years, North Wamses was the more-frequently used pupping site, followed by South Wamses and Northern Hares.

For the last two years, Brownsman has hosted over 200 more pups than the previously highest recorded number in 1969, while pup numbers on the Wamses and Northern Hares have continued to decrease steadily. Meanwhile, the Inner Group has seen a dramatic increase in numbers, going from none in 2007 to a total of 374 in 2017.
Now that pup production has recovered to beyond 1960s levels, the question is when will numbers stabilise? Increased production has been seen across the east coast and, despite the lower numbers recorded in 2017 due to the weather, production continues to increase, with record numbers at all other English east-coast sites this year. Whether the carrying capacity will be first met by food availability, breeding habitat or disease remains to be seen, but there is little doubt that habitat exists for continued population growth on the Farnes. Staple Island is currently producing 200 fewer pups than at its peak in 1973, while the Wamses, Northern Hares and even Crumstone, though exposed, have proven themselves capable of hosting hundreds of pups when pupping sites on the higher-lying, more sheltered islands are unavailable.

Figure 2. The number of Grey Seal pups recorded per island from 1956 to 2017 (excluding 1999 – data deficient). Inner Group islands are Inner Farne, Knoxes Reef, Wideopens and Scarcar; Outer Group islands are South Wamses, North Wamses, Brownsman, Staple, and Northern Hares together with Longstone, Bluecaps, Harcars, Roddam & Green (Rest OG); Outlying Islands are Crumstone and Megstone. Dashed vertical blue lines represent the start and end years of the last period of seal culling.



While a great success for the North Sea Grey Seal population, the recolonisation of Staple and Brownsman for pupping and moulting poses a dilemma for the Farne Islands. Vegetation loss and erosion of the fragile soil cap atop Staple and Brownsman is an issue that has been discussed on the Farne Islands for decades. The same situation was described by Bonner and Hickling (1971): "By the end of the 1970 breeding season large parts of the top of South Wamses, the northern half of Staple top and areas on Brownsman had been converted into muddy quagmires devoid of vegetation". As well as vegetation loss and erosion, the seal colony has caused considerable soil compaction, particularly on Brownsman, and this has caused many Puffin *Fratercula arctica* burrows to be flooded out in the heavy rain this season.

At the last count in 2013, Staple (11,151 pairs) and Brownsman (10,047 pairs) together provided nesting sites for 53% of the Farnes Puffins. The Atlantic Puffin is listed on the Birds of Conservation Concern Red List (Eaton *et al.* 2015) having suffered substantial declines in the UK, while facing an uncertain future due to the impact of climate change on sandeel distribution. To add to the challenges facing our Puffins, the number of seals pupping on Brownsman has more than doubled since the last Puffin census in 2013. It is very possible that the impact of seals on the soil cap may have caused a decline in Puffin numbers and breeding success on the Outer Group. The next Puffin census, due in 2018, will indicate the state of their population and this may be cause for further reflection as to how the soil cap and vegetation can best be managed for the future benefit of Puffins and seals alike.

The strategy in recent years has involved a ranger presence on Brownsman throughout the pupping season, with regular patrols of the island. However, the seal population has continued to increase regardless and because of the unprecedented density of cow seals and their defensive nature, it is not safe for the ranger team to reside on Brownsman in December; therefore, counting visits are now made from Inner Farne.

A new monitoring technique was explored in 2017, involving the use of a drone to count seal pups. Trials were carried out alongside the traditional counting method, and observations indicated that the drone caused minimal disturbance to the seal colony. Drone monitoring should certainly be less invasive than the traditional count method, which involves rangers physically approaching the colony, as well as improving staff safety as the density of the colony increases. The accuracy of the drone data is yet to be analysed; it will be crucial that drone counts can produce consistent data that will be comparable with the long-term datasets. More to follow in 2018!

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FARNE ISLANDS MARINE LIFE

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CETACEANS

Cetacean sightings were recorded throughout the year and give us an understanding of the state of the ecosystem surrounding the islands, as well as indicating changes to the marine environment. In 2017 a total of 109 sightings of five species (Bottlenose Dolphin *Tursiops truncatus*, Common Dolphin *Delphinus delphis*, Harbour Porpoise *Phocoena phocoena*, Minke Whale *Balaenoptera acutorostrata* and Humpback Whale *Megaptera novaeangliae* were reported between March and November (Table 1). In comparison with the last 10 years, the diversity of both species and number of sightings this year were above average.

Surveys were conducted from March until July from the picnic area on Inner Farne. These were carried out in the morning and lasted for a minimum of 30 minutes. The time, sea conditions and visibility were recorded at the beginning of the surveys; for all sightings, the time, species, direction of travel and number of individuals were recorded. These surveys were combined with casual sightings recorded by the rangers and commercial boat operators.

Table 1. Number of pods and greatest number of individuals observed in pod by month 2017.

Species		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Total
Bottlenose Dolphin	Pods	1	8	13	11	18	9	3	4	3	**70**
	Max per pod	50	18	30	50	50	60	20	25	15	
Common Dolphin	Pods	1	0	0	0	0	0	0	0	0	**1**
	Max per pod	30	0	0	0	0	0	0	0	0	
Harbour Porpoise	Pods	6	6	5	1	5	5	1	1	0	**30**
	Max per pod	6	1	2	1	3	3	2	3	0	
Minke Whale	Pods	0	0	0	0	4	2	1	0	0	**7**
	Max per pod	0	0	0	0	2	1	2	0	0	
Humpback Whale	Pods	0	0	0	0	0	0	0	1	0	**1**
	Max per pod	0	0	0	0	0	0	0	1	0	
Total											**109**

Bottlenose Dolphin

This year has been excellent for Bottlenose Dolphins with 70 sightings and many large pods. The earliest sighting was recorded on 26 March and the latest on 12 November. In total, 949 individuals were recorded and the highest number of individuals in a pod was 60. July had the greatest number of sightings with 18 pods recorded. Compared to the last ten years, the number of sightings was comfortably above average and similar to the number of records in 2015 (76). Adults with calves were recorded on five separate dates in April and the maximum number of calves recorded in a group was two. As well as those travelling through Inner Sound, pods were recorded twice near Megstone, twice through Staple Sound and once near Gun Rock and Brownsman.

Common Dolphin

There was one sighting of Common Dolphin this year: a pod of 30 individuals observed from Seahouses harbour (therefore not strictly a Farnes record!) moving through Inner Sound on 25 March. Photographs taken show the hourglass tan and pale grey markings along the flank, visible when the dolphin breached. This species is rare for the Farne Islands area, with only one other sighting in the period from 2003 to 2017.

Harbour Porpoise

During the season, only 30 sightings of Harbour Porpoise were recorded. This is below average in comparison with the previous 10 years, and a noticeable difference in comparison with 2011 and 2013 when 93 and 95, respectively, were recorded. The first record this year was on 18 March when six were spotted in the Inner Sound. The last sighting was of a pod of three on 10 October. Only one calf was seen this season, recorded with two adults feeding in Inner Sound on 10 August. The maximum number of individuals recorded at any one time was six, the only occasion when more than three were recorded. This is about average for the last 10 years and contrasts with 2003 and 2004 when pods of 30 were observed.

Minke Whale

Minke Whales were observed seven times during the season, just below the average number of sightings for the past decade. The first sighting was on 7 July when two individuals were seen travelling through Inner Sound. There were three more records of Minke Whales passing through Inner Sound and three records of them passing through Staple Sound. In total, 10 individuals were recorded and the largest number within a pod was two. A potential juvenile was observed with an adult by a visitor boat on 30 September, this was the last sighting for the season.

Humpback Whale

Humpback Whales are a rare visitor to the Farne Islands. The only record in the past decade is from 2009 when the rangers witnessed one breaching two miles north of the Outer Group. On 24 October this year a Humpback Whale was reported by the skipper of *Serenity*, seen breaching twice north of North Wamses by a boatload of passengers.

INTERTIDAL SPECIES

The rocky shore on Inner Farne is a relatively undisturbed ecosystem with a rich diversity of marine flora and fauna. As well as rock pools there is a large kelp bed in the sublittoral zone between Inner Farne and West Wideopen which supports a variety of organisms. The current that runs between the islands is also important for filter feeders such as sponges and bryozoans which inhabit the rocks and kelp. The underside of the jetty acts as a sheltered holdfast for many species such as anemones, barnacles and molluscs.

Shore surveys allow us to investigate the abundance and diversity of marine organisms inhabiting the shore. During the season, casual shore searches as well as organised group surveys were conducted. For the group surveys, the date, time, location and zonation were recorded. This year Porcupine Marine Natural History Society (PMNHS) and Capturing Our Coast visited Inner Farne and aided rangers in the collection of data on 8 September and 8 October, respectively. These were great opportunities to work with other organisations and get volunteers involved. A species list was compiled from the casual shore searches and the organised group surveys. Overall, 147 species were identified on Inner Farne; this included eight species of sea slug, two species of sea spider and 20 species of annelids. The species list is available on the Natural History Society of Northumbria website

Sea Slugs

Sea slugs are gastropods, a taxonomic class of the Phyllum *Mollusca*, but unlike other gastropods their shell is reduced or absent. They are often brightly coloured and can disguise themselves to look like their prey; some species can eject noxious fluids as a defence mechanism. One species can even use chloroplasts from algae in order to photosynthesise.

The most diverse group of sea slugs are the nudibranchs, so named on account of their external naked gill. The eye-catching specimen pictured in Figure 1 is the Orange-clubbed Sea Slug *Limacia clavigera,* found under a rock on the lower shore. The colouring of this species is thought to mimic another species *Eubranchus farrani* also found on Inner Farne. Six more species of sea slug were identified on Inner Farne including Sea Hare *Aplysia punctata* which camouflages itself by gaining pigments from its food, and Rough-mantled Doris *Onchidoris bilamellata* which was found attached to the jetty. A high diversity of sea slugs indicates a healthy marine ecosystem as the sea slugs are supported by diverse and abundant prey such as sponges, hydroids and bryozoans.

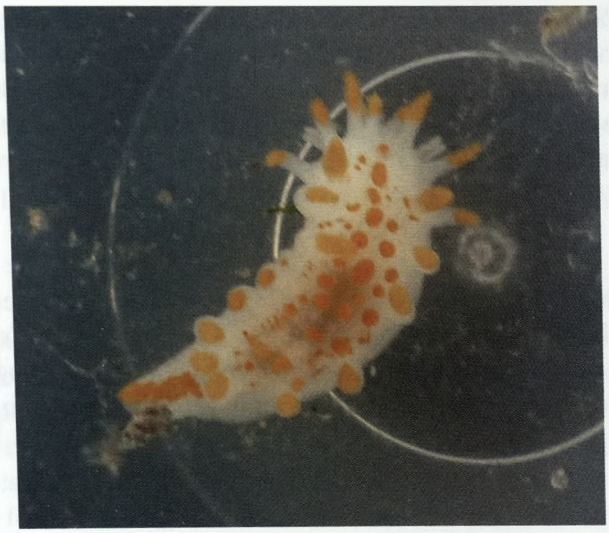

Figure 1. Orange-clubbed Sea Slug *Limacia clavigera.* Photograph by Harriet Reid

Sea Spiders

Sea Spiders belong to a class of arthropods known as *Pycnogonida*. Like land-based spiders they have eight legs which they use to walk along rocks of the lower shore or swim using a pulsing motion. They feed by inserting their proboscis into sessile organisms such as anemones and sucking the bodily fluid into their gut, often leaving their prey alive. Two species were observed on the lower shore of Inner Farne (Figure 2) the broad-legged pale species *Pycnogonum littorale* (Figure 2A) was found in the debris under a rock and the pink species *Endeis spinosa* (Figure 2B) was found clinging to the underside of a rock. They are widely distributed from the Arctic to Southern Spain.

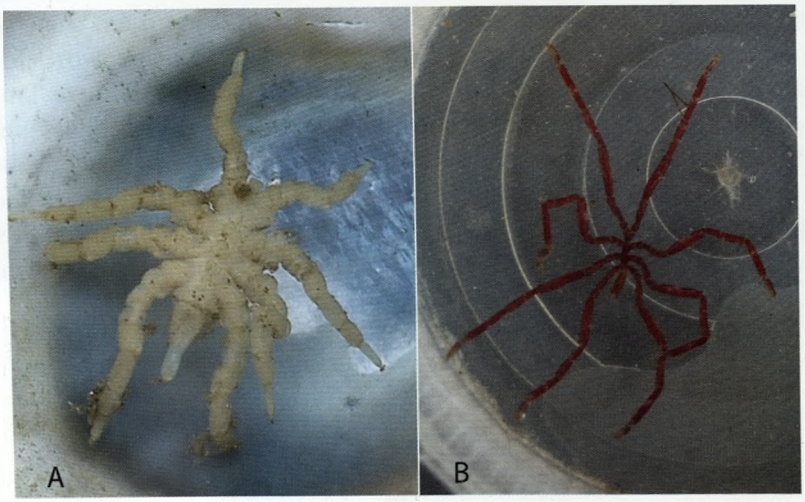

Figure 2. *Pycnogonum littorale* (A) and *Endeis spinosa* (B) found on Inner Farne in 2017. Photographs by Harriet Reid.

As well as the shore survey, PMNHS also conducted diving surveys at Crumstone, Longstone End and The Hopper. They observed 108 species in total and recorded 12 species of fish, including Conger Eel *Conger conger*, Yarrel's Blenny *Chirolophis ascanii* and Norwegian Topknot *Phrynorhombus norvegicus*. They also recorded a Sponge Spider Crab *Inachus* spp., and a Crystal Sea Slug *Janolus cristatus*.

ACKNOWLEDGEMENTS

I would like to thank Andy Douglas for information about cetacean sightings from visitor boats, PMNHS (http://pmnhs.co.uk/) and Capturing Our Coast (https://www.capturingourcoast.co.uk/) for their help with surveying and recording intertidal marine species on Inner Farne, and PMNHS for providing records from their dive surveys.

ARCTIC TERN *STERNA PARADISAEA* CHICK PROVISIONING ON BROWNSMAN, FARNE ISLANDS

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INTRODUCTION

Among UK breeding seabirds, Arctic Terns *Sterna paradisaea* have a relatively small body size, short feeding range, lack of spare time in daily energy budget and lack of alternative prey species due to a specialisation in surface feeding. This gives them low behavioural plasticity, limiting their ability to compensate for changing environmental conditions (Furness and Tasker 2000). This also means that they are an important indicator species for the health of the marine environment. Therefore, it is important to monitor how environmental changes may affect their breeding success. The parental effort required to meet chick food demands depends on a number of factors, including weather, food availability, tidal fluctuations, brood age and brood size (Anderson *et al.* 2005). Chick provisioning surveys of Arctic Terns were undertaken on Brownsman Island in 2017 to investigate the factors that could be influencing their breeding success.

METHODS

Up to five Arctic Tern broods at a time were selected to record chick feeding attempts over a period of at least 60 minutes and up to 120 minutes between 16 June and 10 July. Sixty-eight nest surveys were completed over 23 hours during these 24 days. Broods were selected by ease of visibility from suitable vantage points at a safe distance so as not to disturb the birds. The majority of recording was done from the front-room windows of Brownsman Cottage, where 14 broods were selected based on visibility. The size and age of the brood, the state of the tide (low, high, ebb, flood), the time of each feeding attempt, the prey species, the size of each prey item in relation to adult bill length, and whether successfully ingested by the chick were recorded. Fish delivery rate was calculated as number of deliveries per hour, whether or not the fish was ingested. Age of chick, accurate to within four days, was known for each brood from productivity monitoring and was categorised into five groups (Table 1).

Table 1. Arctic Tern chick age groups.

Group	Age (days)
A	4-7, 5-8, 6-9, 7-10, 8-11
B	9-12, 10-13, 11-14, 12-15, 13-16
C	14-17, 15-18, 16-19, 17-20, 18-21
D	19-22, 20-23, 21-24, 22-25, 23-26
E	24-27, 25-28, 26-29, 27-30, 28-31

Provisioning data were collected for seven one-chick and seven two-chick Arctic Tern broods. Ideally, equal sampling times for each nest, tide state and age category are desirable, but this was not possible due to time constraints of work commitments. The majority of recording was done on ebbing (36%) and high tides (34%), and on three broods which respectively represented 15.84%, 13.86% and 15.84% of total observation time.

Data were analysed using one-way ANOVA to compare fish delivery rate with tide stage, chick age, and brood size. Values were considered significant at the ≤ 0.05 level.

Figure 1. Clupeid (above) and Three-spined Stickleback *Gasterosteus aculeatus* (below), both found discarded in the colony by Rachelle Regan.

RESULTS AND DISCUSSION

Prey items were represented mainly by sandeels *Ammodytidae* spp (92%), with 7.8% unknown and 0.2% clupeids (Table 2). On one occasion a Three-spined Stickleback *Gasterosteus aculeatus* was found discarded in the colony (Figure 1) and a few days later another was seen being successfully fed to a chick. Sticklebacks are not desirable prey items as chicks are often unable to swallow them as the spines can catch in their throat. The average fish size was 1 x the length of the adult bill. There was no significant difference between broods, either in the size of fish fed or the fish delivery rate (mean 9.6 deliveries per hour; Table 2). The fish delivery rate was 1.75-fold greater for broods with two chicks than for broods with one. Most (99.4%) fish deliveries were successfully ingested by the chick; occasional unsuccessful attempts resulted from the adult not passing the fish to the chick, or an inability of the chick to swallow the fish.

Table 2. Arctic Tern feeding surveys.

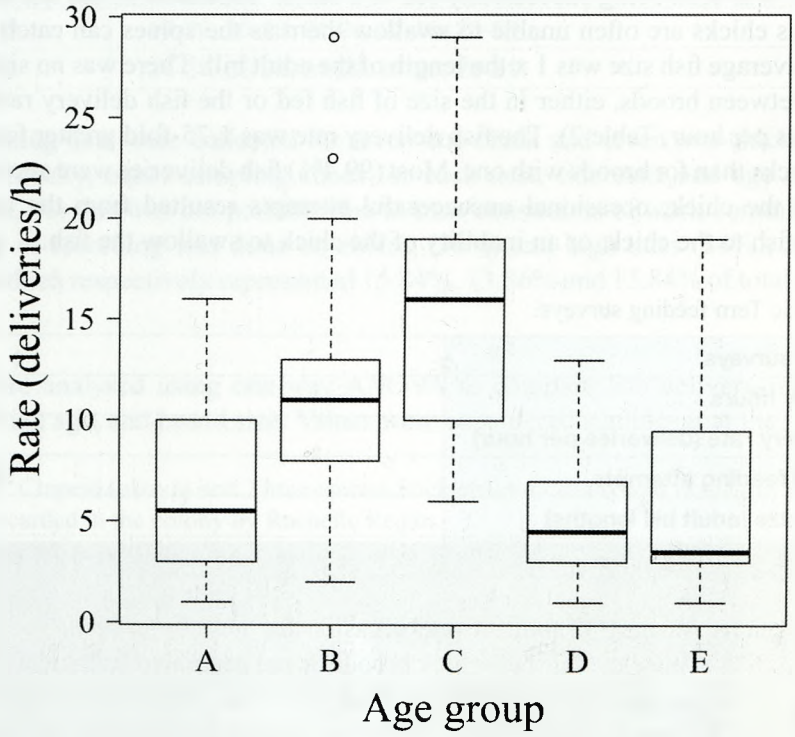
Number of surveys	68
Total survey hours	23
Mean delivery rate (deliveries per hour)	9.6
Successful feeding attempts	99.4%
Mean fish size (adult bill lengths)	1
Fish species	92% sandeel, 7.8% unknown, 0.2% clupeid

On two occasions for nest 32 and on one occasion for nest 8, an adult successfully delivered two fish at once to their two-chick broods; these nests also had the two highest fish delivery rates (mean 14 and 12.25 deliveries per hour, respectively) of all study broods. An adult at nest 33 successfully delivered three fish at once to its two-chick brood. These multiple feed events took place in the period 20-24 June, and represent behaviour that has been observed in several tern species but is most characteristic of Roseate Terns *Sterna dougallii*, which can sometimes bring in up to four fish at a time (Cabot and Nisbet 2013). No tern has been observed in the act of catching multiple fish and it is not yet understood how they do so, but individuals learning this behaviour could be at an advantage (Cabot and Nisbet 2013).

Chick Age

Two of the 14 nests included all age groups (nests 32 and 34) and age group had a significant effect on fish delivery rate with an increase in delivery rates up to 21 weeks, before a decline until 31weeks/fledging (A-B $P = 0.0054$, C-D $P < 0.0001$; Figure 2). This effect was still significant when only considering the two nests observed at all age groups (B-C $P = 0.0006$, C-D $P < 0.0001$).

Figure 2. Fish delivery rates in relation to chick age. Box and whisker plots indicating the median (bold line), upper and lower quartiles (upper and lower limits of boxes), with the upper whiskers representing the smaller of the maximum rate or the upper quartile + 1.5 time the interquartile range, and the lower whiskers representing the larger of the minimum rate or lower quartile + 1.5 time the interquartile range. Outliers are open circles.

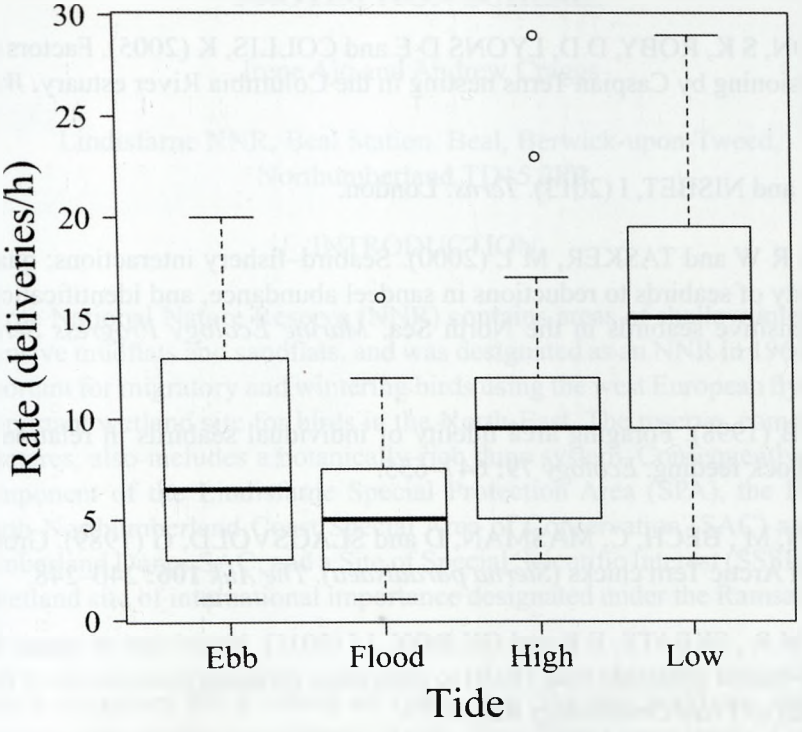


This pattern of feeding in relation to chick age is expected, as the energy requirements for Arctic Tern chicks increase from hatching up to around 20 days and then decrease slightly before fledging (Klaassen *et al.* 1989). These results and the observation that sandeels, the preferred prey species Arctic Terns (Cabot and Nisbet 2013), comprised the diet of the majority of study chicks (92.4%), suggest that there were no periods of food shortages during the 2017 breeding season. If sandeel availability was low, a switch to alternative prey species such as clupeids would have been seen. Indeed, productivity for this particular area of Brownsman was relatively good at 0.45 chicks per pair.

Tides

Five of the 14 nests were observed at all four tide stages and tide stage had a significant effect on fish delivery rate (Figure 3), with a significantly higher rate at low tide compared to high ($P = 0.0263$), ebb ($P = 0.0023$), and flood ($P = 0.0001$). This effect was still significant when only the nests observed at all four tide stages were analysed ($P = 0.0087, 0.0002, 0.0041$ respectively).

Figure 3. Fish delivery rates in relation to tide stage. Box and whisker plots as in Figure 2.



These results show that low tide was the peak feeding time for Arctic Terns, suggesting that food availability was highest at these times. This could be due to mixing of the warmed shallow areas of water at a high/ebb tide back into the deeper area of water, bringing nutrients to the surface together with sandeels that may previously have been out of the diving range of terns. In studies of Caspian Terns *Hydroprogne caspia* and Black-legged Kittiwakes *Rissa tridactyla*, foraging activity has also been higher on an ebb tide (Irons 1998, Anderson *et al.* 2005). However, Arctic Terns may forage up to 30 km offshore (Perrow *et al.* 2011) and individuals may adopt different foraging strategies, so the effect of the tide in the present study may be a particular feature of Brownsman or the Farne Islands area. Given the international importance of the Farne Islands seabird colonies, recording annual variation in foraging success (delivery rate and prey size and species) with respect to tide, and other factors such as weather, would be an important strategy for monitoring changes in the local marine environment.

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LINDISFARNE NATIONAL NATURE RESERVE SHOREBIRD PROTECTION SCHEME

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INTRODUCTION

Lindisfarne National Nature Reserve (NNR) contains areas of shallow inlets and bays, and extensive mudflats and sandflats, and was designated as an NNR in 1964 (Figure 1). It is important for migratory and wintering birds using the west European flyway and the most important wetland site for birds in the North-East. The reserve, comprising some 3500 hectares, also includes a botanically-rich dune system. Consequently, the reserve is a component of the Lindisfarne Special Protection Area (SPA), the Berwickshire and North Northumberland Coast Special Area of Conservation (SAC) and the North Northumberland Dunes SAC, and a Site of Special Scientific Interest (SSSI). The area is also a wetland site of international importance designated under the Ramsar convention of 1971.

The site is important for a colony of Little Tern *Sternula albifrons*, and protection from human disturbance has allowed Arctic Tern *Sterna paradisaea*, Common Tern *Sterna hirundo*, Ringed Plover *Charadrius hiaticula* and Oystercatcher *Haematopus ostralegus* to breed successfully in the reserve. The importance of the Little Tern colony has been recognised by the award of funding from the EU *Life* Little Tern project and the Heritage Lottery Fund Peregrini Lindisfarne Landscape Partnership, which has, over the last three years, provided funding for additional shorebird wardens.

The 2017 Reserve team of three full-time and one part-time shorebird wardens, three placement shorebird wardens, three volunteers and a Senior Reserve Manager, has established the four main protection areas across the Reserve. The formal protection areas consist of two-stage fencing with the inner fence electrified, information signs and warden presence. The 2017 season was defined by poor weather conditions with strong northwest winds, heavy rain and low temperatures, which has had an effect on breeding success.

Figure 1. Lindisfarne Site Designations

Southern breeding site

The first Little Terns of the season appeared at the main southern site on 28 April, with up to four adults present by the end of the day. From then on, numbers began to creep up slowly to a high of 24 individuals on 6 May. During this period, the first scraping activity was observed on 4 May along the edge of the dunes in the north-east corner of the site, closest to the sea.

During the count of the pre-breeding roost of Little Terns on the Farne Islands NNR, 124 individuals were noted on 8 May, and at Lindisfarne NNR 56 adults were counted on 10 May at the southern site over the afternoon high tide, the first large count of the season. The first mating was observed the following day. This pattern continued for another week or so, with around 30 birds fishing offshore at low tide and then settling on-site over high tide where they began to scrape. Scraping was confined exclusively to the north-east corner of the site, closest to the tide line.

Egg-laying was thought to have commenced from 21 May, with two birds sitting consistently on their scrapes from then on. An influx of seemingly new adult birds then occurred and the number of terns and active scrapes increased rapidly: by 24 May, 17 scrapes were observed (nine on the dune edge and eight on the beach) and the following day 87 adult Little Terns were counted by the wardens.

The need to erect extra electric fences around the periphery of the main colony on 30 May allowed the first survey of scrapes with eggs to be conducted. A quick count of 44 eggs from 26 scrapes (19 on the dune edge and seven on the beach) was made.

A concerted effort made over the next few days to map all the potential scrapes with eggs produced a maximum of 43 active scrapes by 5 June (Table 1). The number of adults observed at any one time throughout this period remained consistently around 80 with a good turnover of fishing birds coming and going to feed their partners.

Throughout the day of 6 June, strong winds and heavy rain battered the area, intensifying during the night and into the early hours of the next day. The morning revealed that the storm had had a catastrophic impact on the main colony with every Little Tern scrape lost. An inspection of the area revealed several intact eggs completely buried by sand and crushed eggshells on the shore. Evidence suggested that northwest winds had caused significant sand blow which, combined with the heavy rain, resulted in the abandonment of the site. The weather remained poor for several weeks, and despite efforts to encourage return and re-laying there was little effective breeding activity at the southern site for the rest of the season.

After the colony had been hit by the storm on 7 June, a group of eight clay Little Tern decoys were set up within the southern site, in an effort to encourage them to breed in

the same area. This technique had been used on the reserve in 2004 with some success, but proved to be unsuccessful this season. On 10 June, 15 adults landed briefly and inspected the area but left soon afterwards without any scraping; a similar event occurred on 22 June when, despite evidence of mating, no concerted interest was observed. On 25 June, a high spring tide combined with strong westerly winds washed through the site, covering almost the whole area previously occupied by the colony.

The following day, 26 Little Terns were seen roosting over high tide but they paid no attention to the breeding area. Throughout July until the end of the season, small groups of terns would occasionally appear at the site but no further breeding activity was observed. Thus, although the number of scrapes at the Southern site was higher than in previous years, the storm on 7 June resulted in birds relocating to other sites within the NNR and the Long Nanny.

Table 1. Summary of Little Tern numbers at the Southern site in 2017.

Estimated Numbers	Southern Site
Peak no. of scrapes at any one time	43
Scrapes lost	43
Total no. of scrapes	0
Total no. of chicks	0
Total no. of fledglings	0
Peak no. of adult birds	113*
Productivity	0

*25 May 2017

Mid breeding site

The peak count at the mid site was 16 on 20 June; six scrapes with eggs were lost through a combination of high tides and Oystercatcher predation. A total of 16 Little Terns fledged from the mid site, demonstrating the benefit of having a number of suitable nesting sites which are formally protected. Productivity at the mid breeding site was 1.0 with whole-site productivity at 0.27 (Table 2).

Table 2. Overall summary of breeding Little Terns at Lindisfarne NNR in 2017.

Estimated Numbers	Total
Peak Scrapes	59
Scrapes Lost	49
Total Scrapes	66
Total Fledglings	16
Peak Adults	120
Productivity for whole site (Total Fledge/Peak Scrapes)	0.27

RINGED PLOVER

Twenty-seven scrapes were noted within the four main protection areas with ten lost due to high tides and/or sand blow. The mid site was the most productive with seven young from five scrapes, benefiting from the higher elevation this site affords. Ringed Plovers continued their breeding attempts at the southern site but no chicks hatched there this season. Overall breeding success across the four main protection areas is summarised in Table 3.

Ringed Plover nest and chick by Andrew Craggs

During 2017, a repeat of an NNR-wide Ringed Plover study, originally carried out in 1977, found 33 territories in March which was comparable to the 1977 study. However, the 1977 survey noted an increase in activity during April and May with 44 and 42 territories observed. During the 2017 repeat survey, territories territory numbers fell in April and May to 24 and 18, respectively, despite the increase of protection provided by reserve wardens. Disturbance by people and dogs was the main reason for early-season territory loss. The study also emphasises that the breeding success of Ringed Plovers outside the formally protected sites is almost non-existent.

Table 3. Summary of other breeding shorebirds on Lindisfarne NNR in 2017.

Species	Scrapes	Young	Scrapes lost
Ringed Plover	17	12	10
Oystercatcher	10	5	3
Arctic Tern	112	136	-
Common Tern	28	34	-

OYSTERCATCHER

A single pair of Oystercatchers set up territory during the middle of May at the mid site and the female began sitting on three eggs from 23 May. The scrape was situated on top of the same fore dune as the Little Terns, and the Oystercatchers were regularly mobbed as they made their way through the colony. The eggs were lost in the storm event on 7 June.

Unlike the terns, the Oystercatchers returned and after a short period they were sitting on three eggs again by 20 June. Intervention was required during the high tide on 24 June with the scrape being moved slightly higher on the dune to avoid the risk of inundation; after the nest was moved, the parents quickly returned to it at the new location and continued incubating. Unfortunately, during the night of 1 July a section of electric fence was felled by a strong wind and all three eggs were gone by the following morning. A check of the area revealed a set of tracks leading to and from the scrape which were identified as being from an Otter *Lutra lutra*, explaining the predation of the eggs.

A total of five young Oystercatchers fledged from four scrapes at the mid site. Overall productivity across the reserve is summarised in Table 3.

WEATHER AND TIDES

Little Terns tend to breed around, and in some cases below, the mean high-water mark. Increasing frequency of storm surges coupled with rising sea levels make them more vulnerable to flood and sand blow. On 27 May, a storm from the east pushed the waves from a 5.2 metre spring tide into the main site, requiring two low-lying scrapes, one a Little Tern and the other a Ringed Plover, to be relocated. However, the eggs were already wet and parents subsequently deserted. The weather on 6 June was unseasonably cold and overcast with strong rain and wind building from the northwest during the evening, virtually destroying the colony by the following morning. On 25 June a 5.1 metre spring tide combined with strong northwesterly winds flooded the site; water coming from Holy Island harbour joined the waves coming from the east and a fast-flowing stream developed across the site.

Lindisfarne terns by Andrew Craggs

DISTURBANCE

Breeding bird productivity can be seriously compromised by disturbance, which can be defined as any activity that influences a bird's behaviour or survival.

Disturbance by wardens

As in previous seasons, intervention by wardens was kept to a minimum and volunteers and staff only accessed the protected areas when necessary. Routine tasks included electric fence maintenance to check battery power and relocating the fence according to tidal conditions to prevent it from being washed away.

In advance of the June high tides, two scrapes, a Ringed Plover with three eggs and an Oystercatcher with two eggs, located on the shingle along the west side of the mid site, were relocated to higher ground. However, an extraordinary high tide on 24 June required further intervention. The Oystercatcher scrape with three eggs, located within the electric fence area at the southern site, had to be moved into the border of thick vegetation. The incubating female returned soon afterwards.

Disturbance from visitors

Despite our efforts, some visitors got close enough to the outer roped area to disturb the birds. People walking by, even at a close distance, did not seem to cause too much distress. However, individuals standing by the colony would make most of the birds take off. Birds were very susceptible to dogs walking close to the fenced area, even if they were on a lead and just passing by. Since so many people walk past the site, it is necessary to designate a buffer zone to restrict human access. On many occasions, guidance to visitors provided by the Shorebird Wardens has avoided any further disturbance.

Disturbance from aircraft

During the season, there was a microlight landing attempt. The aircraft came from the south, turned around and flew low over the colony. Wardens prevented them from landing but did not manage to record the aircraft registration number.

PREDATION

A bird breeding colony is a notable food resource and an easy target for predators. To protect nesting shorebirds from ground predation, electric fences were installed around the main protection areas, and dedicated staff and volunteers provided wardening throughout the season.

Terrestrial predation

Signs of Fox *Vulpes vulpes* activity were noted throughout the breeding season. Overnight several different Fox tracks would cross the rope-fenced area (but not the inner electric-fenced and netted area). Numerous territorial markings were regularly found next to the site boundaries. Although Fox tracks could be seen along the electric fence, none was found within the breeding area. On the night of 1 July the strong wind blew the electric fence down, allowing an Otter to gain access and predate an Oystercatcher scrape. Despite this incursion, the electric fence has proved to be an effective protection method.

Aerial predation

A pair of Kestrels was seen flying over the sand dunes behind the shorebird wardens' hut, but they only got into the fenced area once. A Peregrine *Falco peregrinus* was seen flying over the southern site several times but showed no interest in the colony. An increase in the presence of corvids was noted during the season. One particular corvid was observed walking within the electric fenced area, foraging. During the whole season, a Carrion Crow *Corvus corone*, presumably the same individual, carried out persistent stealth attacks over the colony. It was successfully mobbed by Little Terns and Oystercatchers on most occasions, and wardens also played an active role in reducing the effectiveness of these attacks. This individual would take a short flight, hide and return, sometimes extending the chase to over an hour. Incursions would occur mostly during the morning. Soon after the colony was sandblasted by bad weather on 7 June, visits by crows increased, but active chasing and harassment of them reduced their subsequent presence on-site.

Visitors

A total of 35 signs with a range of messaging to warn of the presence of nesting shorebirds was installed across the site. Throughout the 2017 breeding season, shorebird wardens and volunteers successfully approached over 1000 people, mostly at the Southern site (Table 4). Those who could not be reached in time usually turned back when they saw the roped fence.

At the southern site, monthly visitor numbers remained over 200 (Table 4); the decline in numbers in June and July was presumably due to poor weather conditions. Just over one-fifth (21%) of visitors were walking dogs; 170 dogs in total throughout the season. The vast majority of people put their dogs on the lead or kept them at heel while passing by the shorebird breeding area. The flow of visitors was higher during the middle hours of the day (12:00–15:00), and increased sharply at weekends and bank holidays; the highest number of visitors approached in a day was 32 at the southern site on Sunday 28 May. Ensuring that the Shorebird warden shifts covered the peak visitor periods times was an effective way to manage the influx of people and reduce disturbance to nesting shorebirds.

Table 4. Monthly numbers of visitors and dogs at the southern site in 2017.

Month	Visitors	Dogs
May	326	76
June	225	51
July	233	43

People engagement

Most visitors who were approached had previously visited the site and many of them come back every year. This season a hut was set up for the shorebird wardens' use. This 'welcome hut' provided shelter to wardens and volunteers on rainy days and drew visitors before they approached the breeding area. The presence of an official Natural England structure reinforced the wardens' role at the time of approaching people.

SUMMARY

Management of nesting shorebirds on beaches that are increasingly popular with visitors is extremely challenging and has required an increase in the sizes of areas that are fenced off for protection and the presence of dedicated wardens at the main nesting areas. The 2017 season has seen the largest investment in time and money in the 53-year history of the reserve, and has resulted in the majority of Little Terns in Northumberland choosing to nest at Lindisfarne National Nature Reserve.

ACKNOWLEDGEMENTS

We express our gratitude to our team of volunteers and seasonal staff who play a vital role in helping to protect this important wildlife site.

Natural History Society of Northumbria

Established in 1829, the Natural History Society of Northumbria is one of the oldest and most active natural history societies in the world. Since 1831 NHSN has published a journal, named the Transactions until 2009, and now called the Northumbrian Naturalist. This journal contains scientific papers, research and observations about the natural world of Northumbria and is the only journal of its kind in the North East.

As a registered charity, our aims are to encourage the study and exploration of the natural world, protect the flora and fauna of northeast England, and care for and extend our natural history library and collections in the Great North Museum: Hancock.

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